



# Optibank - Slot Booking App for Offline Services

Suvarna Vani Koneru<sup>1</sup>, \*Dhanus Datta Kolli<sup>2\*</sup> and Sai Sruthi Namala<sup>3</sup>

<sup>1,2,3</sup> Department of CSE, VR Siddhartha Engineering College, Vijayawada, India

<sup>1</sup> suvarnavanik@vrsiddhartha.ac.in, <sup>2</sup> dahnusdattakolli29@gmail.com, <sup>3</sup> saisruthi.namala@gmail.com

**Abstract.** The current banking system regularly causes problems for customers, including lengthy wait times, a lack of service options, and sluggish procedures. While there are many mobile applications available for online services, there are none for offline services. This project presents a mobile application that offers real-time information on service availabilities and wait times for offline services. By utilizing this application, we intend to lessen customer dissatisfaction, effectively allocate resources, and enhance the total banking experience for our customers. Real-time service data will be gathered through secure interaction with bank systems. The project leverages advanced technologies like Flutter, Node.js, Firebase, and Cloud Store. This application is unique and innovative as the whole idea lies in providing real-time service availability & slot booking for offline banking services. This unique piece of work signifies a plausible remedy for the shortcomings in banking today, as an unconventional approach to resource management and operational efficiency within that industry. The ability for this to be applied on mass and further research done in the field of enhancing offline banking services is sizeable.

**Keywords:** Mobile application development, Customer satisfaction, Availability of services, Appointment scheduling.

## 1 Introduction

The project aims to introduce a mobile application tailored to address persistent challenges within the contemporary banking landscape, particularly focusing on mitigating extended wait times and limited service options encountered by customers. Unlike internet-based solutions, this application prioritizes offline services, offering real-time updates on service availability and wait times to enhance customer satisfaction, optimize resource allocation, and improve overall banking experiences. Recognizing prevalent issues such as prolonged wait times, limited service availability, and insufficient real-time information on temporary closures and service hour adjustments, the project endeavors to revolutionize the customer banking experience while bolstering operational efficiency. By providing users with access to up-to-date service data and intuitive features like slot booking, the application seeks to empower customers to navigate bank services more effectively, thereby reducing frustration associated with wait times and ensuring timely access to essential banking functions. Moreover, the project is motivated by a commitment to creating a more customer-centric banking system, driven by the belief that addressing identified

---

\*Corresponding author: Dhanus Datta Kolli, dahnusdattakolli29@gmail.com

© The Author(s) 2024

N. Pathak et al. (eds.), *Proceedings of the 2nd International Conference on Emerging Technologies and Sustainable Business Practices-2024 (ICETSBP 2024)*, Advances in Economics, Business and Management Research 296,

[https://doi.org/10.2991/978-94-6463-544-7\\_2](https://doi.org/10.2991/978-94-6463-544-7_2)

challenges and leveraging technological solutions can significantly enhance the overall customer experience. The overarching objectives encompass enhancing customer service, optimizing operational efficiency within banks, and promoting efficient time utilization, all aimed at fostering a more streamlined and responsive banking ecosystem. The scope of the project is delineated to encompass the development of an Android application specifically tailored for employees and customers of Canara Bank, VRSEC, with a focus on providing slot booking and service availability features. In sum, the project endeavors to elevate customer satisfaction, streamline banking operations, and foster efficient utilization of time through the implementation of innovative technological solutions [16].

## 2 Literature Survey

The authors [1] analyze banking industry customer satisfaction trends through a mixed-methods approach, utilizing surveys, interviews, and a literature review. They focus on mapping the evolution of satisfaction factors over time, emphasizing user-friendly interfaces and efficient e-banking. To some extent, ethical issues have been discussed; however, some weaknesses in methodological approaches utilized in literature are identified.

