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The Landscape of Mobile Banking Channels: Exploring Their Diverse Characteristics

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ABSTRACT

Mobile banking channels have transformed how consumers engage with financial services by providing convenience, efficiency, and accessibility. This research investigates the various features of mobile banking channels, focusing on their usability, technological progress, security measures, and patterns of customer adoption. It examines the influence of mobile applications, SMS banking, USSD services, and new technologies like chatbots and voice interfaces on the current banking environment. The study also addresses significant challenges, such as security issues and barriers to digital literacy, while offering insights into opportunities for innovation and customer interaction. By analyzing trends across different demographics and regions, this article enhances the understanding of the changing dynamics of mobile banking and its significant effect on the financial sector.. this paper is based on Secondary sources, such as relevant articles and the website of the Reserve Bank of India, are used to gather the data.

Keywords: mobile banking, multiple channels, application based, SIM based, USSD, SMS, IVR

INTRODUCTION

Historically, access to communication infrastructure in India was limited, with fixed-line telephones considered a luxury and long waiting periods for new connections. The liberalization of the telecommunications sector during the mid-1990s marked a significant shift, as policy reforms encouraged private participation, foreign investment, and competition. Subsequent reductions in customs duties, advancements in telecommunications technology, and the establishment of domestic manufacturing facilities substantially lowered the cost of mobile devices. These developments resulted in widespread mobile phone adoption across socio-economic groups.

Policy initiatives such as the National Telecom Policy (1999), the Special Economic Zones Act (2005), and liberalized Foreign Direct Investment regulations played a crucial role in strengthening India's telecom and electronics manufacturing ecosystem. By 2004, mobile subscriptions exceeded fixed-line connections, reflecting a structural transformation in communication access. Regulatory interventions by the Telecom Regulatory Authority of India (TRAI), particularly in reducing interconnection usage charges, further contributed to declining call tariffs and mass adoption of mobile services.

The extensive penetration of mobile phones and the expansion of digital infrastructure laid the foundation for India's digital economy. Recognizing the potential of mobile devices as financial service delivery tools, the Reserve Bank of India (RBI) promoted the adoption of information and communication technologies (ICT) in the banking sector. In January 2014, the RBI formally permitted banks to provide mobile banking services through multiple channels, ensuring that customers with varying levels of technological access could participate in the formal financial system..

Later, between 1995 and 2001, the government implemented a number of reforms in the telecom sector, including giving private telecom players licenses and granting them access to the market. Mobile phones have

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become more affordable and accessible to the general public because to government reductions in custom duty fees for a variety of mobile products and services, advancements in telecommunications technology, and especially the establishment of mobile manufacturing plants in the nation.

Although India's 1991 economic reforms welcomed international investment, the country gradually deregulated the electronics and telecommunications industries. At first, foreign businesses operated through imports or joint partnerships. later other reforms and policies like:

National Telecom Policy (NTP) in 1999 The goal of this policy was to draw in foreign investment and improve communications infrastructure. In order to address the rising demand for mobile devices, it loosened regulations and encouraged businesses to establish local production.

Special Economic Zones (SEZ) Act, 2005: this act made India to became a desirable location for manufacturing because to the SEZ Act's infrastructure assistance, tax incentives, and streamlined regulations. For instance, Nokia opened a plant in Chennai in 2006 with SEZ benefits so that it could export gadgets all over the world.

Foreign Direct Investment (FDI) Policy: Companies like Samsung and Nokia were able to establish totally owned operations in India by the early 2000s when the country allowed 100 percent FDI in manufacturing through the "automatic route" (without prior government clearance).

Post-2014 Push ("Make in India"): The 2014 "Make in India" campaign further accelerated foreign manufacturing, drawing in newer firms like Xiaomi and Apple's suppliers, even though Nokia was at its peak before that year.

Thus, Nokia began its manufacturing journey in Chennai in 2006, rising to prominence as one of India's leading mobile phone exporters, only to confront tax issues in the 2010s.

Samsung, on the other hand, launched local production in the mid-2000s, with a significant plant in Noida near New Delhi established in 2007, and later expanded its operations through initiatives such as "Make in India."

In the early to mid-2000s, telecom rules, FDI liberalization, and SEZ incentives officially allowed foreign mobile manufacturers to open offices in India. Both Samsung and Nokia benefited from these reforms; Nokia's Chennai facility (2006) was a turning point in India's history as a producer of electronics. Consequently, mobile phones became less expensive, allowing more people to access them easily. The Indian mobile phone market reached a crucial milestone in September 2004, as it was the first time that mobile phone connections exceeded fixed line connections in the country.

Call rates for incoming and outgoing calls during the early stages of the development of mobile phones ranged from Rs. 8 to 16 per minute. The telecom business was altered by technical advancement and a supportive policy environment. The basis for a digital economy has been set by widespread use of telecom and the internet as well as government efforts to build digital infrastructure. The actions taken by the Telecom Regulatory Authority of India (TRAI) regarding interconnection usage charges (IUC) played a crucial role in the reduction of call rates. In February 2015, TRAI implemented a decrease in the network interconnection usage fees for mobile calls. This change in the charges that telecom operators incur for connecting calls was expected to lead to lower consumer costs. Notably, TRAI reduced the mobile termination charge, which directly influenced the overall cost of call completion, encouraging operators to potentially lower their tariffs. Furthermore, TRAI abolished interconnection charges for calls made from landlines to both landlines and mobiles, which also contributed to the decrease in costs. Decrease in call rates less expensive of mobile devices, thus, made India as one of the leading mobile phone penetrations in the world.

The extensive reach of telecommunications and the internet, coupled with the government's commitment to enhancing digital infrastructure, has established a robust foundation for a digital economy. The significant advancement in digital infrastructure and the widespread adoption of mobile phones have facilitated comprehensive growth across major sectors, enabling the population to connect digitally through mobile devices. Financial institutions, particularly banks, have traditionally been customer-centric, requiring clients to visit

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branches for transactions such as deposits, transfers, and withdrawals. To ensure the safety and security of these banking needs, banks must prioritize customer service, a complex challenge that necessitates timely responses while maintaining positive relationships. To address these challenges, the Reserve Bank of India (RBI) initiated the deployment of technology and the digitalization of banks in the 1990s. Rapid technological advancements have led to innovative changes in daily banking operations. Increased competition and customer demand have compelled banks to offer digital services. The advent of the internet in the late 1990s paved the way for online banking, e-banking, and virtual banking in India, allowing customers to conduct transactions such as NEFT, RTGS, and utility bill payments through financial institution websites. However, a significant limitation was the accessibility of computer systems for customers. The swift rise in mobile users and the expansion of mobile network coverage have positioned mobile phones as a crucial platform for delivering banking services. As of December 2024, India had approximately 1,060.34 million active wireless subscribers, the RBI explored the potential of mobile phones as a self-service banking solution. Currently, the Indian banking industry has embraced information and communication technology (ICT) as an effective and efficient means of service delivery. Based on the report from the RBI technical committee chaired by Ramamurthy, banks were authorized in January 2014 to deliver mobile banking services through multiple channels. These channels encompass application-based, SMS (Short Message Service), USSD (Unstructured Supplementary Service Data), and IVR (Interactive Voice Response) methods. This approach guarantees that customers with various handsets can access banking services securely.

