CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of International Studies

UNIVERSITY COLLEGE LONDON

SCHOOL OF SLAVONIC AND EAST EUROPEAN STUDIES

International Masters in Economy, State and Society: Economy & Business

Master thesis

2023 **YU ZHONG**

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Customer Satisfaction's Mediation Role in the Relationship Between Service Quality and Customer Loyalty: Evidence From ČSOB

Master thesis

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Abstract

455 questionnaires data from ČSOB customers about their satisfaction towards digital service quality is used to investigate the relationship between digital service quality and bank customer loyalty. This study introduces a six-dimensional model, i.e. Tangibility, User-friendliness, Security & Privacy, Responsiveness, Efficiency, and Personalization. To assess mediating effects of bank customer satisfaction, structural equation model is employed. ČSOB brand equity is also selected for the moderating effects. The empirical results entails that all six dimensions selected for this study are positively related to bank customer satisfaction and loyalty. The moderating effects of ČSOB are not significant between digital service quality and bank customer satisfaction, but they are between bank customer satisfaction and loyalty. Therefore, six main factors influencing users' perceptions of digital service quality at ČSOB were identified, and brand equity does not allow customers to build satisfaction with digital services directly but can build customer loyalty in the long-term use of digital services. These findings give additional empirical evidence for the digital service quality model and provide theoretical support for the transformation of traditional banks into digital to meet users' expectations of digital services in emerging banking sectors.

Keywords

Digital Service Quality, Bank Customer Satisfaction, Bank Customer Loyalty, ČSOB Brand Equity, Digital Banking, Mediating Effect, SEM

Range of thesis: [25538 Words, 97 Pages]

Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

2. The author hereby declares that all the sources and literature used have been properly cited.

3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Shenzhen, China 01.08.2023 **YU ZHONG**

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Institute of International Studies

Master thesis proposal

Faculty of Social Sciences

Charles University

Author:	**YU ZHONG**	Supervisor:	Ing. Marek Vokoun, Ph.D.
Specialization:	IMESS Economics and Business	Defense Planned:	2023 Summer

Proposed Topic:

Customer Satisfaction's Mediation Role in the Relationship Between Service Quality and Customer Loyalty: Evidence From ČSOB

Motivation:

The digital transformation of the economy is currently dominating the world. Central and Eastern European countries have lagged behind Western Europe and the United States in industrialization in the past, and the digital economy is an excellent opportunity for them to advance.

Digital banking is the backbone of the digital economy and CEE is also conservative and lagging behind in its development, with little literature on the subject. Banks in CEE have to accelerate the pace of digitalization to compete with strong challengers from Western Europe and the US. Therefore, this study aims to study the digitization of the largest traditional commercial bank in the Czech Republic, ČSOB , as an entry point to look at the state of digitalization of these traditional banks from the user's point of view and to analyse what factors affect customer satisfaction and loyalty. The study hopes to provide recommendations for the direction of digitalization of Czech banks and to help them play a significant role in the development of the Czech digital economy.

Hypotheses:

Hypothesis 1: Bank digital service quality has a positive effect on bank customer satisfaction.

Hypothesis1a: Tangibility of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis1b: User-friendliness of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis1c: Security & Privacy of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis1d: Responsiveness of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis1e: Efficiency of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis1f: Personalization of digital service quality positively influences customer satisfaction to ČSOB.

Hypothesis 2: Bank customer satisfaction has a positive effect on bank customer loyalty.

Hypothesis 3: There is a moderating effect of bank brand equity on digital service quality affecting .bank customer satisfaction.

Hypothesis 4: There is a moderating effect of bank brand equity on bank customer satisfaction affecting bank customer loyalty.

Hypothesis 5: There is a mediating effect of bank customer satisfaction on bank digital service quality affecting bank customer loyalty.

Hypothesis5a: There is a mediating effect of bank customer satisfaction on bank digital service quality of tangibility affecting bank customer loyalty.

Hypothesis5b: There is a mediating effect of bank customer satisfaction on bank digital service quality of user-friendliness affecting bank customer loyalty.

Hypothesis5c: There is a mediating effect of bank customer satisfaction on bank digital service quality of

security & privacy affecting bank customer loyalty.

Hypothesis5d: There is a mediating effect of bank customer satisfaction on bank digital service quality of responsiveness affecting bank customer loyalty.

Hypothesis5e: There is a mediating effect of bank customer satisfaction on bank digital service quality of efficiency affecting bank customer loyalty.

Hypothesis5f: There is a mediating effect of bank customer satisfaction on bank digital service quality of personalization affecting bank customer loyalty.

Methodology:

This study employs structural equation model to testify the relationship between digital service quality and bank customer loyalty using 455 ČSOB customers` questionnaire data. This paper applies proven questionnaire scales constructing a six dimensional digital service quality model based on SEVRQUAL model (Parasuraman et al., 1988). To assess moderating and mediating effects, ČSOB brand equity is selected for the moderator and bank customer satisfaction is the mediating variable.

Expected Contribution:

This research is one of the few empirical studies that examines the relationship between digital service quality and bank customer loyalty of conventional banks in the CEE regions. A six factor digital service quality model will be introduced and the mediating effects of bank customer satisfaction and the moderating effects of ČSOB brand equity are employed.

The results of this study will give additional empirical evidence for the digital service quality model and provide theoretical support for the transformation of traditional banks into digital to meet users' expectations of digital services in emerging banking sectors.

Outline:

1. Introduction
2. Literature Review
3. Theoretical Foundation and Hypothesis Development
4. Questionnaire Design and Data Collection
5. Results
   - 5.1 Sample Selection and description
   - 5.2 Reliability Analysis
   - 5.3 Exploratory Factor Analysis
   - 5.4 Confirmatory Factor Analysis

Core Bibliography:

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1 Introduction

1.1 Research Background

Knoema (2023) data states that the banking sector accounts for about 14% of the current world GDP, which is confirmed by McKinsey's Banking Global Report 2022. Zephaniah (2020) states that banks are the most important savings mobilizing and financial resource allocating institutions in every economy. Modern economies depend on a thriving financial system, which is believed to account for about 20% of GDP in 2019. McKinsey (2022) reports that the banking sector has been hit hard by Covid-19 especially the traditional banks which account for most of the market capitalization of the entire banking sector. McKinsey (2022) notes that digital banking grew faster than ever during the epidemic, especially as travel restrictions due to the epidemic provided the perfect opportunity for online shopping to flourish, and digital banking rose as a complementary service to online shopping. McKinsey's data suggests that digital banking and Fintech firms accounted for just 30 % of the overall banking sector before the epidemic, while during the epidemic that share rose to nearly 50%. Traditional banks are losing margins and user bases, while digital banks are growing rapidly. Deloitte (2022) argues that in the digital era, banks are more than just banks and many leading banks are building their digital presence into service platforms that integrate banking, wealth management and investment, e-governance, healthcare and multinational businesses into one well-integrated ecosystem for their customers. Anderton et al. (2020) argue that the pandemic has allowed users to develop habits and rely on digital payments, which has continued even after the Covid-19 ended, and that technological advances in Europe are therefore needed to meet the development of this demand.

Deloitte (2022) points out that user experience is a key indicator of the success of digital banking. A good digital banking experience with added value for the user leads to increased overall satisfaction and therefore loyalty to the bank. Bloomberg (2021)

argues that customers are looking for new and innovative financial service experiences on mobile devices, and they want more convenient digital ways to access their money outside of traditional methods. Economic Times (2022) even predicts that there will be 3.6 billion digital users in 2024, which is a huge market. " Napoletano and Foreman (2021) give a simple formula to express digital banking:

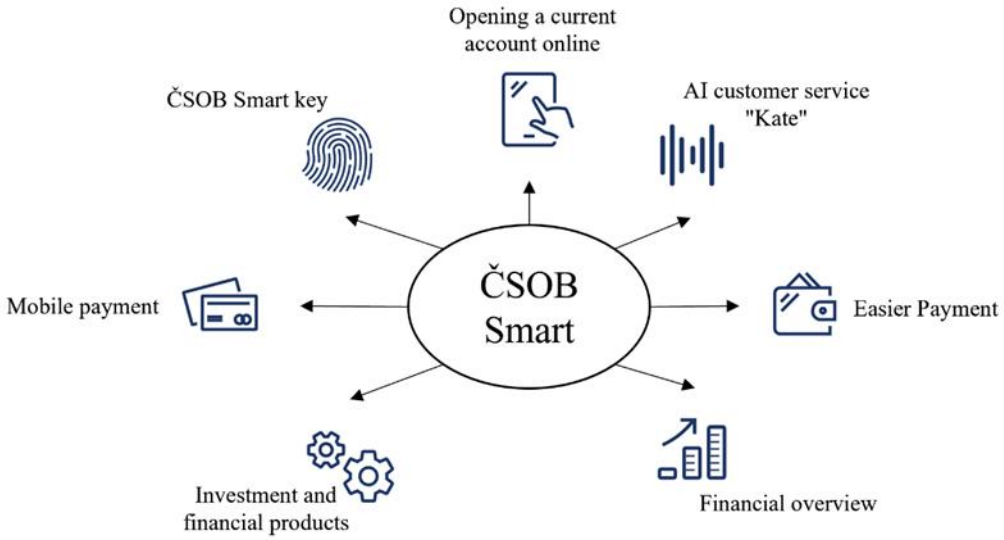
Online Banking + Mobile Banking = Digital Banking

Napoleano and Foreman (2021) noted that digital banking is essentially about users accessing their banking functions using a website or mobile app degree and through an electronic bank account. The research in this thesis centers on observations in the digital banking sector in terms of service quality and reputation, and is not a technically orientated piece that delves into the technical aspects of specific digital banks. My research in this thesis was conducted by analyzing, generalizing, and summarizing the models of previous researchers and selecting the most suitable model to analyse the digital services quality of the Československá obchodní banka (ČSOB). In this thesis ČSOB is chosen to explore the relationship between digital service quality and bank customer loyalty through the mediating role of bank customer satisfaction. The moderating role of ČSOB brand equity between digital service quality and bank customer satisfaction, and bank customer satisfaction and bank customer loyalty is explored together.

ČSOB is chosen for this study because it is a representative of the digitilization of traditional banks in emerging markets in Europe. In terms of the size of assets under management and the number of users, ČSOB is one of the largest commercial banks in the Czech Republic. ČSOB is also a pioneer in the Czech banking sector in terms of digitalization. In terms of digitilization, ČSOB launched Internet Banking on PC and ČSOB smart on mobile. As a digital bank, ČSOB's digital services provide all the basic services of ČSOB Bank including management of personal bank accounts, balance and mobile payment services, 24-hour AI customer service “ Kate”. ČSOB smart can even be linked to the accounts of six other Czech banks, making it easy for customers to

manage different bank accounts on one mobile app. ČSOB launched the ČSOB smart key in line with the Czech government's data sharing policy and the EU's digital identity decision to facilitate user authentication, which also improves security compared with SMS authentication. Appendix 1 contains information on certain ČSOB Smart features.

Figure 1.1 ČSOB Smart functional structure



Source: Author's own work

Based on Deloitte's (2022) discussion of digital banking champions, the quality of service provided by digital banks is difficult to be measured by objective data, Deloitte states that for digital service quality, user satisfaction often comes from subjective experience, which involves a variety of factors. Therefore I identified the first research question of this thesis - RQ1: What factors of digital service quality in banks affect bank customer satisfaction and loyalty. In addition, Deloitte (2022) states that in the digital banking industry there are "challenger banks", which are smaller and newer banks that lack brand recognition compared to long-established banks but still have an advantage in digitalisation. Deloitte (2022) suggests that traditional banks such as ČSOB have an advantage over "challenger banks" in terms of their lack of brand equity, or familiarity and recognition of the brand by users, but whether this advantage has a positive impact

on digital banking is the second question in my research - RQ2: Does ČSOB brand equity have a positive moderating impact between digital service quality and bank customer satisfaction? Also, Whether ČSOB brand equity moderates the relationship between bank customer satisfaction and bank customer loyalty.

1.2 Research GAP

Zephaniah et al (2020) stated that although many scholars and research organizations are closely following the development of digital banking, researchers are lagging behind. Zephaniah et al (2020) argues that traditionally scholars have focused their research on digital banking on technology and efficiency, whereas Deloitte's (2022) data found that Users' focus is increasingly on the user-friendliness of digital banking and its ability to create value for customers, rather than just being a cold, online bank. Deloitte (2022) argues that digital interactions, while simple, struggle to create an emotional connection between the service provider and the customer, and that this contributes to a lack of loyalty built into digital banking, especially among young users who are most passionate about digital channels. Deloitte (2022) notes that a shift in demand from efficient banking to the need for a more empathetic and high-speed responsive AI chatbot was found among the users interviewed. Therefore, this study focuses on the responsiveness and human dimension of the bank in constructing the dimensions, and I believe that my findings are highly informative for the bank to improve the operations of the digital and customer service departments, as well as for the marketing department to go through the interpersonal and emotional aspects of checking the relationship with the customers.

Another particular entry point for this study is to take the digital development of traditional bank, ČSOB , as the object of study, rather than those challenger banks that are fully digitalised. Murphy (2019) cites the UK banking market as an example of a traditional bank in the UK that has lost a significant number of customers in the face of the disruptive onslaught of Monzo, Starling and Revolut, with its market share dropping from 92% in 2009 to 70% in 2019. However, Hristova (2019) points out that the

advantages of digital banks over traditional banks in terms of technology marketing, customer insights and digital media are the key to their ability to quickly dominate the market and that digital banks are no less loyal than traditional banks. However, digital banks as challengers are riskier. Hristova (2019) points out that traditional in order to retain customers to fight back against these challengers, they need to rebuild customer loyalty by reconstructing customer loyalty and digitally transforming their business to come up with more personalised and multi-distant services to rebuild user loyalty.

All in all, this study makes a pre-research for the digital transformation of traditional banks and the counterattacks made to meet the challenges of the emerging purely digital banks. The aim of this research is to determine where ČSOB, one of the largest traditional commercial banks in the Czech Republic, should focus its efforts to rebuild customer satisfaction and loyalty by examining the current development of the digitalization process from the user's point of view. In other words, the study seeks to identify those dimensions of digital transformation that are of most interest to users, and then to make recommendations to bank executives on the favourable direction of digital development.

1.3 Research Structure

Large consulting organizations such as Deloitte have suggested that digital banking is an important development for the financial and banking industry after the pandemic (Deloitte, 2022). Therefore, how to measure the service quality of digital banking is the key to guide the banking industry to become digital champions. In this thesis, ČSOB is selected as a research object to explore the relationship between digital service quality and bank customer loyalty through the mediating role of bank customer satisfaction. In this, the moderating role of ČSOB brand equity in digital service quality and bank customer satisfaction, bank customer satisfaction and bank customer loyalty is explored together. As Deloitte (2022) points out, the comparison between the new "challenger banks" that have emerged in the development of the digital banking industry and traditional banks such as ČSOB points out that the difference between the two is brand

equity. Good brand image and word-of-mouth among its user base has an impact on its ability to compete in digitalization. Initially, this study gives definitions and measurements of digital service quality, bank customer satisfaction, bank customer loyalty, and ČSOB brand equity, and secondly, this study formulates the corresponding hypotheses by exploring the relationship between the four components: digital service quality, bank customer satisfaction, bank customer loyalty, and ČSOB brand equity. Next, this study explores the moderating role of ČSOB brand equity and the mediating role of bank customer satisfaction through structural equation modelling. The results of the study and their implications will then be discussed. Finally, the paper makes suggestions for further research.

The remaining part of this dissertation is organized as follows. Section 2 presents a review of the literature. Section 3 describes the research theories and the hypothesis development. Section 4 contains the questionnaire design and data collection. Section 5 shows the empirical analysis and Section 6 represents discussion and recommendation and also gives contribution and limitation for future research.

2 Literature Review

2.1 Digital Financial Services

2.1.1 Digital transformation and Digital Financial Services of Banks

The growth of traditional commercial banks has been significantly impacted by the advent of digital finance (Guo & Shen, 2016). By quickly identifying what business needs using big data, digital finance can also offer customers better financial services (Sandhu & Arora, 2022). The integration of digital finance with China's rural finance has lowered the barrier for rural Chinese investors to access financial services and provided rural areas with an Internet payment platform and a variety of electronic financial services that include deposit and loan content. (Shuguang, 2019). For example, with the help of Ali's e-commerce platform, Netcommerce Bank has served 8.97 million "three rural" users, with a cumulative microfinance fund of more than 800 billion yuan. Xinhua Village in Yunnan has upgraded its traditional handicraft village into an "e-commerce village", integrating the Internet supply and marketing chain and the financial chain, with the annual Internet sales of only 1,100 villagers exceeding 80 million yuan in 2019 (Xing, 2021). Dong et al. (2020) analyzed 24 Chinese A-share listed companies from 2006 to 2018 using fixed-effects and random-effects models and found that digital finance could boost commercial banks' profitability, growth, safety, and business performance.

Digital finance uses contemporary technologies like Internet technology, big data, and cloud computing to lower the costs of disseminating, accessing, and processing information (Gkoutzinis, 2006). This allows for a significant reduction in transaction costs and information asymmetry in micro and simple financial services in the areas of funds financing, payments, and information intermediation, as well as an improvement in the breadth of financial services. Commercial banks have committed to accounting, management, transfer, execution, and settlement in the form of digital information,

increasing customer convenience and assisting commercial banks in the development of new products and services.

Commercial banks can adjust their business models and adapt to new surroundings with the support of digital capital, which also helps them develop and market new products and services (Bubnova, 2021). A cognitive mapping model is used by Rodrigues et al. (2022) to examine how are cybersecurity, digital transformation, and artificial intelligence are interconnected in the financial and banking sectors, assisting bankers in minimizing the risks associated with adopting digital technology. According to Naimi-Sadigh et al. (2022), a clear strategy and the right organizational structure are necessary for digital transformation in banks. Naimi-Sadigh et al. (2022) use the example of Bank Maskan, an Iranian specialized bank that adopted digital transformation, to argue that commercial banks should undertake digital transformation in three areas: infrastructure, endpoint development, and business. Muhammaditya et al. (2022) claim that expertise of IT and programming languages is essential for commercial bank managers to succeed in digital governance by rebuilding the three constituent principles of Digital Weberian Bureaucracy (DWB). The financial services provider should transition to the new digital carrier as part of banks' digital transformation. Passbooks, deposit slips, and bank cards are among the traditional carriers of bank financial services, but as mobile phones and terminals like PCs emerge, commercial banks are shifting their financial services more toward mobile banking applications, credit card applications, and other similar applications.

Diener and Špaček (2021) used the interview method to conduct a qualitative analysis of interviews with German bank boards and discovered that the process of digital change in banks necessitates consideration of factors like strategy and management, technology and regulation, as well as customers and employees. Commercial banks must become more attentive to the interests of investors since investors can use mobile banking to easily compare the financial services offerings of various banks. Commercial banks must fully utilize big data's potential in order to get an advantage in determining

consumer demands and anticipating the market. Commercial banks must employ financial technology characteristics like cloud computing and quickly produce financial products and services that meet investor demands and market demand to boost investor user stickiness.

Financial institutions use digital technology to improve their understanding of the user demands of their financial consumers and offer a variety of financial services in response to those needs (Taka & BAYARÇELİK, 2023). With regard to performance measurements, service delivery expectations, and shifting consumer behavior, artificial intelligence has completely changed the service ecology of financial institutions. Mobile banking integrates the digitization of services into the ecosystem of financial services, precisely identifying and improving the customer experience (Manser Payne et al., 2021). Commercial banks have been pushed to adapt their service concepts and business models as a result of electronic finance's innovation of classic commercial banking operations.

Traditional banks' service models have changed as a result of advancements in information and communication technology, and the trend in financial services is quickly becoming one that is knowledge-driven and information-based (Gkoutzinis, 2006).

A traditional commercial bank's primary activities are the management of deposits and the issuance of loans. Intermediation of payments, financial services, credit intermediation, and credit creation are the four fundamental tasks performed by commercial banks. Commercial banks primarily provide financial services in the form of financial services marketing, which has a highly subjective nature. In the past, the majority of banking financial services are offered through offline number-picking counter transaction services, which work long hours and involve numerous steps in serving customers (Sanhu & Arora, 2022). The digital finance model encouraged the transformation of banking financial services with the development of technologies like the Internet of Things, big data, and cloud computing (Soldatos & Kvriazis, 2022). The

introduction of electronic banking and banking electronic goods has increased service areas for banks, enhanced traditional banks' customer-centered service methods, and standardized service behavior while improving service effectiveness. As a result of the digital economy, banking financial services have undergone significant change (Levy, 2022). Rather than adding more branches, financial services are provided to customers via the growth of remote or online banking services (Sanhu & Arora, 2022).

2.2 Digital Service Quality and its measurement

2.2.1 Digital Service Quality in Banks

Service quality is where digital service quality first emerged. The word "service quality" was first used by Lavitt (1972) to define it as the discrepancy between the services consumers receive and the criteria they have set for themselves. According to O'Neill et al. (2001), service quality is a characteristic of customers that helps them satisfy service standards and gives them a competitive edge in the service industry. Five characteristics were used to characterise service quality from the client's perspective: advisor, client adaptation, consultation process, deliverables, and communication (O'Neill et al, 2001).

Digital service quality is defined as "consumers" evaluation of the quality of banking services delivered through internet (Jun & Cai, 2001). Four separate quality dimension models for expertise, relationship, engagement, and performance were also found. Electronic service or e-service as it has become more commonly known is now recognized as one of the key determinants for successful e-business. The electronic service encounter between the consumer and service provider differs from the traditional physical encounters experienced in conventional marketing domains (e.g. retailing, banking, sporting events) given the absence of sales staff; the absence of traditional tangible elements, and customer self-service (Alkhowaiter, 2020). As defined by Alkhowaiter (2020), the quality of digital banking services is how well they meet their client's needs, expectations, and wants. Accessibility, personalization, correctness, privacy, and security are just a few of the consumer needs that e-service quality

addresses, making it one of the primary drivers of digital banking adoption (Alkhowaiter, 2020). Quality digital banking services, as defined by Ananda et al. (2020), are those that customers believe can be relied upon to satisfy their needs fully. Ananda et al. (2020) also examined what motivates Omanis to switch to digital banking by analyzing service quality, convenience, privacy, and security. Based on this research, digital banking clients in Oman have higher expectations for service quality than consumers who do not use digital banking. Ananda et al. (2020) found that customers care most about speed, convenience, security, and privacy while using digital banking services also show that these factors can be used to rank the quality of digital offerings. According to Khan et al. (2019), "service quality" refers to how customers evaluate the efficacy and convenience of digital banking services. Khan et al. (2019) found that online shoppers who have a convenient and efficient digital banking experience maintain higher levels of satisfaction and loyalty to the banks that provide them with digital services.

The quality of a bank's digital services is measured by the extent to which its clients view those services as sufficient and trustworthy (Li et al., 2021). Customers' satisfaction with banks' offerings was examined in relation to cloud services, security, e-learning, and service quality (Li et al., 2021). Li et al. (2021) found that service quality was a significant predictor of consumer happiness with banks and advised that financial institutions should prioritize enhancing the quality of their digital services to increase customer satisfaction. According to Mostafa (2020), the effectiveness and dependability of digital banking services constitute their quality. Including customers in the service delivery process might enhance the quality of digital services through customer value co-creation (Mostafa, 2020). Therefore, this thesis defines bank digital service quality as the gap between expected and actual service quality based on bank customers' perceptions.

