Customer satisfaction with bank services: The role of cloud services, security, e-learning and service quality

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ABSTRACT

The banking industry is rapidly developing to utilize e-banking as an efficient and suitable tool to satisfy customers. Online banking service is the general service suggested by customary banks to provide faster and more reliable services for customers. With fast technology improvement, e-banking has been utilized to absorb subscribers and conduct banking transactions. Still, the major problem with e-banking is satisfying customers who are now using Internet banking. Customer satisfaction is a significant factor in helping banks to keep their competitive advantage. Therefore, the present investigation aims to examine the factors influencing the satisfaction of customer with e-banking services. Four factors that can drive customer satisfaction towards e-banking are cloud services, security, e-learning, and service quality. This study has utilized the structural equation modeling method to evaluate the causal model with the measurement model's validity and reliability. The research model is analyzed based on the data which are collected from the questionnaires using SMART PLS 3.2. The results have shown that cloud services, security, e-learning, and service quality are four significant factors influencing customer satisfaction in using Internet banking services.

1. Introduction

The rapid growth of information technology has made it possible for bank customers to be more connected to their bank accounts through the Internet and mobile. Although e-banking has several stages, the main point that separates e-banking is the available hardware, software, and financial information processing systems [1]. In other words, e-banking is the optimal combination of total bank activities through the utilization of modern information technology that provides all the services based on customers' needs [2]. However, most experts' concern is how to use hardware, software, and network technologies to integrate all activities and customer orientation. E-banking uses some tools like the electronic wallet, electronic check, electronic money, some types of cards including credit card, debit card, ATM, expense card (Automatic Teller Machine), and POS (Point Of Sale) system [3]. In addition, the hardware and software infrastructures, the legal and cultural infrastructures, customer relationship management systems, and human resource management are the requirements of e-banking. On the other hand, traditional banking is currently the most common way for banking transactions in most countries. A lot of money has been spent on the development of e-banking systems in many countries. However, reports illustrate that potential users do not utilize them despite their accessibility, which has raised concerns among banks. Therefore, it is required to identify factors that impact people's tendency to use Internet banking services in improving marketing tactics [4]. Moreover, since users' attitudes towards adopting new information technology have a fundamental influence on the success of information technology adoption [5], it is essential to recognize the factors that impact their viewpoints.

With the rapid improvement of e-commerce, the Internet, and the financial and banking sectors, customers are encouraged to use online banking [6]. Therefore, developing and facilitating access to banking services and Customer Satisfaction (CS) is a significant achievement of the world's new banking system [7]. Due to the continuation of banks' economic cycle, financial institutions with the presence of customers, and the investment of people, there is a growing focus on the principle of customer-centricity in the use of electronic banking systems [8]. It is also significant to consider CS as the central bank marketing strategy. CS is the feeling and attitude of the subscriber towards the product or service [9]. In addition, CS is a response, which is evaluated by the company in the customer's long-term behavior and is considered an essential tool in

marketing activities. However, satisfaction is the consumer's approach toward the service provider [10]. Also, the CS is relevant to the people who have paid for a product or service or has utilized services and products that are a significant result of marketing activities [11].

In addition, information and communication technology (ICT) and the Internet have made a great change in information and communication transfer [12,13]. Studies conducted by economics researchers have shown that banks' profitability increases with increasing CS and loyalty. E-banking refers to providing customers uniform access to banking services through secure mediators without physical presence. Today, most banks are faced with a highly dynamic environment. Also, all banks, large and small, focus on absorbing and retaining commercial customers due to the rapid changes in competitive positions and market situations. As the critical determinant of competition, customers compare banks' services in terms of technology, speed, and technical expertise. In the Internet infrastructure, banks invest a lot of money. Customer satisfaction and maintenance are progressively improving into main success elements in e-banking. It causes current bank managers to take more challenges in making strategies in continuity to deal and promote e-banking to sustain with them [14]. Also, CS is an essential factor in helping banks to preserve a competitive advantage. Current customers are more profitable for banks than new customers; so, it is essential to recognize CS's factors with e-banking services. Besides, cloud computing is a reliable solving method for updating company operations. It can stay on the same value with the zero Internet or customer constructs with low utilization time [15–17]. The banking industry is a domain in which cloud computing can be applied. Also, going further in this domain, issues like the shortage of utilizing cloud computing appears. Besides, the question is what time and how the bank has to go further in this domain. These issues rely on various parameters and need further investigation in the bank study and progress. This paper aims to totally explain the influence of cloud computing on customer satisfaction in the electronic banking industry.

Prior investigations have taken service quality into account as an effective factor in customer satisfaction with E-banking services. Apart from service quality in CS, three variables of cloud services, security, and e-learning, have been investigated in this study. Besides, variables have been investigated for the first time that had not been under attention in any investigations in developing countries priorly. The present investigation's most significant target is to provide a general model to check out the effect of e-banking services on CS. In this regard, the sub-objectives are as follows:

- Examining the influence of the cloud services on CS with e-banking services;
- Investigating the effect of the banking systems security on CS with e-banking services;
- Examining the influence of the e-learning on CS with e-banking services;
- Investigating the influence of the service quality on CS with e-banking services.

The rest of the paper has been organized as follows: the research framework and theoretical background are discussed in the subsequent section. In Section 3, the research methodology that includes statistical population and data collection tools, sample size determination, data analysis methods, and study validity and reliability, are thoroughly described. In the fourth section, data analysis is presented using some tests such as T-value, R2, path coefficients, GOF (Goodness of Fit) criterion, etc. In the end, conclusions, future suggestions, and limitations of the research are provided in the fifth section.

2. Theoretical background and research framework

E-banking is a term used to cover the procedure in which the customer may do banking interactions electronically [18]. E-banking is known as any banking service that does not restrict the customer to the physical presence in a particular location and that banking services are presented utilizing electronic tools [19]. E-banking can be presented with the utilization of advanced network technology, network telecommunications, and telecommunications to transfer resources (money) into the banking system. Several electronic and communication devices containing PCs, mobile phones, ATMs, laptops, and point of sales have a profound impact on completing this banking style, including information, communication, and data transaction [20]. In the rest of this section, we first review the related work, then the conceptual framework and hypotheses are provided.