Mobile banking is a wireless delivery system of services that bestows significant value to customers due to its ability to allow them access bank services at their own convenience, anywhere and anytime (Shaikh & Karjaluoto, 2014). The increase in smartphone usage has fueled the demand for mobile banking, and therefore financial institutions have established new services and applications that enhance customer interaction, enhance operational efficiency, and enhance their market reach (Shaikh & Karjaluoto, 2014).

The speedy development of mobile technology has transformed the banking sector significantly, and consequently, many mobile banking platforms were created. Such platforms provide customers with unparalleled access to financial services, which allow them to control their accounts, transfer funds, and make transactions at any time and from almost anywhere (Rezaei et al., 2015). The paper aims to analyze the diverse characteristics of mobile banking channels, highlighting their advantages and disadvantages of the various mobile banking channels.

Objective of the study

primary objective of the study is to identify various channels and study its diverse charteristicsmultiple channels of mobile banking.

To study the Comparative Analysis of multiple mobile banking Channel Performance

METHODOLOGY

The research for this paper was carried out by reviewing secondary data, without any empirical investigation. A substantial amount of written material was utilized, including books, RBI reports, articles, and websites.

Theoretical Landscape of Mobile Banking Channels.

In the past decade, mobile banking has been a subject of significant scholarly research, with scholars analyzing its rate of adoption, usage behavior, and sustained influence on the banking industry. The literature offers a range of characteristics and promise of mobile banking platforms such as enhanced financial inclusion, enhanced customer experience, and enhanced operating efficiency.

Unctional Characteristics of Mobile Banking Channels

early studies describe mobile banking as an extension of electronic banking, initially delivered through SMS-based services, which allowed users to receive transaction alerts and perform basic balance inquiries (Barnes &

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Corbitt, 2003). With advancements in mobile internet and smartphone penetration, banking channels expanded to include USSD-based services, mobile web banking, and dedicated mobile applications. Research highlights that each channel differs in terms of accessibility, interactivity, security, and technological dependence (Donner & Tellez, 2008).

USSD and SMS-based banking are often emphasized in studies focusing on developing economies, as these channels function on basic mobile phones and do not require internet connectivity. In contrast, app-based and mobile web banking channels are dominant in digitally advanced markets, offering integrated financial services such as fund transfers, bill payments, loan applications, and investment management (Shaikh & Karjaluoto, 2015).

adoption and Usage Perspectives

Mobile Banking: A Study on Adoption and Challenges (. L Narayana Swamy, IJCRT,2023) This paper explores the adoption of mobile banking in the Rayalaseema region of Andhra Pradesh, India. It highlights factors like security, trust, and usability that influence customer satisfaction and adoption.

Mobile Banking as Technology Adoption and Challenges (Archana Sharma & Vineet kansal,2012) This study focuses on the adoption of mobile banking services in India, identifying key factors influencing consumer behavior and providing insights into marketing strategies for financial services.

Distribution Channels of Banking Services (Marina, et al,2022) This research examines the attitudes and preferences of clients regarding banking service distribution channels, emphasizing the growing use of digital channels like mobile banking.

This study explores client attitudes and preferences concerning the distribution channels of banking services, with a particular focus on the increasing adoption of digital platforms such as mobile banking.

The research on mobile banking channels has uncovered a range of diverse characteristics.

Despite the extensive research on mobile banking, there remain several gaps in understanding of the diverse characteristics and implications of evolving mobile banking landscape.

Technology implementation in bank's

Few customers inside the bank rely on others to fill out their bank challan (either withdrawal or deposit, despite the fact that most customers use traditional banking. Despite this situation, the majority of banks began implementing technology for delivery channels, such as ATMs, cash deposit machines, debit cards, credit cards, and smart cards. Internet and mobile banking, or telebanking

Mobile banking

Mobile banking allows users to perform banking activities through their mobile devices. This service enhances convenience for customers, helping them save both time and money. It offers the flexibility to access banking facilities at any time and from anywhere.

Characteristics of Mobile Banking

- Convenience
  - 24/7 availability of banking services from any location.
  - No need to visit a physical bank branch
- security concerns
  - Uses encryption, multi-factor authentication (MFA), and biometricauthentication.
  - Secure payment gateways and fraud detection mechanisms.
- User-Friendly Interface

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- Easy-to-use apps and Simple navigation.
- Multiple language options are available to improve accessibility.
- Variety of Services
- Fund transfers (IMPS, NEFT, RTGS, UPI, etc.).
- Bill payments, mobile recharges, and tax payments.
- request a cheque book.
- To locate ATM's.
- Account Access and Balance Inquiry.

Drawbacks of Mobile Banking

Although mobile banking has revolutionized the financial industry, it poses several challenges and risks. Some of the key disadvantages are deliberated below:

1. Security Issues

Cyber Attacks: Mobile banking is vulnerable to cyber-attacks, such as phishing, malware, and hacking. Identity Theft and Fraud: Identity thieves may use spoofed apps or social engineering techniques to hack user credentials.

2. Internet and technical challenges

Network Dependency: The operation of mobile banking depends on a secure internet connection, which can be lacking in remote or rural settings.

Performance Issues in Banking Applications: Banking applications occasionally experience poor performance, system crash, or technical issues, leading to customer dissatisfaction. Compatibility Problems: Older devices may not support the latest security updates or banking applications, limiting functionality.

2. Constraints Associated with Mobile Banking Even though mobile banking has changed the banking sector drastically, it also has many challenges and threats. Some of the key drawbacks are mentioned below:

1. Security Vulnerabilities

Cyber Threats: Mobile banking is vulnerable to various cyber threats such as phishing, malware, and unauthorized hacking.

Identity Theft and Fraud: Attackers can obtain user credentials from fake apps or deceptive social engineering tactics.

2. Technical and Internet Limitations

Internet Connectivity Dependence: Operation of mobile banking depends on an assured internet connection, which is sometimes not available in rural or far-flung places.

Application-related Issues: Banking apps can sometimes run slow, crash unexpectedly, or have numerous technical issues, causing inconvenience to users. Problems with Device Support: Older devices may be deficient in their implementation of modern security patches or finance apps.

3. Problems with Mobile Banking

Mobile banking has revolutionized the banking sector, but there are also some challenges and risks involved. Some of the major disadvantages are as follows:

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1. Security Issues

Cybercrime Risks: Mobile banking is at risk of cyber threats such as phishing, malware, and hacking attacks. Identity Theft and Fraud: Attackers could exploit user credentials through imposter applications or social engineering.

2. Technical and Internet Issues

Dependence on Internet Availability: Internet banking is dependent upon a reliable internet connection, which might not always be present in rural or far-off areas. Technical Glitches: The banking software sometimes suffers from low performance, system crashes, or other technical issues, which are inconvenient to users. Compatibility Issues: Legacy devices might be incompatible with modern security patches or banking software, thus limiting their functionality.

Over the last ten years, mobile banking has been extensively researched, with academics exploring its adoption, usage trends, and effects on the banking sector. The existing body of work has underscored the various features and advantages of mobile banking platforms, which include greater financial inclusion, improved customer experiences, and increased operational efficiency. For example, research indicates that the rise in smartphone usage in India is closely linked to the growth of mobile banking, allowing financial institutions to connect with previously unbanked individuals in rural regions (Bhatt & Bhatt, 2016). Additionally, another study highlighted critical factors affecting mobile banking adoption in India, such as perceived ease of use, compatibility, social influence, security, and cost (Singh & Srivastava, 2014).