2.2.2 Measuring digital service quality in banks

Patrcio et al. (2003) employ qualitative study on Portuguese banks to examine consumer

satisfaction with digital banking service channels and how phone and automated counter banking services affect bank performance. In a multichannel environment, customer satisfaction with a digital service depends on the channel's performance and how it influences the total service offering. In order to investigate the relationship between the quality of bank digital services and customer loyalty and satisfaction, Raza et al. (2020) conducted structured interviews with 500 Pakistani bank customers. Through structural equation modeling, the study discovered that the quality of bank digital services served as the foundation for boosting customer satisfaction and loyalty. In order to determine the effects of service quality, brand reputation, and customer trust on customer satisfaction and repurchase intention for retail banking services in Vietnamese commercial banks, Thuy and Ngoc (2022) applied structural equation modeling to a questionnaire survey of 605 Vietnamese commercial bank customers. According to Thuy and Ngoc (2022), switching costs and relationship commitment can boost consumer repurchase rates as customers move from being satisfied to doing business again.

Different scholars have focused on the measurement dimensions of banks' digital service quality. Zhu and Chen (2012) found that service fairness is crucial for banks' online web marketing by analysing 331 online satisfaction surveys of online banking users on fairness, trust, and perceived value. Lau et al. (2013), on the other hand, shifted the perspective to traditional banks by using a sample of 119 Hong Kong and Shanghai HSBC retail banking customers in Hong Kong and Shanghai, and examined the impact of five aspects of the bank's service environment (transparency, accountability, reliability, assurance, and empathy) on customer satisfaction, finding that empathy had the least significant impact.Lau et al.'s (2013) study identifies the basic direction of research on bank service quality, and it is also more systematic and clearer than that of Zhu and Chen (2012).

George and Kumar's (2014) study on Indian banks expanded the study of service quality of bank websites to six dimensions - service reliability, service responsiveness, service

fulfilment, service efficiency, and privacy and security of services, establishing a system for evaluating the quality of bank services. Arcand et al. (2017) found that Lau et al. (2013) ignored social attributes of digital banking, and in turn proposed to measure the satisfaction of 375 bank customers with the mobile platform for banking activities from five perspectives: security, confidentiality, usability, aesthetics and sociality. To investigate the relationship between customer satisfaction and financial soundness of banks in the UK, Mbama and Ezepue (2018) measured customer satisfaction in four dimensions: service quality, functional quality, perceived quality, and employee and customer engagement. Using bank financial statement data, multifactor analysis and structural equation modelling, they found that the higher the customer satisfaction, the better the bank.

Shankar et al. (2020) used focus groups, in-depth interviews, critical incident technique and web interviews to collect data and investigated the underlying dimensions of digital service quality measurement in banks using inductive content analysis and Pareto analysis. The findings show that the most important factors determining the quality of banks' digital services are privacy and security, customer assistance, interactivity, efficiency and content. In fact, this finding will help banks to better understand customer expectations and provide guidance for providing high quality e-banking services, which will help to establish standards for digital service quality in banks.

Mir et al. (2023) used a well-structured questionnaire to elicit information from active users of online banking. Mir et al. (2023) expanded the Digital Banking Service Quality Scale (DBSQual) to have seven important dimensions: Website organization, user friendliness, website efficiency, reliability, responsiveness, security and personalization are the first five factors to be considered. Alarifi and Husain (2023) investigated how the six pre- and post-COVID-19 factors - website organization, reliability, responsiveness, user friendliness, personal needs and efficiency - affect bank customer satisfaction. By collecting information from 588 bank e-customers, the researchers found that the impact of digital service quality on customer satisfaction differed before

and after the outbreak, with bank customers expressing greater concern about employee-customer interactions in digital services after the outbreak.

Table 2.1 Dimensions of Digital Service Quality Measurement

Author	Dimensions
Zhu and Chen (2012)	Service fairness, Trust, and Customer-perceived Value.
Lau et al. (2013)	Tangibility, Responsibility, Reliability, Assurance and Empathy.
George and Kumar (2014)	Website attributes, Reliability, Responsiveness, Fulfillment, Efficiency, and Privacy and Security
Arcand et al. (2017)	Security/Privacy, Practicity, Design/Aesthetics, Enjoyment and Sociality.
Mbama and Ezepue (2018)	Perceived value, Convenience, Functional quality, Service quality, Brand trust, Employee-customer engagement, Perceived risk, Perceived usability, Innovation, customer experience, and loyalty.
Yilmaz et al. (2018)	Assurance, Reliability, Tangible, Accessibility, and Loyalty
Shankar et al.（2020）	Privacy and Security, Customer Support, Interactivity, Content, and Efficiency
Mir et al. (2023)	Web Architecture, User Friendliness, Efficiency of Website, Reliability, Responsiveness, Security, and Personalization.
Alarifi and Husain (2023)	Site Organization, Reliability, Responsiveness, User Friendliness, Personal Needs, and Efficiency.

Source: Author’s own work

2.3 Bank customer satisfaction and its measurement

2.3.1 Bank customer satisfaction

Howard and Sheth (1969) defined 'satisfaction' as the psychological state of consumers towards the goods and services of a firm. Customer satisfaction is "a judgement of the degree of consumption-related pleasurable satisfaction, including the degree of under- or over-satisfaction, provided by a product, a service feature, or the product or service

itself" (Oliver, 1997). Anderson and Srinivasan (2003) define e-customer satisfaction as "the degree to which a customer is satisfied with his or her previous purchasing experience with a particular e-commerce company level of satisfaction". Online businesses need to keep their customers online because keeping customers loyal is a difficult task. Mir et al. (2023) emphasise the two detailed dimensions of individuality and responsiveness in their own research model. Because in the era of digital services, beyond the basic digital banking services, users are becoming more and more discerning and are looking for services that are efficient and suited to their needs. Mir et al. (2022) emphasised that comparison between digital services is easy in the user's perspective and which digital bank can provide services that are more in line with the user's preferences is the one that will be more likely to gain the user's satisfaction. George and Kumar (2014) emphasised the importance of customer satisfaction by suggesting that higher user satisfaction will lead to higher behavioural intention to adopt i-banking. Morgeson et al. (2011) suggested the use of cost-benefit analysis to measure customer satisfaction. According to customer satisfaction research, customer satisfaction is the value response of a customer after using a product in a particular environment. Value perception inconsistency occurs when the perceived value of the customer exceeds the expected value. Negative perceived value inconsistency occurs when the expected value is higher than the perceived value. According to Fronell (1996), this thesis defines bank customer satisfaction as the degree of customer satisfaction with bank products and services.

2.3.2 Measuring bank customer satisfaction

Habtemichael Redda (2023) states that customer satisfaction and loyalty are directly tied to a company's service excellence. The author believes that banks will retain and attract customers by improving their online banking services. Drs. S.and C. (2020) found that financial institutions value customer satisfaction. They also argued that the most important factors in a positive banking experience are how well their needs are met, how quickly problems are solved, how knowledgeable the staff is, how committed

the company is to customer security, how accessible the banking options are, the quality of the service, and financial aid availability. The research shows that banks must meet customers' high expectations before acquiring trust and providing outstanding service.

Abror et al. (2019) examined service quality, religion, customer satisfaction, engagement, and loyalty. These factors are immediately relevant to Islamic banks. Abror et al.(2019) indicated that religious views strongly influenced brand loyalty. The study also indicated that customers with a stronger religious devotion choose an Islamic bank as their primary financial institution. They also discovered that customer satisfaction greatly impacts client loyalty. They believed this underscored the necessity to keep serving their current customers well.

Fida et al. (2020) examined Oman's Islamic banks' recurring clients and pleased consumers. The study found a high correlation between customer loyalty and service excellence. Happy consumers were treated professionally. These data imply that improving customer service will increase bank loyalty. Ozkan et al. (2019) also examined customer satisfaction, loyalty, and service quality. Ozkan et al. (2019) found that better service makes customers happier and more loyal.

Pakurár et al. (2019) looked into the banking sector in Jordan. Respondents were most pleased when service providers went above and beyond regarding timeliness, availability, convenience, and personalization. In addition, RahiSamar and Hafaz (2020) investigated the factors that encourage consumers to switch to Internet banking. E-customer service, the quality of the website, the satisfaction of consumers, and the public's perception of the organization were all stressed. RahiSamar and Hafaz (2020) found that customer satisfaction is related to factors such as a company's name recognition, the effectiveness of its online customer service, and the attractiveness of its website. From RahiSamar and Hafaz (2020), financial institutions would do well to put client satisfaction first and make their websites as simple and user-friendly as feasible in light of their findings.

Sardana and Bajpai (2020) researched customers' satisfaction levels with online banking. The most significant factors influencing customers' opinions of a service are its convenience, efficiency, degree of user input, and accessibility. In 2020, Sardana and Bajpai found that customers would be more satisfied if banks enhanced their online banking services. According to a recent study by Supriyanto et al. (2021), satisfied customers are more inclined to make additional purchases. The report recommends prioritizing the quality of services and the happiness of contacts with former clients if financial institutions wish to regain patronage.

Khan et al. (2021) state that mobile banking's ease of use is becoming increasingly significant in the battle to retain current consumers. The study found that the factors most related to user satisfaction were the mobile banking platform's security, aesthetics, usability, dependability, and responsiveness. According to research by Khan et al. (2021), financial institutions could see an uptick in consumer satisfaction if they improved the reliability, visual quality, and security of mobile banking. In light of this, Vencataya et al. (2019) investigated how various service quality factors affected customers' perceptions of commercial banks in Mauritius. Responsive, transparent, and empathetic businesses are more likely to retain satisfied customers (Vencataya et al., 2019).

2.4 Bank customer loyalty and its measurement

2.4.1 Bank customer loyalty

Customer loyalty is defined as the “strength of relationship between an individual’s relative attitude and repeat patronage” (Dick & Basu, 1994). Engel et al. (1982) defined brand loyalty as "consumers' preferences, attitudes and behavioural responses to one or more brands in a product category over a period of time". Jacoby (1971) argued that loyalty is a biased behavioural buying process that is the result of a psychological process. Keller (1993) argues that loyalty occurs when goodwill towards a brand is reflected in repeat purchase behaviour. Gremler (1995) argues that both attitudinal and

behavioural dimensions need to be taken into account when measuring loyalty. Oliver (1997) argues that customer loyalty defines loyalty as "a strong commitment to consistently repurchase or repatronise a preferred product or service in the future, despite situational influences and marketing efforts that may result in switching behaviour." In today's increasingly competitive environment, customer loyalty has become an important part of a bank's strategy. Today, the entire bankers need to compete with each other to survive in this competitive market. Banks not only need to compete with each other. It also needs to compete with non-banks and other financial institutions (Kaynak & Kucukemiroglu, 1992). As explored earlier in this section, several researchers have explored the impact of several factors on loyalty. There are service quality, customer satisfaction, corporate image, commitment and conflict management. According to the research, these factors have a great impact on customer loyalty. Filip and Anghel (2009) note that Customer loyalty can be determined by looking at the number of purchases a customer makes from a company's product portfolio, frequency of acquisition, percentage of total customer spending on a product or service.

2.4.2 Measuring bank customer loyalty

Saraswati (2022) investigates the factors such as market orientation, service quality, and customer satisfaction contributing to customer loyalty in Indonesia's Sharia banking sector. Market concentration, service quality, customer satisfaction, and brand loyalty were all significantly correlated in this study. Saraswati (2022) shows that financial institutions may increase customer loyalty by catering to consumer preferences and providing superior support. In addition, Customer loyalty in a certain sector of the banking business was studied by Das et al. (2019), who then ranked the sector's leaders. Using a Structural Equation Model (SEM), Das et al. (2019) examined how customer relationship quality, customer experience, trust, and satisfaction could predict customer loyalty. There were shown to be significant correlations between relationship quality, customer satisfaction, and customer loyalty. There was little correlation between trust and consumer retention. Kamath et al. (2019) examined retail banking customer loyalty.

Using serial mediation, Kamath et al. (2019) examined how trust, switching barriers, and satisfaction affected customer loyalty. Customer loyalty was closely correlated with customer experience quality. High switching costs combined with low trust and dissatisfaction led to low customer loyalty. Putting more emphasis on the customer's total experience, lowering switching obstacles, increasing trust, and improving customer satisfaction could help the banking industry retain more customers. In addition, Kant et al. (2019) examine Customer loyalty programs at Indian commercial banks. Loyalty, customer experience, brand image, trust, and customer satisfaction in retail banking were evaluated using structural equation modeling and multiple regressions. Kant et al. (2019) also stated that customer satisfaction is a subjective user attitude based on the service experience with the bank and on the basis of satisfaction, the user reasons to repeatedly make purchases and use the same bank's services and reap multiple satisfaction. This multiple satisfaction from the time scale is customer loyalty to the bank. Customer loyalty directly results from the customer's experience, perception, trust, and satisfaction with the brand. The results of this study support the idea that satisfying customers' needs and wants is crucial to creating loyal banking clients. According to research by Mainardes et al. (2020), omnichannel strategies are associated with higher customer loyalty. This study shows that financial institutions can increase client loyalty by adopting an omnichannel strategy. Monferrer et al. (2019) suggests integrating clients into the banking process may increase customer loyalty. Zkan et al. (2019) found a correlation between service excellence and repeat business, which shows that prioritizing consumers' demands increases banks' client loyalty. Rashid et al. (2020) polled bank clients to learn how brand loyalty affects profitability. This study's findings reveal that customer loyalty significantly positively influences business outcomes.

The research conducted by Shankar and Jebarajakirthy (2019) examined the relationship between e-banking service quality and customer loyalty by examining 19 different quality criteria. Customer satisfaction with an online bank's support team impacted retention significantly. This study's findings support the hypothesis that the quality of an institution's online banking services is associated with client loyalty. Zephaniah et al.

(2020) analyzed a survey of bank customers to learn how marketing communication affects customer loyalty. This research found a clear and statistically significant correlation between efficient marketing communication and consumer commitment to a particular brand- improving marketing communication can boost customer loyalty in the banking sector.

2.5 Bank brand equity and its measurement

2.5.1 Bank brand equity

Holbrook and Hirschman (1982) were the first to point out in their research that the user's perception of the brand experience is critical to the brand's marketing. Pine II and Gilmore (1998) further build on this idea by stating that brands create mechanisms and criteria for observing and measuring users' experiences with the brand, which can also be seen as a reflection of users' perceptions of the firm. Ali et al. (2014) defined brand quality as the holistic and subjective responses that arise from a customer's contact with a service provider, which can be derived from the customer's perceptions and emotions. Bank brand equity refers to positive associations with and awareness of the bank brand, perceptions of quality, and brand loyalty (Yoo & Donthu, 2001; Loureiro et al., 2014; Rambocas et al., 2014). Pine II and Gilmore also point out that brand identity is crucial in the service industry, particularly in the banking industry, and Morrison and Crane (2012) emphasise that in the service industry, it is not only the brand's service that users buy but also the brand's service experience. Morrsion and Crane (2012) point out that for service businesses, customers buy products and complementary services, so customer evaluations include not only the quality of the product but also the experience of interacting with the brand. They point out that creating and delivering rich experiences and emotions is one of the keys to creating differentiation for service-based brands and affects sales, consumer loyalty and brand promotion development. Doyle and Stern (2006) argues that branding is central to marketing and business strategy. Prasad and Dev (2000) further suggest that building brand equity is one of the critical

drivers of a company's success. Lassar et al. (1995) emphasise that the measurement of brand equity is not an analysis of objective conditions but a core criterion for the perception of user competence. The retail banking industry, as a financial services industry, as stated by Alamgir and Uddin (2017), is facing challenges in maintaining customer loyalty and reducing customer churn. Ernst and Young (2017) states that young users' variable expectations of service, the emergence of alternatives to service providers, and unethical behaviour in the industry competition have led to a rapid decline in customer loyalty in the banking sector, with users switching between banks. As a result, in the current market and economic environment, the retail banking industry is paying more attention than ever to brand equity, the subjective attitudes of customers and the perception and evaluation of brands.

2.5.2 Measuring bank brand equity

Retail banking is a standard service sector, thus bank brand equity is customers' attitudes and impressions of banking services and other bank brand-related items. It's three-layered. The bank's services revolve around knowledge of bank products, competitive loan interest rates, and information sharing. The bank's customer service, feedback, and empathy are the second level (Chahal & Dutt, 2014) The bank's behavior, including customer service and high-quality, error-free banking, is the third level of perception (Chahal & Dutt, 2014). Based on these three aspects, Loureiro and Sarmento (2018) provides seven measures: accessibility; ease of doing business; organizational excellence; customized offering; staff engagement; value for money; reputation. According to Loureiro and Sarmento (2018), the PAD model classifies customer feelings and perceptions as Pleasure, Arousal, and Dominance. Loureiro and Sarmento (2018) claim their seven-point user experience metric will alter user feelings. This feeling will arouse the user's cognitive waking to subjectively judge if they like the brand, which will influence their brand loyalty.

Lindemann (2003) divides this into three levels: brand assets, brand power and brand value. In Lindemann's view, brand assets are equivalent to brand equity. Lindemann

(2003) and Tajik et al. (2016) proposed six measures: brand awareness, brand reputation, distinctiveness, profit, quality..., brand personality, brand depth value and brand image. Tong and Hawley (2009) state that brand awareness is a fixed impression formed by combining a brand with a specific product and image to the customer. Keller (2011) sees this image as a measure of the customer's ability to identify brand equity under different conditions. Keller sees brand awareness as a study of the customer's brand perception. Keller argues that brand awareness is the basis for studying customer perceptions of brands. Based on excellent and correct brand awareness, many customers' good impressions of a brand form the brand's reputation. Tajik et al. (2016) state that brand awareness and reputation create a sense of customer familiarity with the brand. This familiarity leads customers to prefer familiar banks without other contact conditions. This familiarity is also a sign that a brand, especially a bank with a good reputation, possesses a sense of stability and reliability. Aaker (1991) argues that brands with good awareness and reputation play a crucial role in communicating with other groups.Rosario et al. (2016) stated that word of mouth, especially electronic word of mouth (eWOW) can greatly influence consumers' shopping decisions. Consumers of the Internet are influenced by a variety of online information, and the word of mouth of a company is more likely to reach the ears of the user with the addition of the Internet's communication, which in turn impresses the customer's shopping decision.

In order to achieve this positive brand awareness and reputation, brands have to provide quality service. Gronroz (1924) pointed out long before the Second World War that service quality depended on the customer's evaluation and judgement of the service process. The two critical factors in the evaluation process are the customer's expectations and the customer's actual feelings. Gronroz believed that quality service gives the customer a positive awareness and creates word of mouth. A good brand reputation raises customer expectations of branded services. Wong and Sohal (2003) build on Gronroz by suggesting that the difference between customer expectations and actual perceptions affects the customer's evaluation of service quality, affecting the quality of brand awareness and reputation. Erenkol et al. (2010) conclude that user

recognition of branded service quality through the brand awareness and reputation developed will persuade users to choose that brand for themselves over other competition and alternatives. Erenkol (2010) argues that from a branding perspective, this brand awareness and reputation from the customer increases the strength and competitiveness of the brand and creates higher value for the brand.

Aaker (1991) argues that excellent brand awareness and reputation will significantly increase the likelihood of a brand being selected by a customer if the customer is unaware of the industry. On the other hand, Aaker (1991) also argues that if customers do not care about the brand, they will focus more on specific product specialities, and convenience. Aaker argues that long-term quality awareness and reputation will build brand loyalty among customers, and this loyalty will undermine the competitiveness of substitutes. Yoo et al. (2000) support Aaker's view and suggest that brand loyalty will help brands capture more market share and lead to repeat brand purchases by existing customers. Customers may even actively resist the marketing of the brand's competitors. Li and Hsieh (2008) suggest that brand loyalty increases market share and creates a premium that allows brands to be priced higher than their competitors. Esch et al. (2006) conclude that brand image is built on the previously discussed service quality, brand awareness and word of mouth, and loyalty. Keller (2008) argues that brand image, or brand equity, in brand image, or brand equity, in the eyes of the customer, is excellent, solid and unique and will allow the brand, especially in the banking industry, to attract more stable customers over time.

To summarise, in the combing of the literature, the retail and digital banking industry, with its attributes of being a service industry, puts a lot of emphasis on the subjective experience of the customer as it is the key to attracting and retaining their users. Therefore for contemporary banks and digital banks, analysing and measuring user recognition, satisfaction and loyalty is the main way to win the market. In addition, we have analysed and compared different researchers' methods of observing and measuring banks to come up with seven dimensions that are the most important for the quality of

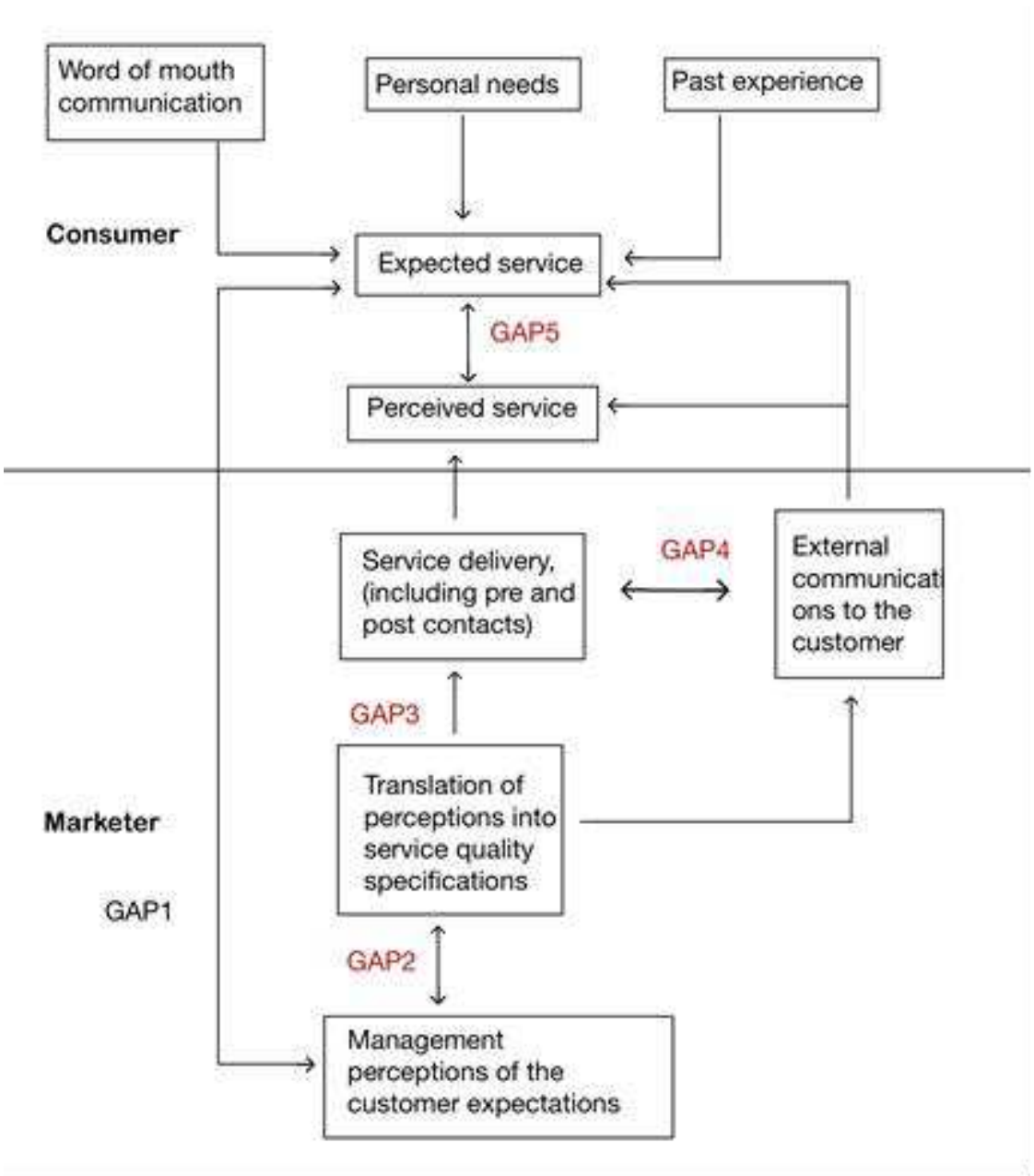
digital banking services: Physicality, User-friendliness, Security & Privacy, Responsiveness, Efficiency, and Personalisation. explored in Section 3.