2.1. Related work

Mbukanma et al. [21] applied a literature-depended analysis by assessing the relationship among subscribers' bank services and products knowledge and electronic banking transactions. Their investigation made use of the principle of literature review methodology. The results showed that the more knowledgeable customers are partaking to the available e-products and services, the more usage there will be. However, there is a knowledge gap and lack of e-product and services awareness to drive customers to adopt and use available platforms.

Sharma and Sharma [22] examined the effect of trust and quality aspects on the use of banking services. The research model has been validated and evaluated with the utilization of the data gathered from the questionnaire. The present investigation was a two-step analytical method with merging Structural Equation Modeling (SEM) and neural network analysis. The outcomes showed that intention and satisfaction to utilize banking services are two essential variables of actual use. In addition, satisfaction and intention to use e-banking have played a mediating role in information quality, service quality, system quality, and trust.

Shahid Iqbal et al. [23] examined how Self-Service Technologies (SSTs) influence behavioral intentions, customer loyalty, and satisfaction in Pakistan's service section. The data were gathered from the 238 SST's subscribers via the online inquiry. Structural Equation Modeling has been executed with the utilization of the LISREL program. The outcomes revealed an affirmative and notable relationship among SSTs loyalty, service quality, and behavioral intentions straightly and indirectly through customer satisfaction.

Asadi et al. [24] investigated the factors impacting cloud computing selection in the banking sector from the customers' viewpoint. They proposed a selection model for this target. Data had been gathered with the utilization of inquiry and were analyzed utilizing the Partial Least Squares (PLS). The outcomes showed that the privacy and security structures indicated a powerful positive impact on perceived usefulness, trust, and ease of use. The outcomes also indicated that perceived ease of use, cost, usefulness, trust, and viewpoints toward cloud notably impact subscribers' behavioral intention to select cloud computing.

Iberahim et al. [25] examined the relationship among ATM reliability and responsiveness, customer satisfaction, and service enhancement factors. Research has been conducted in Malaysia. Also, the data were gathered via a questionnaire of 271 responders and visual observations of services. SPSS software had been utilized to analyze data. The outcomes illustrated that three dimensions of service quality, namely stability, reliability, and being on time, maximize CS.

Moreover, Ling, et al. [26] investigated factors influencing CS in Malacca. The data were obtained through a questionnaire (200 participants). The five identified factors in this study, which influence customer satisfaction with Internet banking, were service quality, web and content design, security and privacy, convenience, and speed. The results showed that service quality, privacy and security, content and web design, speed, and accessibility influence customer satisfaction.

Ayo et al. [27] in their research examined the influence of customer attitude, perceived quality of e-services, and customer satisfaction on the utilization of e-banking services. The results illustrated that the

quality of electronic services has a strong and positive effect on the customer's attitude. In addition, comparative advantage meaningfully influences customer attitude, while complexity and adaptability do not mainly impact customer attitude. Their study results confirmed the importance of traditional service quality attributes ignored in the online environment, such as service competency and samples. Also, the importance of the e-service quality in optimizing customer attitude and enhancing customer satisfaction in using e-banking has been validated.

Furthermore, Shanmugam, et al. [28] examined the e-banking evaluation criteria in Malaysian. The data had been analyzed with the utilization of SEM, making use of AMOS version 21. The results showed that perceived benefit, credibility, and usefulness were the elements influencing subscribers' intention to select mobile banking. Simultaneously, the perceived financial cost and ease of use had been known not to be notable in the present investigation.

Ahmed et al. [29] checked out the influence of e-banking on consumer behavior and e-service quality. This article critically has analyzed the existing literature, which has concluded that high-quality service delivery in e-banking leads to increased CS, and consequently increases income by minimizing costs. In addition, increasing acceptance of the Internet as an instant delivery channel has a large share in the gradual reduction of overhead costs such as marketing, staffing, etc.

Finally, Casaló, et al. [30] examined the effect of website satisfaction and capability on increasing customer loyalty and affirmative news bomb in e-banking services. The results showed that satisfaction with previous associations with the bank's website has an affirmative impact on customer loyalty and affirmative news bomb. Besides, the availability of a website had a positive effect on customer satisfaction. As expected, loyalty was also related to the positive news bomb.

Table 1 summarizes the main idea, advantages, and disadvantages of the reviewed articles.

2.2. Definitions of variables, conceptual model, and research hypotheses

After defining the variables and identifying the sub-indicators, the conceptual model of research and assumptions is presented in this section.

Cloud Services: ICT has been integrated with the physical universe elements because of the enhancing ubiquity of the Internet with abrupt apid advances in speed, miniaturization, mobility, and power to produce intelligent or smart systems. It elevates effectiveness, safety, productivity, and velocity and enables functions not priorly possible [31]. Nowadays, using cloud computing and replacing traditional platforms with these new technologies is one of the topics discussed in IT circles [32,33]. Cloud computing points to a huge virtualized resource pool. This pool is able to be dynamically reconfigured to supply elastic services through the Internet [34,35]. It contains the capability to elevate efficiencies, improve fault tolerance ability, enhance business agility, and decrease expenses [36,37]. Cloud computing uses computing resources, both hardware, and software, through the network [38]. These resources can be applications, software platforms, or a virtual machine [39]. In this method, most of the procedure is done on data center servers [40]. Also, the information is stored in the storage facilities of these centers. The technical solving method could be executed in the IaaS/PaaS layer of commercial clouds or the high-performance computing (HPC) hardware setting [41]. The difference between this approach and traditional platforms is that the user device has no role in data processing and storage preservation in cloud computing. Any user with any device capable of connecting to those data centers can access and share their services at any time. Cloud databases are offered to supply secure and transparent access for subscribers to diverse platforms and heterogeneous databases [42,43]. In the cloud service variables, the sub-indicators are virtualization of resources, ease of use, and cost flexibility.