Existing research on mobile banking channels emphasizes several pivotal characteristics that drive the industry's advancement. Mobile banking functions as an additional delivery channel that complements conventional banking services, including ATMs, telephone banking, and internet banking. This channel is increasingly being utilized by both retail and microfinance banks, spurred by the need to connect with unbanked populations, particularly in rural areas, and to enhance convenience for existing customers. (Bhatt & Bhatt, 2016) Moreover, studies have looked into the factors that affect the adoption of mobile banking, such as perceived usefulness, ease of use, trust, and social influence. (Rezaei et al., 2015).

mobile banking, also known as m-banking, can perform various functions like mini statement, checking of account history, SMS alerts, access to card statement, balance check, mobile recharge etc. via mobile phones (Vinayagamoorthy and sankar, 2012). banks are constantly updating their technology and want to increase their customer base by reaching to each and every customer. there are many advantages of using mobile banking, such as people in the rural or remote areas can also get an easy access to mobile

First mobile banking transaction services in India were offered by ICICI bank in January 2008(Mr. V. Vaidyanathan, 2008) but SMS alerts started in 2005-06 (Alpesh Patel, 2013).

According to Cho & Jung (2005) mobile banking is one of the banking delivery channels that are being implemented by banking institutions in order to facilitate better services to their customers.

The research on mobile banking channels has uncovered a range of diverse characteristics that shape the landscape of this evolving industry. (Swamy, 2023) (Singh & Srivastava, 2014) (Shaikh & Karjaluoto, 2014).

Existing Knowledge Gaps

Although significant research has been conducted on mobile banking, there are still notable gaps in our comprehension of the various features and consequences associated with this rapidly changing field.

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Statement of the problem

As of March 2025, India is recognized for its remarkable diversity, consisting of 28 states and 8 union territories. Each state features its own unique languages and cultural traditions, resulting in a varied population that changes every 1,000 kilometers. Socio-economic conditions and standards of living differ significantly across regions, revealing income inequality within the country. For individuals in lower income groups, the cost of smartphones and mobile devices remains a barrier, exacerbating the digital divide. The landscape of the country is a rich and diverse panorama, spanning from the lofty Hills in the northern and western parts to the calm coastal areas in the south. It comprises lush woodlands, broad deserts, rolling plains, and vibrant plateaus to address these issues, the Reserve Bank of India has released guidelines to promote mobile banking accessibility for all customer types through multiple channels. This paper examines the characteristics and features of these various mobile banking channels.

Purpose of the Study

The purpose of this study is to explore and analyze the diverse characteristics of mobile banking channels, examining their impact on user experience, security, accessibility, and financial inclusion. As mobile banking continues to evolve with advancements in technology, understanding the strengths and limitations of various channels such as mobile applications, SMS banking, and USSD-based transactions becomes essential for banks, policymakers, and consumers. This research aims to provide insights into emerging trends, adoption patterns, and the role of mobile banking in shaping the digital financial ecosystem. By identifying key factors that influence user engagement and satisfaction, this study will contribute to the development of more efficient, secure, and inclusive mobile banking solutions.

objective of the study

The main goal of this study is to identify and analyze the various characteristics of mobile banking channels.

METHODOLOGY

This study adopts a qualitative, descriptive research design based exclusively on secondary data. Relevant literature was collected from peer-reviewed journals indexed in Scopus and other reputed databases, RBI reports, policy documents, and official websites of banks. The review covers literature published primarily between 2003 and 2024, ensuring relevance to contemporary digital banking developments. Sources were selected based on academic credibility, relevance to mobile banking, and policy significance.

Mobile Banking Channels in India

Figure1: types of mobile banking

Sources: created by the author based on secondary data

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Figure 1 demonstrates the various channels available for mobile banking. Here, No. 1 (mobile application) is identified as phone-based mobile banking, while No. 2 (SMS), No. 3 (Unstructured Supplementary Service Data - USSD), and No. 4 (Interactive Voice Response - IVR) are recognized as SIM-based mobile banking.

The most Essential Steps for Consumers to Access Mobile Banking Services

Mobile banking services allow customers to utilize banking features at any time and from any location via mobile devices. Prior to engaging with any mobile banking service, such as mobile application/WAP (wireless application protocal), USSD banking, IVR banking, or SMS banking, consumers must follow specific standard procedures. Customers need to possess a valid bank account and register their mobile number with the bank. This registration can be accomplished by visiting a bank branch, using an ATM, accessing internet banking, or through the bank's mobile application. Upon successful registration, the bank issues login credentials, MPIN, or activation information necessary for secure access to mobile banking services. After activation, customers can utilize various mobile banking options based on their preferences and the capabilities of their mobile devices.

- 6.1 Application-Based Mobile Banking/ **Wireless Application Protocol (WAP)**
- Application-based mobile banking involves the use of dedicated banking applications installed on smartphones or tablets. These applications provide comprehensive services, including account management, fund transfers, bill payments, loan applications, and investment services. Advanced security features such as multi-factor authentication, biometric verification, and end-to-end encryption enhance transaction safety. However, this channel requires reliable internet connectivity, compatible devices, and a moderate to high level of digital literacy.

- Phone-based mobile banking is a category of mobile banking in which customers engage with a bank's Authorized mobile banking applications (for instance, SBI YONO, HDFC Mobile Banking, or ICICI iMobile) to conduct banking activities

- Phone-based mobile banking denotes banking services that are reachable using a good smart phone or tablet, with an essential requirement for internet connectivity.

- Mobile banking applications dominate in markets with high smartphone penetration and reliable data connectivity. Their ability to leverage device capabilities enables superior functionality compared to other channels, though this comes with higher development and maintenance costs for financial institutions.

The consumer must install the authorized banking application provided by the bank on their smartphone.

How It Operates

- User logs in using MPIN, password, or biometrics.
- The app connects to the bank server via the internet.
- The bank server verifies and processes the request.
- The transaction result is sent back to the app.
  Key Features
- Money transfer options (NEFT / IMPS / RTGS / UPI)
- Inquiry of balance and mini statements
- Payment of bills and mobile top-ups

Services for loans and credit cards

QR code payments and merchant transactions

Management of accounts (FD, RD, profile updates)

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Requirements

Necessary Device:

- Smartphone (Android/iPhone)
- Network Prerequisite:
- Internet (Mobile Data / Wi-Fi)

Security Prerequisite:

MPIN, OTP, transaction PIN/Fingerprint/face unlock, keypad lock etc.

Technical Specifications:

• Compatible with all mobile devices

• Requires minimal data usage.

User Experience Considerations:

No need to memorize commands or codes.

Limited visual feedback

Processes are sequential

Confirmation may be delayed in certain situations

Security Measures:

- Authentication via PIN
- Restricted session management
- Limits on transactions
- Verification through phone number
- One-time passwords for each transaction.
- Advantages:
  Quick and easy to use
  Offers complete banking services.
- Extremely safe with OTP and encryption
  Supports several services in a single app. Available around-the-clock
  Table1.1 list of banks who offer mobile banking services over mobile application with application icon/logo's

s.no	Application name	Bank name	Icon/logos of the mobile application
1.	YONO SBI	State bank of India	
2.	iMobile	ICICI Bank	
3.	IndSMART	Indian Bank	
4.	PNB ONE	Punjab National Bank	

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5.	GOMO	Saraswat cooperative Bank ltd	
6.	TNSC Mobile	Tamil Nadu State Apex Co-operative Bank's mobile	

source: respective bank's website

Table 1.1 shows a few names of banks that offer mobile banking through mobile applications. ICICI Bank's iMobile and State Bank of India's SBI Yono and few other mobile applications are some examples of mobile banking via mobile banking applications/WAP.