3 Theoretical Foundation and Hypothesis Development

3.1 SERVQUAL MODEL

The key to providing quality service is to exceed the user's expectations, according to SERVQUAL(Service Quality) theory, a new system for evaluating service quality in the service business (Parasuraman et al., 1988). The equation is as follows: Servqual score = Real perception score – Expected score. Using a questionnaire, users are asked to rate their expectations, actual perceptions, and minimum acceptable values for each of the five dimensions of service quality that SERVQUAL has identified: tangibles, reliability, responsiveness, assurance, and empathy. For each of these dimensions, users are asked to rate their expectations, actual perceptions, and minimum acceptable values. Also, it is used to identify the 22 particular components that are pertinent to it. The questionnaire, customer score, and total calculation are then used to determine the service quality score.

Figure 3.1 SERVQUAL Model



Source: Based on Parasuraman et al. (1988)

The SERVQUAL model describes the processes that lead to service quality (Parasuraman et al., 1988). Customer-related phenomena are listed in the model's upper half. Word of mouth, individual requirements, and genuine prior client experiences make up desired service. The actual service received, or the perceived service as it is known in the model, is the outcome of numerous internal choices and actions. The service quality standards that the organization adheres to are determined by the

manager's judgment of the customer's expectations at the time the service transaction occurs. This fundamental framework demonstrates the procedures that must be taken into account while analyzing and designing service quality. The core causes of issues are then discovered. There are five different kinds of quality gaps, or disparities between elements. Consistency issues in quality management are the cause of quality gaps. The five different forms of quality gaps include the perceived service quality gap (Gap 5), the marketing communication gap (Gap 4), the service transaction gap (Gap 3), the service standard gap (Gap 2), the managerial awareness gap (Gap 1). The difference between expected and perceived services, or the perceived service quality gap, is the biggest discrepancy (Gap 5).

Table 3.1 SERVQUAL`S(SERVICE QUALITY`S) five dimensions

Dimension	Content
Tangibles	Physical facilities, equipment, and appearance of personnel
Reliability	Ability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides its customers

Source: Based on Parasuraman et al. (1988)

3.2 The relationship between bank digital service quality and bank customer satisfaction

There has been a major movement in the banking business towards digital services in the modern era. Banks increasingly rely on digital platforms and technology, such as online banking, smartphone apps, and digital payment systems, to serve their consumers (Khatoon et al., 2020). According to this theory, bank customers are more satisfied when the digital services they are supplied are high quality.

Several causes contribute to the correlation between digital service quality and customer satisfaction. To begin, the term "digital service quality" refers to the overall standard of a digital platform in terms of factors like its user interface, functionality, reliability, security, and responsiveness (Kitsios et al., 2023). When customers see these factors as high quality, it improves their impression of the bank's digital services as a whole (Khatoon et al., 2020). Customers are more likely to utilize a bank with features that make their lives easier, such as an easy-to-navigate interface and a reliable, secure system. Digital services improve customer satisfaction because of their convenience and accessibility. Digital banking frees customers from the need to visit a branch or wait until regular business hours to make deposits or withdrawals (Li et al., 2021). Customers are happier as a result because they value the adaptability and efficiency of digital services. In addition, customer satisfaction is strongly influenced by how well digital services satisfy customers' expectations and preferences. Customers nowadays anticipate a streamlined and individualized banking experience. Banks can collect client information via digital platforms to provide individualized services like suggestions and targeted offers (Li et al., 2021). Customers are more satisfied and loyal to the bank when they receive services tailored to their tastes. Resolution of issues and communication with customers is sped up using digital services. Chatbots, instant messaging, and telephone support services allow banks to offer customers instant aid. Customers are more likely to be happy when they have access to helpful, fast assistance when they encounter issues (Li et al., 2021). Yilmaz et al. (2018) chose the SERVQUAL model, which is the service quality model, for their first and second order confirmatory factor analysis on the satisfaction of 441 university economics and administration students with banking services. They found that the dependability of financial services has an impact on consumer satisfaction. Moreover, customer satisfaction is influenced by the bank's capacity to inspire confidence in customers, the dependability of its services, and the bank's physical attributes and accessibility.

The hypothesis predicts that banks providing superior digital services will see happier customers. Banks may better serve their customers, boost their satisfaction, and live up

to their expectations by concentrating on the quality of their digital services. All of these elements work together to correlate the banking industry’s digital service quality and satisfied customers.

H1: Bank digital service quality has a positive effect on bank customer satisfaction.

This dissertation develops a questionnaire on customer satisfaction with the digital service quality of ČSOB's financial services based on six dimensions: Tangibility, User-Friendliness, Security & Privacy, Responsiveness, Efficiency, Personalization, based on the characteristics of banking services, based on the SEVRQUAL model, which is the service quality model (Parasuraman et al., 1988) and by compiling prior research from scholars.

3.2.1 Tangibility

Parasuraman et al. (1988) proposed the SEVRQUAL model and defined tangibility as the physical facilities, equipment and the appearance of employees. Rosima and Apat (2022) argue that tangibles are those things that customers can see exist and touch, which can include communication facilities, physical facilities and service personnel. Rosima and Apat (2022) argue that users' perceptions of the bank intuitively derive from what they see and hear in the bank and from the interactions they have with the staff. Thus, tangibles are the base impression that customers have of the bank quility. Duffy (2003) suggests that customer loyalty is based on the gradual formation of the first impression. Rosima and Apat (2022) argue that customer satisfaction with the bank's facilities and staff is what leads to further understanding of the bank's services and other dimensions. In the case of digital services, a clear and concise interface and clear and understandable product descriptions are tangible ways of demonstrating good quality in front of customers (Quesada, 2004). Thus, for both banks and digital banking services, clarity and seemingly reliable and stable tangibles are the first impression that customers have of service quality of a bank or digital bank, which determines whether or not they will take up the service, which is the starting point of user`s loyalty (Barquin

et al., 2019).

H1a: Tangibility of digital service quality positively influences customer satisfaction to ČSOB.

3.2.2 User-friendliness

According to Raza et al. (2020), the user-friendliness of digital service providers (DSPs) is reflected in their willingness to provide more convenient services to improve the digital service quality to their customers, including ease of use of the product, simplicity of product descriptions; language preference of the user; and ease of use of interfaces and processes that are easy to understand and time-saving. Tabash et al. (2019) state that Saudi Islamic Bank's user-friendliness measures have allowed it to enjoy higher user loyalty amongst banks in Saudi Arabia. Rajaobelina et al. (2019) explain that the spreading of the digital bank's ease-of-use attributes amongst its users and throughout the process puts the digital banks' image to potential customers and customers of other digital banks. User-friendliness allows the digital banks to earn good word-of-mouth from users builds a positive image for the digital banks service and reinforces the digital banks' reputation for high quality. For e-services, older users are more in need of user-friendly measures such as cleaner interfaces and more straightforward instructions to create a favourable environment for their use (Sinha & Singh, 2022).

H1b: User-friendliness of digital service quality positively influences customer satisfaction to ČSOB.

3.2.3 Security & Privacy

Security and Privacy, which refers to “the degree to which customers believe that the site is safe from intrusion and that personal information shared over the platform is protected (Hussien & Abd El Aziz, 2013, p. 561).” Mir et al. (2023) identified users' perceptions of "whether the bank protects their credit and debit card information; whether the bank shares their information with other firms and whether the bank helps

them avoid fraud" as reflecting the security and privacy dimensions. Mir et al. (2023) point out that security and privacy and issues are highly interrelated in digital services. Wang et al. (2021) suggest that customer concerns about privacy and cybersecurity are among the most important topics in digital world today. Users worry in the digital age that their convenient services require their privacy in exchange. Especially in banking, an industry that places great importance on privacy and security, data sharing and risks in the digital era make digital banking questionable. Therefore, Mir et al. (2023) argue that giving users confidence and satisfaction in privacy and security is one of the most important dimensions of digital banking services quality. This protection of security and privacy can link digital bank to reliability, which is more important in the eyes of customers than any other service.

H1c: Security & Privacy of digital service quality positively influences customer satisfaction to ČSOB.

3.2.4 Responsiveness

According to Zeithaml et al. (2000) Responsiveness indicates the quick response and the ability to get help if there is a problem or question. George and Kumar (2014) through a study of Indian banks found that customers value DSP's (Digital Service Provider's) responsiveness second only to the fact that they value their privacy and security. George and Kumar (2014) also state that for building a retail bank with high levels of satisfaction and loyalty, it is essential to have approachable and responsive employees who can quickly and professionally respond to all the demands of customers. Meanwhile, George and Kumar (2014) argued that fast and professional response will give customers a sense of professionalism and security, which in turn will increase the level of user satisfaction with the bank and be more willing to be loyal to the bank instead of changing at will. Quesada et al. (2004) argued that for e-banking services, professional human customer service that is always on call is a key measure to build e-responsiveness. Lee and Lee (2020) argue that in the present time, digital banking services need to focus more on training more humane AI customer service to improve

the bank's responsiveness.

H1d: Responsiveness of digital service quality positively influences customer satisfaction to ČSOB.

3.2.5 Efficiency

Efficiency covers items such as site is simple to use, structured properly and requires minimum of information to be input by the customer. George and Kumar (2014) argue that efficiency includes responsiveness and user-friendliness as discussed earlier. George and Kumar (2014) start with the example of e-banking in India and argue that highly satisfied retail banks should provide easy to use websites, sensible processes and minimum input of information to create convenience for the customer to the maximum extent possible conditions of use. Convenient use process and efficient customer service combine to build high efficiency for e-banking, which can appeal to millennials who are familiar with electronics, especially since they are less patient than older customers (Lee & Lee, 2020).

H1e: Efficiency of digital service quality positively influences customer satisfaction to ČSOB.

3.2.6 Personalization

Mir et al. (2023) consider it a form of personalization for banks to use the data of personal information and product usage preferences provided by customers to provide more appropriate services to customers. Mir et al. (2023) argue that providing personalised services to customers leads to a perception that the bank values them rather than mechanically delivering a consistent service. Wewege et al. (2020) state that customers who feel belittled will have lower loyalty and a greater desire to find a bank that values them. Similarly, customers who lack user-friendliness and timely responses feel slighted and will be less loyal (Mir et al., 2023). Wewege et al. (2020) also note that younger users value personalization like never before, and are more focused on whether

they are respected and valued. They also focus on the interactive experience that digital services give them when they receive them. Lambie (2020) argues that personalised banking services, especially human customer service will give customers a human touch rather than cold codes in digital banking. This human touch experience will greatly increase user satisfaction, which in turn builds word of mouth and loyalty for the digital bank.

H1f: Personalization of digital service quality positively influences customer satisfaction to ČSOB.

In conclusion, this research develops a digital service quality evaluation model using six influencing factors: Tangibility, User-friendliness, Security & Privacy, Responsiveness, Efficiency, and Personalization, as illustrated in the Figure 3.1 above.

3.3 The relationship between bank customer satisfaction and bank customer loyalty

Regular bank customers who are satisfied with the service they receive are more likely to stay with that institution (Hayati et al., 2020). This suggests that if a customer has a positive banking experience, they are more likely to remain loyal to that bank. Customer satisfaction with a bank is a measure of how well the bank meets the wants and needs of its clients (Li et al., 2021). It encompasses characteristics such as the friendliness of bank workers, the convenience with which bank services can be accessed, the security of financial transactions, and overall pleasure with the bank (Abror et al., 2020). Customers are satisfied when their requirements are recognized and met, if not exceeded. On the other hand, customer loyalty is determined by the regularity with which a customer utilizes the bank's services, the amount spent, and whether or not the customer would suggest the bank to others. Customers loyalty to a bank are more likely to stay with that institution longer, spend more money on its products and services, and recommend that institution to their friends and family (Abror et al., 2020).

Several pieces of empirical data corroborate the hypothesis, demonstrating an inverse link between consumer satisfaction and loyalty in the banking industry. Customers who believe their financial needs will be addressed regard the bank as trustworthy and dependable (Hayati et al., 2020). People who believe this are more loyal to the company because of their trust and loyalty. Customers who are satisfied are less likely to defect or look elsewhere. Because they are satisfied with their current bank, they are less likely to seek financial services elsewhere (Hayati et al., 2020). This benefits the bank's bottom line by lowering client attrition and raising retention rates. Furthermore, satisfied customers are more likely to use up-selling and cross-selling opportunities. They are interested in the bank's other products, which benefit its bottom line (Hayati et al., 2020). Customers who are pleased with the services the bank provides are more likely to offer constructive comments and new suggestions.

H2: Bank customer satisfaction has a positive effect on bank customer loyalty.

3.4 The moderating effect of bank brand equity

3.4.1 The moderating effect of bank brand equity in the relationship between digital service quality and bank customer satisfaction

The same With the same level of digital service quality, consumers of banks with more brand equity and recognition tend to be happier overall (Boonlertvanich, 2019). People are more likely to do business with a bank and be tolerant of service issues if they know they can trust the institution (Satvati et al., 2016). If the quality of a bank's digital services falls short of customer expectations, the bank may need help attracting new customers and keeping existing ones (Kokoreva, 2022). A well-recognized brand can give an advantage in business since it inspires confidence and reliability among consumers (Boonlertvanich, 2019). Customers may be more forgiving of poor digital service quality from trusted brands than they would be from similarly situated businesses that need a well-known brand name and this is because consumers link a company's name with a certain standard of excellence and level of service (Satvati et al.,

2016). The quality of a digital service may also benefit from increased brand recognition. Customers' willingness to accept and even enjoy digital services that fall short of the highest quality requirements can be attributed to increased confidence and faith in the brand (Boonlertvanich, 2019). Customers may feel more at ease knowing they can count on the company's dependable service because the name is associated with it.

Customers are more likely to be pleased with a bank if it provides high-quality digital services, and the satisfaction boost will be even more pronounced if the bank also has strong brand equity. According to Flores et al. (2020), brand value directly correlates with customer satisfaction since committed customers are more likely to have a positive overall experience. Therefore, businesses that focus on customer satisfaction will see bigger returns in the form of repeat business and advocacy. Quality digital services have been linked to increased customer satisfaction, highlighting their importance in the overall equation. Banks with high brand equity that are also seen to provide great digital services would have higher customer satisfaction, according to a study by Flores et al. (2020). A bank's brand and customer base will flourish if it prioritizes providing high-quality digital service to its clients.

Given that a company's reputation plays a significant role in the loyalty and contentment of its customers, it stands to reason that brand equity would moderate the relationship between digital service quality and customer satisfaction in banks (Boonlertvanich, 2019). The hypothesis is that brand equity moderates the positive link between digital service quality and bank customer satisfaction (Flores et al., 2020). This hypothesis is predicated on the supposition that customers' satisfaction levels are affected by the quality of digital services and that the relationship between digital service quality and customer contentment is moderated by the strength of the brand's equity. Brand equity in the banking industry is significant since it indicates customer loyalty and trust and influences their choice of financial institution (Ebrahim, 2019). According to the proposed hypothesis, the connection between digital service quality and consumer

satisfaction is moderated by the strength of the brand.

H3: There is a moderating effect of bank brand equity on bank digital service quality affecting bank customer satisfaction

3.4.2 The moderating effect of bank brand equity in the relationship between bank customer satisfaction and bank customer loyalty

Brand equity has been found to have a significant impact on both customer loyalty and satisfaction in the banking industry (Hossain, 2021). The connections between satisfied customers and repeat business are moderated by brand equity (Boonlertvanich, 2019). One important result of satisfied customers is brand loyalty. There is a direct correlation between how satisfied and loyal a bank's clients are and their opinions of the bank's products and services (Abror et al., 2019). When both client loyalty and satisfaction are boosted by a bank's strong brand equity, the satisfaction/loyalty relationship is moderated. There are a few potential ways in which a company's brand equity might influence customer loyalty: increased customer trust in the bank, and more loyalty points and offers for existing clients (Boonlertvanich, 2019). Extensive customer service, low pricing, and high-quality offerings all contribute to satisfied customers. Meanwhile, high levels of client satisfaction and brand loyalty are beneficial to any financial institution (Iglesias et al., 2019). Additionally, brand equity influences customer loyalty through its assurance of dependability and uniformity. Customers are more likely to remain loyal to a bank if they have received high-quality products and services in the past (Boonlertvanich, 2019). They have similar expectations, and they may even become brand advocates for the bank. Brand equity has an effect on client loyalty since it increases customer confidence in the bank's offerings. Finally, when a bank does a good job of communicating its brand, it sees a moderated effect on customer loyalty and satisfaction. A bank's brand message must be conveyed unambiguously, precisely, and consistently (Boonlertvanich, 2019). This is done so that clients have a solid foundational knowledge of the banking services available to them. Customers who are familiar with the bank's identity tend to be more loyal since they make more informed

decisions when it comes to financial risk. Customers who are aware of the bank's reputation and who face the necessity of switching banks can do so knowingly and with an appreciation of the potential downsides (Manyanga et al., 2021). Therefore, it is hypothesized that a bank's brand equity acts as a moderator between the loyalty and satisfaction of its customers.

H4: There is a moderating effect of bank brand equity on bank customer satisfaction affecting bank customer loyalty.

3.5 The mediating effect of bank customer satisfaction

Customer satisfaction and loyalty are strongly correlated with the quality of a bank's digital services, including online banking, mobile banking, and remote banking. According to research by Zariman et al. (2022), satisfied consumers are less likely to switch to a different provider. The bank benefits from customer loyalty through higher income and decreased expenses. There is a favorable relationship between the quality of digital services and client retention rates. Customers appreciate the speed and simplicity with which their digital accounts may be accessed (Zariman et al., 2022). Customers expect that digital services will be reliable, private, and equipped with useful extras. Customer service can be improved with digital services because of the increased accessibility of information and the reduced friction of providing feedback. Customers who are happy with the services they receive are more inclined to stick with the bank and tell their friends about it.

Customers' satisfaction with those services mediates this connection between digital service quality and customer loyalty. According to research by Zariman et al. (2022), a service provider's ability to keep their customers happy is a major predictor of how likely they are to recommend that provider to others. Customers who feel their needs have been met are more likely to become repeat buyers and to spread the word about their positive experiences (Miao et al., 2022). However, dissatisfied clients are more likely to look elsewhere, costing banks business and revenue (Miao et al., 2022).

Customer satisfaction was investigated as a mediator of the relationship between service quality and financial performance in Australian banks by Al-Hawari and Ward (2006) using a mediation model. Karatepe (2011) investigated the mediating role of bank customer satisfaction in the impact of service environment, interaction quality, empathy and reliability on bank customer loyalty by collecting data from bank customers in Northern Cyprus, based on the results of hierarchical multiple regression analysis showed a significant mediating role of bank customer satisfaction between service quality and loyalty.

H5: There is a mediating effect of bank customer satisfaction on bank digital service quality affecting bank customer loyalty.

H5a: There is a mediating effect of bank customer satisfaction on bank digital service quality of tangibility affecting bank customer loyalty.

H5b: There is a mediating effect of bank customer satisfaction on bank digital service quality of user-friendliness affecting bank customer loyalty.

H5c: There is a mediating effect of bank customer satisfaction on bank digital service quality of security & privacy affecting bank customer loyalty.

H5d: There is a mediating effect of bank customer satisfaction on bank digital service quality of responsiveness affecting bank customer loyalty.

H5e: There is a mediating effect of bank customer satisfaction on bank digital service quality of efficiency affecting bank customer loyalty.

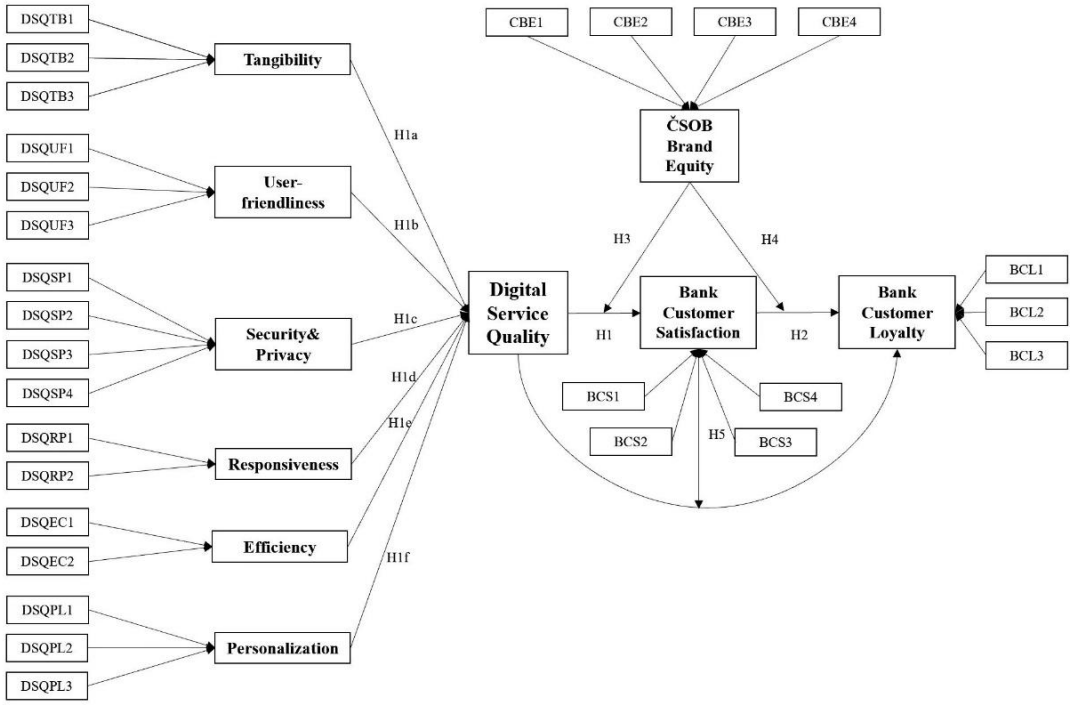
H5f: There is a mediating effect of bank customer satisfaction on bank digital service quality of personalization affecting bank customer loyalty.

3.5 Conceptual Model

It is anticipated that bank customer satisfaction mediates the link between digital service

quality and bank customer loyalty and that bank brand equity moderates the link between these two variables.

Figure 3.2 Conceptual Model



Source: Author's own work.