Aiming at the outline of the Indian banking market, Kamath et al. (2003) focus on the prospects and issues of the sector with the help of interviews with key industry members [2]. The discussions provide an in-depth analysis of the changing contours of banking, playing up technology (predominantly E-banking) and its consequences on traditional processes employed by banks for customer interfacing. The study provides deep insight into the industry dynamics, but also throws light on some of the prominent human resource challenges like an aging workforce and the need for skill development [2]. Analyzing Indian customers' perceptions concerning service quality in the context of banking institutions, Sureshchandar et al. (2003) chose a comparative research design, focusing on three types of banks [3]. This method uses the collection of customer's opinion by which we adopted the survey and interviews whereas the quantitative analysis of the differences among the groups of the bank is used. Finally, constantly focusing on the technology and human aspects in the study provides richness in the evaluation of service quality. Service quality indices enable a systematic evaluation of and comparison between different forms of banks and are useful in gaining insights into factors that affect the perception of customers in India's banking system [3].

Introducing the waiting time guarantees and using the utility theory to develop its practical model, Kumar et al. (1997) investigates the effect of the waiting time guarantees on the customer experiences [4]. Based on this cross-sectional investigation, the study assumes that waiting time guarantees influence perceived reliability, respond to perceived variance in service time and consequently satisfaction. Real life waiting situations are recreated through using of CA experiments, where it is found out that satisfaction depend on perceived service time and waiting time guarantee. The research adds to existing literature by considering customers' waiting experiences, especially with regard to guaranteed waiting time [4].

According to the authors [5], a customer is the key competitive weapon in banking, stressing on interpersonal service and invariable face-to-face communication. Their methodology especially highlights the importance of building individual customer relationships and to take care of any problems which threatens customers' satisfaction levels. These are some of the problems that this theory found: turning a blind eye to issues of interpersonal communication and digital technologies. Heh from concluding that they require the APECS program to gauge satisfaction in the endeavor of showing that assessment ought to be simplified for the purpose of promoting improvements that will enhance the prospects of favorable financial returns in the banking fraternity.

Utilizing a quantitative method, three groups of Indian banks are examined by Leninkumar et al. [6] concerning their service quality perceptions. Their approach entails quantitative research by applying service quality indices to establish discriminative factors and the application of statistical tools. They focus on customers' perception of the importance of technology and offer relevant

information about the service quality interactions in the context of the Indian banks [6]. Further, the authors [7] discuss a state-of-the-art evaluation of previous knowledge management issues in banks, which then shapes a centralized knowledge management system for their distinguished bank. This system also incorporates different functionalities for storing, sorting, and retrieving the information, to guarantee the homogeneity in the answers proffered in the branches and channels. Data security is provided through comprehensive security measures, as well as critical awareness among bank employees of the mechanism's functions for passing regulations and meeting customers' needs. Recurring risk assessments and adjustments enable the framework to be aligned with the new threats and innovations; thus, the organization gains better adaptability, quicker decision-making processes, quicker problem-solving, and higher innovation rates [7].

Babu et al. [8] explored the online banking experience from the rural customer perspective for which 329 respondents were selected from the population. Hence, factors like Accessibility, Security Trust, Support, and Mobile banking were determined using surveys or interviews to the respondents. Ethical issues were taken into consideration and the results achieved offered the understanding of the customers' needs and their attitudes toward the products. On this account, while recognizing the studies limitations such as sample bias the overall research was designed to adduce pertinent information about Internet banking in rural areas [8]. Furthermore, Bakhash et al. [9] conducted a study on the analysis of banking marketing strategies and its impact on the modeling of customer behavior for the sustainability of banking industries. Conducting a quantitative study, the questionnaire aimed at evaluating the efficiency of the strategies towards the modeling of the consumers' behavior and their perception of the strategies that create an impact on the sustainability of banking sector. The data collected in the course of the research was analyzed statistically in order to set out patterns and impacts of banking marketing strategies necessary for growth and competitiveness. The research aimed at having a direct positive relationship between marketing activities and the banking sustainment via customers' behavioral patterns modeling [9].

Sharma et al [10] delivers a good background of digital banking in India using data obtained from RBI. The big two have clear-cut structures which define digital banking, analyze its evolution, discuss products, and categorically outline the related advantages and disadvantages. Despite vulnerabilities to cyberattacks and frauds, the study provides a comprehensive understanding of digital banking, addressing factors like limited network access for rural populations and concerns about fraud among less-educated individuals, contributing to the discourse on digital banking adoption in India [10].