Table 1
Summary of reviewed articles.

Article	Main Idea	Advantages	Disadvantages
Mbukanma et al. [21]	Providing a framework of bank products and services knowledge towards improved customer electronic banking (e-banking)	● Helping banks and their management in educating their customers and bridging existing knowledge gaps by providing a comprehensive framework	● Lack of considering customers' knowledge and level of awareness
Sharma and Sharma [22]	Using DeLone & McLean's Information Systems Success (D&M IS) model for understanding the use of mobile-banking users	● Creating a deeper understanding of users compared to using mobile banking ● Increasing capability and smart design of applications	● Collecting data only from Oman academic institutions
Shahid Iqbal et al. [23]	Investigating the effect of SSTs on CS, loyalty, and behavioral Intentions	● Providing important insights in the SSTs literature in service marketing research ● Understanding the customer attitude towards the use of SSTs	● Collecting questionnaire-based data ● Inability to consider all customers as a sample
Asadi et al. [24]	Using the TAM-DTM to address the knowledge gap in customers' perspectives for the adoption of cloud computing in the banking sector	● Providing an innovation model for future studies ● Focusing on customer relationships management, human resource management, and financial management	● Using a small sample size
Iberahim et al. [25]	Checking the current level of service quality of ATMs in Malaysian banks.	● Helping managers to improve ATM services	● Statistical community constraints
Ling et al. [26]	Search and determine factors affecting CS with internet banking	● Helping banking providers to increase CS	● Using a small sample size
Ayo et al. [27]	Providing a model for banking user behavior	● Confirmation of the importance of service characteristics on CS	● Examining only one system ● Limiting the age of responders
Shanmugam et al. [28]	Investigating factors affecting technology acceptance (TAM) in the mobile banking framework	● Increasing user satisfaction with the use of systems and mobile banking	● Not considering variables such as financial risk and security
Ahmed et al. [29]	A critical review of previous researchers' studies	● Improving CS ● Increasing income ● Reducing costs gradually	● Focusing on research done in a specific period
Casaló et al. [30]	Investigating the role of satisfaction using structural equation questionnaire (LISREL)	● Increasing the usability of the influencer website to improve CS	● Cross-sectional research

- **Virtualization of Resources:** It is a technology that provides multiple operating systems to allocate hardware resources (CPU, memory, storage, network card, etc.).
- **Ease of Use:** A system is used when it meets the necessities of the user. Usability is related to ease of learning, usefulness, user satisfaction, ease of use, and quality [44]. Thus, ease of use points to the stage where one believes that learning how to use and operate an information system requires little effort [45].
- **Cost Flexibility:** Cloud customers can easily change their resources and costs to suit their needs.

Banking System Security: Security can be defined as a way of protecting and ensuring, as well as preventing hackers from attacking customer information and privacy. The foundation for the execution of any IT project is protecting corporate information systems from security threats [46]. Banks, having secure electronic systems, can protect their customers' financial and private information, especially when performing online banking [26]. They can also increase CS in this way. In the banking system security variables, the sub-indicators are privacy, integrity, and digital signature.

- **Privacy:** Confidentiality means preventing the revelation of information to unauthorized people.
- **Integrity:** Integrity means preventing unauthorized data changes and detecting changes if the information is unauthorized.
- **Digital Signature:** Digital signatures are significant in creating security systems and are utilized in many real-world security protocols [47]. Most digital signatures have some codes to prevent spoofing attacks [48]. Encryption-based digital signature detects electronic information so that the detection of the document creator makes its information integrity manageable [49].

E-Learning Users: The advanced information technologies have made it feasible for individuals to conduct cooperative learning impressively and efficiently from anywhere and anytime [50]. Albeit, technology by itself is not adequate in knowledge transmission, since people are important in producing and disseminating knowledge [51]. E-learning is learning in different ways, different sectors, and by different people [52]. It is also a way individuals can obtain new skills or knowledge and improve their performance (Jia et al., 2011). In the e-learning user variables, the sub-indicators are system availability, temporal and spatial flexibility, and skill utilization.

- **System Availability:** The utilization of disseminated databases in e-learning systems develops information availability and makes data gathering faster. Since they enhance the data reliability and accessibility, they have a great performance in data processing and reduce processing costs [53].
- **Temporal and Spatial Flexibility:** One of the most attractive features of e-learning for the learner and instructor is the time and place flexibility in the e-learning system. In traditional classes, commuting was one of the main problems, but e-learning with the meaning of training anywhere, anytime, and anyplace has solved it [54]. In addition, the flexibility of the online learning environment due to the adaptation of our circumstances can increase the satisfaction of learners and time [55].
- **Using Skill:** Satisfaction mainly depends on computer skills [55]. If users imagine that technology is simple to be utilized, and useful to them, they will be satisfied [56].

Service Quality: Service quality is diversity among customers' anticipations and their service comprehension. If performance exceeds the anticipated rate, the comprehended quality will be above the satisfactory rate; so, customer satisfaction appears. There has been a lot of proof, illustrating that a straight relationship exists between customer satisfaction and service quality [57,58]. The system's service quality will be essential for achieving a successful implementation and satisfying customers with e-banking. The higher the speed and the better the delivery quality, the server is of the best quality [59]. Also, it will have an affirmative influence on subscriber satisfaction. In the service quality variables, the sub-indicators are cost-effectiveness, user-friendliness, and technical support.

- **Cost-Effectiveness:** Cost includes the cost of objects or services needed to earn the income. The description of cost-effective is a thing containing a good value, in which the pros and utilization are worth at least what is spent on them.
- **User Friendliness:** The user-friendliness of an electronic system directly affects user satisfaction. Easy interaction with people and users online over the Internet while being flexible in time and place will create an attractive environment for users. Thus, their satisfaction will be attracted [59].
- **Technical Support:** Technical support is the organization's support for the use of information and communication technology, which includes two dimensions of user support and management support [60]. In general, technical support services try to solve issues specified to the users regarding products or services. Technical support for the services provided may be a frequency or technical in which users can interact easily, provide feedback, and receive feedback [61]. If there is a problem with the costumers while using the service, they can be supported by email or phone; it can certainly give them satisfaction.