4 Questionnaire Design and Data Collection

4.1 Principles of Questionnaire Design

In examining how digital service quality affects customer loyalty by influencing bank customer satisfaction with ČSOB, the top bank in the Czech Republic, is the main subject of this study research. This thesis primarily relies on questionnaires to get feedback from ČSOB customers regarding the satisfaction and loyalty of ČSOB's digital service quality. Exploratory factor analysis, confirmatory factor analysis, multiple regression analysis, moderating effects analysis, mediating effects analysis and structural equation modelling are used to analyze the data. The questions in the questionnaire are carefully focused on the ČSOB customers` satisfaction and loyalty towards the ČSOB's digital financial services and are set according to the actual scenario of the bank's clients to avoid any logical fallacies. This is done to ensure that the data gathered is authentic and valid. In order to make the questionnaire about bank customers' perceptions of the ČSOB's digital service quality concise, simple to comprehend, and focused, repetition and redundancy were avoided for each question.

There are a total of five sections in the questionnaire: (1) the Bank Digital Service Quality Questions; (2) the Bank Customer Satisfaction Questions; (3) the Bank Customer Loyalty Questions; (4) The ČSOB Brand Equity Questions; and (5) Demographic questions regarding gender, age, occupation, income, education level, years of use of digital banking services, frequency of use of digital banking services, and frequently used ČSOB digital banking services. All responses were tallied using a 7-point Likert (1932) scale: 1 meant "Strongly Disagree," 2 meant "agree," 3 meant "Slightly Disagree," 4 meant "Neutral," 5 meant "Slightly Agree," 6 meant "Agree," and 7 meant "Strongly Agree."

The measurement dimensions in this paper are based on six dimensions formed from the SERVQUAL model of Parasuraman et al. (1988) and Yilmaz et al. (2018) and the models of different researchers that are discussed extensively in section 2, 3. The Bank's

Digital Service Quality Scale, consisting of six dimensions of (1) Tangibility, (2) User Friendliness, (3) Security & Privacy, (4) Responsiveness, (5) Efficiency, and (6) Personalization, is shown in Table 4.1 to Table 4.6.

In my research, the DSQTB (Digitial Service Quality_Tangibility) Scale is based on Rosima and Apat (2022), and there are total 3 questions. From the literature discussion in section 2, retail banking as a financial service industry, to explore its service quality it is necessary to observe users' subjective perception feedback. The interactivity of digital banking is the best source of word-of-mouth and reputation of digital banking, which is the best source of users' subjective perception of digital banking and the display of digital banking service quality. Wu (2022) points out that functional value perception is the utilitarian benefit perception about the basic utility of a product that consumers obtain from the quality and functionality of the product they buy. In conjunction with the discussion in section 2 and 3, tangibility is one of the six dimensions in my research model. Just like the quality of a banking product, the ease of use, reliability and usability of a banking product are also tangible perceptions that customers have of a banking product. It is also the most intuitive thing that users can experience from digital banking. When users are satisfied with these most intuitive and basic features, the brand image will establish a basic impression in the mind of the user.Wu (2022) states that this is the most basic need and purpose of the user when choosing a product. After this basic condition is met, users begin to seek satisfaction from other higher dimensions, which Wu (2022) expresses as consumers are more willing to repeat purchases of services whose perceived value exceeds the pricing of the service itself. Therefore, my questionnaire will include website design of digital banking, mobile app and smart services of physical banking as the very first questions of the questionnaire.

Table 4.1 Bank digital service quality measurement questions - Tangibility

Digitial Service Quality—Tangibility (DSQTB)	
1. ČSOB has appropriate digital financial services facilities, such as digital online website, a smart service facility in the banking hall, a smart app - ČSOB Smart, and etc.	Rosima and Apat (2022)
2. ČSOB has good promotion tools such as pamphlets to advocate its digital financial services	
3. ČSOB digital financial services design are obvious, if clearly marked	

Source: Author's own work.

The DSQUF (Digitial Service Quality_User Friendliness) scale is based on Alarifi and Husain (2023), and there are total 3 questions. Apart from the most basic dimension of tangibility, the other five dimensions are based on the customer's recognition of tangible services, which in turn has started to lead to more in-depth research and assessment of digital service quality. Mir et al. (2023), and Alarifi and Husain (2023) have pointed out that one of the important criteria for measuring service quality in the digital era is the degree of user friendliness. In fact, Mir et al. (2023) pointed out that in the traditional service industry, i.e., traditional banking, the ability of the user to feel friendly and good service experience is also an important criterion for measuring service quality.Lau et al. (2013) pointed out a similar evaluation criterion when discussing the tangibles. The tangibles contained in the counter service staff's attitude is enthusiastic or not, whether the service is simple, smooth, and at a glance, and whether the user availability of their preferred language services, etc. are also important manifestations of friendliness in the evaluation of service quality. Alarifi and Husain (2023) argued that there is a need to observe and measure user-friendliness as a separate dimension in the evaluation of digital services. When the underlying services of digital services are homogenised, user-

friendliness increases the user's favourability and becomes an important reason for the user to choose or even be loyal to the digital service. Alarifi and Husain (2023) state that the user interface and user interface design involved in digital banking is a bridge between the bank and the user through digital mediums, and whether these mediums feel valuable and whether it is smooth to use is a key factor.

Table 4.2 Bank digital service quality measurement questions - User-Friendliness

Digital Service Quality—User Friendliness (DSQUF)	
4. ČSOB digital financial services are simple and easy to use	Alarifi and Husain (2023)
5. The ČSOB digital Financial Service is highly readable, with all service functions visible at a glance	
6. ČSOB Digital Financial Services communicates and listens in a language that customers can understand	

Source: Author’s own work.

The DSQSP (Digitial Service Quality_Security & Privacy) scale is based on Mir et al. (2023), and there are total 4 questions. Whilst efficiency is an important indicator of the quality of digital services, security and privacy are also of paramount importance and concern to users, with researchers' concerns about security and privacy being almost ubiquitous in section 2 and 3. The most important security and privacy concerns of users are: is the transaction environment of digital banking secure and is the user's money safe (Mir et al., 2023) ? Zhu and Chen (2012) attribute security and privacy to TRUST, i.e., whether users can trust the providers of digital services, especially digital banking, which entails direct access to important privacy issues such as the user's private identifying information and possessions, and thus Mir et al (2023) set out to ask questions that include in digital service quality Therefore, Mir et al. (2023) set the question to include the security of personal data submitted by users in digital financial

services. Privacy and data security are the most concerned topics in the 21st century. Arcand et al (2017) argued that with the spread of data leakage problems in some internet companies, it makes users more concerned than ever about the ability of digital services to protect their privacy and security, and that service providers of digital finance do not share users' personal information with other companies. Arcand et al (2017) and Shanker et al. (2020) also point out that current digital banking services are aggressively promoting and engaging their users by emphasising how they protect their users' security through technological means as these banks are well aware of their users' concerns.

Table 4.3 Bank digital service quality measurement questions - Security & Privacy

Digital Service Quality—Security & Privacy (DSQSP)	
7. The trading environment of ČSOB digital Financial Services is secure	Mir et al. (2023)
8. Client money is safe with ČSOB Financial Digital Services	
9. ČSOB Financial Digital Services ensures customer privacy	
10. ČSOB Digital Financial Services channels do not share any personal information with other channels	

Source: Author’s own work.

The DSQRP (Digitial Service Quality_Responsiveness) scale is based on George and Kumar (2014), and there are total 2 questions. George and Kumar (2014) proposed a detailed measurement dimension-responsiveness and they pointed out that it is a very important measurement dimension for digital banking services. In the previous dimensions of user-friendliness and efficiency, we pointed out that users are very much focused on their personal service experience when using digital banking services and are looking for smooth and efficient services. In many studies responsiveness is a part of

efficiency and George and Kumar (2014) pointed out that in digital services users are increasingly focusing on whether they are valued by the digital bank and are more in need of a ready and timely response to their needs. Iberahim et al (2016) pointed out that due to the fast-paced life and work, users seek for a timely response to their raised questions in a timely manner, otherwise they will feel slowed down and thus reduce their satisfaction with digital banking. In addition, Rita et al. (2019) also pointed out that digital banks, especially mobile apps, are striving to build an efficient and accurate virtual customer service AI to meet the 24/7 and timely response service, Rita et al. (2019) argued that this responsiveness has a great impact on the evaluation of the e-servic quality which can affect the user's satisfaction and loyalty to the digital banking service. Therefore, this study takes responsiveness as a research dimension, differentiated from efficiency, which is more concerned with the speed of feedback received by users after asking questions and needs, whereas efficiency refers more to the high efficiency of users in using digital service.

Table 4.4 Bank digital service quality measurement questions - Responsiveness

Digital Service Quality—Responsiveness (DSQRP)	
11. The ČSOB Digital Financial Services Staff is able to record and provide feedback on customer service issues in a timely manner	George and Kumar (2014)
12. ČSOB Digital Financial Services has a 7/24-hour AI customer service that can clear up doubts and provide advice to customers	

Source: Author’s own work.

The DSQEC (Digitial Service Quality_Efficiency) scale is based on George and Kumar (2014), and there are total 2 questions. In the discussion of user-friendliness, the user's experience in digital services especially web and mobile banking services can greatly influence the user's perception of digital banking and then decide whether they want to use this digital banking service for a long period of time or not, i.e., loyalty. For

improving the user experience, George and Kumar (2014) proposed a dimensional concept - efficiency. George and Kumar argued that in the era of digital services, speed and efficiency are among the most important factors that users value in using the services and experiences. This not only highlights the overall characteristics of digital services that seek efficiency, but it is an overall ethos in the current fast-paced digital era. The emergence of digital banking itself is also a way to meet the users' pursuit of efficient banking services, because compared to the need to physically arrive at a physical bank and face the inefficiencies that exist in waiting in queues for business, digital banking online directly one-to-one to face the customer, no need to go out of the house and queuing time, the user can be operated on their own in mobile phones and computers is much more efficient than the traditional bank has been (George & Kumar , 2014). Mbama and Ezpue (2018) based on George and Kumar (2014) pointed out that the simplification and optimisation of the interface design and UI of their mobile apps among the digital banks are also maximising the creation of convenience for the users and shortening the time for the users to use the services, which in turn results in increased efficiency for the users. Shankar et al. (2020) argued that current digital users, especially young users, place the highest value on the convenience of digital services, and therefore the efficiency of the service becomes a heavily weighted factor in measuring the quality of digital services.

Table 4.5 Bank digital service quality measurement questions - Efficiency

Digital Service Quality—Efficiency (DSQEC)	
13. ČSOB Digital Financial Services always meets customer needs in a timely manner	George and Kumar (2014)
14. ČSOB digital financial digital services are highly efficient	

Source: Author’s own work.

The DSQPL (Digitial Service Quality_Personalization) scale is based on Mir et al.

(2023), and there are total 3 questions. Wewege (2020) notes that there are similarities between the personalisation dimension and the responsiveness dimension, both being influential factors that are amplified in the digitisation process. Wewege (2020) also notes that customers of digital services, especially the younger generation, place great importance on whether or not the individual is valued by the service provider, and that they perceive ordinary and consistent services to be mediocre and perfunctory, and therefore they would prefer that digital Mir et al (2023) point out that users also expect digital banks to expand their services to include digital healthcare, digital wellness, and other services based on the user's personally identifiable information to build an integrated service platform that facilitates the user's digital experience. One of the expectations of the Czech government for digital service providers in 2022 is to build platforms to take over the functions of digital healthcare, digital government, etc. Mir et al. (2023) point out that users believe that they should be able to personalise and optimise the services they receive from the service with their own personal data, provided that they share their personal information and shopping preferences with the digital bank. Therefore, this study uses personalisation as one of the six dimensions to study the quality of digital services based on the research model of Mir et al. (2023).

Table 4.6 Bank digital service quality measurement questions - Personalization

Digital Service Quality—Personalization (DSQPL)	
15. ČSOB can meet customers' personal needs for digital financial services	Mir et al. (2023)
16. ČSOB digital financial services can provide customers with certain value-added services, such as sports and fitness, medical and health, leisure and entertainment, food and beverage, etc.	
17. ČSOB digital financial services designed with customers` preferences. (e.g., Customers can change their preferences in the ČSOB Smart)	

Source: Author’s own work.

The measurement of bank customer satisfaction is based on the Alarifi and Husain (2023) scale with 4 questions and the measurement of bank customer loyalty is based on Zeithaml et al. (1996) with 4 questions. Details can be found in Table 4.7 & Table 4.8.

Table 4.7 Bank Customer Satisfaction Measurement Questions

Bank Customer Satisfaction (BCS)	
18. I am satisfied with my choice of ČSOB digital financial services	Alarifi and Husain (2023)
19. I am more satisfied with ČSOB digital financial services than other banks	
20. I think it is wise to use ČSOB digital financial services	
21. I am happy to use ČSOB digital financial services	

Source: Author's own work.

Table 4.8 Bank Customer Loyalty Measurement Questions

Bank Customer Loyalty (BCL)	
22. I will introduce ČSOB digital financial services to people who ask me for advice	Zeithaml et al. (1996)
23. I will post positive reviews of ČSOB digital financial services online	
24. I intend to continue using ČSOB digitial financial services afterwards.	

Source: Author's own work.

The measurement scale for ČSOB Brand Equity is adapted from Loureiro and Sarmento (2018) and has a total of four questions.

Table 4.9 ČSOB Brand Equity Measurement Questions

ČSOB Brand Equity (CBE)	
25. I am proud of using ČSOB digital financial services	Loureiro and Sarmento (2018)
26. I would prefer ČSOB digital financial services.even if another brand has the same features as ČSOB	
27. I prefer ČSOB if there is another bank as good as ČSOB	
28. It would be smart not to change if there was a bank like ČSOB	

Source: Author's own work.

4.2 Model Specification

4.2.1 Factor Analysis Model Specification

Factor analysis is the most commonly used test of construct validity, in which researchers use factor analysis to test the validity of a test instrument and effectively extract common factors, and if the common factors are close to the characteristics of the theoretical construct, the measurement instrument or scale is said to have construct validity (Gorsuch, 2013). The basic aim of factor analysis is to reduce the number of indicators and to identify a selection of conceptually meaningful and similar, independent common factors in a group of correlated and not easily interpretable data

that are sufficient to capture most of the information about the original variable (Gorsuch, 2013).

There are two types of factor analysis, EFA (Exploratory Factor Analysis) , and CFA (Confirmatory Factor Analysis). Exploratory Factor Analysis is when there is a lack of clear theoretical expectations about the internal structure of the test, all the measures are put together in a factor analysis, and then the resulting factor loadings are used to judge the goodness of construct validity (Mavrou, 2015). If the factor loadings of the indicators measuring the same dimension are higher (usually higher than 0.4) and at the same time the factor loadings on the other dimensions are lower, it means that the test has a higher construct validity (Mavrou, 2015). According to exploratory factor analysis it is possible to identify indicators that are not related to the measurement or do not meet expectations in order to identify the internal structure of the test. Confirmatory Factor Analysis is based on Exploratory Factor Analysis (Gallagher & Brown, 2013). Confirmatory Factor Analysis is a way of fitting an existing theoretical model to the data to a Validation Factor Analysis focuses on the validity of three parts of the model: structural validity, convergent validity, and discriminant validity (Gallagher & Brown, 2013). The mathematical formula is as follows:

$$F_1 = \alpha_{11}X_1 + \alpha_{12}X_2 + \alpha_{13}X_3 + ... + \alpha_{1m}X_m \quad (4.1)$$

$$F_2 = \alpha_{21}X_1 + \alpha_{22}X_2 + \alpha_{23}X_3 + ... + \alpha_{2m}X_m \quad (4.2)$$

...

$$F_p = \alpha_{p1}X_1 + \alpha_{p2}X_2 + \alpha_{p3}X_3 + ... + \alpha_{pm}X_m \quad (4.3)$$

This thesis measures bank digital service quality in six dimensions, ČSOB's equipment and facilities, appearance, and brochures as a measure of Tangibles, ČSOB's digital services' simplicity, ease of use, ease of understanding, and ease of communication as a measure of User-friendliness, ČSOB's digital services' information security, security of

funds, and customer privacy as a measure of Security & Privacy as the measurement standard, Timely response of ČSOB staff, AI customer service as the measurement standard of Responsiveness, Efficiency and timeliness of ČSOB digital services as the measurement standard of Efficiency, Individualisation, value-added products and customised services of ČSOB digital services as the measurement standard of Personalisation as a measure of personalisation, Satisfaction as a measure of customer satisfaction and happiness with ČSOB Digital Services, and Loyalty as a measure of customer recommendation, continued use and positive feedback on ČSOB Digital Services.

4.2.2 the Moderating effect Model Specification

Moderating effects are used to examine the effects of two or more factors working together in combination on the indicator variable under study, and are reflected in practical studies where changes in the level of the factors have an effect on the indicator, as well as different levels of association between individual factors (MacKinnon, 2011). Bank brand equity refers to positive associations with and awareness of the bank brand, perceptions of quality, and brand loyalty (Yoo & Donthu, 2001; Loureiro et al., 2014; Rambocas et al., 2014) . Brand equity is the most direct manifestation of brand loyalty indicators (Rubio & Yagüe Guillén, 2019). Based on the customer's perception of the brand, brand equity affects the customer's performance in perceived service quality and satisfaction. As a result of the brand's past good standards, customers are willing to generate higher ratings of perceived service and satisfaction, which in turn affects loyalty (Rubio & Yagüe Guillén, 2019). ČSOB customers' perception of ČSOB brand equity may affect digital service quality and bank customer satisfaction, and the relationship between bank customer satisfaction and bank customer loyalty. The formula for the moderating effect is as follows.

$$M_{bankcustomersatisfaction} = a_0 + a_{1j}X_{tangibility} + a_{2j}X_{userfriendliness} + a_{3j}X_{securityprivacy} +$$

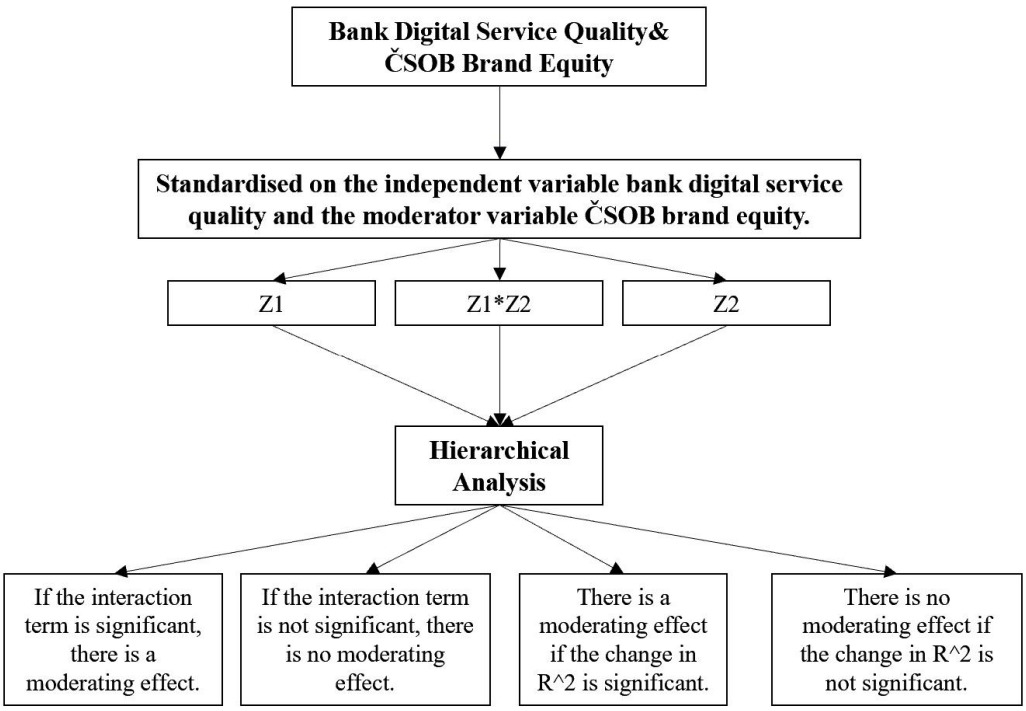
$$a_{4j}X_{responsiveness} + a_{5j}X_{efficiency} + a_{6j}X_{personalization} + a_{7j}X_{ČSOBbrandequity} +$$

$b_j X_j X_{\check{C}SOBbrandequity} + \varepsilon_j$ (4.4)

$$Y_{bankcustomerloyalty} = a_0 + a_{1j}X_{bankcustomersatisfaction} + a_{2j}X_{\check{C}SOBbrandequity} + b_j X_j X_{\check{C}SOBbrandequity} + \varepsilon_j \quad (4.5)$$

In this thesis, the moderating mechanism of ČSOB brand equity in 6 dimensions of bank digital service quality and bank customer satisfaction will be investigated through moderating effects, and the moderating mechanism of ČSOB brand equity in bank customer satisfaction and bank customer loyalty will be investigated through moderating effects. a_{ij} (i=0,1,2,3,4,5,6,7, and j=1,2,3,4,5,6,7) is coefficient, b_j is moderated coefficient, ε_j is the error term.

Figure 4.1 Steps for testing moderating effects



Source: Author's own work.

4.2.3 The Mediating Effect Model Specification

The mediating effect is the use of one or more intermediate variables, M, to conduct the effect of the independent variable X on the dependent variable Y. M is the mediating

variable, which exerts the mediating effect (Hayes, 2017). The formula is as follows:

$$Y_{bankcustomerloyalty} = K1_{bankdigitalservicequality}X_{bankdigitalservicequality} + \varepsilon_1 \quad (4.6)$$

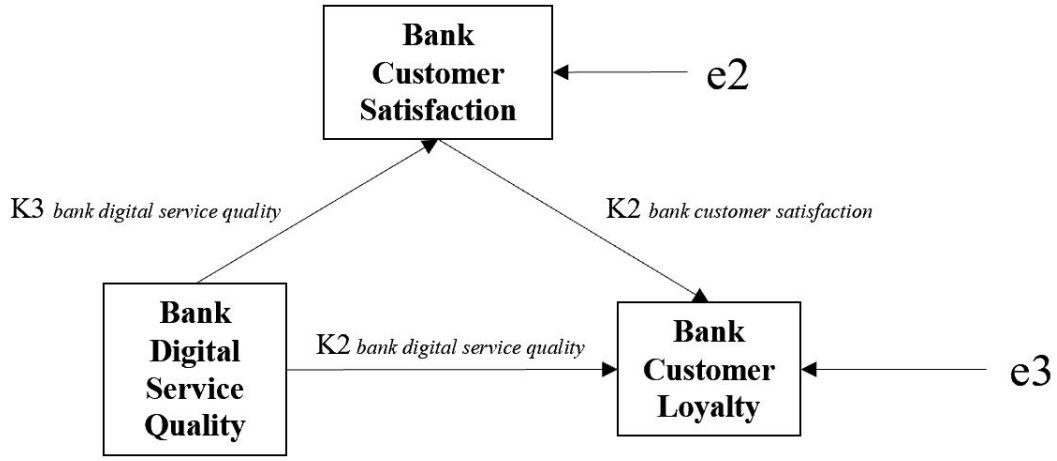
$$M_{bankcustomersatisfaction} = K3_{bankdigitalservicequality}X_{bankdigitalservicequality} + \varepsilon_2 \quad (4.7)$$

$$Y_{bankcustomerloyalty} = K2_{bankdigitalservicequality}X_{bankdigitalservicequality} + K2_{bankcustomersatisfaction}M_{bankcustomersatisfaction} + \varepsilon_3 \quad (4.8)$$

Figure 4.2 The Mediating effects model 1

Source: Author's own work.