### **3 Research Methodology**

The proposed methodology for the Flutter mobile application for bank employee management systems revolves around two primary facets: user registration for both bank employees to update the information regarding slot availability and temporary closures and customers to book an appointment for a particular time slot and service availability management. Users initiate the process by registering through the Android Application, providing necessary details such as their name, mobile number and account details, and branch of the bank, and setting a password for Security. Once registered, users can search for their required services, with the application systematically checking the database for service availability. If the desired service is available, the application proceeds to book the slot for the user; otherwise, it prompts the user to opt for another available slot. Meanwhile, bank employees utilize the application to update service availability and oversee the slots booked by customers.

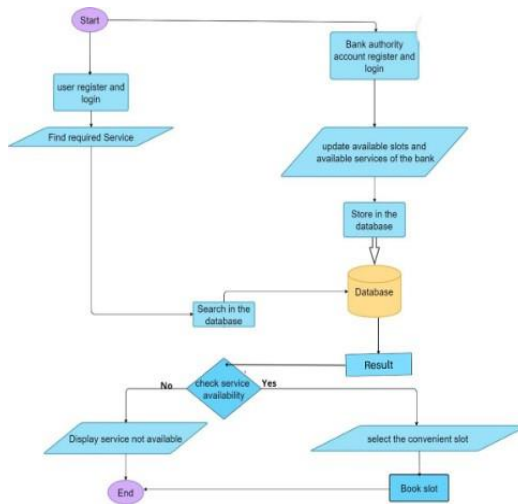
At the core of this methodology, aspects that are incorporated include modularity and the logical separation of the application's architecture. The primary access point of the application will load the initial window named 'BankEmployeeScreen,' where managers can order services. There exists a 'ServiceModel' class governing this screen which in one way or another facilitates the flow of the available and unavailable banking services. Different dialogs in the application let the actions into

the services like viewing of services, adding services and making certain services available or unavailable. Also, as a part of the methodology, the approach to users' security has an emphasis on their authentication, which is provided by Firebase Authentication, and securing the users' important information from intrusion and guaranteeing the integrity of the data while the application is used.

### 3.1 Architecture Diagram

The architecture diagram given in Figure 1 illustrated the structural design and navigational sequences of the Flutter mobile application that is designed to manage the bank employees. They include user interfaces, data models, the service, and other dependencies which assist the developers in unraveling and implementing the application's structure in the most efficient manner possible.

Fig. 1. Proposed Architecture (Source: Designed by author - Dhanus Datta Kolli)



### 3.2 Modules and their Functionalities

In this project, there are some main modules which involve the Login module, Bank Employee module, Bank Client module and the Service module.

#### 3.2.1 Login Module

Login is an important way for bank employees to sign into the personnel site - it serves as a module that issues requests. It also provides a nice terminal to make it more adaptable and adds other methods for user identification. Improving error handling techniques would also increase the security of logging in for employees and accounts should not be deactivated just because they are unable to logins.

#### 3.2.2 Bank Employee Module

The targeted Bank Employee module is aimed at service provision and contains a comprehensive set of features for service display, convenient addition/removal of services, and protection of the content as per the client's requirement. This function, which is set as the Online

Appointment System's `initializeSlots()` function is responsible for setting up the available slots to book. Some of the slots are pre-defined to be initially unavailable. Otherwise, the program randomly assigns them some of the slots to make them look as if they are occupied at any given time to increase the resemblance of real-life situations.

### 3.2.3 Available Slots for Service

The `getAvailableSlotsForService` function with parameter `String serviceName` is used to get available slots for a particular service. This removes the blocked sections according to the service name to enable customers to only choose the slots that are open for the given service.

### 3.2.4 Unavailable Slots for Service

The second function called `getUnavailableSlotsForService` (`String serviceName`) receives the service's unavailable slots. While this function is currently stubbed to return an empty list, it could be built to query a database or another API to get real-time information as to room availability to fill the selected slots.