Customer satisfaction: With the improvements in the information technologies, e-commerce has abruptly expanded its scope and scale within the past ten years [62]. Customer satisfaction is an abstract and vague notion. The real appearance of happiness differs from product to product, person to person, and service to service [63,64]. In fact, satisfaction depends on some factors, such as psychological, economic, and physical factors [65]. However, satisfaction is considered as a set of negative and affirmative reactions to a collection of elements and a type of emotional attitude [66]. Satisfaction is the answer to the realization and prosperity of the consumer [67]. It is the judgment of whether the character of a service or product has provided an enjoyable level of understanding and success related to consumption and includes supernatural or sub-realistic levels [68]. Satisfaction with services is an outcome of comprehended value or quality. Customer s make their assessment standing on their service skills and anticipations. CS is a crucial parameter for banks [29], and today all banking channels must have a strategy aimed at achieving high CS. It is because improving perceived quality increases CS [27]. Scholars have recognized some factors influencing CS, like the ease of use, product attributes, consumer traits, situational factors, usefulness, enjoyment, trust, and previous online shopping experiences [69–72].

Based on a literature review in e-banking and CS domains, the present investigation identifies the factors affecting CS based on the plan presented in Fig. 1 as a conceptual model of research.

In this study, four hypotheses are presented:

H1. Cloud services have positive effects on CS with e-banking services.

H2. Banking system security has a positive effect on CS with e-banking services.

H3. E-learning of users has a positive effect on CS with e-banking services.

H4. Service quality has *a* positive *effect* on CS with e-banking services.

3. Research method

The study method is a systematic process to detect the response for a question or solving method to an issue. The present investigation is depended on the descriptive and questionnaire model. It concentrates on
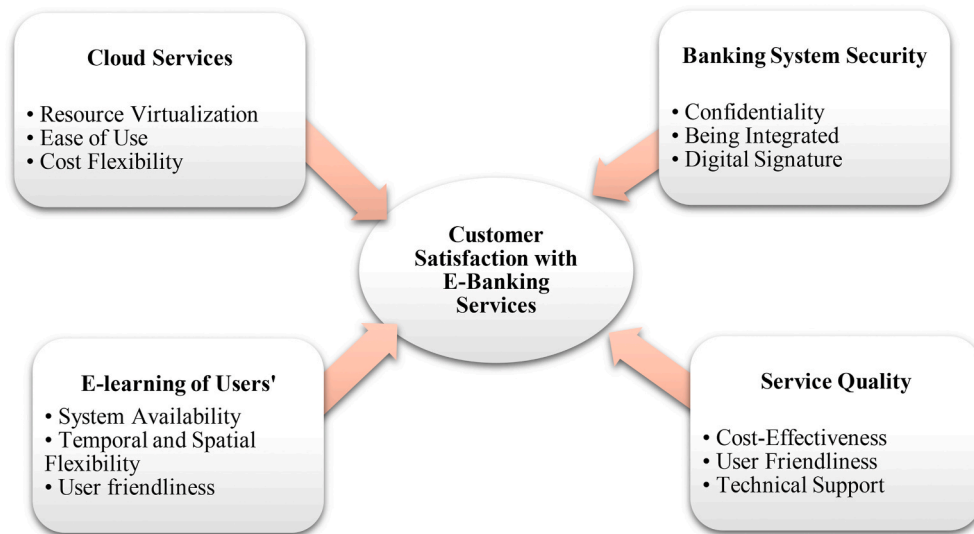
Fig. 1. Conceptual model of research.

detecting solving methods to urgent problems of empirical life and has practical implications, meaning that this research's results are objective and precise. In the present paper, SEM with the utilization of PLS software has been utilized. SEM applications have lately been enhanced substantially [73,74]. It is basically because of the enhanced potency of the procedure to evaluate the validity and reliability of multi-item structure measures and test structural model connections [75]. SEM integrates two strong statistical methods: structural path analysis and exploratory factor analysis, which activate the structural and measurement model's simultaneous evaluation. Besides, in the dependent variable(s), the variance explained is higher with the utilization of SEM compared to the multiple regressions; because it is considered as indirect and straight impacts [76].

Two SEM procedures are in access for investigations to select from covariance-depended SEM and variance-based partial least squares. The comprehension of the diversities between the two procedures is a significant factor when deciding which of the two methods must be utilized in your study. CB-SEM is basically utilized in confirmatory established theory (i.e., explanation). On the other side, PLS is a prediction-oriented method to SEM, basically utilized in the exploratory study, and is suitable in the confirmatory study [77]. Particularly, PLS-SEM dominates the sounding dichotomy among predictive and confirmatory studies. It is done because investigators anticipate their model to have great predictive precision with the procedure's utilization while also being grounded in well-improved causal descriptions. Gregor [78] points to this procedure as description and anticipation theory, noting that this method "implies both comprehension of underlying anticipation and causes, as well as the explanation of theoretical structures and the connections among them" [79]. The statistical population, sample size, sampling method, and data collection tools are discussed in this section. Then, statistical analysis methods, validity, and reliability of research instruments are presented.

3.1. Statistical population and sample size determination

A statistical population is a group of individuals with one or more features in common. The researcher considers these features. Society may include all individuals, a particular type, or a limited number of the same group. The statistical population in the present investigation is the costumers online baning customers in China. The statistical population might be high or less regarding the items or people to be observed. To preserve time, human resources, expenses, and other administrative assessments, a community member sample can be chosen and

researched in lieu of investigating total society members. A sample is a community subset in which members are part of the core community. Due to the unlimited statistical population, 384 people were selected randomly. After disseminating the questionnaires, gathering them, and decreasing the unusable and incomplete questionnaires, 357 questionnaires were prepared for analysis.