Figure 4.3 The Mediating effects model 2 & 3



Source: Author's own work

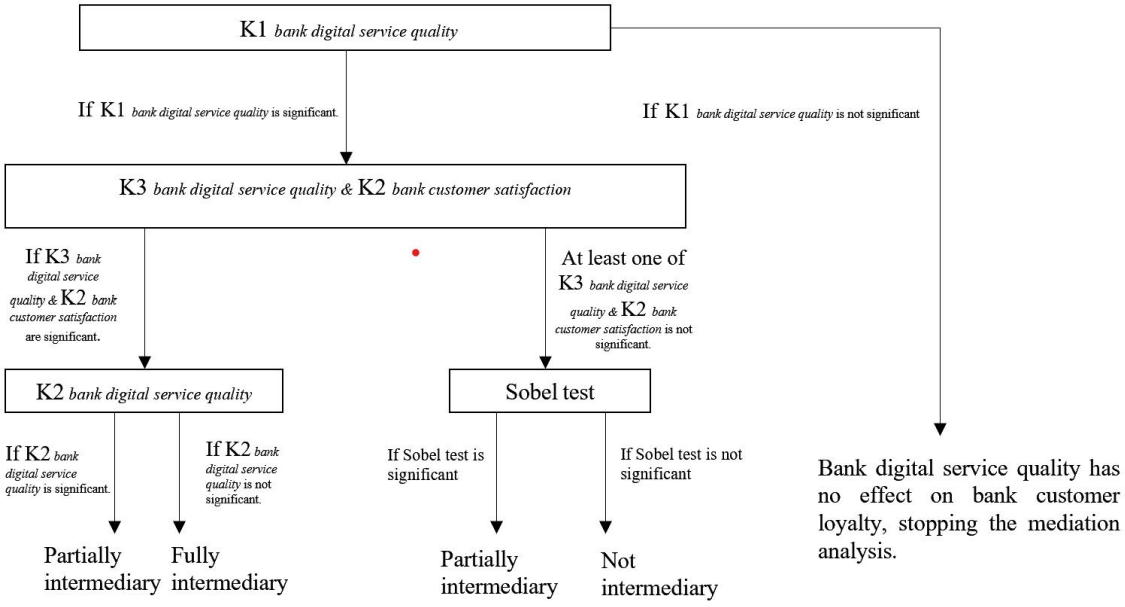
In the Model 1,

$K1_{bankdigitalservicequality}$ is the total effect of $X_{bankdigitalservicequality}$ on $Y_{bankcustomerloyalty}$, $K3_{bankdigitalservicequality}K2_{bankcustomersatisfaction}$ is the mediating effect through the

mediating variable $M_{bankcustomersatisfaction}$, and $K2_{bankdigitalservicequality}$ is the direct effect. When there is only one mediating variable, the total effect = the direct effect + the mediating effect ($K1_{bankdigitalservicequality} = K2_{bankdigitalservicequality} + K3_{bankdigitalservicequality}K2_{bankcustomersatisfaction}$).

As for partial mediation effect, it refers to the existence of both direct and mediation effects, i.e., one part of $X_{bankdigitalservicequality}$ directly affects $Y_{bankcustomerloyalty}$ (coefficient $K2_{bankdigitalservicequality}$ is significant), and the other part affects $Y_{bankcustomerloyalty}$ through the mediating variable $M_{bankcustomersatisfaction}$ (coefficient $K3_{bankdigitalservicequality}K2_{bankcustomersatisfaction}$ is also significant). And the full mediating effect is that $X_{bankdigitalservicequality}$ cannot have an effect on $Y_{bankcustomerloyalty}$ directly, but must be transmitted through $M_{bankcustomersatisfaction}$. In this case, the coefficient $K2_{bankdigitalservicequality}$ is 0, $K1_{bankdigitalservicequality} = K3_{bankdigitalservicequality}K2_{bankcustomersatisfaction}$.

Figure 4.4 Flowchart of the mediating effect test



Source: Author's own work

4.3 Analytical tools and methodology

The following software and methods were used in this thesis to process and analyse the questionnaire data.

4.3.1 Descriptive Statistical Analysis

Descriptive statistical analysis is to summarise, organise, categorise and simplify the data obtained in the research, as a way to reflect the basic characteristics of the research sample (Gaur & Gaur, 2009). In this thesis, descriptive statistical analysis is used to reflect the concentration trend, degree of dispersion and strength of correlation of ČSOB customers' data, which mainly includes data distribution, frequency analysis, mean, standard deviation and some basic statistical graphs.

4.3.2 Reliability Testing

Reliability refers to the reliability of the scale results, the higher the repeatability and reliability of the scale, the more it is not affected by the time and place of the environment, the more stable the results of the test with it (Carmines & Zeller, 1979).

The higher the alpha coefficient, the higher the reliability, the better the internal consistency of the questionnaire, it is generally believed that, when the alpha of $0.7 \leq$ alpha < 0.8, the reliability of the questionnaire is quite good, when the Cronbach`s alpha coefficient is greater than 0.8, the questionnaire has a very high value of the use (Kamis et al., 2020). When the value of Cronbach`s alpha coefficient is greater than 0.8, the questionnaire has a very high value for use (Kamis et al., 2020).

4.3.3 Validity Testing

Validity is often defined as the degree of agreement between the definition of a construct and the test and is an important reflection of the quality of the measurement (Schwab, 1980). Validity is generally categorized in research as Content Validity and Construct Validity. Content validity refers to the extent to which the content of a test reflects or represents the construct that the researcher is trying to measure (Haynes et al., 1995). Construct validity refers to the extent to which a structure is reflected in the results of a measurement and corresponds to the values measured, including Convergent Validity and Discriminant Validity (Haynes et al., 1995). Construct validity refers to the agreement between the measurement model and the constructed theoretical model (Strauss & Smith, 2009). The results of construct validity are often expressed in terms of model fit, and the main references of fit include X^2/df, RMSEA, GFI, AGFI, CFI (Strauss & Smith, 2009). Convergent Validity refers to the degree to which the observed values should be highly correlated when agreeing on concepts measured in different ways (Haynes et al., 1995). Discriminant validity means that the observed values should be distinguishable when different constructs are measured in different ways (Haynes et al., 1995). Discriminant validity examines the variability between variables, and when the square root of the AVE of a variable is greater than the absolute value of its own correlation coefficient with other variables, it means that the data of the study has good discriminant validity (Nugent, 1993).

The CR of a latent variable is the combination of the reliabilities of all the observed variables and is used to analyse the consistency between the observed variables and is

given by,

$$\mathrm{CR} = \left(\frac{(\sum\lambda_i)^2}{[(\sum\lambda_i)^2 + \sum(\varepsilon_i)]}\right)$$ (Raykov, 1997) (4.9)

Whereby, λ is the standardized factor loading for item i and ε is the respective error variance for item i. The error variance (ε) is estimated based on the value of the standardized loading (λ) as,

$\varepsilon_i = 1 - \lambda_i^2$

Average Variance Extracted is able to reflect how much of the variance explained by each latent variable comes from all the topics in that latent variable, and when the AVE value is greater than 0.5, it indicates that the latent variable has a good convergent validity, which is given by the formula,

$$\mathrm{AVE} = \left(\frac{(\sum\lambda_i)^2}{(\sum\lambda_i)^2 + \sum Var(\varepsilon_i)}\right)$$ (Fornell & Larcker, 1981) (4.10)

In this thesis, Exploratory Factor Analysis (EFA) is carried out by SPSS 26.0, and Confimatory Factor Analysis (CFA) methods are employed using AMOS 26.0. The validity test include the convergent validity and discriminant validity

4.3.4 Structural Equation Modelling (SEM) Analysis

Structural equation modelling is an analytical method to measure the relationship between different variables (Kline, 2014).The purpose of SEM is mainly to conduct a path analysis of the research model and to test the validity of the prior hypotheses on the basis of the model fit (Kline, 2014). This study hypothesises that bank customer satisfaction has a mediating effect between digital service quality and bank customer loyalty. In thesis choose to use Bootstrap method to perform the mediation effect test by using the Process software in SPSS26.0. Before the test starts, the sample size of Bootstrap execution is set to 5000, and then the original data are imported into the modified model to perform the mediation effect test. According to the results of the

structural equation model after Bootstrap, the point estimates (Point estimate), standard error (SE), Bias-Corrected percentile, 95% confidence intervals of the Percentile methods, and the significance levels of their two-tailed tests for the total effect, direct effect, and indirect effect after execution are obtained. (Sig.) (Stine, 1989). According to the mediation effect principle of Process, if the confidence interval after Bootstrap implementation does not include zero or the significance level of the two-tailed test is less than 0.05, then the corresponding total, direct, or indirect effect is significant, and vice versa, there is no significant effect (Stine, 1989).

5 Results

5.1 Sample Selection and Description

This study use simple random sampling method to obtain survey respondents mainly from Qualtric platform. The sampling units are ČSOB customers and the sampling area was focused on Prague region. The online questionnaires are used to collect the opinions of ČSOB customers on ČSOB's digital service quality, satisfaction, loyalty and ČSOB brand equity.. In total, the questionnaire consists of 36 questions, 17 questions on ČSOB digital service quality, 4 questions on ČSOB customer satisfaction, 3 questions on ČSOB customer loyalty, 4 questions on ČSOB brand equity, and the remaining 8 questions on basic information. (The questionnaire sample sees Appendix 2).

During the sampling process, this study try to avoid the influence of human factors on sample selection, and validate and screen the sample to ensure its accuracy and representativeness. In the end, a total of 500 online questionnaires are distributed and 455 valid questionnaires are returned with a validity rate of 91%. By collecting and arranging the data, and using SPSS 26.0 to analyse the descriptive statistics of the 455 questionnaire samples, this study obtains a table of basic information about the

respondents, as shown in Table5.1.

Table 5.1 Demographics

Variable	Category	Frequency	Percent
Gender	Female	179	39.3
	Male	260	57.1
	Non-binary / third gender	16	3.5
	Total	455	100
Age	18 - 25 years old	90	19.8
	26 - 35 years old	113	24.8
	36 - 45 years old	158	34.7
	46 - 55 years old	63	13.8
	Above 55 years old	29	6.4
	Prefer not to say	2	0.4
	Total	455	100
Occupation	Prefer not to say	10	2.2
	Private Sector	157	34.5
	Public Sector	94	20.7
	Self-employed	72	15.8
	Semi-public Sector	91	20
	Unemployed	31	6.8
	Total	455	100
Monthly Pre-tax Income	No income	34	7.5
	Less than 23,000 CZK	76	16.7
	23,000 CZK to 45,999 CZK	117	25.7
	46,000 CZK to 68,999 CZK	138	30.3
	69,000 CZK to 91,999 CZK	59	13
	92,000 CZK or more	18	4
	Prefer not to say	13	2.9
	Total	455	100
Education level	High School	103	22.6
	Bachelor`s degree	121	26.6
	Master`s degree	161	35.4
	Ph.D.	41	9
	Others	19	4.2
	Prefer not to say	10	2.2
	Total	455	100
Experience in using digital banking services	Less than 1 year	117	25.7
	1 - 3 years	213	46.8
	More than 3 years	125	27.5
	Total	455	100
How often do you use digital banking services?	Daily	137	30.1
	Weekly	173	38
	Monthly	126	27.7
	Yearly	19	4.2
	Total	455	100

Source: Author’s own work

Of the 455 ČSOB customers who participated in the survey, 57.1% are men and 39.3% are women, with significantly more male customers than females. In terms of age, ČSOB customers are mainly in the 36-45 age group (34.7%), followed by those in the 26-35 age group (24.8%). The survey on the educational background of ČSOB customers finds that 35.4% of them have a master's degree, which indicates that ČSOB customers surveyed are generally well-educated and they accepted the questionnaire well. In terms of occupation, the largest share of ČSOB customers working in the Private Sector is 34.5%. In terms of income, 46,000 CZK to 68,999 CZK is the main share of ČSOB customers amounting to 30.3%.

In terms of experience in using digital services of banks, 46.8%, almost half of ČSOB customers have 1-3 years of experience in using digital services, which indicates that ČSOB customers may have a high level of acceptance of digital services. 38% of ČSOB customers deal with bank digitalization on a weekly basis, and 30.1% of ČSOB customers have daily contact with bank digitalization services, indicating a high level of promotion and popularity of bank digitalization services.

5.2 Reliability Analysis

The reliability analysis of this questionnaire data is shown in Table 5.2. Alpha values for the six dimensions of digital service quality (DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL) are 0.832, 0.819, 0.854, 0.801, 0.748, 0.815, Alpha value for digital service quality (DSQ) is 0.858. Moreover, Bank customer satisfaction (BCS), Bank Customer Loyalty (BCL), and ČSOB Brand Equity (CBE) have an Alpha value of 0.861, 0.818, and 0.867, respectively. The Alpha values of all variables are greater than 0.7, which indicates that the questionnaires of this study are homogeneous, with high and stable reliability.

Table 5.2 Reliability Test of Cronbach`s Alpha

Dimensions	N of items	Total	Cronbach's Alpha
DSQTB	3	455	0.832
DSQUF	3	455	0.819
DSQSP	4	455	0.854
DSQRP	2	455	0.801
DSQEC	2	455	0.748
DSQPL	3	455	0.815
DSQ	17	455	0.858
BCS	4	455	0.861
BCL	3	455	0.818
CBE	4	455	0.867

Source: Author’s own work

5.3 Exploratory Factor Analysis

5.3.1 KMO and Bartlett's Test

Kaiser (1974) stated that when performing factor analysis, the KMO index can be referred to the following criteria: greater than 0.90 is highly suitable for factor analysis, between 0.8 and 0.9 is suitable, between 0.7 and 0.8 is fair, between 0.6 and 0.7 is barely acceptable, between 0.5 and 0.6 is unsuitable, and below 0.5 is highly unsuitable.

Table 5.3 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.871
Bartlett's Test of Sphericity	Approx. Chi-Square	6339.395
	df	378
	Sig.	0.000

Source: Author’s own work

The KMO and Bartlett's Test showed that the KMO value of the sample data was 0.871 greater than 0.8, which satisfied the prerequisite requirements for factor analysis. The KMO and Bartlett's Test reached the level of significance (P value=0.000 < 0.01) at the significance level of 1%, indicating that the questionnaire data of this study is suitable for exploratory factor analysis.

5.3.2 Determining factor variance contributions

Appendix 5 shows the variance contribution of the common factors. Common factors with eigenvalues greater than 1 are proposed according to the principal component method, and a total of nine public factors are extracted. The Rotation sums of squared loadings are: 10.632%, 10.413%, 10.155%, 8.097%, 8.088%, 8.007%, 7.599%, 5.972%, 5.665%, and the cumulative variance explained rates of the nine common factors after rotation are more than 70%, which indicates that the nine common factors have retained most of the original data information.

5.3.3 Rotated factor loading coefficients

Appendix 3 is obtained by maximum variance rotation method. Observation of the loading coefficients reveals that the commonality values of the 28 manifest variables and the corresponding common factors are all higher than 0.4, which means that the correlation between the manifest variables and the common factors is stronger, and the nine common factors can extract effective information.

5.3.4 Factor Score Coefficient Matrix

Use the weight of each factor's variance contribution ratio in the overall factor variance contribution ratio to objectively assign weights to each factor, avoiding the existence of commonality in the factors and resulting in small data coefficients, which cannot reflect the real situation. The regression method is used to estimate the factor score coefficients and output the factor score coefficients, and the specific results are shown in Appendix 4.

Establishing a linearly weighted comprehensive evaluation model, we can write down the following score functions for the common factors,

F1=-0.007*DSQTB1-0.049*DSQTB2-0.002*DSQTB3+0.005*DSQUF1-0.012*DSQUF2-0.016*DSQUF3-0.045*DSQSP1-0.038*DSQSP2-0.016*DSQSP3-0.036*DSQSP4-0.035*DSQRP1-0.021*DSQRP2-0.028*DSQEC1-0.033*DSQEC2-0.055*DSQPL1-0.006*DSQPL2-0.018*DSQPL3-0.013*BCS1-0.047*BCS2+0.013*BCS3-0.002*BCS4-0.041*BCL1+0.003*BCL2-0.033*BCL3+0.372*CBE1-0.314*CBE2+0.29*CBE3+0.307*CBE4 (5.1)

F2=-0.06*DSQTB1+0.005*DSQTB2-0.063*DSQTB3-0.061*DSQUF1-0.018*DSQUF2-0.031*DSQUF3+0.001*DSQSP1-0.047*DSQSP2-0.025*DSQSP3-0.019*DSQSP4-0.026*DSQRP1-0.047*DSQRP2-0.07*DSQEC1-0.018*DSQEC2-0.06*DSQPL1-0.022*DSQPL2-0.029*DSQPL3+0.416*BCS1+0.305*BCS2+0.336*BCS3+0.335*BCS4-0.045*BCL1-0.042*BCL2-0.051*BCL3-0.008*CBE1-0.009*CBE2-0.016*CBE3-0.022*CBE4 (5.2)

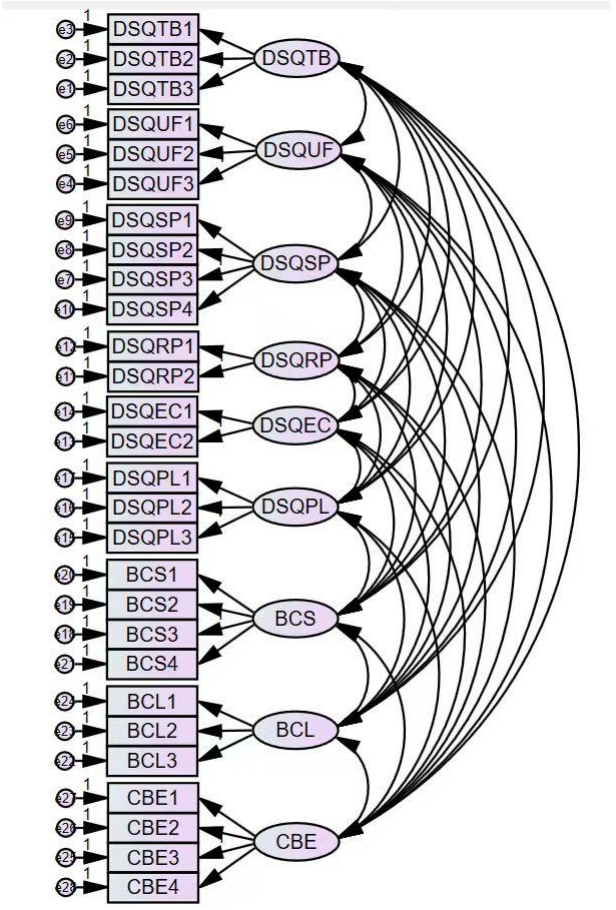
.....

F9=-0.046*DSQTB1+0.063*DSQTB2-0.084*DSQTB3-0.007*DSQUF1-0.017*DSQUF2-0.01*DSQUF3-0.033*DSQSP1-0.046*DSQSP2-0.059*DSQSP3+0.031*DSQSP4-0.039*DSQRP1-0.028*DSQRP2+0.642*DSQEC1+0.591*DSQEC2-0.04*DSQPL1-0.063*DSQPL2-0.012*DSQPL3-0.083*BCS1-0.003*BCS2-0.028*BCS3-0.039*BCS4-0.023*BCL1+0.019*BCL2-0.059*BCL3-0.072*CBE1-0.024*CBE2-0.011*CBE3-0.007*CBE4 (5.3)

5.4 Confirmatory Factor Analysis

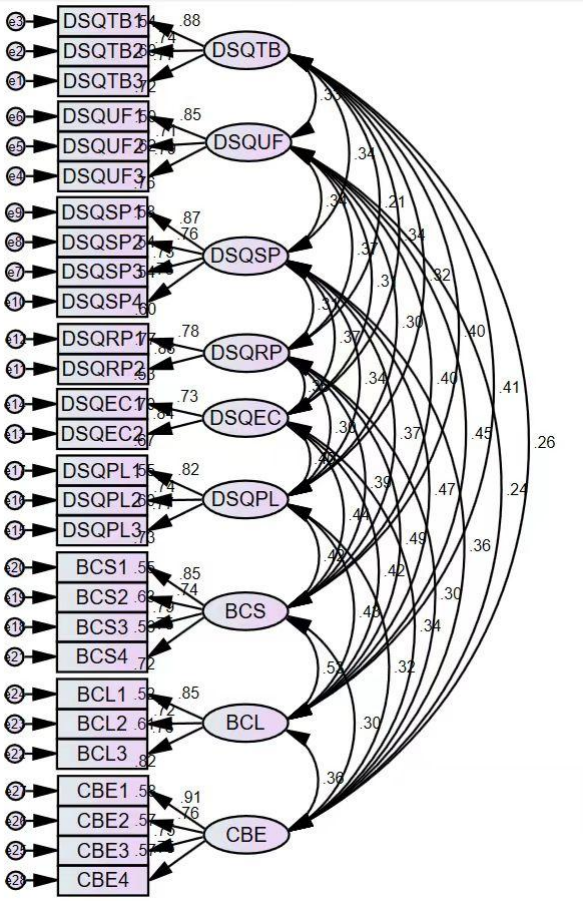
The confirmatory factor analysis pathway and confirmatory factor analysis pathway results for this study are shown in Figure5.1 and Figure5.2, respectively.

Figure 5.1 Confirmatory Factor Analysis Pathway



Source: Author's own work

Figure 5.2 Confirmatory Factor Analysis Pathway results



Source: Author's own work

5.4.1 Model Fit Indices

Table 5.4 show that the model fit indicators of GFI, AGFI RMSEA and CFI of the measurement model reached the critical level, which indicates that the overall fit of the measurement model is good.

Table 5.4 Model Fit Indices

Fit Index		Recommended Threshold	Model	Fit Measures
Absolute Index	X^2/df	⩽3 Hu & Bentler, 1999	1.747	GOOD
	GFI	⩾0.9 Hair et al. (2019)	0.924	GOOD
	AGFI	⩾0.8 Chau and Hu. (2001)	0.901	GOOD
	RMSEA	⩽0.08 Malhotra and Desh (2011)	0.041	GOOD
Relative Index	CFI	⩾0.9 Hair et al. (2019)	0.961	GOOD

Source: Author's own work

5.4.2 Convergent and discriminant validity

The results of the convergent and discriminant validity of this study are shown in Table 5.5. The standardized factor loadings for all measurement items were greater than 0.6, indicating that the latent factors explained most of the variance in the respective measurement items. The CR values for each of the latent factors were greater than 0.7, indicating that the measurement models have high internal consistency. The AVE values of the latent factors are all greater than 0.5. The results indicate that the convergent validity test of the research data in this thesis is satisfactory.

Table 5.5 Results of Validity Analysis

Latent Variable	Manifest Variable	Std. Estimate	AVE	CR
DSQTB	DSQTB1	0.880		
	DSQTB2	0.737	0.638	0.84
	DSQTB3	0.772		
	DSQUF1	0.851		
DSQUF	DSQUF2	0.711	0.616	0.827
	DSQUF3	0.787		
	DSQSP1	0.874		
DSQSP	DSQSP2	0.761	0.604	0.859
	DSQSP3	0.734		
	DSQSP4	0.732		
DSQRP	DSQRP1	0.778	0.69	0.816
	DSQRP2	0.879		
DSQEC	DSQEC1	0.725	0.615	0.76
	DSQEC2	0.839		
	DSQPL1	0.815		
DSQPL	DSQPL2	0.742	0.605	0.821
	DSQPL3	0.775		
	BCS1	0.853		
BCS	BCS2	0.738	0.617	0.865
	BCS3	0.795		
	BCS4	0.751		
	BCL1	0.851		
BCL	BCL2	0.72	0.616	0.827
	BCL3	0.779		
	CBE1	0.905		
CBE	CBE2	0.763	0.634	0.873
	CBE3	0.753		
	CBE4	0.754		

Source: Author's own work

Based on the values of AVE of each variable obtained from Table5.5, the square root of AVE of each variable was calculated to compare the correlation between different variables to test the discriminant validity of the research data. The results of the discriminant validity analysis of the research data are shown in Table5.6 . From Table 5.6, it can be seen that the AVE square root of each latent factor is greater than the correlation coefficient between that latent factor and any other latent factor, indicating that the scale has good discriminant validity.