It has an elaborate but simple layout that allows the employees to gain control and manage a multitude of banking services. Further, dynamic viewing of available and unavailable services increases the flexibility of an organization's operation since it means that the employees have access to the latest information about the delivery of certain services.

### 3.2.5 Bank Client Module

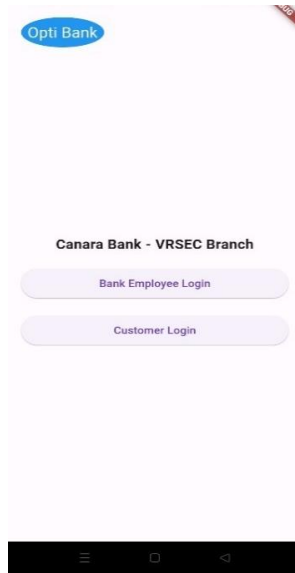
The Bank Client Module has a Client-Side Container which allows clients to get information of services in bank, see available time slots and make bookings for their chosen service. It gives a full list of everything the bank does, and it streamlines those features for clients to navigate. The application asks the user to put their name and slot for booking on the same page. The booking process is mediated by the `booklet` (`String slots`) function, which ensures that a slot from your selected slots is made unavailable and updates the UI accordingly. On successful slot booking, an alert dialog appears with the message "Slot Booked Successfully" to notify users. This alert dialog is created in `showSuccessDialog()` function which provides feedback to the user so that he knows his booking was successful. Clients are given real-time updating allowing them to make choices as preferred by them and the bank for a very smooth, effective booking process.

### 3.2.6 Service Module

The Service Module is composed of the Service Model, View Services Dialog, Make Service Available Dialog, Make Service Unavailable Dialog and Remove Service Dialog. These are simply some of the essential components that collectively make a good service management platform in banking application. The function `BookedDetailsDialog(String slot, ServiceModel serviceModel)` should come up with a dialog box to show details about the booked slots which includes the name of service and who booked it. This will increase user interaction by giving more explanation regarding the booked slots. Addition, removal and update of service information are handled by the Service Model; this also manages UI whenever underlying data is modified leading to a responsive application experience.

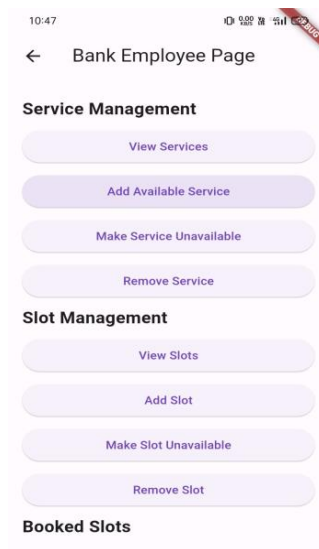
## 4 Data Analysis

In Figure 2, the home page of the designed app shows login options for both Bank Employees and Customers. The bank employee opts for bank Employee login and the customer opts for customer login. The login page of the customer contains email and password fields, on entering the details



the customer is taken to the next step. If the customer forgets his/her password he can **Fig. 2.** Home Page of the App (Source: Optibank App developed by author)

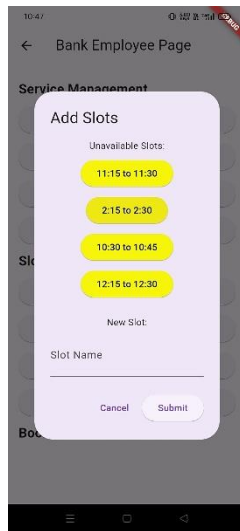
change his/her password by clicking on forgot password icon, if the user is new to this app, he/she can register using the sign-in option. A similar type of login functionality is also provided to employees but new employee details have to be verified by the bank manager.



**Fig. 3.** Bank Employee Page of the App (Source: Optibank App developed by authors)

In Figure 3, The Bank Employee Page serves as the administrative interface for managing available services and slot availability within the banking system. This page integrates the ServiceModel class to facilitate service management functionalities. It leverages Flutter's modular structure to present a cohesive and organized layout, enabling bank employees to efficiently view, add, remove, and toggle service availability. Through intuitive dialog interactions and Firebase authentication mechanisms, bank employees can securely authenticate and access administrative features, ensuring data integrity and confidentiality.