3.2. method and tools of data collection

Evaluation and measurement tools are the tools that the investigators can use to assess variables, collect the needed data from inspecting and investigating the under phenomenon, and ultimately detect the truth. Here, library and field methods were utilized for data collection, and the instrument utilized is a questionnaire.

- Library Studies: In order to collect information on theoretical foundations and literature and research background, including books, articles, scientific journals, and reputable Internet resources, this sort of study has been used.
- Fieldwork: Questionnaires had been utilized to gather the needed data to determine the relationship between study variables.

To investigate the factors influencing customer satisfaction with e-banking, researcher-built questionnaires with 25 questions had been utilized. The questions had been provided depending on the detected variables. Besides, a five-point Likert scale (strongly agree, agree, no idea, disagree, strongly disagree) was used in this questionnaires.

Tables 2–6 show the questionnaire, the T-value, and factor loadings for the research variables.

Table 2
The questionnaire, factor loading, and T-value for cloud services.

Measure	Factor loading	T-value
CLS1: Cloud services contribute to increased CS with the advantage of widespread access.	0.69	15.50
CLS2: To develop electronic banking services, cloud security, as the biggest advantage of cloud computing, becomes more important.	0.80	25.65
CLS3: The information processing with high speed affects e-banking growth.	0.79	18.89
CLS4: Cloud-based banking systems increase the productivity and efficiency of banks.	0.69	17.54
CLS5: Quick service recovery with low costs.	0.80	23.36

Table 3
The questionnaire, factor loading, and T-value for banking system security.

Measure	Factor loading	T-value
BSS1: There are secure infrastructure platforms in e-banking systems.	0.86	34.59
BSS2: Stability in the way services are provided in banking systems creates security.	0.79	29.60
BSS3: The use of electronic and off-bank services is safe.	0.80	44.82
BSS4: Confidentiality of information is protected in electronic banking systems.	0.76	19.89
BSS5: The presence of digital signatures increases the security of electronic banking systems.	0.75	22.52

Table 4
The questionnaire, factor loading, and T-value for E-learning.

Measure	Factor loading	T-value
EL1: Having e-learning on how to use e-banking services increases my satisfaction.	0.73	10.95
EL2: The temporal and spatial flexibility of education in banking systems is satisfactory.	0.69	30.10
EL3: The training programs available in e-banking systems help to improve my knowledge and awareness.	0.65	20.01
EL4: A proper training program helps to increase the level of customer orientation.	0.63	14.30
EL5: The right training program helps the organization achieve its goals.	0.57	12.69

Table 5
The questionnaire, factor loading, and T-value for service quality.

Measure	Factor loading	T-value
SQ1: The speed of service delivery in e-banking systems is satisfactory.	0.69	31.20
SQ2: Electronic banking systems technology reduces the cost of providing banking services.	0.59	18.29
SQ3: Electronic banking systems technology increases competition between banks and improves service quality.	0.58	19.69
SQ4: Electronic banking systems are easy to use, accessible, and user-friendly.	0.71	23.33
SQ5: The quality of technical services provided is satisfactory and well supported.	0.72	34.65

Table 6
The questionnaire, factor loading, and T-value for CSEBS.

Measure	Factor loading	T-value
CSEBS1: All kinds of electronic banking services meet all my expectations.	0.65	17.32
CSEBS2: My banking work is done in time-saving in electronic banking systems.	0.79	24.31
CSEBS3: Customer complaints will be dealt with as soon as possible.	0.76	20.61
CSEBS4: Electronic banking systems have accelerated the process of getting things done.	0.67	19.65
CSEBS5: Electronic system users tend to use new electronic services.	0.43	7.24

3.3. validity and reliability of research instruments

After regulating the questionnaires, to certify the accurate schematization of the questionnaire and enhance the reliability and validity, after the confirmation of qualified professors, the questionnaires were tested among 50 costumers. Cronbach's alpha coefficient, Average Variance Extracted (AVE), and Composite reliability of the questionnaire was specified with the utilization of two software (SPSS) and (SMART PLS) to ensure greater validity and reliability.

Reliability measurement in this study is done using Cronbach's alpha method and composite reliability. Cronbach's alpha is a standard measure of reliability, with values above 0.7 indicating admissible reliability [80]. Since the Cronbach's alpha criterion is a customary criterion to specify the variable reliability, the PLS procedure utilizes a more recent criterion than the Cronbach's alpha, the hybrid reliability. If the composite reliability value for variables goes further 0.7, it illustrates good internal consistency for the model [81]. Composite reliability is suggested as a more suitable criterion, since it takes the indicators' differential weights into account, whereas Cronbach's alpha weights the indicators equally [79].

The next criterion is AVE. The AVE criterion demonstrates the mean-variance shared among variables with their indices. The critical value for it is 0.5. That is, the AVE value of more than 0.5 demonstrates an average admissible variance [82]. Finally, the next criterion is discriminate validity: the relationship of one variable with its indices than the relationship of that variable with the other variables. Discriminate validity is acceptable when the AVE value for variables is above the shared variance among that variable and the other variables (the square of the value of the correlation coefficients among variables) in the model [82]. As Tables 7 and 8 show, all criteria are at the standard level, and the outcomes are admissible.

Cronbach's alpha for the independent variables, namely cloud services, security, e-learning of user, and service quality were 0.79, 0.72, 0.70, 0.72, and 0.87 for the dependent variable and CS. Furthermore, being above 0.7 indicates good reliability. In addition, the composite reliability was above 0.7 for all variables. AVE was above 0.5 for total variables. The suggested model is admissible at the standard level due to the criteria introduced. In addition, the matrix of Table 8 is relevant to the proposed model that the numbers in the original diagonal are higher than the amounts below; this represents an acceptable discriminate validity.