Advantages of mobile banking via mobile application

- Accessibility – Utilize banking services at any time and from any location.
- Efficiency – Transactions are completed more quickly than through branch visits or online banking.
- Improved Security – Transactions are safeguarded with one-time passwords, biometric authentication, and encryption technology.
- Usability: Intuitive interfaces facilitate the transfer of funds, account balance inquiries, and bill payments.
- Cost-Effective: Reduces the need for physical infrastructure and operational costs for banks, benefiting both institutions and customers.
- Multiple Services in One Platform: Users can access loans, investments, insurance, and account management through a single app.

Disadvantages:

- Security Concerns: Despite strong security measures, mobile banking apps are vulnerable to hacking, phishing attacks, and malware.
- Technical Issues: Server downtime, app crashes, or slow processing can disrupt transactions.
- Dependency on Internet Connectivity: Requires a stable internet connection, making it less accessible in remote areas.
- Risk of Fraud: Users may fall victim to scams, unauthorized transactions, or identity theft.
- Limited Digital Literacy: Not all users, especially elderly and less tech-savvy individuals, find it easy to navigate banking apps.
- Device Compatibility Issues: Some apps may not function properly on older smartphones or operating systems.

Transaction Limits: Some mobile banking apps impose daily or per-transaction limits, restricting large transactions

Disadvantages of Mobile Banking via mobile Applications:

In order to use this channel, a smartphone with reliable internet access is required.

Storage & Updates Requirement: Mobile banking apps require installation, storage space, and frequent updates, which may not be feasible for users with limited phone storage.

Cybersecurity Risks – Threats such as phishing, malware, and hacking.

Compatibility: It can be challenging to make sure an application functions flawlessly across a range of screens, operating systems, and devices.

Poor User Experience: Users, particularly those who are not tech-savvy, may be put off by complex interfaces, drawn-out procedures, or a lack of accessible features.

Technical Difficulties – Issues including app crashes, slow performance, and software glitches.

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Digital Disparity – Certain customer segments, particularly the elderly or those in rural areas, may lack technological proficiency.

Dependence on Internet Access: Requires a stable internet connection, making it less accessible in remote areas

Limited Digital Literacy: Not all users, especially elderly and less tech-savvy individuals, find it difficult to navigate mobile banking apps.

Lack of Personalized Assistance: Unlike traditional banking, mobile banking lacks face-to-face interaction, which can be a drawback for consumers needing personalized guidance.

Two-Factor Authentication: Some users find two-factor authentication cumbersome, especially when they have to authenticate frequently. Even some users find difficult to remember multiple passwords or PIN numbers.

Dependency on Mobile Devices: Users may be unable to access their accounts if they lose access to a registered phone number or login app.

Banks must create and evaluate the application across a range of mobile devices and OS version combinations. Banks find it extremely challenging to develop and test for a range of platforms and handsets

Customer service: If customers encounter problems or have questions, they may become unsatisfied with the app's inadequate or delayed support.

Mobile banking apps require more processing power and drain battery life faster.

Mobile banking apps drain phone battery faster due to their graphical interface, background processes, and data usage

The below mentioned are few demerits of mobile banking via mobile application

- **Internet dependency**: Requires stable connectivity; transactions fail in poor network areas requires a smartphone.
- Danger of a hacked or malware-infected phone
- In low network areas, the app might not function.
- Device dependency: Needs a smartphone with updated software; older devices may not support features.
- User errors: Mistakes in entering details or navigating the app can cause failed or incorrect transactions.
- Privacy concerns: Personal financial data stored on devices may be exposed if lost or stolen.
- **technical glitches**: App crashes, server downtime, or compatibility issues can disrupt transactions

SIM-Based Mobile Banking

SIM-based mobile banking operates independently of internet connectivity and functions on basic mobile phones. The primary forms include SMS banking, USSD banking, and IVR-based services. These channels enable essential banking transactions and are particularly effective in reaching rural populations, elderly users, and low-income groups.:

Mobile banking can be generally categorized into two distinct types.

- **SIM-BASED mobile banking**

1. **phone/ Application based mobile banking:** This is more advanced and widely used. Banks provide dedicated mobile applications that offer a wide range of functionalities, from fund transfers to loan applications, investment tracking, and more, all within an interactive user interface**.**
   A mobile banking application is a specialized application created for smartphones and mobile devices by authorized banks, enabling customers to carry out various banking transactions. After registering at their bank branch for mobile banking services, customers will receive an application password and MPIN on

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their registered mobile number. Some banks may also provide a link to download the app via SMS, which customers can then install on their devices—available on Google Play for Android users and the App Store for iPhone users. Customers will need to register the app using their bank details and password.

Once downloaded, applications are user-friendly for customers who are skilled in navigating smartphone-based platforms. Banks have ensured that these applications are compatible with the latest operating systems, accommodating a wide variety of smartphones currently in use.

This mobile banking application enables customers to conduct banking transactions anytime and anywhere without the need to visit a physical bank. To use the mobile application, a smartphone with a reliable internet connection is necessary. The application provides users with access to their bank accounts and is available on multiple platforms, including, Symbian, Windows Phone, BlackBerry OS, Windows, Android, and Apple iOS.

A few lists of banks that provide mobile banking via mobile applications are displayed in table 1.1. Examples of mobile banking using applications include iMobile by ICICI Bank and SBI Yono by State Bank of India.

Characteristics of multiple channels of Mobile Banking

Mobile Application-Based Mobile Banking

Mobile banking that relies on dedicated applications enables users to engage with financial services through banking apps on their smartphones and tablets. This modern approach surpasses the earlier SMS and WAP banking methods by providing a secure, easy-to-navigate, and feature-rich experience for users.

Essential Features of Mobile Banking Applications

Account management – Monitor your account balance, review transaction history, and access account statements.

Money Transfers – Move funds between your accounts, send money to other banks, or utilize UPI (Unified Payments Interface).

Bill Settlements – Pay for utilities, credit card bills, and mobile top-ups.

Loan and Investment Options – Apply for loans, invest in mutual funds, or purchase insurance products.

Card Management – Block or unblock debit/credit cards, request replacements, and adjust spending limits.

Security Measures – Multi-factor authentication (MFA), biometric login options (fingerprint/Face ID/MPIN/TPIN), and encryption to ensure secure transactions.

Customer Assistance – Access chatbots, live support, and FAQs for prompt help.

Benefits of Mobile Banking Applications

- Accessibility – Utilize banking services at any time and from any location.
- Efficiency – Transactions are completed more quickly than through branch visits or online banking.
- Improved Security – Transactions are safeguarded with one-time passwords, biometric authentication, and encryption technology.
- Usability: Intuitive interfaces facilitate the transfer of funds, account balance inquiries, and bill payments.
- Cost-Effective: Reduces the need for physical infrastructure and operational costs for banks, benefiting both institutions and customers.
- Multiple Services in One Platform: Users can access loans, investments, insurance, and account management through a single app.