Table 5.6 Correlation Coefficient Matrix and Square Root of AVE

	DSQTB	DSQUF	DSQSP	DSQRP	DSQEC	DSQPL	BCS	BCL	CBE
DSQTB	**0.799**								
DSQUF	0.329***	**0.785**							
DSQSP	0.340***	0.337***	**0.777**						
DSQRP	0.210***	0.369***	0.310***	**0.831**					
DSQEC	0.339***	0.312***	0.366***	0.357***	**0.785**				
DSQPL	0.321***	0.304***	0.337***	0.295***	0.403***	**0.778**			
BCS	0.404***	0.400***	0.372***	0.392***	0.445***	0.416***	**0.785**		
BCL	0.412***	0.449***	0.467***	0.494***	0.423***	0.431***	0.528***	**0.785**	
CBE	0.264***	0.236***	0.360***	0.301***	0.340***	0.324***	0.299***	0.361***	**0.796**

Notes: *** represents $p < 0.01$; Diagonal lines are mean variance extractions AVE square Root

Source: Author's own work

5.5 Regression analysis

5.5.1 Descriptive analysis

The 455 participated ČSOB customers are relatively satisfied with ČSOB`s digital service quality. The mean values of all variables are generally greater than 4, absolute values of Skewness range from 0.020-0.425, and absolute values of Kurtosis are between 0.530-1.469, indicating a small fluctuation in the ČSOB customers' evaluation of each of the dimensions of the questionnaire. Overall, the research data in this thesis study were well discrete and in line with normal distribution.

Specifically, the DSQEC has the highest mean value of 4.513 and the DSQSP has the lowest mean value of 4.282. This means that ČSOB customers are satisfied with the efficiency dimension of ČSOB digital service quality, which indicates that ČSOB digital services are able to meet the needs of ČSOB customers in a timely manner. However, at the same time, ČSOB customers have some degree of concern about the privacy and

confidentiality of personal information when using ČSOB digital services.

Table 5.7 Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation	Median	Skewness		Kurtosis	
						Statistics	Std. Error	Statistics	Std. Error
DSQTB	1.00	7.00	4.451	1.441	4.67	-0.419	0.114	-0.843	0.228
DSQUF	1.33	7.00	4.436	1.372	4.67	-0.338	0.114	-0.887	0.228
DSQSP	1.00	7.00	4.282	1.371	4.50	-0.353	0.114	-0.744	0.228
DSQRP	1.00	7.00	4.388	1.546	4.50	-0.399	0.114	-0.761	0.228
DSQEC	1.00	7.00	4.513	1.506	4.50	-0.412	0.114	-0.788	0.228
DSQPL	1.00	7.00	4.378	1.374	4.67	-0.400	0.114	-0.727	0.228
DSQ	2.35	6.29	4.396	0.909	4.29	0.143	0.114	-0.929	0.228
BCS	1.25	6.75	4.353	1.402	4.50	-0.407	0.114	-0.952	0.228
BCL	1.00	7.00	4.342	1.317	4.67	-0.277	0.114	-0.847	0.228
CBE	1.00	7.00	4.279	1.419	4.50	-0.437	0.114	-0.905	0.228
Note: N=455									

Source: Author's own work

5.6.2 Correlation analysis

It can be seen that DSQTB (Tangibility), DSQUF (User-friendliness), DSQSP (Security & Privacy), DSQRP (Responsiveness), DSQEC (Efficiency), DSQPL (Personalization) and DSQ, BCS, BCL, CBE, and their correlation coefficients are all greater than 0, implying that Tangibility, User-friendliness, Security & Privacy, Responsiveness, Efficiency, Personalization has a positive relationship with bank digital service quality, bank customer satisfaction, bank customer loyalty, and ČSOB Brand Equity. The strongest correlations were found between DSQSP and DSQ, BCL, and CBE, with correlation coefficients of 0.725, 0.431, and 0.351. The strongest correlations were found between DSQTB and BCS. From the correlation analysis, it was found that Security & Privacy has a stronger effect on digital service quality, bank customer loyalty, and ČSOB Brand Equity, and Tangibility has a stronger effect on bank customer satisfaction.

Table 5.8 Correlation Analysis

	DSQTB	DSQUF	DSQSP	DSQRP	DSQEC	DSQPL	BCS	BCL	CBE	DSQ
DSQTB	1.000									
DSQUF	0.293**	1.000								
DSQSP	0.328**	0.312**	1.000							
DSQRP	0.189**	0.304**	0.279**	1.000						
DSQEC	0.279**	0.246**	0.307**	0.280**	1.000					
DSQPL	0.280**	0.260**	0.299**	0.235**	0.325**	1.000				
BCS	0.375**	0.355**	0.343**	0.337**	0.359**	0.364**	1.000			
BCL	0.377**	0.383**	0.431**	0.412**	0.347**	0.362**	0.466**	1.000		
CBE	0.252**	0.210**	0.351**	0.263**	0.306**	0.290**	0.280**	0.343**	1.000	
DSQ	0.641**	0.637**	0.725**	0.550**	0.590**	0.631**	0.556**	0.607**	0.441**	1.000

Notes: *p<0.05 , **p<0.01

Source: Author's own work

5.5.3 The regression analysis between six dimensions of digital service quality and digital service quality

DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP as the independent variables and DSQ as the dependent variable are assessed to obtain Regression Model 1. From Table5.9, we can write down the equation for Regression Model 1, which is given as follows,

DSQ = 0.001 + 0.176 * DSQTB + 0.176 * DSQUF + 0.236 * DSQSP + 0.118 * DSQRP + 0.118 * DSQEC + 0.176 * DSQPL (5.5)

The R2 of regression model 1 is 1.000, implying that DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL can explain 100.0% of the variation in DSQ. Regression Model 1, at a significance level of 0.05, passes the F-test (F=7107580.613, p=0.000<0.05), which means that at least one of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL can have an effect on DSQ. In addition, all the VIF values in the model are less than 5, which means that there is no problem of collinearity in the regression model 1; and the D-W value is around the number 2, thus indicating that there is no auto-correlation in the regression model 1.

Specifically, the regression coefficient of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL is 0.176, 0.176, 0.236, 0.118, 0.118, 0.176 respectively implying that DSQTB,

DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL all will have a significant positive effect on DSQ.

Table 5.9 Regression Analysis -- Model 1

	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	Collinearity Statistics	
	B	Std. Error	*Beta*			VIF	Tolerance
(Constant)	0.001	0.001	-	1.117	0.265	-	-
DSQTB	0.176	0	0.28	1646.429	0.000**	1.231	0.812
DSQUF	0.176	0	0.266	1559.471	0.000**	1.243	0.805
DSQSP	0.236	0	0.355	2043.063	0.000**	1.291	0.775
DSQRP	0.118	0	0.2	1193.382	0.000**	1.198	0.835
DSQEC	0.118	0	0.195	1136.616	0.000**	1.252	0.798
DSQPL	0.176	0	0.267	1569.182	0.000**	1.234	0.811
R Square	1						
Adjusted R Square	1						
F	*F* (6,448)=7107580.613, *p*=0.000						
Durbin-Watson	1.956						
Predictors: (Constant), DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP							
Dependent Variable: DSQ							
Notes: *p<0.05 , **p<0.01							

Source: Author's own work

5.5.4 The Regression Analysis between six dimensions of digital service quality and bank customer satisfaction

DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP as the independent variables and BCS as the dependent variable are assessed to obtain Regression Model 2. From Table5.10, we can write down the equation for Regression Model 2, which is given as follows,

BCS = 0.513 + 0.180 * DSQTB + 0.149 * DSQUF + 0.104 * DSQSP + 0.136 * DSQRP + 0.136 * DSQEC + 0.165 * DSQPL (5.6)

The R^2 of regression model 2 is 0.318, implying that DSQTB, DSQUF, DSQSP, DSQRP,

DSQEC, and DSQPL can explain 31.8% of the variation in BCS. Regression Model 2, at a significance level of 0.05, passes the F-test (F=34.825, p=0.000<0.05) , which means that at least one of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL can have an effect on BCS. In addition, all the VIF values in the model are less than 5, which means that there is no problem of collinearity in the regression model 2; and the D-W value is around the number 2, thus indicating that there is no auto-correlation in the regression model 2.

Specifically, the regression coefficient of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL is 0.180, 0.149, 0.104, 0.136, 0.136, 0.165 respectively implying that DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL all will have a significant positive effect on BCS.

Table 5.10 Regression Analysis -- Model 2

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			VIF	Tolerance
(Constant)	0.513	0.272	-	1.886	0.06	-	-
DSQTB	0.180	0.042	0.185	4.27	0.000**	1.231	0.812
DSQUF	0.149	0.044	0.146	3.36	0.001**	1.243	0.805
DSQSP	0.104	0.045	0.101	2.288	0.023*	1.291	0.775
DSQRP	0.136	0.039	0.150	3.524	0.000**	1.198	0.835
DSQEC	0.136	0.041	0.146	3.349	0.001**	1.252	0.798
DSQPL	0.165	0.044	0.161	3.724	0.000**	1.234	0.811
R Square	0.318						
Adjusted R Square	0.309						
F	F (6,448)=34.825, p=0.000						
Durbin-Watson	0.681						
Predictors: (Constant), DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP							
Dependent Variable: BCS							
Notes: *p<0.05 , **p<0.01							

Source: Author's own work

5.5.5 The regression analysis between six dimensions of digital service quality and bank customer loyalty

DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP as the independent variables and BCL as the dependent variable are assessed to obtain Regression Model 3. From Table5.11, we can write down the equation for Regression Model 3, which is given as follows,

BCL = 0.453 + 0.147 * DSQTB + 0.141 * DSQUF + 0.192 * DSQSP + 0.190 * DSQRP + 0.086 * DSQEC + 0.129 * DSQPL (5.7)

The R^2 of regression model 3 is 0.378, implying that DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL can explain 37.8% of the variation in BCL. Regression Model 3, at a significance level of 0.05, passes the F-test (F=45.313, p=0.000<0.05) , which means that at least one of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL can have an effect on BCL. In addition, all the VIF values in the model are less than 5, which means that there is no problem of collinearity in the regression model 3; and the D-W value is around the number 2, thus indicating that there is no auto-correlation in the regression model 3.

Specifically, the regression coefficient of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL is 0.147, 0.141, 0.192, 0.190, 0.086, 0.129 respectively implying that DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, and DSQPL all will have a significant positive effect on BCL.

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Table 5.11 Regression Analysis -- Model 3

	Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	Collinearity Statistics	
	B	Std. Error	*Beta*			VIF	Tolerance
(Constant)	0.453	0.244	-	1.855	0.064	-	-
DSQTB	0.147	0.038	0.161	3.895	0.000**	1.231	0.812
DSQUF	0.141	0.040	0.147	3.531	0.000**	1.243	0.805
DSQSP	0.192	0.041	0.200	4.718	0.000**	1.291	0.775
DSQRP	0.190	0.035	0.223	5.459	0.000**	1.198	0.835
DSQEC	0.086	0.036	0.098	2.360	0.019*	1.252	0.798
DSQPL	0.129	0.040	0.135	3.253	0.001**	1.234	0.811
R Square	0.378						
Adjusted R Square	0.369						
F	F (6,448)=45.313,p=0.000						
Durbin - Watson	1.889						
Predictors: (Constant), DSQPL, DSQRP, DSQTB, DSQUF, DSQEC, DSQSP							
Dependent Variable: BCL							
Notes: *p<0.05 , **p<0.01							

Source: Author's own work

5.6 The Moderating Effects of ČSOB Brand Equity

5.6.1 The moderating effects of ČSOB Brand Equity

Model 1 includes the independent variable DSQ (digital service quality). Model 2 adds the moderator variable CBE (ČSOB Brand Equity) to Model 1, and Model 3 adds the interaction term DSQ * CBE to Model 2. Looking at Model 1, it is clearly to see that the effect of the independent variable DSQ on the dependent variable BCS (bank customer satisfaction) is significant (t=14.235, p=0.000<0.05) without considering the interference of the moderator variable CBE. It means that DIGITAL SERVICE QUALITY will have a significant effect on BANK CUSTOMER SATISFACTION. However, as can be seen from Model 3, the interaction term between digital service quality and ČSOB Brand Equity is not significance (t=0.049, p=0.961>0.05). Combined with model 1, we can find that when digital service quality has an effect on bank

customer satisfaction, the magnitude of the effect of the moderating variable ČSOB Brand Equity remains consistent at different levels. The coefficient of the independent variable and the coefficient of the interaction term are not significant, so there is no moderating effect of ČSOB Brand Equity between digital service quality and bank customer satisfaction.

Table 5.12 The moderating effect of ČSOB Brand Equity between digital service quality and bank customer satisfaction

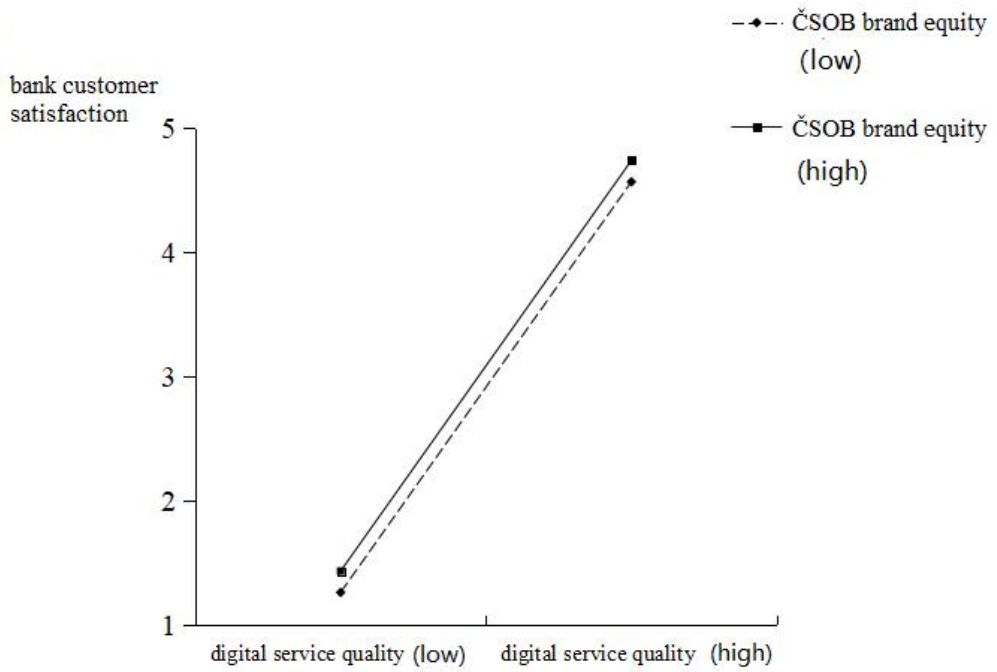
	Model 1					Model 2					Model 3				
	B	Std. Error	t	Sig.	β	B	Std. Error	t	Sig.	β	B	Std. Error	t	Sig.	β
Constant	4.353	0.055	79.606	0.000**	-	4.353	0.055	79.606	0.000**	-	4.351	0.062	70.197	0.000**	-
DSQ	0.857	0.06	14.235	0.000**	0.556	0.828	0.067	12.336	0.000**	0.537	0.827	0.073	11.304	0.000**	0.536
CBE						0.043	0.043	0.999	0.318	0.043	0.043	0.044	0.983	0.326	0.044
DSQ*CBE											0.002	0.051	0.049	0.961	0.002
R Square			0.309					0.311					0.311		
Adjusted R Square			0.308					0.308					0.306		
F			F (1,453)=202.630,p=0.000					F (2,452)=101.813,p=0.000					F (3,451)=67.726,p=0.000		
△R			0.309					0.002					0		
△F			F (1,453)=202.630,p=0.000					F (1,452)=0.998,p=0.318					F (1,451)=0.002,p=0.961		

Dependent Variable: BCS
Notes: *p<0.05 , **p<0.01

Source: Author's own work

From Figure5.3, we find that there is no moderating effect of ČSOB Brand Equity on bank customer satisfaction and bank customer loyalty.

Figure 5.3 Slopes of high/low ČSOB Brand Equity moderating between digital service quality and bank customer satisfaction



Source: Author's own work

Model 1 includes the independent variable BCS (bank customer satisfaction). Model 2 adds the moderator variable CBE (ČSOB Brand Equity) to Model 1, and Model 3 adds the interaction term BCS * CBE to Model 2. Model 1 shows that the effect of the independent variable BCS on the dependent variable BCL is significant (t = 11.217, p= 0.000<0.05) when the interference of the moderator variable CBE is not taken into account. It means that bank customer satisfaction will have a significant effect on bank customer loyalty. And, from model 3, we can see that the interaction term between bank customer satisfaction and ČSOB Brand Equity presents significance (t=3.418, p=0.001<0.05). Combined with model 1, we can find that when bank customer satisfaction has an effect on bank customer loyalty, the magnitude of the effect of the moderator variable ČSOB Brand Equity is significantly different at different levels. The coefficients of the independent variables and the coefficients of the interaction terms are equally good, so ČSOB Brand Equity has a positive moderating effect between bank

customer satisfaction and bank customer loyalty.

Table 5.13The moderating role of ČSOB Brand Equity in the relationship between bank customer satisfaction and bank customer loyalty

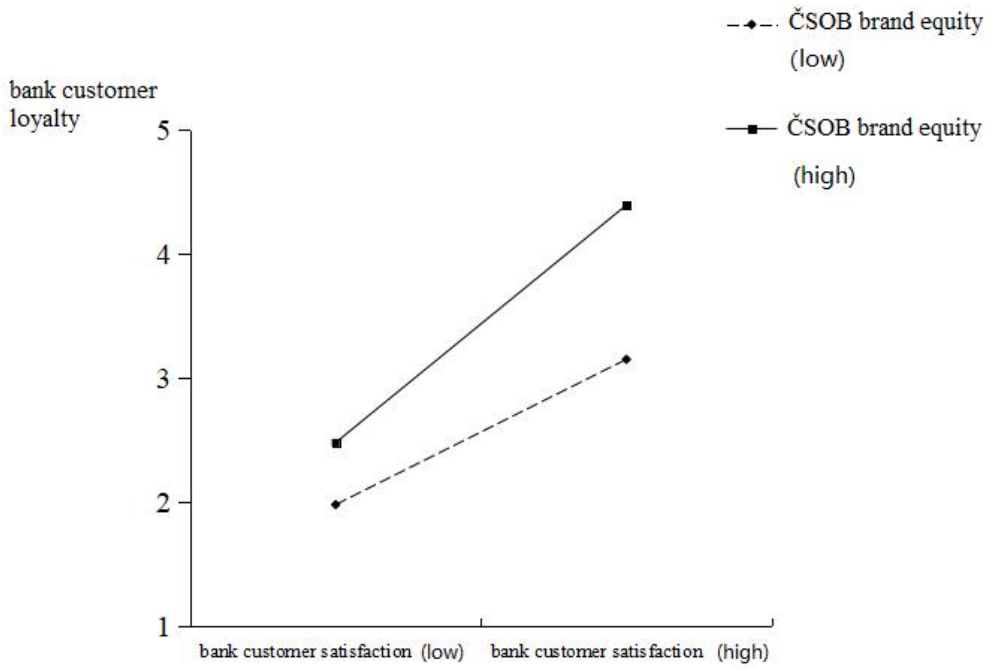
	Model 1					Model 2					Model 3				
	B	Std. Error	t	Sig.	β	B	Std. Error	t	Sig.	β	B	Std. Error	t	Sig.	β
Constant	4.342	0.055	79.382	0.000**	-	4.342	0.053	81.898	0.000**	-	4.29	0.055	78.643	0.000**	-
BCS	0.438	0.039	11.217	0.000**	0.466	0.378	0.039	9.571	0.000**	0.402	0.386	0.039	9.874	0.000**	0.41
CBE						0.214	0.039	5.493	0.000**	0.231	0.218	0.039	5.663	0.000**	0.235
BCS*CBE											0.093	0.027	3.418	0.001**	0.137
R Square	0.217					0.266					0.285				
Adjusted R Square	0.216					0.263					0.28				
F	*F* (1,453)=125.823,*p*=0.000					*F* (2,452)=82.050,*p*=0.000					*F* (3,451)=59.888,*p*=0.000				
△R	0.217					0.049					0.019				
△F	*F* (1,453)=125.823,*p*=0.000					*F* (1,452)=30.174,*p*=0.000					*F* (1,451)=11.686,*p*=0.001				

Dependent Variable: BCL
Notes: *p<0.05 , **p<0.01

Source: Author's own work

From Figure5.4, we find that ČSOB Brand Equity has a positive moderating effect on bank customer satisfaction and bank customer loyalty.

Figure 5.4 Slopes of high/low ČSOB Brand Equity moderating between bank customer satisfaction and bank customer loyalty



Source: Author's own work

The results of the moderating role hypothesis validation are shown in Table5.14, where hypothesis H3 is not accepted, and hypothesis H4 is accepted.