3.4. Data analysis methods

Here, the analysis of the data was conducted with the utilization of inferential and descriptive statistics. Descriptive statistics were utilized to explain the statistical population's outcomes, and hypotheses were inspected and examined with the assistance of inferential statistics. In addition, SMART-PLS software was utilized for the whole of these examinations. This software is a component-depended method that can measure validity, reliability, and relations among variables [83]. The least-squares procedure is frequently utilized to substitute for structural equation modeling [56]. So, here, PLS had been utilized in the analysis of the data. The analytical process was conducted on two levels. The first level consisted of reliability analysis, convergent and discriminate validity, model reliability, and questionnaire. The second level needs to verify the total research hypothesis via examinations with the utilization of software [84]. In the present investigation, SMART PLS 3.2 was utilized for analyzing data; therefore, the R2 criterion, path coefficients test, T-VALUE coefficient, and GOF index were used to test the model's overall fit.

Table 7
Reliability and validity for the measurement model.

Variables	Cronbach's alpha	Composite reliability	AVE
Cloud Services	0.79	0.87	0.62
Banking System Security	0.72	0.82	0.53
E-learning of Users	0.70	0.82	0.61
Service Quality	0.72	0.83	0.55
Customer satisfaction	0.87	0.90	0.50

Table 8
Discriminate validity for the measurement model.

	Cloud Services	Banking System Security	E-learning	Service Quality	Customer satisfaction
Cloud Services	0.79				
Banking System Security	0.54	0.73			
E-learning	0.60	0.66	0.76		
Service Quality	0.63	0.62	0.69	0.74	
Customer satisfaction	0.67	0.63	0.64	0.63	0.70

4. results

The raw data collected through the questionnaire and other tools will be useful and valuable during the analysis process. The hypotheses and research model will be confirmed or rejected. Here, the software analyzed the data, and the outcomes have been indicated in two sectors. The first sub-section contains descriptive statistics describing the demographic attributes of the sample population. Sub-section two includes inferential statistics that have investigated research hypotheses and model fitness using statistical assessments.

4.1. Descriptive statistics

Descriptive statistics is a set of methods used to organize, summarize, prepare a chart, draw a chart, describe, and interpret the data gathered from the statistical sample. In this study, descriptive statistics methods like percentages, frequency distribution tables, and frequency were utilized to test and explain the respondent attributes.

We offered no remuneration or other enticements. Subjects contributed namelessly and voluntarily. The population was large and relatively unknown. The following section explains the age, gender, and sample education with the utilization of descriptive statistics. As it is evident from Table 9, from 357, 213, or 59.66% were males, and 40.33% were females. Also, the largest frequency is relevant to the 31–40 age group. Another sample attribute in this investigation is the participants' education stage; the bachelor's degree contains the largest frequency.

4.2. Inferential statistics

Inferential statistics specify if procedures and patterns detected in the sample can apply to the statistical population; so, inferential statistics are related to the parameters and attributes of the statistical study population and the linkage quality among variables and notions. Thus, it can be stated that inferential statistics have been utilized in relational and comparative analysis. To disprove or approve the hypothesis and examine the model's overall fit, it is required to select the examinations

Table 9
Descriptive statistics of study participants.

Measure	Item	Frequency	Percentage
Gender	Female	144	40.33%
	Male	213	59.66%
Age	Under 20	35	9%
	21–30	85	23.80%
	31–40	115	32.21%
	41–50	57	15.96%
	Over 50	65	18.20%
Education	Associate Degree	59	16.52%
	Bachelor	172	48.17%
	M.A	100	28.01%
	P·H.D	26	7.28%

and inspect the data based on these tests using the selected software. Here, we will assess the models and hypotheses using the three criteria, including R2, T-values, and GOF, which will be described below.

4.2.1. R2 criterion and path coefficients test

This criterion is utilized to connect the SEM structural components and measurement and illustrate the impact that an independent variable has on a dependent variable. Chin [85] recognizes three numbers of 0.19, 0.33, and 0.71 as the criterion for weak, medium, and strong R2 amounts [86]. The R2 criterion was used to evaluate the model capability. Here, one dependent variable and four independent variables exist. The influence of these four variables, namely cloud services, the banking system of security, e-learning, and quality service on the dependent variable (Customer satisfaction) was investigated. Amounts attained by analysis of R2 criteria and path coefficients can be essential and confirm the hypotheses and the strong impact of the dependent variable's independent variables. Fig. 2 illustrates the outcomes.

4.2.2. T-Value

The most primary criterion to assess the relationship among variables in the model (structural section) is the T-values. If they exceed 1.96, 2.58, and 3.27, the relationship among the structures and the hypothesis validity is confirmed at 95%, 99%, and 99.9 confidence level, respectively. To examine the factors influencing CS with e-banking systems, the hypotheses presented were analyzed using T-values. The T-test outcomes are shown in Fig. 3. The outcomes demonstrate that the hypotheses are admissible at the 99.9% significant level.

4.2.3. GOF criterion

In recent times, a proper general measurement has been suggested for the overall model fit with PLS utilization. The amount obtained for it is between 0 and 1. Wetzels et al. [87] have presented three amounts of 0.01, 0.25, 0.36 as a weak, medium, and strong GOF amounts. In other words, if we compute 0.01 and its closest amount as GOF in a model, we can say that the overall model fit is weak, and we require to correct the connections among model constructs. On the other side, this guideline is confirmed, and the GOF computation formula is as below in the presence of the other two GOF amounts (0.25: moderate overall fit, 0.36: strong overall fit) [87]:

$$\text{GOF} = \sqrt{\overline{AVE} \times \overline{R^2}} \tag{1}$$

Eq. (2) is utilized to attain the mean AVE:

$$\mu_{AVE} = \frac{1}{n} \cdot \sum_{i=1}^{n} x_i \tag{2}$$

$$\mu_{AVE} = \frac{0.62 + 0.53 + 0.61 + 0.55 + 0.50}{5}$$

$$\mu_{AVE} = 0.57$$

Also, in order to attain the model's overall fit, we must attain the mean R2:

$$\mu_{R^2} = \frac{1}{n} \cdot \sum_{i=1}^{n} x_i \tag{3}$$

$$\mu_{R^2} = 0.71$$

Substituting (2) and (3) into Eq. (1), the value of GOF is obtained:

$$\text{GOF} = \sqrt{0.57 \times 0.71} = 0.63$$

A value of 0.63 was obtained by using a test to generalize the model. This value illustrates that the model structure is appropriate when compared to the baseline GOF amounts.
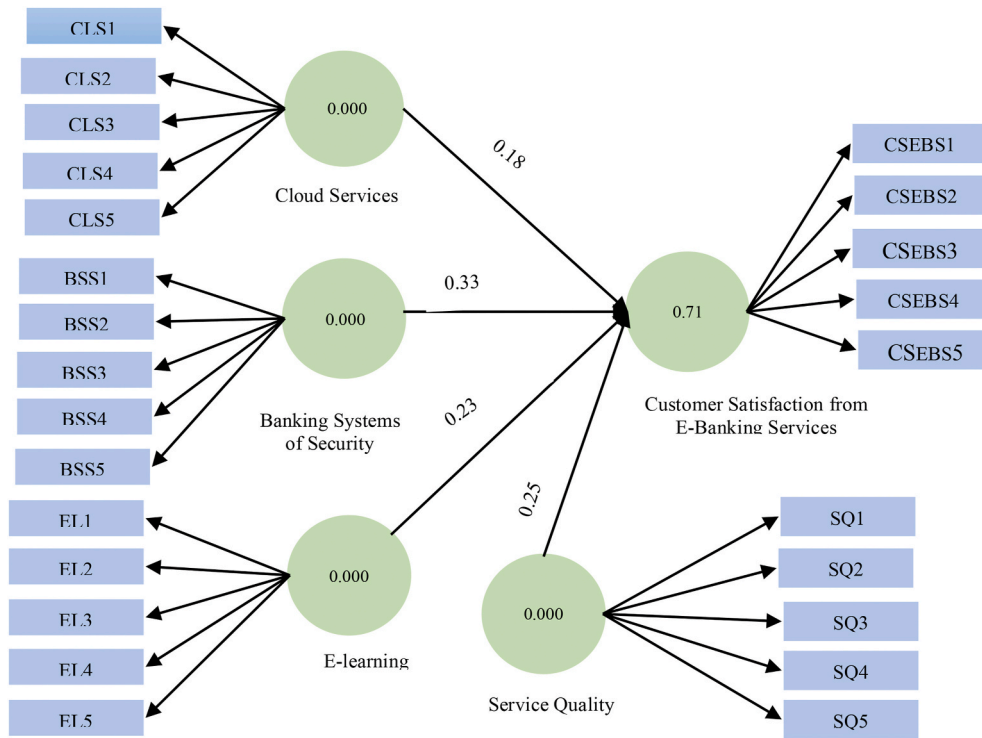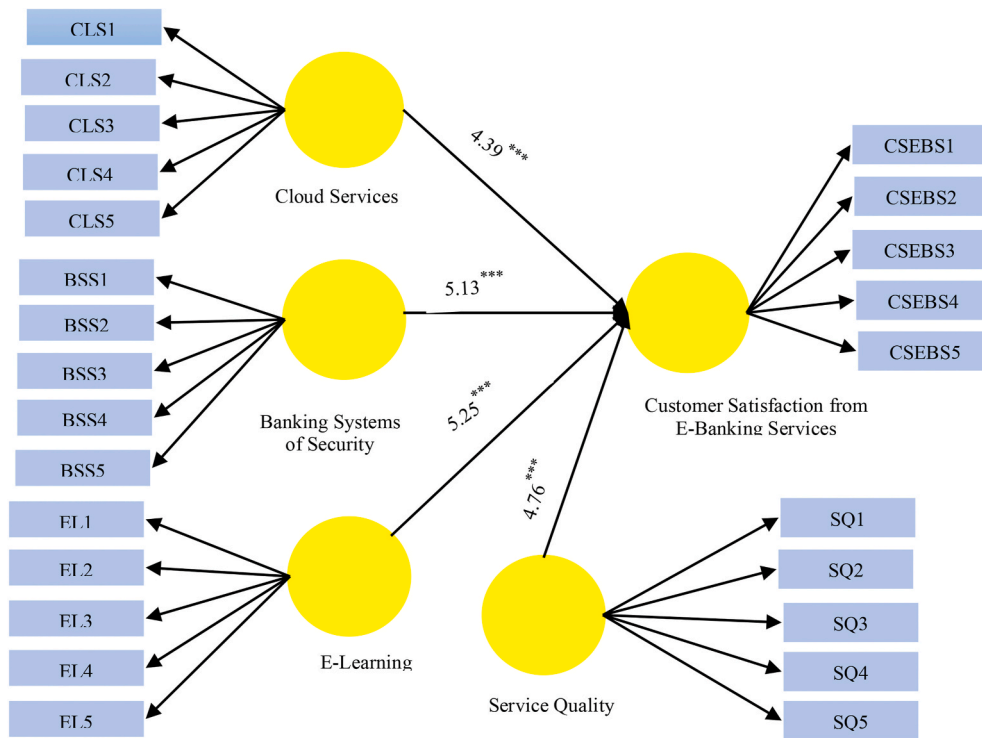
Fig. 2. Structural model for CS.

Fig. 3. The test of T-value.

4.3. Discussion and implications

Table 10 indicates the outcomes path coefficients of and T-test. The results show that cloud services have a positive and significant influence on CS with e-banking services ($\beta = 0.18$, $t = 4.39$, $p < 0.001$); so, hypothesis (1) is confirmed. This study shows that as customers' awareness

increases in cloud services, the tendency to use electronic services increases in users as well. Considering the high costs involved in improving e-banking systems, it is essential to make sure that people are familiar with these systems and use them. In order to improve customer understanding of e-banking services, systems should be designed in a way to be simple to utilize, in addition to being useful to customers, and

Table 10
Summary of research results.