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Disadvantages:

- Security Concerns: Despite strong security measures, mobile banking apps are vulnerable to hacking, phishing attacks, and malware.
- Technical Issues: Server downtime, app crashes, or slow processing can disrupt transactions.
- Dependency on Internet Connectivity: Requires a stable internet connection, making it less accessible in remote areas.
- Risk of Fraud: Users may fall victim to scams, unauthorized transactions, or identity theft.
- Limited Digital Literacy: Not all users, especially elderly and less tech-savvy individuals, find it easy to navigate banking apps.
- Device Compatibility Issues: Some apps may not function properly on older smartphones or operating systems.
- Transaction Limits: Some mobile banking apps impose daily or per-transaction limits, restricting large transactions.

Obstacles in Mobile Banking Applications

In order to use this channel, a smartphone with reliable internet access is required.

Storage & Updates Requirement: Mobile banking apps require installation, storage space, and frequent updates, which may not be feasible for users with limited phone storage.

Cybersecurity Risks – Threats such as phishing, malware, and hacking.

Compatibility: It can be challenging to make sure an application functions flawlessly across a range of screens, operating systems, and devices.

Poor User Experience: Users, particularly those who are not tech-savvy, may be put off by complex interfaces, drawn-out procedures, or a lack of accessible features.

Technical Difficulties – Issues including app crashes, slow performance, and software glitches.

Digital Disparity – Certain customer segments, particularly the elderly or those in rural areas, may lack technological proficiency.

Dependence on Internet Access: Requires a stable internet connection, making it less accessible in remote areas

Limited Digital Literacy: Not all users, especially elderly and less tech-savvy individuals, find it difficult to navigate mobile banking apps.

Lack of Personalized Assistance: Unlike traditional banking, mobile banking lacks face-to-face interaction, which can be a drawback for consumers needing personalized guidance.

Two-Factor Authentication: Some users find two-factor authentication cumbersome, especially when they have to authenticate frequently. Even some users find difficult to remember multiple passwords or PIN numbers.

Dependency on Mobile Devices: Users may be unable to access their accounts if they lose access to a registered phone number or login app.

Banks must create and evaluate the application across a range of mobile devices and OS version combinations. Banks find it extremely challenging to develop and test for a range of platforms and handsets

Customer service: If customers encounter problems or have questions, they may become unsatisfied with the app's inadequate or delayed support.

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Mobile banking apps require more processing power and drain battery life faster.

Mobile banking apps drain phone battery faster due to their graphical interface, background processes, and data usage.

SIM BASED mobile banking:

SIM-based mobile banking is a banking solution that depends on the Subscriber Identity Module (SIM) card in mobile phones. It is especially useful in areas with limited internet access or where feature phones are the norm. This method allows users to carry out secure banking transactions without requiring a smartphone or an internet connection. i.e. customer require a simple basic mobile phone with activated sim card. The classification of SIM-based mobile banking includes several services, namely Short Message Service (SMS), Unstructured Supplementary Service Data (USSD), and Interactive Voice Response (IVR).

Essential Characteristics of SIM-Based Mobile Banking:

SIM-based mobile banking refers to a banking service that utilizes the SIM card of a mobile device, functioning independently of internet access. This service is especially advantageous in areas characterized by low smartphone adoption and restricted internet availability.

- No Internet Needed – Functions on basic mobile devices without the necessity for Wi-Fi or mobile data.
- USSD & SMS Functionality – Transactions are executed through USSD codes or SMS commands**.**

Major Benefits of Mobile Banking services via SIM

- Inclusivity: Encompasses rural and economically poor communities' access to banking via basic mobile phones.
- Economic Viability: Reduces dependency on internet connectivity, thereby increasing affordability.
- Fraud Prevention: Requests PIN to be inputted when making transactions, which minimizes fraud.

Dual linguistic facility: dual-linguistic facility mobile banking application would be a powerful tool to cater to a diverse user base by offering services in multiple languages**.** consumer can set their preferred language (either English/regional language) during account setup or adjust it later in settings**.** it Allow consumer to seamlessly switch between two or more languages within the app. This could be a simple button or menu.

SIM-based mobile banking, as convenient as it is, has some drawbacks.

Here's a breakdown of some key demerits:

security Threats

SIM swapping: It is a serious threat where scammers swap your phone number with their SIM card, enabling them to intercept OTPs and gain access to your bank accounts.

Reliance on Cellular Networks:

Service outages: Mobile banking relies on network coverage, and therefore service outages or poor signals might prevent access to the users' accounts.

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Limited rural coverage: Where there is no, or poor, connection of cellular networks, SIM-based banking is not available.

Device Dependency:

Theft or loss of a cell phone can lead to the potential loss of a user's financial information.

Device malfunctions: Technical issues with the mobile device may hinder access to banking services.

Potential for Deception:

Unauthorized access: In case the user's SIM card or mobile phone is hacked, it can result in unauthorized transactions.

Social engineering: criminals can persuade individuals into disclosing confidential information through phone calls, or SMS messages.

Unauthorized access can be initiated through a compromised user SIM card or mobile phone, leading to unauthorized transactions. Social engineering: fraudsters can trick individuals to reveal confidential data, via phone calls, or SMS messages.

Limited Services: sim based Mobile banking might not provide all the services.

Transaction Failures - Network congestion or system outages may result in unsuccessful transactions, causing inconvenience for customers.

Higher Dependency on Telecom Operators – Banks depend on mobile network operators for service availability and security, which can lead to delays in resolving customer issues.

mobile banking over USSD (Unstructured Supplementary Service Data) Banking

Mobile banking using USSD (Unstructured Supplementary Service Data) gives customers an alternative to using simple codes in the mobile phone to receive basic banking services without having to connect to the internet. It is particularly convenient where it is not possible to get to a smartphone or have reliable internet.

Below are some of the typical features and benefits of USSD-based mobile banking:

Balance Inquiry: Get your account balance immediately.

Funds Transfer: Transfer money to accounts within the same bank or to other banks.

Bill Payments: Pay electricity, water, and mobile recharge bills.

Mini-Statements: View latest transactions on account.

Secure Access: Transactions are protected with a PIN for safety.

Convenience: Compatible with all cell phones and not smartphones

USSD is more stable as it operates through telecom networks with minimal app dependency.

USSD runs on simple menus without significant impact on battery life.

USSD banking does not require installation or updates, making it more accessible for users with limited phone storage.

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To use USSD banking, one usually calls a particular code that the bank provides, such as *99# in India. (under the NPCI framework)

Mobile banking via USSD presents several benefits, particularly for users in areas where smartphone or internet access is scarce. Here are the main advantages:

Availability: Functions on all mobile devices, including basic feature phones, without the need for a smartphone or internet access.

Economical: Involves minimal fees, making it accessible to a broad spectrum of users.

Mobile banking applications necessitate installation, consume storage capacity, and demand regular updates, which may be impractical for customers with restricted phone storage.

USSD requires no installation or updates.

Disadvantage of mobile banking over USSD.

However, there are some disadvantages of mobile banking over USSD. The major disadvantages are listed below:

Limited Features: Many of these features are not available in the USSD banking system and are only available in the app or internet banking system including statement requests, loan applications, and investment management.

Security Concerns: PIN based authentication is available but the use of USSD banking is prone to interception or phishing if security measures are not well embraced.

Many telecom operators charge fees for each USSD session, making it more expensive for frequent transactions compared to free mobile banking apps.