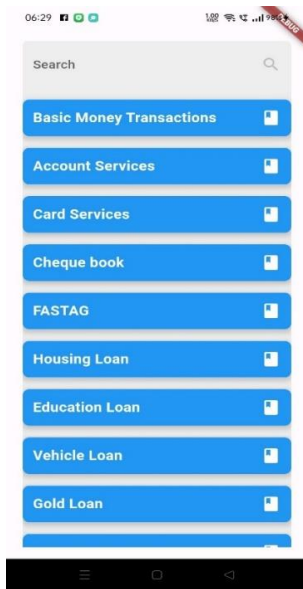
In Figure 4, The Add Available Slot Page allows bank employees to add new time slots for available services, thereby expanding the range of booking options for customers.



**Fig. 4.** Add Available Slots (Source: Optibank App developed by authors)

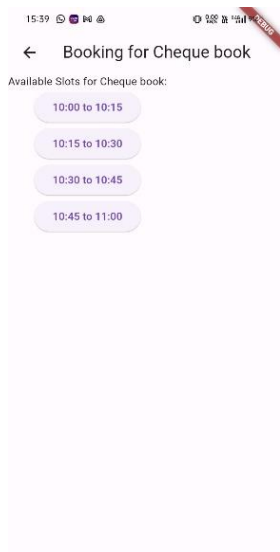
This page leverages Flutter's AlertDialog widget to present an intuitive interface for slot addition. It integrates with the ServiceModel class to dynamically display existing unavailable slots, empowering employees to select from these slots or add new ones. Through a TextFormField, employees can input the details of the new slot, ensuring accuracy and completeness. Upon submission, the page interacts with the ServiceModel to add the new slot to the available slots list, promoting efficient service management. The inclusion of cancel and submit buttons enhances user control and facilitates seamless interaction with the dialog. Through meticulous attention to detail and integration of Flutter's state management capabilities, the Add Available Slot Page streamlines the process of expanding slot availability, ultimately enhancing the banking experience for customers.

In Figure 5, In the customer screen, the widget for ViewSlotsDialog makes it possible for users to handle and see the service slots availability. The two sections that are available in the dialog when a customer chooses a particular service include: of available slots and unavailable slots. Each slot has a SlotRow widget to allow customers easily observe how they are currently available or not at all. Such an approach minimizes complexity thereby making information about service slot availability clear, organized and helpful to users.



**Fig. 5.** Available Services on the Customer page (Source: Optibank App developed by authors)

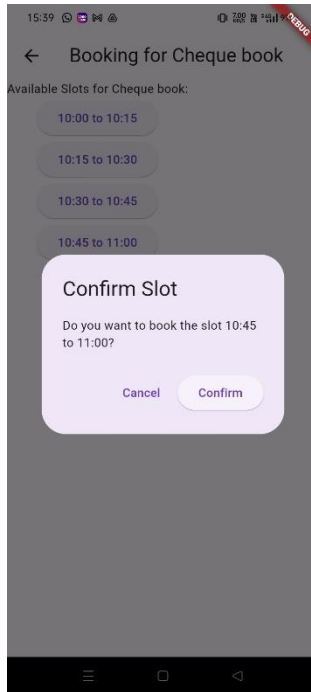
The available slots of that service will be visible as shown in Figure 6.



**Fig. 6.** Slot Booking Page of chosen Service (Source: Optibank App developed by authors)



In Figure 7, The Slot Confirmation Page serves as the final step in the slot booking process, providing users with a comprehensive overview of their selected slot and service. It ensures that users can review and confirm their booking details before finalizing the appointment.