Table 5.14 Results of Hypothesis Tests

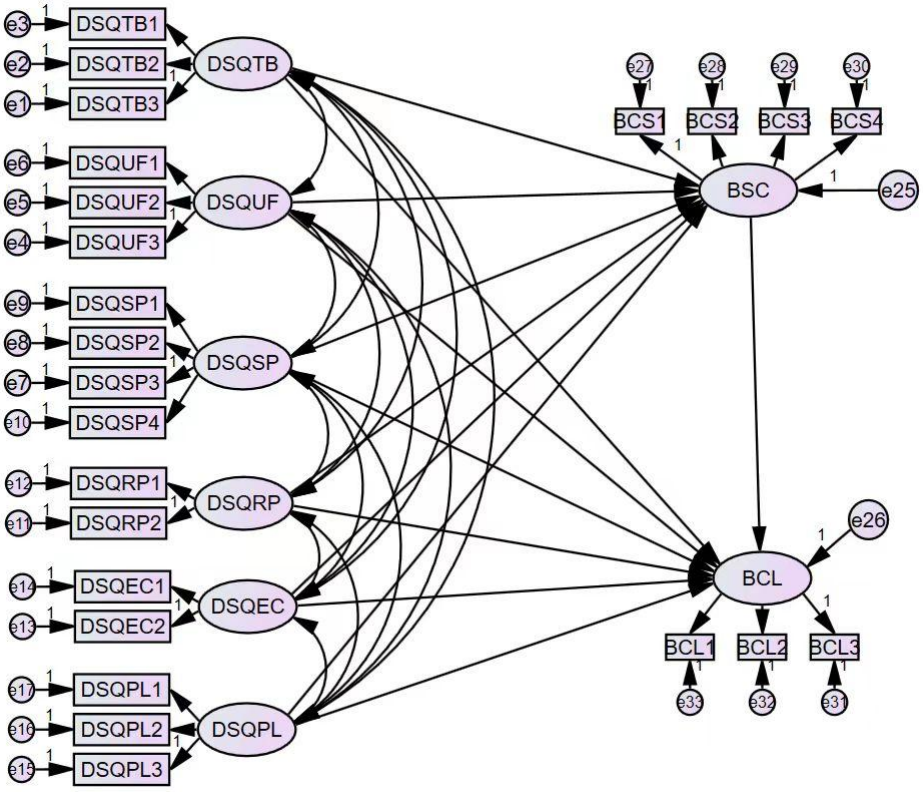
Hypothesis	Hypothesis Testing
H3: There is a moderating effect of bank brand equity on bank digital service quality affecting bank customer satisfaction	Not Accepted
H4: There is a moderating effect of bank brand equity on bank customer satisfaction affecting bank customer loyalty	Accepted

Source: Author's own work

5.7 The Mediating Effects of Bank Customer Satisfaction

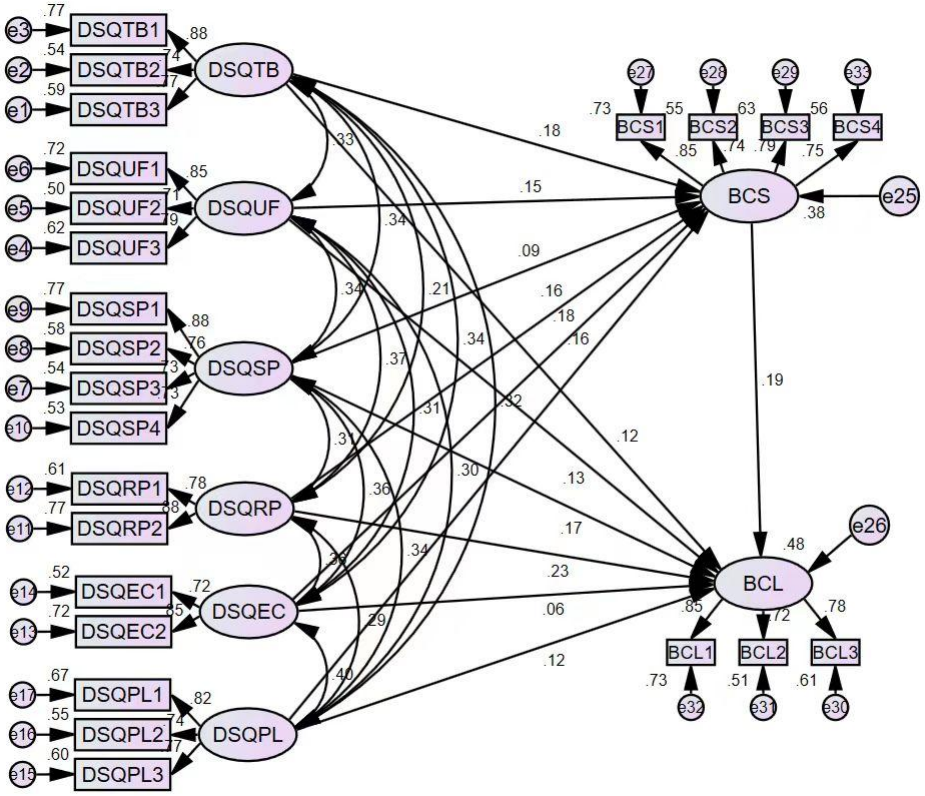
The confirmatory factor analysis shows that the research data of this thesis fits well with the theoretical model, and the research data of this thesis has passed the reliability and validity test with good reliability and validity. Therefore, according to the research hypotheses, this thesis constructed a structural equation model diagram as shown in Figure 5.5, as a way to verify the relationship between digital service quality and bank customer loyalty. As can be seen from Figure 5.5, the structural equation modelling establishes 8 variables, 24 observed variables and 26 residual terms.

Figure 5.5 Structural Equation Modelling Pathway



Source: Author's own work

Figure 5.6 Structural equation modelling pathway results



Source: Author's own work

5.7.1 Tests of model fit

The X^2/df value of the structural equation model in this paper is 1.761, which is less than 3, the RMSEA is 0.041, which is less than 0.08, the value of the GFI is 0.937, which is greater than 0.9, the CFI is 0.961 which is greater than 0.9,,and the value of the TLI is 0.958, which is greater than 0.95, and all the fit indicators have met the requirements, which means that the model matches the scale well, and the model fits well to the scale. The model fit is high and the model is valid.

Table 5.15 Results of Model Fit Indices

Fit Index		Recommended Threshold	Model	Fit Measures
Absolute Index	X^2/df	≤3 Hu & Bentler (1999)	1.761	GOOD
	GFI	≥0.9 Hair et al. (2019)	0.937	GOOD
	RMSEA	≤ 0.08 Malhotra & Desh (2011)	0.041	GOOD
Relative Index	CFI	≥0.9 Hair et al. (2019)	0.961	GOOD
	IFI	≥0.9 Bollen (1989)	0.967	GOOD
	TLI	≥0.95 Schumacker & Lomax (2004)	0.958	GOOD

Notes: X^2 = Chi-square statistics, GFI = Goodness-of-fit Index RMSEA = Root Means Square error of approximation CFI = Confirmatory fit Index, IFI = Incremental Fit Index, TLI = Tucker-Lewis index

Source: Author's own work

5.7.2 Path analysis

The research data of this thesis is imported into the research model and path analysis was carried out to obtain the standardised path coefficients Estimate, Standard Error S.E., Critical Ratio C.R. and significance p-value between the variables. The significance of the path coefficients of the research model is represented by the critical ratio and p-value, when the absolute value of the critical ratio is greater than 1.96, it means that the path coefficients have reached the significance level of 0.05. The results of the path analysis of the research model are shown in Table 5.16.

Table 5.16 Partial Parameter Estimates

Pathways	Estimate	S.E.	C.R.	Sig.
DSQTB→BCS	0.177	0.074	3.280	**
DSQUF→BCS	0.145	0.077	2.625	**
DSQSP→BCS	0.092	0.076	1.708	\
DSQRP→BCS	0.160	0.071	2.826	**
DSQEC→BCS	0.184	0.077	3.037	**
DSQPL→BCS	0.162	0.081	2.894	**
BCS→BCL	0.193	0.041	3.271	**
DSQTB→BCL	0.124	0.050	2.361	*
DSQUF→BCL	0.131	0.052	2.414	*
DSQRP→BCL	0.235	0.049	4.168	***
DSQSP→BCL	0.173	0.051	3.282	**
DSQEC→BCL	0.057	0.052	0.971	\
DSQPL→BCL	0.120	0.055	2.203	*
Notes: *** means p＜0.001； ** means p＜0.01； * means p＜0.05				

Source: Author’s own work

The standardized path coefficient of DSQTB→BCS is 0.177 and reaches the level of significance (P<0.05) indicating that this path has a significant positive effect, H1a is accepted.The standardized path coefficient of DSQUF→BCS is 0.145 and reaches the level of significance (P<0.05) indicating that this path has a significant positive effect, H1b is accepted.The standardized path coefficient of DSQSP→ BCS has a standardized path coefficient of 0.092 and does not reach the significance level (P>0.05), indicating that this path does not have a significant effect, H1c is not accepted. DSQRP→BCS has a standardized path coefficient of 0.16 and reaches the significance level (P<0.05), indicating that this path has a significant positive effect, H1d is accepted. DSQEC→BCS has a standardized path coefficient of 0.184 and reaches the significance level (P<0.05), indicating that this path has a significant positive effect, H1d is accepted.

path coefficient is 0.184 and reaches the significance level (P<0.05), indicating that there is a significant positive effect of this path, and H1e is accepted.The standard path coefficient of DSQPL→BCS is 0.162 and reaches the significance level (P<0.05), indicating that there is a significant positive effect of this path, and H1f is accepted.

The standardised path coefficient of BCS→BCL is 0.193 and reaches the level of significance (P<0.05), which indicates that this path has a significant positive effect, and H2 is accepted. The standardised path coefficient of DSQTB→BCL is 0.124 and reaches the level of significance (P<0.05), which indicates that this path has a significant positive effect.The standardised path coefficient of DSQUF→BCL is 0.131 and reaches the level of significance (P<0.05), which indicates that this path has a significant positive effect. 0.131 and reaches the level of significance (p<0.05), indicating that there is a significant positive effect of this path.The standardised path coefficient of DSQSP→BCL is 0.173 and reaches the level of significance (p<0.05), indicating that there is a significant positive effect of this path.The standardised path coefficient of DSQRP→BCL is 0.235 and reaches the level of significance (p<0.05), indicating that there is a significant positive effect of this path. 0.05), indicating a significant positive effect of this path. The standardised path coefficient of DSQEC→BCL is 0.057, which does not reach the significance level (P>0.05), indicating that this path does not have a significant effect. the standardised path coefficient of DSQPL→BCL is 0.12 and reaches the significance level (P<0.05), indicating that this path has a significant positive effect.

In summary, the variables DSQTB, DSQUF, DCQRP, DSQEC, and DSQP all have a significant positive effect on BCS; and the variables BCS, DSQTB, DSQUF, DSQRP, DCQSP, and DSQPL all have a significant positive effect on BCL.

5.7.3 Mediated effects test

Table5.17 shows the standardized path coefficients and 95% confidence intervals for the total, direct and indirect effects for the different paths. If the 95% confidence interval for

the indirect effect does not include 0, the path has a significant mediation effect, if the 95% confidence interval for the direct effect does not include 0, the type of mediation is partial mediation, and if the 95% confidence interval for the direct effect includes 0, the mediation type is full mediation (Stine, 1989). From Table5.17, the 95% confidence interval for the indirect effect of BCS in the paths of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL and BCL does not include 0, indicating that the mediation effects of BCS in the paths of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL and BCL is significant, and because the 95% confidence interval for its direct effect does not include 0, the mediation effect type of BCS in the pathway of DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL with BCL is partial mediation.

Table 5.17 Analysis of the mediating effect of bank customer satisfaction between digital service quality and bank customer loyalty

		Point Estimate	SE	95% CI	
				LLCI	ULCI
DSQTB→BCS→BCL	Total Effect	0.344	0.040	0.266	0.423
	Direct Effect	0.215	0.040	0.137	0.293
	Indirect Effect	0.130	0.020	0.093	0.171
DSQUF→BCS→BCL	Total Effect	0.368	0.042	0.286	0.450
	Direct Effect	0.239	0.041	0.158	0.320
	Indirect Effect	0.129	0.021	0.091	0.173
DSQSP→BCS→BCL	Total Effect	0.414	0.041	0.334	0.494
	Direct Effect	0.295	0.040	0.216	0.374
	Indirect Effect	0.119	0.019	0.084	0.157
DSQRP→BCS→BCL	Total Effect	0.352	0.037	0.280	0.423
	Direct Effect	0.246	0.036	0.175	0.316
	Indirect Effect	0.106	0.019	0.072	0.146
DSQEC→BCS→BCL	Total Effect	0.304	0.039	0.228	0.379
	Direct Effect	0.180	0.038	0.105	0.255
	Indirect Effect	0.123	0.018	0.089	0.161
DSQPL→BCS→BCL	Total Effect	0.347	0.042	0.264	0.429
	Direct Effect	0.212	0.042	0.130	0.294
	Indirect Effect	0.135	0.020	0.098	0.176

Source: Author's own work

5.7.4 Hypothesis testing of the mediating effect

The results of the mediating effect hypothesis validation are shown in Table 5.18, where hypotheses H1, H1a, H1b, H1d, H1e, H1f, H2, H5a, H5b, H5c, H5d, H5e, H5f, are accepted, and hypothesis H1c is not accepted.

Table 5.18 Results of Hypothesis Tests

Hypothesis	Hypothesis Testing
H1: Bank digital service quality has a positive effect on bank customer satisfaction	Accepted
H1a: Tangibility of digital service quality positively influences customer satisfaction to ČSOB.	Accepted
H1b: User-friendliness of digital service quality positively influences customer satisfaction to ČSOB.	Accepted
H1c: Security & Privacy of digital service quality positively influences customer satisfaction to ČSOB.	Not Accepted
H1d: Responsiveness of digital service quality positively influences customer satisfaction to ČSOB.	Accepted
H1e: Efficiency of digital service quality positively influences customer satisfaction to ČSOB.	Accepted
H1f: Personalization of digital service quality positively influences customer satisfaction to ČSOB.	Accepted
H2: Bank customer satisfaction has a positive effect on bank customer loyalty.	Accepted
H5: There is a mediating effect of bank customer satisfaction on bank digital service quality affecting bank customer loyalty.	Accepted
H5a: There is a mediating effect of bank customer satisfaction on bank digital service quality of tangibility affecting bank customer loyalty.	Accepted, Partial mediation
H5b: There is a mediating effect of bank customer satisfaction on bank digital service quality of user-friendliness affecting bank customer loyalty.	Accepted, Partial mediation
H5c: There is a mediating effect of bank customer satisfaction on bank digital service quality of security & privacy affecting bank customer loyalty.	Accepted, partial mediation
H5d: There is a mediating effect of bank customer satisfaction on bank digital service quality of responsiveness affecting bank customer loyalty.	Accepted, partial mediation
H5e: There is a mediating effect of bank customer satisfaction on bank digital service quality of efficiency affecting bank customer loyalty.	Accepted, partial mediation
H5f: There is a mediating effect of bank customer satisfaction on bank digital service quality of personalization affecting bank customer loyalty.	Accepted, partial mediation

Source: Author's own work

5.8 Summary of the section

In this section, this research mainly uses factor analysis, regression analysis, moderating effects analysis, and mediating effects analysis to explore the effect of digital service quality on bank customer loyalty, and also to verify the effect of ČSOB brand equity on digital service quality and bank customer satisfaction and the moderating effect of ČSOB brand equity on bank customer satisfaction and bank customer loyalty. Based on the results, the following main conclusions are obtained

1) The results of regression analysis shows that all the six dimensions of digital service quality (Tangibility, User-friendliness, Security & Privacy, Responsiveness, Efficiency, Personalisation) are significant to digital service quality. All of them have a significant positive effect on digital service quality, bank customer satisfaction, and bank customer loyalty. Combining the scores of ČSOB customers on the six dimensions of digital service quality, ČSOB customers are most satisfied with the efficiency dimension of ČSOB digital service quality;

2) The moderating effect analysis entails that ČSOB Brand Equity has no moderating effect between digital service quality and bank customer satisfaction , but ČSOB Brand Equity has a positive moderating effect between bank customer satisfaction and bank customer loyalty.

3) The mediating effect analysis shows that there is a mediating effect of bank customer satisfaction on bank digital service quality affecting bank customer loyalty. And the type of mediating effect of bank customer satisfaction in the path of six dimensions of digital service quality is partial mediation.

6 Discussions

In order to explore bank customer satisfaction as a mediator of the effects of digital service quality on bank customer loyalty, the present study constructs and tests a model based on the SEVRQUAL (Service Quality) model (Parasuraman et al., 1988). As a

moderator of the effects of these digital service characteristics on bank customer satisfaction and the effects of bank customer satisfaction on bank customer loyalty, this research additionally investigates the moderating role of ČSOB brand equity. The study is conducted at Československá obchodní banka, a. s. (ČSOB) in the Czech Republic. The results of this analysis quickly led to the general conclusion that the majority of the hypotheses are supported by the empirical evidence.

6.1 Assessment of findings

The findings imply that the six-dimensional digital service quality scale created for the Czech Republic's retail banking sector has good empirical backing.

1) The results reported in this study suggest that all six digital service quality dimensions have significant positive impacts on bank customer satisfaction and bank customer loyalty. Tangibility is the most important determinant of bank customer satisfaction, followed by Personalization, User-friendliness, Responsiveness, Efficiency, and Security & Privacy. Security & Privacy is the most important determinant of bank customer loyalty, followed by Responsiveness, Tangibility, User-friendliness, Personalization, and Efficiency. These are partially consistent with the work of Mir et al. (2023), and George and Kumar (2014). Mir et al. (2023) finds that the web-architecture is found to be the main driver of digital service quality on bank customer satisfaction equally followed by user friendliness and efficiency of website. Reliability precedes responsiveness, security and personalization respectively. George and Kumar (2014) shows that Privacy was the one having the strongest impact on bank customer satisfaction, followed by Responsiveness, Security, Fulfillment and Reliability. When the results of this study are compared to the results of other studies, there are also a number of similarities. For example, in a study conducted with the retail bank customers in India, an emerging market, Fulfillment, Security & Privacy, Website Design Efficiency, System Availability were among the most important dimensions of digital service quality influencing bank customer loyalty (Shaikh et al. 2023). In a study of Islamic banks in Jordan, compliance, tangibility, responsiveness, assurance, and

empathy were the common service quality dimensions positively influencing loyalty intentions (Dandis et al. 2021). In addition, Empathy, Assurance, Responsibility, Reliability, Tangible influenced satisfaction and loyalty among the customers of Bank Jatim Syariah Surabaya (Putro & Rachmat, 2019).

2) This study examines ČSOB brand equity as a moderator of the effects of digital service quality dimensions on bank customer satisfaction and of the effects of bank customer satisfaction on bank customer loyalty. This is important for at least two reasons. First, from a theoretical perspective, Customers' perceptions of service quality are positively impacted by positive brand equity, which in turn enhances their inclination to repurchase the brand. A bank's brand equity should emphasize convenient or efficient transactions and services in order to attract high-net-worth consumers. Bank customers who are looking for convenience or efficiency will also be drawn to this brand. Second, from a practical perspective, evaluation of the moderating effects of ČSOB brand equity on digital service quality and bank customer satisfaction, and bank customer satisfaction and bank customer loyalty will enable the banking industry to better assess its reputation and trustworthiness among bank customers, and thus to rebrand itself and enhance its competitiveness in the market. Two important findings emerge from the moderating role of ČSOB brand equity. That is, ČSOB Brand Equity has no moderating effect between digital service quality and bank customer satisfaction. These results may be explained by the fact that ČSOB customers adopt digital services without regard for a financial institution's reputation. Past research have also shown this to be true. For instance, Fauzi et al. (2019) discovered that customers' encounters with a company impact their perceptions of it and the calibre of its digital services. Additionally, Boonlertvanich's (2019) study confirmed that rather than brand equity, the relationship between service quality and customer loyalty was co-mediated by wealth status and the main bank. These findings significantly expand the body of existing knowledge base.

On the other hand, ČSOB Brand Equity has a positive moderating effect between bank

customer satisfaction and bank customer loyalty. Such findings may be explained by the fact that bank brand equity increases customers' awareness of the bank's cutting-edge offers, dedication to the protection and integrity of their data, customer-centric policies, abstract more likely to remain loyal to that business (Sun et al., 2020). Additionally, Purnama et al. (2021) provided evidence to support the idea that brand equity has a major impact on customer satisfaction since customers have higher expectations of a well-known business.

3) The result that bank customer satisfaction partially mediates the impact of digital service quality (e.g. Tangibility, User-friendliness, Security & Privacy, Responsiveness, Efficiency and Personalization) on bank customer loyalty is consonant with the other empirical studies in the services marketing literature. For instance, in a study of retail bank customers in Jordan, Dandis et al. (2021) found that customer satisfaction was found to be a mediating variable between service quality and self-reported loyalty intentions. Similar findings were also reported in the works of Mohammad & Bello (2022) in Nigeria, Haron et al. (2020) in Malaysia, and Sohail et al. (2020) in Pakistan.

6.2 Management Implications

The promotion of banks to improve their digital service skills is becoming more important as the digital economy and digital banking evolve (McMillan, 2014). In order to enhance banks' ability to provide digital services and better support social and economic growth, the banking sector is increasing its investments in financial technology (McMillan, 2014). Based on SEVRQUAL (Service Quality) model (Parasuraman et al., 1988), this study empirically analyses the mechanism of the impact of digital service quality on bank customer loyalty through 455 questionnaire data using structural equation modelling, with a view to providing a theoretical basis for ČSOB to develop a reasonable marketing and service strategy and build a satisfactory customer relationship. The management recommendations are as follows,

6.2.1 Strengthening the bank's digitalization concept and improving the long-term strategic planning for digital banking

The first three sections of this study discovers that traditional banks' influence will continue to decline in the modern day, especially in the post-COVID-19 world and that digital banking will undoubtedly be the future of banking (Pio et al., 2023). In the context of traditional banks being constantly challenged by digital banking (Grassi et al., 2022), this thesis chooses the digital transformation service situation of traditional bank ČSOB in the Czech Republic as an entry point, and analyses it to find out that the improvement of the digital service quality positively affects the bank customer satisfaction and loyalty. Therefore, this study suggests that traditional banks should seize the opportunities of digitalization, develop a strategy for digitalization and set up a special department to implement the strategy (Agafonova et al, 2021). As pointed out by the EU's DESI (2022) the Czech Republic currently lacks digital technology talent, which is the real basis for the implementation of all digitalization strategies in banks. The digitalization of Czech banks must concentrate on forging partnerships with local academic and research institutions and depending on the EU to draw top digital talent from across the EU. In order for clients to understand that a bank is digitizing, banks must simultaneously develop a digital image, which is at the core of this study.

6.2.2 Improving banks' digital financial infrastructure.

This study finds that, among the six important dimensions that affect the quality of digital services, tangibility, is the most significant and fundamental. The primacy effect, which is referred to in psychology as the user's first impression and exposure to the initial service, has been discovered through study on user satisfaction and loyalty (Van Erkel & Thiissen, 2016). Mbama and Ezepue (2018), through a retrospective causal survey study of different attitudes between digital and traditional banks in the UK found that digital banks' aggressive marketing of their products and their own advanced digital technology and modern tech-filled app design have led to users' confidence and satisfaction, whereas traditional banks' complex and crappy mobile banking designs

have disappointed users. Mbama and Ezepue's (2018) findings are consistent with the results of this study, where users' contentment comes from advanced digital technology and clean and mobile interface design and usage experience. Therefore, the second recommendation of this study to banking managers is to enhance the visible facilities of digital banking including: building online banking websites that are functional and easy to operate; simplifying and optimizing the interface design and UI of mobile apps; and improving the digital service facilities in banking service halls for example, digital autonomous service facilities with AI guides.

6.2.3 Innovating financial products, integrating financial services into the scene ecology, and improving customer satisfaction with the financial service experience

The six digital service quality dimensions explored in this study are all positively affecting bank customer satisfaction and loyalty. Therefore, this study suggests that the digitization process of banks should focus on these six dimensions. Agafonova et al. (2021), in their recommendations for developing a strategy for digital banks, emphasize that the digitization of banks should pay more attention to the user's personal experience than in traditional banks because in the digital era the user is directly confronted with the online services and the mobile apps, which give the user a more intuitive view. In particular, social media allows users to freely share and disseminate their views and attitudes towards digital banking. Therefore, this study suggests that banks should pay extra attention to the development of user-friendliness and user-personalization in the process of digitization. Jaiwant (2022) claims that customers today, especially the younger generation, give their experience more weight than previously. They appreciate the prospect of a digital bank using the information they offer about themselves and their preferences for services to better serve them. Therefore, this study suggests that banks need to provide more user-friendly services in the process of digitization, including multi-language options in banking halls and digital apps, and convenient services for blind and deaf users. Digital banks need to provide the service of reading the page aloud and the option of larger fonts for elderly users. At the same time, digital

banks need to make full use of the personal data provided by users to analyse their preferences for user profiling and to provide them with more relevant service interfaces. In addition, the banking halls should provide staff who are well versed in the use of digital services to provide humanistic assistance to users who come to the halls looking for help, as well as training 24h AI customer service to respond to the needs of customers with a more human touch.