USSD are text-based and menu-driven, which can be cumbersome and confusing for some users. They can also be prone to errors, such as typing mistakes, network delays, or service interruptions.

Costs may vary by region and mobile network providers

Dependence on Mobile Network: This is because it is dependent on the availability of reliable mobile network coverage which may be a challenge in regions with poor or limited network coverage.

USSD banking relies on telecom service providers. If there is network congestion or a technical issue with the operator, transactions may fail to be processed.

Restricted Access for Prepaid Users: This is because many USSD services are chargeable and therefore, prepaid mobile subscribers would need to have enough airtime to use the service.

Session Time-Outs: USSD sessions are time-sensitive and may be interrupted or necessitate a restart if the response is not completed swiftly.

No Offline Records: Transactions completed over USSD leave no offline record on the user's device, relying on SMS confirmations, which could be delayed or missed.

Unlike apps, USSD transactions don't save detailed history locally on your device. Confirmation relies on SMS, which may be delayed.

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Table1.2 List of Banks Providing Mobile Banking over ussd

s.no	Bank Name	First 4 Letters of bank's IFSC	Bank Short Code	USSD Code
1.	Abhyudaya Co-op Bank	ABHY	ACB	*99*87#
2.	Allahabad Bank	ALLA	ALB	*99*54#
3.	Apna Sahakari Bank	ASBL	APN	*99*85#
4.	Axis Bank	UTIB	AXB	*99*45#
5.	Bank of Baroda	BARB	BOB	*99*48#
6	Indian Bank	DIB	INB	*99*58#
7.	State Bank of India	SBIN	SBI	*595#

Sources: http://cashlessindia.gov.in/ussd_services.html

Mobile Banking over SMS

SMS banking, also known as mobile banking over SMS, is an easy and widely available way to handle banking services through text messages. This service enables users to carry out fundamental banking tasks without requiring an internet connection, making it suitable for all kinds of mobile devices.

Accessibility: No internet or smartphone is required; any mobile phone can be used to access banking services through SMS.

Account Balance Check: Quickly verify your account balance by sending a designated keyword or command.

Transaction Summaries: Obtain a short history of your recent transactions to monitor your activity.

Money Transfers: Some banks permit fund transfers between accounts using SMS commands.

Bill Payments: Pay utility bills or top up mobile services using specific SMS formats.

Notifications: Get immediate updates regarding transactions, low balances, and other account activities.

PIN Management: You can often securely change or reset your PIN via SMS.

Security Measures: Although SMS banking uses basic encryption and security protocols, sensitive actions necessitate user authentication.

How SMS Banking Works

Registration: Customers often visit a branch or send a certain SMS command to register their mobile numbers with the bank.

Sending Commands: To request services like mini statements or balance inquiries, users transmit predetermined keywords or commands to the bank's SMS banking number.

Information Received: The bank sends an SMS with the requested information.

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Benefits of Mobile Banking via SMS.

advantages of mobile banking services via SIM CARD are numerous, especially for users who value simplicity and accessibility. Here's a breakdown:

- Universal Accessibility: Works on any mobile phone, whether it's a basic phone or a smartphone, as long as it can send and receive SMS.
- No Internet Required: Operates without the need for mobile data or Wi-Fi, making it ideal for areas with limited internet access.
- Convenience: Easy to use with simple commands, allowing users to perform banking tasks anytime, anywhere.
- Cost-Effective: Unlike app-based banking, SMS banking has minimal costs as it relies on standard SMS charges.
- Security: Provides secure banking operations with encrypted SMS formats and authentication protocols for sensitive transactions.
- Immediate Alerts: Offers real-time updates on transactions, balance changes, and other account activities via SMS.
- Low Learning Curve: Simplified interface and commands make it user-friendly, especially for older adults or those unfamiliar with apps

Demirts of Mobile Banking over SMS.

While mobile banking services via Sms has numerous benefits, it has some constraints as well. Below are the most important constraints:

- Limited Functionality: SMS banking is limited in functionality as opposed to online or application-based banking, with no more advanced features like investment options or in-depth analysis.
- Security Threats: Although normally secure, SMS banking messages could be intercepted or read on non-secure terminals.
- Dependence on Network Coverage: There must be sufficient network coverage for reception and transmission of SMS, and poor connectivity can lead to delays in transactions.
- SMS Fees: Based on your cellular network, SMS fees can add up, especially with repeated transactions or queries.
- Complex Command Syntax: It will be challenging for certain people to remember certain SMS codes and syntax required.
- Lack of Real-Time Interaction: Unlike application-based banking services that include live chat support, SMS banking lacks interactive customer support.
- Language Barriers: Not all banks provide SMS assistance in more than one language, restricting access to non-native speakers of the provided languages.
- below are few examples to perform mobile banking through SMS banking in SBI bank are as follows:

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Balance Enquiry

- For enquiring the balance in the account, send following SMS to 9223440000:
- **<sbal><mpin>**
- on sending the above format SMS from the registered mobile number, the consumer will receive a message that shows the balance of the account holder.
- 2**. MINI STATEMENT**
- For receiving a mini statement of the account, send following SMS to 9223440000:
- **<Smin><UserId><Mpin>**
- on sending the above format SMS from the registered mobile number, consumer will receive a message showing the last five transactions in the account.

IMPS fund transfer

- customer can transfer funds to accounts in same bank /other Banks through Mobile to Mobile Money Transfer (IMPS) based on Beneficiary's Mobile number and MMID (Mobile Money ID) allotted to the beneficiary by his bank.

- For making a funds Transfer, send below format SMS to 9223440000:

- **<IMPS><Mobile No><MMID><amount><User ID><MPIN><Purpose (optional field- up to 20 char-Alpha numeric**)>
- on sending the above format SMS from your registered mobile number, consumer will receive a message that your IMPS transaction is successful.
- 4. MOBILE TOP UP (mobile recharge)

- For topping up a prepaid connection, send following SMS to 9223440000:

- **Stopup><UserId><Mpin><Service provider name of the mobile no to be topped><Mob no ><Amount>**
- If the transaction is successful, the mobile that has been topped will get a message that the account has been topped up.
- 5. fund transfer to another account.
- SMS "IMPS <Beneficiary account number> <Beneficiary IFSC> <Amount> <M-PIN>
- The request is forwarded to the bank server, the bank server processes the transaction, and sends response to customer via SMS.

Demerits of Mobile Banking over SMS (Short Message Service):

- customer need to know the exact syntax of SMS for performing transaction.

- it is also difficult to communicate and educate the customer to use the syntax.

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• the SMS remains in the readable form within the sent items on the mobile phone. in case the custody of the customer's handset is obtained by some other person, which will result into the risk of losing the confidential information to initiate the financial transactions

Limited Functionality:

SMS-based banking supports only basic services like balance inquiries, mini statements, or simple fund transfers. It lacks the capabilities of modern app-based or USSD/Internet banking.

Security Risks:

SMS is not encrypted, making it vulnerable to interception, spoofing, and phishing attacks. Sensitive banking information may be exposed if the phone is lost or hacked.

Dependence on Network Coverage:

SMS requires a working cellular network. In areas with poor signal strength, SMS banking may fail or be delayed.

No Real-Time Confirmation:

Delays in SMS delivery can lead to confusion about whether a transaction has been completed successfully.