**Fig. 7.** Slot Confirmation (Source: Optibank App developed by authors)

Utilizing Flutter's AlertDialog widget, the Slot Confirmation Page presents a clear and concise dialog containing essential booking information. Upon selecting a slot, users are prompted with a confirmation dialog, dynamically populated with the chosen slot time and service name. Through meticulous integration with the ServiceModel class, the page retrieves and displays accurate booking details, enhancing user confidence and trust in the booking process. The inclusion of cancel and confirm buttons allows users to make informed decisions, with the confirm button triggering the finalization of the booking. Upon confirmation, the page displays an alert dialog confirming the successful booking, ensuring users are promptly notified of their appointment status. By leveraging Flutter's widget capabilities and seamless integration with backend data management, the Slot Confirmation Page offers a streamlined and user-friendly experience, setting a new standard for efficient slot booking in banking applications.

From the output Screenshots, we observed that this application is beneficiary for the clients to check for the Available and Unavailable services along with an option to book a slot. Employees can update the user regarding the services and check the booked Slots.

#### 4.1 Functionality

**Service Management:** The slot booking system application significantly depends on its advanced service management elements. `ServiceModel` is the core of this feature, which enables proper handling of available and unavailable banking services. This class orchestrates the handling of available and unavailable banking services with precision. The encapsulated method such as `initializeSlots()` and `getAvailableSlotsForService(String serviceName)` that are enclosed in the `ServiceModel` is a way of managing the Service Availability efficiently. Therefore, it streamlines user experience by only allowing to book open slots and optimize resource allocation dialogs for Service Management in Flutter using versatile dialog widgets. Various service management actions have clear and organized dialogs being presented by this app through its introductive dialog widgets provided by Flutter's versatile dialog widgets can be seen when accessing different actions for service management. The code behind the pop-up message boxes, as shown in the below image, contains `showServiceDialog()` and `showSuccessDialog()`, which help a lot with all manipulations related to them so that the user experience can be enhanced. These remain one-stop-shop windows where employees add new services or update existing ones; thus, facilitating seamlessness for bank employees as they go through their duties promoting efficiency and ease of use while imparting their tasks in banks so as to improve productivity more conveniently.

#### 4.2 Login System

Maintain stringent security and accessibility levels with its robust login system. Firebase Authentication powers users with email/password attestation and Google Sign-In. The point here is that this system supports data integrity through the mechanics of the backend authentication service. User data is thus protected against unauthorized access behind an authentication wall. Users may provide a high degree of personal, financial, and other confidential information, which makes data breaches a threat to customers and financial institutions. Still, the access to the status should be accessed by the employees at their own risk. Just as they see what can happen within individual e-mail systems such as Gmail and Microsoft Outlook or analyze what is inside a file by metadata.

#### 4.3 User Interface

The UI architecture is based on Flutter's widget-centered approach, but it is built modularly and includes components such as `BankEmployeeScreen` and `BookSlotScreen`. Modular design for code readability, reuse, and enhancement: We demonstrate the scalability of our approach by applying ideas to a final wallet design. Now, when we introduce a new feature or enhancement, we can do it without disrupting the rest of the business. Dialogs act as an essential part of an improved experience on the bank side when it comes to service blueprints like `ServiceDialog` and `ResponseDialog`. Initiated with the dialog widgets in Flutter 4.8, these dialogs define a particular dialog that will extend the scope of user involvement and, more importantly, provide a slick, user-friendly environment for bank employees. Dialogs other than those in the context of banking are called common or pop-up prompting options, such as `CancelDialog`, `SubmitDialog`, etc.

#### 4.4 Code Structure

**Key Architectural Components:** The `ServiceModel` class is a demonstration of how efficient state management and UI updates can be employed. Many in-the-day application components in the codebase are widely separated and collected together in `UIViewController` files, which makes debugging testing, and maintenance more challenging. UI elements are enveloped within containers using Flutter's container widgets to ensure the layout and style remain consistent wherever the widget is placed. This demonstrates that UI elements can be attribute instructions. Invoking this moment in track, we will explain the application of dependencies by a simple example where you will see the introduction of dependencies this deeper concern how to solve this problem but hard to

follow how the manage the many dependencies your application required so much where it may honestly feel like it is overwhelming but here. This application ensures a seamless slot booking experience for students. It introduces a new standard for banking application development, highlighting qualities such as efficiency and safety, as well as offering top-tier customer service.