The other important findings of this study on the evolution of digital banking include quick feedback and efficient service, which are, respectively, the aspects of efficiency and responsiveness in this study. Jaiwant (2022) states that the two important directions of digital banking are efficiency and user-friendliness. The initial reason for digital banking is to rely on the internet and digital technology to greatly improve the efficiency of banking services, where users can access their bank accounts and use the bank's services anytime and anywhere (Mbama & Ezepue, 2018). The fourth recommendation made by this study to the bank executives is to continue collecting extensive amounts of data from bank customers about the bank's current digitalization and to use big data analytics tools to filter the users' pursuit preferences to improve the current digital banking apps, especially to simplify the use process and reduce the difficulty of use by the users in order to greatly increase the efficiency of the users in using the digital applications. Another point is that digital banks need to enhance the training of AI customer service and update their databases so that users can receive more timely and humane responses, rather than cold and mechanical answers filled with incomprehensible jargon.

6.2.4 Strengthening banks' digital branding and marketing efforts

The fifth recommendation of this study is to strengthen the efforts in building and marketing the digital brand of the bank. As Mbama and Ezepue (2018) in their study of digital banks found that those purely emerging digital banks build primacy effects among users because they are more adept at building their brand equity in front of users and actively market extensively through digital channels compared to traditional banks.

The results of this study conclude that ČSOB brand equity has a positive moderating effect between bank satisfaction and bank loyalty. Therefore, this study suggests that banks should increase the construction and marketing of their brand equity along with their digital strategy. The first is brand equity, which should consider the reputation for security and stability that traditional banks have built while actively pursuing a younger and more modern image. Another point is the marketing channel, the digitalization of traditional banks should make active use of social media, setting up social media accounts to actively promote their new services to bring them closer to younger users.

6.2.5 Establishing a digital risk control system, improving risk pre-research and pre-judgment, and better securing client assets and the nation's financial stability.

Digital technologies like artificial intelligence are driving bank digital scenarios like intelligent risk control as the pace of banks' digital transformation quickens (Kenett & Raanan, 2010). Digitalization strategies and models are constantly evolving, and if they are not followed, the overall business of the bank may suffer irreparable harm (Kenett & Raanan, 2010). Building a risk control system for a bank that is compatible with the digital transformation is crucial for banks to protect the calibre of their operations, to continuously raise the competitiveness of financial institutions, and to keep the financial market stable. Also, the results of this study show that Security & Privacy is the most important determinant of bank customer loyalty. And the dimension of Security & Privacy has the lowest mean score of satisfaction in this study, which indicates that ČSOB customers still have concerns about privacy and information security during the use of digital services. Therefore, banks need to better identify, assess, control and manage business risks in the process of digital services, optimize the allocation of business resources, improve the efficiency of business operations and reduce the overall level of risk. Specifically, the use of a third party to do credit audits, real-time decision-making, credit application and approval processes, dynamic risk pricing and limit setting, and enhanced customer experience. To increase total risk management skills,

spend money on machine learning tools for real-time data processing, reporting, and monitoring. Improve the digital automation of data quality, aggregation, and reporting by digitally overhauling capital analytics, such as stress testing. In order to increase the effectiveness and precision of the bank's risk detection, support intelligent investigations and automated filing of suspicious activity reports.

6.2.6 Enhancing protection of bank users' personal information and data security privacy

The study's final recommendation is for banks to improve the safeguards for customer privacy, data security, and personal information. Navalon and Fernandez (2023) note that the emergence of digital banking amenities is a result of the rapid development of digital platforms. However, according to Navalon and Fernandez (2023), the security and privacy of personal information has come under scrutiny from the general public. In particular, digital wallets and banking are closely linked to the usage of personal financial information of bank users. Through descriptive statistical analysis, this study also found that ČSOB customers' satisfaction with Security & Privacy in the quality of digital banking services is the lowest. Therefore, this study concludes that digital banks have to utilize cutting-edge digital encryption technology to protect users' personal information.Widyadhana and Handayani (2022) also suggest that digital banks have to actively utilize biometrics instead of traditional passwords to enhance the security of users' accounts. This thesis also suggests that bank executives should not share user's data with other sources for the sake of profit, which will greatly reduce the user's information about the digital bank. In conclusion, for security and privacy is one of the most concerned dimensions for users, digital banks have to pay attention to user's information security as the highest level of development goal.

6.3 Contributions

Compared to previous studies, this study has a unique contribution, and some notable novel contributions of this research study include,

1) This research developed a reliable and valid scale (DSQTB, DSQUF, DSQSP, DSQRP, DSQEC, DSQPL) for measuring the digital service quality with special reference to the Czech banking sector. There are six dimensions in the developed instrument for measuring the digital service quality. The six dimensions are (1) Tangibility, (2) User-friendliness, (3) Security & Privacy, (4) Responsiveness, (5) Efficiency, (6) Personalization. Bank managers can measure their quality of digital services with this instrument and can identify the main factors that influence their perception of customers. As soon as one of the dimensions falls below an acceptable level, managers can make appropriate improvements while delivering their digital banking services to its user's efficiently and effectively. The six-factor model of digital service quality is supported by this study, adding another piece to the body of previous research in this area. As opposed to the studies by Mir et al. (2023) and Biswas et al. (2023), which found that the bank digital service quality indicated a seven-factor model in the context of Indian banking, Leem and Eum (2021) found five dimensions. The study by Herington and Weaven (2007) supported four qualities of bank digital services in the Australian environment.

2) In the Czech banking industry, there are only conceptual papers throwing light on the relationship between bank customer satisfaction and bank customer loyalty (Chocholáková et al., 2015). Also, in the Czech banking industry, there is very limited empirical research on online banking and especially digital service quality. Therefore, the present study contributes to the existing body of knowledge by identifying the six dimension digital service quality model in the Czech Republic and studied banking institutions based in CEE regions like the Czech republic which has comparatively recently liberalized its banking sector compared with EU economies.

3) For the Czech Republic, digitalization is one of the best opportunities to close the development gap between itself and the more developed countries in Europe. This study is innovative by using one of the representatives of traditional Czech commercial banks, ČSOB, as the object of study. Instead of choosing the trendy digital banks, this study focuses on the digitalization of traditional banks. On the one hand, it is true that traditional banks have to accelerate their digitilization process to keep up with the development of users' needs in the face of these emerging challengers. On the other hand the digitilization of traditional banks is indeed an area where there is a gap in academia. This study fills the gap in two areas: the digital transformation of traditional banks and the development of digital banking in the Czech Republic.

4) Another contribution of this paper is to highlight the importance of personalization for the digital banking shift. As Mir et al. (2023) point out, traditional banks strive on the quality of their business to attract users and attempt to replicate their success in the digitalization process, but the results of this study find that digital users, especially young people, care more about their individual opinions being respected and that the service they receive can be tailored to them rather than being the same for everyone. As a research document, this study confirms the place of personalisation in the new digitalisation process and contributes to the further development of my research.

Moreover, this study is relatively exceptional from rest of the previous studies conducted on the subject by identifying the ‘methodological gap that empirically tested the nature of bank digital service quality scale by six dimensional factor model perspective. The findings of this study support the multi-dimensional nature of digital service quality scale, and contribute one more brick to the existing service marketing literature. In addition, this study offers various insights and applications for future research.

6.4 Limitations and Future Research

This study is relevant both theoretically and practically. This study is not an exception to the rule that no research study is flawless in every way. However, these restrictions present opportunities for further study.

1) The research work is based on primary data via a well-structured questionnaire. This thesis focuses on the customers of ČSOB in the Prague region using simple random sampling, and the sample size and sampling methodology of this thesis could be further improved. Also, there is a possibility that some sample participants may not have revealed true and fair views with respect to questionnaire statements due to their personal confidentiality that indicates respondent bias.

2) This study restricts itself to ČSOB only, thus the findings may not be generalized to other banks in the Czech Republic, and the banks in the CEE regions. Thus, this provides an opportunity for future research.

3) In this paper, only ČSOB brand equity is selected as a moderating variable. demographic characteristics of ČSOB customers may also moderate the strength of the relationship for relevant variables, such as gender, age, and educational level. In addition, ČSOB brand equity may not be the only moderating variable, and future research could consider the transfer payment costs of bank customers using digital services as a moderating variable.

4) This research paper only used a simple mediated effects model to explore the mediating role of bank customer satisfaction in digital service quality and bank customer loyalty. Moreover, this research paper separates the moderated and mediated effects, and future research can use the moderated mediated effects model to conduct the mediation analysis of bank customer satisfaction in digital service quality and bank customer loyalty.

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Appendix

Appendix 1 ČSOB Smart Functions

Functions	Functional Description
Opening a current account online	Users can enjoy the complete, simple and smooth account opening function online and on ČSOB Smart, without the need to visit an offline branch.
AI customer service "Kate".	Twenty-four hours a day, seven days a week virtual assistant Kate is available to provide problem solving solutions to clients at all times.
Easier Payment	ČSOB Smart supports the binding of physical bank cards and facilitates online shopping through quick payment with PIN and biometric information.
Financial overview	ČSOB Smart supports users to check their account balances and details of expenses at any time, and ČSOB Smart supports account enquiry services of up to seven Czech banks.
Investment and financial products	ČSOB Smart allows users to find and buy all types of financial and investment products offered and supported by ČSOB, including lending, insurance, investments, mortgages and more.
Mobile payment	ČSOB Smart supports bank cards linked to leading mobile digital wallets, Apple Pay, Google Pay, Garmin Pay and Xiaomi Pay to further facilitate access to digital financial services.
ČSOB Smart key	ČSOB Smart key provides services such as biometrics and PIN code payment, and also replaces traditional SMS

	passwords to be more in line with the EU's Digital Identity Security Policy, providing users with more efficient and secure digital services.

Source: Author’s own work

Appendix 2 Survey on bank customers' satisfaction with the ČSOB's digital financial services

Survey on bank customers' satisfaction with the ČSOB's digital financial services

Dear Madam/Sir:
Hello and Welcome!
Thank you very much for participating in this questionnaire survey. The aim of this survey is to examine the factors influencing bank customers' loyalty and satisfaction with the ČSOB's digital financial services. If you are a ČSOB customer, please answer this questionnaire according to your actual experience of using it, if you are not a ČSOB customer, you do not need to answer. This questionnaire is anonymous and your answers are for academic research purposes only, all information will be kept strictly confidential, so please feel free to fill in the form and thank you for your support and cooperation.
To complete the questionnaire, you will need approximately 5 to 10 minutes. If you have any questions about this study, its subject matter or the survey, please feel free to email 56333798@fsv.cuni.cz (Kim) and I will do my best to respond. Your time and help is much appreciated.

I. The Banking Digital Service Quality Questions
Based on your knowledge of the ČSOB's digital financial services, please make a judgement on the following descriptions and select the corresponding option.

(a) Tangibility

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. ČSOB has appropriate digital financial services facilities, such as digital online website, a smart service facility in the banking hall, a smart app - ČSOB Smart, and etc.							
2. ČSOB has good promotion tools such as pamphlets to advocate its digital financial services.							
3. ČSOB digital financial services design are obvious, if clearly marked.							

1

(b) User Friendliness

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
4. ČSOB digital financial services are simple and easy to use.							
5. The ČSOB digital financial service is highly readable, with all service functions visible at a glance.							
6. ČSOB Digital Financial Services communicates and listens in a language that customers can understand.							

(c) Security & Privacy

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
7. The trading environment of ČSOB digital Financial Services is secure.							
8. Client money is safe with ČSOB Digital Financial Services.							
9. ČSOB Digital Financiall Services ensures customer privacy.							
10. ČSOB Digital Financial Services channels do not share any personal information with other channels.							

2

(d) Responsiveness

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
11. The ČSOB Digital Financial Services Staff is able to record and provide feedback on customer service issues in a timely manner.							
12. ČSOB Digital Financial Services has a 7/24-hour AI customer service that can clear up doubts and provide advice to customers.							

(e) Efficiency

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
13. ČSOB Digital Financial Services always meets customer needs in a timely manner.							
14. ČSOB Digital Financial Services are highly efficient.							

3

(f) Personalization

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
15. ČSOB can meet customers' personal needs for digital financial services.							
16. ČSOB digital financial services can provide customers with certain value-added services, such as sports and fitness, medical and health, leisure and entertainment, food and beverage, etc.							
17. ČSOB digital financial services designed with customers' preferences. (e.g., Customers can change their preferences in the ČSOB Smart).							

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II. The Banking Customer Satisfaction Questions

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
18. I am satisfied with my choice of ČSOB digital financial services.							
19. I am more satisfied with ČSOB digital financial services than other banks.							
20. I think it is wise to use ČSOB digital financial services.							
21. I am happy to use ČSOB digital financial services.							

III. The Banking Customer Loyalty Questions

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
22. I will introduce ČSOB digital financial services to people who ask me for advice.							
23. I will post positive reviews of ČSOB digital financial services online.							
24. I intend to continue using ČSOB digital financial services afterwards.							

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IV. The ČSOB Brand Equity Questions

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
25. I am proud of using ČSOB digital financial services.							
26. I would prefer ČSOB digital financial services even if another brand has the same features as ČSOB.							
27. I prefer ČSOB if there is another bank as good as ČSOB.							
28. It would be smart not to change if there was a bank like ČSOB.							

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V. Demographic Questions

29. Gender (Single Choice)
A. Male
B. Female
C. Non-binary / third gender
D. Prefer not to say

30. Age (Single Choice)
A. 18 - 25 years old
B. 26 - 35 years old
C. 36 - 45 years old
D. 46 - 55 years old
E. Above 55 years old
F. Prefer not to say

31. Occupation (Single Choice)

A. Private Sector
B. Public Sector
C. Semi-Public Sector
D. Self-employed
E. Unemployed
F. Prefer not to say

32. Monthly Pre-tax Income (Single Choice)
A. No income
B. Less than 23,000 CZK
C. 23,000 CZK to 45,999 CZK
D. 46,000 CZK to 68,999 CZK
E. 69,000 CZK to 91,999 CZK
F. 92,000 CZK or more
G. Prefer not to say

33. Education level (Single Choice)

A. High School
B. Bachelor's degree
C. Master's degree
D. Ph.D.
E. Others
F. Prefer not to say

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34. Experience in using digital banking services (Single Choice)

A. Less than 1 year
B. 1-3 years
C. More than 3 years

35. How often do you use digital banking services? (Single Choice)

A. Daily
B. Weekly
C. Monthly
D. Yearly

36. What kind of digital services do you regularly use at ČSOB? (Multiple Choice)
A. Account Enquiry
A. Transferring Money
B. Bill Payment
C. Merchant Offers(Savings, Loans, Insurance, Investment Products, Mortgage)
D. Credit Card Services
E. News
F. Exchange rates
G. Others_____(Please Specify)
H. Prefer not to say

Thank you again for your participation.

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Source: Author's own work.

Appendix 3 Rotated Component Matrix

	Component								
	1	2	3	4	5	6	7	8	9
DSQTB1	0.098	0.098	0.084	0.092	**0.893**	0.097	0.082	-0.02	0.037
DSQTB2	0.04	0.234	0.15	0.096	**0.753**	0.097	0.08	0.039	0.183
DSQTB3	0.13	0.107	0.132	0.105	**0.802**	0.07	0.174	0.089	0.002
DSQUF1	0.083	0.089	0.086	**0.865**	0.114	0.03	0.106	0.105	0.056
DSQUF2	0.057	0.155	0.144	**0.77**	0.115	0.06	0.081	0.083	0.05
DSQUF3	0.054	0.149	0.106	**0.81**	0.047	0.149	0.15	0.06	0.063
DSQSP1	0.105	0.12	**0.892**	0.057	0.052	0.068	0.064	0.022	0.055
DSQSP2	0.124	0.068	**0.775**	0.13	0.119	0.168	0.076	0.075	0.049
DSQSP3	0.171	0.122	**0.711**	0.087	0.103	0.1	0.265	0.048	0.037
DSQSP4	0.124	0.117	**0.751**	0.113	0.119	0.012	0.101	0.109	0.135
DSQRP1	0.09	0.145	0.107	0.103	0.028	0.05	0.144	**0.873**	0.072
DSQRP2	0.135	0.136	0.104	0.144	0.064	0.109	0.172	**0.844**	0.097
DSQEC1	0.142	0.101	0.1	0.057	0.051	0.135	0.123	0.092	**0.855**
DSQEC2	0.132	0.204	0.136	0.108	0.142	0.117	0.088	0.077	**0.807**
DSQPL1	0.045	0.087	0.087	0.063	0.047	**0.879**	0.102	0.028	0.077
DSQPL2	0.159	0.162	0.104	0.081	0.099	**0.776**	0.058	0.133	0.066
DSQPL3	0.139	0.165	0.113	0.097	0.116	**0.767**	0.148	0.008	0.123
CSF1	0.066	**0.878**	0.069	0.1	0.114	0.062	0.096	0.09	0.033
CSF2	0.032	**0.724**	0.119	0.079	0.156	0.118	0.209	0.102	0.13
CSF3	0.158	**0.765**	0.142	0.129	0.116	0.14	0.105	0.086	0.111

CSF4	0.113	**0.757**	0.111	0.149	0.084	0.147	0.131	0.062	0.089
BCL1	0.098	0.192	0.148	0.129	0.084	0.133	**0.834**	0.122	0.087
BCL2	0.205	0.182	0.209	0.063	0.165	0.09	**0.687**	0.137	0.144
BCL3	0.105	0.179	0.144	0.215	0.145	0.131	**0.751**	0.131	0.042
CBE1	**0.905**	0.075	0.084	0.065	0.039	0.094	0.057	0.046	0.021
CBE2	**0.791**	0.096	0.085	0.061	0.083	0.132	0.111	-0.007	0.079
CBE3	**0.764**	0.092	0.195	0.039	0.088	0.02	0.096	0.162	0.1
CBE4	**0.788**	0.073	0.132	0.049	0.071	0.097	0.09	0.061	0.1

Notes: **Bolded numbers** in the table indicate that the absolute value of the load factor is greater than 0.4.

Source: Author's own work

Appendix 4 Component Score Coefficient Matrix

	Component								
	1	2	3	4	5	6	7	8	9
DSQTB1	-0.007	-0.06	-0.046	-0.023	0.481	-0.007	-0.052	-0.025	-0.046
DSQTB2	-0.049	0.005	-0.014	-0.033	0.38	-0.025	-0.076	-0.003	0.063
DSQTB3	-0.002	-0.063	-0.03	-0.028	0.421	-0.028	0.003	0.039	-0.084
DSQUF1	0.005	-0.061	-0.042	0.461	-0.011	-0.049	-0.049	-0.019	-0.007
DSQUF2	-0.012	-0.018	-0.006	0.402	-0.014	-0.032	-0.069	-0.03	-0.017
DSQUF3	-0.016	-0.031	-0.033	0.424	-0.063	0.017	-0.013	-0.064	-0.01
DSQSP1	-0.045	0.001	0.411	-0.041	-0.055	-0.023	-0.082	-0.042	-0.033
DSQSP2	-0.038	-0.047	0.338	-0.002	-0.012	0.037	-0.083	-0.002	-0.046
DSQSP3	-0.016	-0.025	0.289	-0.038	-0.035	-0.018	0.073	-0.051	-0.059
DSQSP4	-0.036	-0.019	0.323	-0.014	-0.013	-0.066	-0.065	0.016	0.031

DSQRP1	-0.035	-0.026	-0.015	-0.046	-0.003	-0.019	-0.075	0.616	-0.039
DSQRP2	-0.021	-0.047	-0.03	-0.027	0.008	0.007	-0.061	0.583	-0.028
DSQEC1	-0.028	-0.07	-0.037	-0.021	-0.049	-0.03	-0.005	-0.028	0.642
DSQEC2	-0.033	-0.018	-0.023	-0.001	-0.005	-0.048	-0.053	-0.04	0.591
DSQPL1	-0.055	-0.06	-0.018	-0.025	-0.036	0.482	-0.023	-0.019	-0.04
DSQPL2	-0.006	-0.022	-0.021	-0.025	-0.008	0.409	-0.086	0.057	-0.063
DSQPL3	-0.018	-0.029	-0.025	-0.016	-0.013	0.392	-0.005	-0.055	-0.012
BCS1	-0.013	0.416	-0.033	-0.038	-0.036	-0.061	-0.074	-0.02	-0.083
BCS2	-0.047	0.305	-0.02	-0.058	-0.015	-0.033	0.014	-0.021	-0.003
BCS3	0.013	0.336	-0.009	-0.022	-0.042	-0.022	-0.079	-0.03	-0.028
BCS4	-0.002	0.335	-0.021	-0.007	-0.059	-0.013	-0.047	-0.051	-0.039
BCL1	-0.041	-0.045	-0.053	-0.043	-0.066	-0.024	0.539	-0.071	-0.023
BCL2	0.003	-0.042	-0.019	-0.076	-0.01	-0.053	0.414	-0.039	0.019
BCL3	-0.033	-0.051	-0.053	0.012	-0.025	-0.021	0.466	-0.054	-0.059
CBE1	0.372	-0.008	-0.055	0.01	-0.031	-0.018	-0.046	-0.034	-0.072
CBE2	0.314	-0.009	-0.056	0.001	-0.015	0	-0.001	-0.082	-0.024
CBE3	0.29	-0.016	0.001	-0.027	-0.006	-0.069	-0.04	0.05	-0.011
CBE4	0.307	-0.022	-0.03	-0.009	-0.017	-0.02	-0.027	-0.025	-0.007

Source: Author’s own work

Appendix 5 Interpretation of Total Variance

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.432	30.114	30.114	8.432	30.114	30.114	2.977	10.632	10.632
2	2.256	8.058	38.172	2.256	8.058	38.172	2.916	10.413	21.045
3	1.838	6.564	44.736	1.838	6.564	44.736	2.843	10.155	31.2
4	1.684	6.016	50.752	1.684	6.016	50.752	2.267	8.097	39.297
5	1.598	5.706	56.458	1.598	5.706	56.458	2.265	8.088	47.386
6	1.532	5.47	61.929	1.532	5.47	61.929	2.242	8.007	55.392
7	1.332	4.757	66.686	1.332	4.757	66.686	2.128	7.599	62.991
8	1.177	4.203	70.888	1.177	4.203	70.888	1.672	5.972	68.964
9	1.047	3.741	74.629	1.047	3.741	74.629	1.586	5.665	74.629
10	0.57	2.034	76.663	-	-	-	-	-	-
11	0.553	1.975	78.638	-	-	-	-	-	-
12	0.522	1.863	80.501	-	-	-	-	-	-
13	0.492	1.756	82.257	-	-	-	-	-	-
14	0.477	1.703	83.96	-	-	-	-	-	-
15	0.458	1.635	85.595	-	-	-	-	-	-
16	0.453	1.619	87.214	-	-	-	-	-	-
17	0.429	1.531	88.745	-	-	-	-	-	-
18	0.406	1.451	90.196	-	-	-	-	-	-
19	0.393	1.404	91.6	-	-	-	-	-	-
20	0.344	1.227	92.826	-	-	-	-	-	-
21	0.313	1.118	93.944	-	-	-	-	-	-
22	0.289	1.033	94.977	-	-	-	-	-	-
23	0.287	1.026	96.003	-	-	-	-	-	-
24	0.258	0.921	96.924	-	-	-	-	-	-
25	0.24	0.857	97.781	-	-	-	-	-	-
26	0.235	0.838	98.618	-	-	-	-	-	-
27	0.202	0.722	99.341	-	-	-	-	-	-
28	0.185	0.659	100	-	-	-	-	-	-

Source: Author’s own work