Limited Two-Way Communication:

User interaction is restricted to specific formats or keywords. There's minimal flexibility or customization.

Cost per Transaction:

Users may be charged for each SMS sent or received, especially in prepaid mobile plans.

Lack of Visual Interface:

Since it's purely text-based, SMS banking does not support user-friendly graphical interfaces, making it harder to understand or navigate.

Storage Risk:

Messages are stored on the device unless deleted manually, posing a security risk if the device is lost or stolen.

Figure:2 snapshot state bank of India USSD

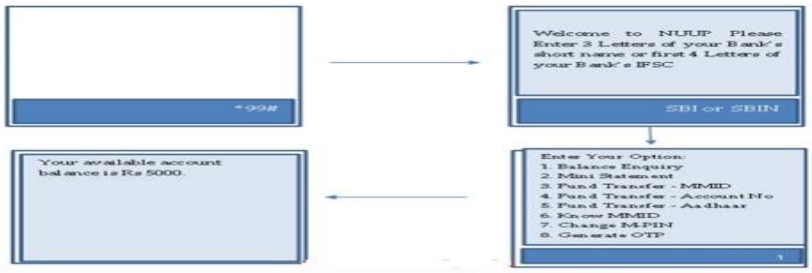

Figure2 shows the step by step process of mobile banking over USSD in state bank of India

Step1: Dial the USSD Code:

If you are customer of state bank of India, open your phone's dialer and type the USSD code for mobile banking: *99#.

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Press the call button.

Choose Your Bank:

A menu will show up after calling. Enter the appropriate number or the first four letters of your bank's IFSC code (for example, SBIN for SBI) to choose your bank.

Enter the mobile number that is registered with your bank:

When asked, provide the mobile number associated with your SBI account

step3: **Choose Your Banking Service**:

- A menu will display various options, such as:
    1. Balance Enquiry
    2. Mini Statement
    3. Fund Transfer-MMID (Mobile Money Identifier)
    4. Fund Transfer- account No
    5. Fund Transfer- adhaar
    6. Know your MMID (Mobile Money Identifier)
    7. Change MPIN
    8. Generate OTP
- Select the service you want by typing the corresponding number.

Follow the Instructions:

Based on the service you select, follow the on-screen instructions. For instance:

To check your balance, simply confirm your request. (press1)

For fund transfers, you may need to enter the recipient’s account details or MMID, the transfer amount, and confirm with your MPIN (Mobile Personal Identification Number).

Complete the Transaction:

Once the transaction is successfully processed, you’ll receive a confirmation message.

NUUP (National Unified USSD Platform) is a mobile banking service in India that allows users to access basic banking services through a simple mobile interface using Unstructured Supplementary Service Data (USSD) technology. Here are the key details about NUUP:

Purpose

Provides basic banking services to people without smartphones or internet access

Enables financial inclusion for rural and unbanked populations

Works on any mobile phone with basic GSM capabilities

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How It Works consumers dial a specific USSD code (typically *99#)

Transactions are conducted through a menu-driven interface

No internet or smartphone required

Works across multiple banks and mobile networks

Services Offered

Check account balance

Transfer money between accounts

Pay bills

Generate mini statements

Access other basic banking services

Advantages of mobile banking over USSD

- No need for a smartphone with enough storage capacity, application, or internet access.
- No need to install updates.
- USSD functions on any mobile device and is compatible with nearly all network providers.
- It is highly cost-effective.
- The service is available around the clock, every day of the year.
- It offers greater security than mobile banking via SMS.
- USSD is quicker than mobile banking through SMS.

Demirts of Mobile Banking Over USSD

- banking through USSD are be prone to errors, such as typing mistakes, network delays, or service interruptions.
- it can be cumbersome and confusing for some users.
- customers who can't read and write will not be able to enjoy the convenience of this service.
- delay in customers respond may affect the flow of the transaction.

Mobile Banking Over Interactive Voice Response(IVR)

customers can use mobile banking via Interactive Voice Response (IVR) to access banking services over the phone without requiring internet connectivity.

It guides customers through transactions using keypad inputs and automated voice prompts.

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Table1.3 list of IVR contact number

S.NO	Bank Name	IVR Banking Services Offered	IVR Contact Number
1.	State Bank of India	Account balance inquiry, fund transfers, bill payments, request for new cheque book, and more.	1800 11 2211
2.	HDFC Bank	Account information, credit card details, loan information, and other banking services.	1800 258 3838
3.	ICICI Bank	Account balance, last five transactions, credit card payment due, and other services.	1860 120 7777
4.	Axis Bank	account balance, mini statement, cheque book request, and other services.	1860 419 5555
5.	Punjab National Bank	Account balance inquiry, mini statement, cheque status inquiry, and more.	1800 180 2222
6.	Indian Bank	Account balance inquiry, mini statement, cheque status, and more.	1800 425 00 000
7.	Sara swat cooperative bank ltd	Account Balance, Cheque Book request Cheque Status Cheque Stop Payment	1800229999 18002665555

Sources: respective bank official website

How it Works

Step-by-Step Process of Mobile Banking Over IVR

1. Dialing the IVR Banking Number

The customer dials the bank's dedicated IVR number (usually a toll-free or short-code number).

Some banks offer different numbers for different services (e.g., balance inquiry, fund transfer).

2. Authentication Process

The IVR system prompts the user to verify identity using:

Registered mobile number (RMN) (detected automatically if calling from the same number).

PIN or password (set by the user).

Voice authentication (in some advanced IVR systems).

3. Navigating the IVR Menu

The system provides menu options via voice prompts, such as:

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Press 1 for Balance Inquiry

Press 2 for Fund Transfers

Press 3 for Mini Statement

Press 4 for Customer Support

Users select an option by pressing the corresponding keypad number.

4. Performing Transactions

After selecting a service, users follow additional prompts to complete the transaction. Examples:

Fund Transfer – Enter recipient's account number & confirm amount.

Bill Payment – Select biller and enter the amount.

Account Statement – Choose email or SMS delivery for statements.

5. Confirmation & Transaction Completion

After completing a transaction, the IVR system provides a confirmation message via voice and may send an SMS confirmation for reference.

If the user needs assistance, they can usually press a key (e.g., "0") to speak with a customer service agent.

Benifits of Mobile Banking Over IVR

Mobile banking over Interactive Voice Response (IVR) systems presents numerous benefits, making it a more user-friendly and effective choice. Here are some of the main advantages:

1. Accessibility and Convenience: Mobile banking via IVR provides unparalleled convenience for customers, allowing them to access banking services 24/7 without the need to visit a physical branch or speak directly with a bank representative. This technology enables customers to perform various banking tasks from anywhere, at any time, using just their basic mobile phone.
2. 24/7 Availability: IVR systems provide constant availability, enabling customers to handle their financial matters at any hour, whether it's late night or in the early morning, even on holidays.
3. Economic Benefits: Automating numerous customer interactions allows banks to decrease their reliance on customer service agents, resulting in cost savings that can be transferred to customers.
4. Speed and Efficiency: Mobile banking transactions and inquiries are typically quicker, as users do not have to wait for IVR prompts or endure hold times. This allows for immediate access to account information, transaction history, and other banking functionalities.
5. Error Reduction: Automated processes minimize the chance of human error, ensuring that transactions and inquiries are handled accurately.
6. Increased Customer Satisfaction: By providing timely responses and self-service options, IVR systems enhance customer satisfaction and engagement. Customers appreciate not having to wait in line and receiving quick responses, which encourages them to engage more with the bank
7. Personalization and Multilingual Support: Modern IVR systems can offer personalized interactions based on customer profiles and support multiple languages, making banking services more inclusive and accessible
8. Security: IVR systems help safeguard sensitive customer data by ensuring that only authorized users can access specific services, enhancing security in financial transaction.
9. Efficient Call Routing: IVR systems quickly route calls to the appropriate department or agent based on customer inputs, reducing the time spent navigating through the support process

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Disadvantages of Mobile Banking via IVR

1.Restricted Natural Language Comprehension: IVR systems might have difficulty understanding intricate or subtle language, which can result in misreading customer intentions and causing frustration.