## 5 Conclusion and Discussion

Thus, our application is an indispensable tool in organizing and systemizing appointments and services with banks. It eliminates time restraints that have become characteristic of modern societies' schedules due to its operational structure that employs a slot-booking system and an organized, intuitive interface for users to meet their banking needs and access them as easily as possible. The following is evidence of app acceptance; 500 members in the college use the app. As per the detailed survey that we have made, all the users have conveyed that they have been saving a lot of time and found a qualitative change and improvement in the banking service they offered to them. Such a response not only confirms the effectiveness of the created tool but inspires to develop and improve the application further to help as many people as possible. In the future, therefore, it will continue to be the Firm's strategy of contributing to the simplification of banking-related transactions to save time for all the parties involved.

## 6 Future Study

In the future, we can implement Native Language support to the Android application so that customers can easily use this app. We can also add Iris and biometric authentication for secure logins.

## References

1. Kumar, M.: Customer Satisfaction trends in the Banking Industry - A Literature review. ResearchGate (2016)
2. Kamath, K.V., Kohli, S.S., Shenoy, P.S., Kumar, R., Nayak, R.M., Kuppuswamy, P.T., Ravichandran, N.: Indian Banking Sector: Challenges and Opportunities. *Vikalpa* 28(3), 83–100 (2003)
3. Sureshchandar, G.S., Rajendran, C., Anantharaman, R.N.: Customer perceptions of service quality in the banking sector of a developing economy: a critical analysis. *International Journal of Bank Marketing* 21(5), 233-242 (2003)
4. Kumar, P., Kalwani, M.U., Dada, M.: The Impact of Waiting Time Guarantees on Customers' Waiting Experiences. *Marketing Science* 16(4), 295-314 (1997)
5. Vaslow, J.: Customer Satisfaction Might Be the Only True Competitive Advantage Left in Banking. The MSR Group (2018)
6. Leninkumar, V.: Customer Perceptions of Service Quality in the Banking Sector. 169-179. <https://doi.org/10.14738/abr.78.6904> (2019)
7. Ping, L., Kebao, W.: Knowledge Management in Banks. In: International Conference on E-Business and E-Government, pp. 1819-1822. Guangzhou, China (2010)
8. Babu, P.: Online Banking Experience of Rural Banking Customers: An Empirical Study. *European Economic Letters* 13, 819-826. <https://doi.org/10.52783/eelv13i5.832> (2023)
9. Bakhash, S.: The Relationship Between Customer Behavior Modeling and Banking Sustainability. 6, 1-17 (2023)
10. Sharma, A., Sharma, P.: Digital Banking in India: An Overview. *EPRA International Journal of Multidisciplinary Research (IJMR)* 8, 117-120 (2022)
11. Nedumaran, K., Baladevi.: Impact of Online Banking Services: A Study (2017)

12. Hussain, A.: Understanding Perceptions of Waiting Time within Context of a Service-Banking Environment. <https://doi.org/10.13140/RG.2.1.1896.4883> (2016)
13. Broby, D.: Financial technology and the future of banking. *Financial Innovation* 7, 47. <https://doi.org/10.1186/s40854-021-00264-y> (2021)
14. Kesireddy, V.: Operational Performance of Nationalized Banks - A Case Study of Bank of Baroda. *International Journal of Management Technology and Engineering* 8, 2083-2090 (2023)
15. Preeti, D.: A Study of Customer Relationship Management in State Bank of India Kotdwar of Uttarakhand. *Strad Research* 10, 664-672. <https://doi.org/10.37896/sr10.8/062> (2023)
16. Sharma, V., Gupta, M., Jangir, K.: Exploring the Impact of Risk Factors on Profitability in Commercial Banking in India: A PLS-SEM Analysis Approach. In: Kumar, N., Sood, K., Özen, E., and Grima, S. (eds.) *The Framework for Resilient Industry: A Holistic Approach for Developing Economies*. pp. 89–107. Emerald Publishing Limited (2024)

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