Paths	Path Coefficients	T-test	Confirmation or Rejection of the Hypothesis
Cloud Services → Customer satisfaction	0.18	4.39***	Confirmed
Banking System Security → Customer satisfaction	0.33	5.13***	Confirmed
E-learning of User → Customer satisfaction	0.23	5.52***	Confirmed
Service quality → Customer satisfaction	0.25	4.76***	Confirmed

***$p < 0.001$.

have the benefits of using them. However, the present investigation's empirical concepts hinge on the outcomes that the cloud computing suppliers and banking industry might face to decrease their judgments depending on a better comprehension of the factors impacting customers' attitudes on the cloud computing adoption in the banking section. It may assist cloud suppliers in prioritizing their services afterward, depending on the customer 's judgments. It might also help them attain superior insight into customers' preferences, thereby concentrating on superior human connections, financial management, and customer linkages, the whole of which can help the banks preserve the previous customer s and absorb novel ones.

In addition, hypothesis (2) that suggested a positive linkage between banking system security and CS with e-banking services is supported (β = 0.32, t = 5.13, p < 0.001). These findings illustrate that as more e-banking is equipped with electronic networks and the more efficient use of electronic and telecommunication networks, customers' secure access to e-banking services will be enhanced, and the use of these services will be expanded. Confidentiality of data and information is necessary to protect them against abuse. Using important security practices to protect critical customer information using modern banking methods can help the bank maintain confidential customer information. Thus, the outcomes proved that security difficulties presently impacting customer satisfaction have turned to a critical part of bank activities. Commercial banks that ground their business frequently on their own trustworthiness are compelled to continually enhance utilized technologies and preserve themselves in contrast to potential hacking attacks.

Also, the outcomes of the path coefficient and *t*-test demonstrate that the e-learning of users contains a positive and significant impact on CS with e-banking services (β = 0.23, t = 5.52, p < 0.001). Therefore, hypothesis (3) has been approved. The research outcomes demonstrate that banks can increase individuals' ability to use e-banking services by conducting training courses. The study concepts here are that e-learning system extenders and executers require to certify the quality accessibility, related and perfect information to satisfy pupils' requirements to certify subscriber satisfaction without sidelining the significance of an available and reliable system. Finally, in hypothesis (4) that a positive relationship between service quality and CS with e-banking services was provided (β = 0.25, t = 4.76, p < 0.001). The findings demonstrate that enhanced service quality is effective in improving CS with e-banking services. Service quality and customer satisfaction are nearly associated. Albeit, the investigation by Sureshchandar et al. [88] and Sureshchandar et al. [88] demonstrates that customer satisfaction and service quality are highly associated; an enhancement in one is similar to leading to an increase in the other. Customer satisfaction might not be adequate to remain ahead of the competition. The right attainments of a quality revolution rise just from customer delighting. To a vast extent, it stays on her or his comprehension of overall service quality.

5. Conclusion, limitations, and future work

Nowadays, the service industry is being altered all over the universe. Novel technologies have altered the way service is delivered to many service organizations. Banking services have also undergone major changes under the influence of information and communication technology. With the rapid improvement of the Internet, e-commerce, and the financial and banking sectors, customers are encouraged to use online banking. Expanding and facilitating access to monetary and banking services through the use, benefit of individuals and communities are one of the major achievements of the modern banking system in the world. Removing the physical attendance in bank branches, increasing the precision of payments and receipts, accelerating the flow of economic transactions, enhancing the safety factor, and many other great advantages are the points that e-banking has brought. This investigation aims to investigate the factors affecting CS with e-banking services. After reviewing the literature, a conceptual framework for research was drawn, and a questionnaire was designed. The questionnaire was disseminated to the bank customers. Then, the validity and reliability of the questionnaire were confirmed. Due to the criteria demonstrated in Section 4, the proposed model is admissible at the standard level. The results of the analysis show that all the hypotheses in this study are approved. In this study, four hypotheses, depending on the detected questionnaire, components, and statistical software, were used to measure CS of e-banking systems. The results showed that used cloud services play an important role in CS. Indicators identified for the cloud services dimension include resource virtualization, ease of use, and cost flexibility. Banks can make the utilization of cloud computing as a foundation to develop their belonging services. Internet banking sections contain low-security assessments and investment amount on internet banking on public cloud IaaS. Other internet banking sectors with great security stage requirements and significant investment power can select internet banking on private cloud IaaS. Others can opt among these execution sorts.

The findings also indicate that the security of banking systems is another significant factor in CS. Banking system security includes privacy indicators, integrity, and digital signature. We also require to detect the people utilizing the internet banking presently. It might be led to significant bank outcomes; on what things they should work more altering the comprehended security among internet banking.

Another notable outcome is that the e-learning of users is significant to the CS. Its sub-indicators include system availability, temporal and spatial flexibility, and usage skills. Hence, generating a suitable application with needed facilities for collaborative learning (like a forum and chat) and supplying the feasibility of certifying the subscribers' is presented. The opportunity of active simultaneous communication with another subscriber is also suggested. The data analysis also showed that service quality greatly impacts CS, and the service quality includes cost-effectiveness, user-friendliness, and technical support. When customers attain good service quality, they comprehend it as good value and are delighted to pay a high price since high quality leads to better-perceived value. Besides, supplying better service quality is a strategic tool for CS.

- **Research Limitations**

The principal study limitation is that the sample is limited to a bank. Despite being an expensive and time-consuming study in many institutions, it is a good selection for future research. Another limitation of this study is the probability of the responders' wrong perception from the questionnaire's questions. The lack of co-operation of the expected statistical population is another limitation of the present investigation. The next limitation is that the data is cross-sectional collected so that the causal relations can change over time. The dependent variable here was satisfaction and is a totally altering factor in psychology. In addition, each person responds based on their feelings and beliefs that it is possible to increase and decrease in each individual over time.

- **Future Suggestions**

To develop the status of e-banking and expand research in e-banking, it is suggested to investigate the relationship between operational methods improvement of e-banking development with organizational culture. It is recommended that this model be applied to all existing banks and the wider statistical community in the future study. Besides, it is suggested that future studies also can take the views of people into account who have not used Internet services so that we can try to motivate them to use and build trust in the e-banking system.

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