2. Complex Menu Structures: IVR menus can become convoluted and difficult to navigate, causing confusion and potentially leading to longer call handling times

3. Extended Waiting Time: In certain situations, IVR systems can result in prolonged wait times as customers navigate through several menu choices before connecting with the right department or representative.

4. Challenges with Accented or Non-native Speech: IVR systems might struggle to correctly identify and understand accents or speech from non-native speakers, leading to communication issues for certain customers.

5. Lack of Personalization: IVR systems may struggle to deliver personalized experiences as they often rely on limited customer information and pre-recorded prompts.

6. potential risk of voice data being stored or misused

7. Limited Functionality: IVR systems typically offer only fundamental banking services, which might not satisfy customers who need to perform more intricate transactions.

8. Lack of Visual Confirmation: Transactions performed over IVR lack a visual interface, making it difficult for customers to verify details before confirmation, increasing the chances of errors.

9. Dependence on Call Quality: Inadequate network connection or surrounding noise can disrupt voice recognition and the overall effectiveness of the IVR system, resulting in unsuccessful transactions or inaccurate entries.

10. No Offline Access – IVR banking requires an active phone network, unlike USSD services that work without internet connectivity, making it less reliable in areas with weak signal coverage.

In SIM BASED MOBILE BANKING, apart from SMS, IVR and USSD, few banks are offering services like Missed Call Services and phone-based banking like third party application (eg, googlepay, phonepe, paytm, amazon pay), and WhatsApp.

What is Missed Call Services in Banking

Missed call banking is an efficient and user-friendly service that enables customers to obtain fundamental banking services by placing a missed call to a specified phone number using their registered mobile number. This service is extensively utilized in India and various other nations, facilitating prompt access to account information without the necessity for internet connectivity or smartphone applications.

Common Features of Missed Call Banking

Balance Inquiry: Customers are able to ascertain their account balance by placing a missed call to a designated number provided by the bank.

Mini Statement: By utilizing a missed call, customers can receive a summary of their most recent transactions via SMS.

Cheque Status Inquiry: Certain banks offer the capability for customers to inquire about the status of their cheques.

Request for a Chequebook: Customers have the option to request a new chequebook through a missed call.

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Loan and Credit Card Details: Some banking institutions provide information regarding loan eligibility and the status of credit cards through missed call services.

Block Debit/Credit Card: In the event of a lost or stolen card, customers can initiate a block on their debit or credit card by making a missed call.

Fund Transfers (Limited Banks): A select number of banks permit fund transfers or UPI registration through missed call services.

Benefits of Missed Call Banking

1. No Internet Necessity – This service is particularly advantageous for individuals residing in rural regions or areas with limited connectivity.
2. Round-the-Clock Accessibility – Users can access banking services at any time of the day.
3. Cost-Free – The majority of financial institutions provide this service at no charge, with only standard mobile operator fees potentially applicable.
4. Ease of Use – The service is compatible with all types of mobile devices, including basic feature phones.

Disadvantages of Missed Call Banking

Although missed call banking provides a level of convenience, it is accompanied by several notable limitations:

1. Restricted Services: The service is confined to basic banking functionalities, such as balance inquiries and mini statements. More complex transactions, including fund transfers and bill payments, are not facilitated.

2. Security Risks: In the event that a mobile device associated with a bank account is lost or stolen, there exists a risk of unauthorized access to account information. Additionally, fraudsters may exploit this service by deceiving customers into registering their phone numbers with fraudulent banking platforms.

3. Dependence on Mobile Number: Customers are required to utilize the mobile number that is registered with the bank. Any alteration to this mobile number necessitates an update to the bank's records, which can be a cumbersome process.

4. Inability to Execute Transactions: Missed call banking does not permit customers to withdraw, deposit, or transfer funds. While some banks may offer limited fund transfer capabilities, these typically necessitate further authentication through internet banking or mobile applications.

5. Network Limitations: Weak mobile network signals may result in missed calls not being registered, thereby delaying access to services. Furthermore, certain telecom providers may impose charges for SMS responses, which could undermine the intended cost-free nature of the service.

6. Possible SMS Delays
7. Customers might face delays in receiving balance or transaction information via SMS.
8. Not Suitable for Complex Banking Needs
9. Business clients and those needing a variety of banking services may find missed call banking inadequate.
10. Language and Accessibility Limitations
11. Certain banks offer responses in a limited number of languages, which can pose challenges for some users in understanding the messages.

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12. Customer may find Difficult to remember numbers and their respective services.

13. No smartphone or internet is required to avail this service.

Table1.4 list of missed call numbers of state bank of India- SBI Quick services

services	Missed call numbers
Registration	09223488888.
Balance Enquiry	09223766666
Mini Statement	09223866666
CAR or home loan	5676/0922
Full list of services	092235888

Sources: state bank of India official website

- It is necessary to register the customer mobile number registered with the bank in order to utilize these services. If your mobile number is not registered, the customer must visit your home branch to update your contact information to avail this service.

- To access missed call services, you may dial the designated number; the call will terminate automatically, and you will receive the requested information via SMS. Please note that standard SMS charges may apply in accordance with your mobile service plan.

Single Account Limitation per Number: Customers with multiple accounts at the same bank can only link one account for missed call banking. Consequently, managing several accounts may require the use of distinct mobile numbers or alternative banking methods.

Lack of Awareness: A significant number of customers, particularly those residing in rural and semi-urban regions, may lack awareness regarding the availability of missed call banking services and the procedures for utilizing them.

Comparative Analysis of multiple Channel Performance

A **Comparative Analysis of Multiple Mobile Banking Channel Performance** evaluates different banking channels based on key parameters like Device Requirements, Connectivity requirement and Technical Literacy Requirement. Below table1.2 is a structured comparison of major mobile banking channels:

The table1.2 analysis reveals significant variations in channel accessibility across different demographic segments:

Table1.2 Comparative Analysis of multiple mobile banking Channel Performance

s.no	Channel	Device Requirements	Connectivity requirement	Technical Literacy Required
1.	Wireless application protocal (WAP)/ mobile	Smartphone/Tablet	Good internet support	Moderate to High

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	banking application			
2.	SMS Banking	Any mobile phone/simple basic mobile phone	No internet connection required, but Basic cellular coverage is must	Low
3.	USSD Banking	Any mobile phone/simple basic mobile phone	No internet connection required, but Basic cellular coverage is must	Low to Moderate
4.	interactive voice response (IVR)	Any mobile phone/simple basic mobile phone No internet connection required, but Basic cellular coverage is must	No internet connection required, but Basic mobile phone with decent network coverage is must	Low to Moderate

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