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## **A Study on Risk Analysis of E-Banking Operations at Bank of Baroda**

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### **ABSTRACT:**

As online banking becomes more popular, financial institutions such as Bank of Baroda face increased cybersecurity concerns, technical problems, and client trust. This study will undertake a thorough risk analysis of online banking, identifying important vulnerabilities and providing mitigation techniques to ensure secure and dependable digital financial services.

According to the poll results, e-banking has a high adoption rate, particularly among young, educated users who choose mobile banking for convenience. While most users trust banks' security and privacy procedures, a significant percentage have reported security breaches, fraud attempts, and technological concerns. Phishing attempts, improper access, and poor password management procedures continue to be major concerns in the cybersecurity world. Furthermore, while customer support is typically well-rated, it should be improved to better answer security-related queries.

The survey also identifies various levels of cybersecurity awareness and password updating practices, emphasizing the importance of ongoing user education on digital banking safety. To maintain client trust and provide a consistent banking experience, financial institutions must reinforce security standards, employ advanced fraud detection systems, and improve customer service. Regular security awareness efforts and technical advancements will assist to reduce the hazards connected with internet banking.

By proactively addressing these difficulties, banks may provide a more secure and user-friendly digital banking environment, maintaining regulatory compliance while increasing consumer happiness and trust

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**Keywords: E-banking, financial institution, Digital banking, Regulatory Compliance, Security, Technical Advancement**

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### **Introduction:**

The rapid expansion of financial technology, e-banking has revolutionized the traditional banking scene, providing clients with smooth and convenient digital transactions. Bank of Baroda, one of India's top public-sector banks, has used e-banking to increase operational efficiency and customer experience. Online banking, mobile banking, UPI transactions, and digital payments have all drastically decreased the need for physical banking. However, as people rely more on digital platforms, the hazards associated with e-banking activities have increased. These threats include cyber fraud, hacking, phishing, unauthorized access, system failures, and data breaches. The growing number of cyber threats poses a significant challenge for banks in terms of transaction security and consumer trust. As a result, analyzing these risks and assessing the effectiveness of risk management techniques at Bank of Baroda is critical to understanding how the bank protects its digital operations and client data.

E-banking has clearly increased convenience, but it has also made institutions vulnerable to a variety of threats. Cybercriminals use technological improvements to commit fraud, steal critical consumer information, and disrupt financial operations. At Bank of Baroda, like at other financial institutions, the growing number of cyber-attacks and fraudulent operations raises worries about the security of digital transactions. Despite implementing current cybersecurity technologies and regulatory controls, the bank continues to encounter issues in risk mitigation and data protection. The lack of user awareness, weaknesses in digital payment systems, and evolving cyber threats all complicate risk management. As a result, there is a need to investigate the risk variables affecting Bank of Baroda's e-banking activities and analyse the effectiveness of its security safeguards. Understanding these issues will aid in upgrading existing frameworks to improve the safety and dependability of e-banking services.

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### **Objectives**

The primary objective of this study is to conduct an extensive risk assessment of Bank of Baroda's e-banking activities and provide actionable recommendations to reduce risks while boosting security and user confidence. The main objectives include:

1. To identify the significant risks to Bank of Baroda's e-banking operations, such as cybersecurity threats, fraud risks, technological failures, and operational weaknesses.
2. To examine how these risks affect consumer trust, financial security, regulatory compliance, and overall banking performance.
3. To investigate customers' opinions of e-banking security, their experiences with fraud events, and the difficulties they have when utilizing online banking services.
4. To assess the effectiveness of Bank of Baroda's current risk management procedures, which include security standards, fraud detection techniques, and customer service tactics.
5. To offer risk mitigation techniques that will improve security, customer service, and the overall digital banking experience.
6. To investigate the role of cybersecurity awareness among customers and recommend strategies to educate them on safe online banking practices.
7. To identify technological innovations and best practices that Bank of Baroda might use to boost its e-banking security framework.

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## Literature Review

1. **Binalben Arvindbhai Patel, Ritesh Patel, Library Progress International 44 (1s), 292-303, 2024**, Digital banking is mostly associated with its application, backend process and internet connectivity. Apart from this, many such hindrances impact digital banking for respective customers. The present paper used a qualitative research method to achieve the research objectives as well as an aggregate collection of 290 samples of customers from different cooperative banks in Gujarat. The study has found no significant variation among cooperative banks for hindrance factors in digital E-banking services whereas significant variation was found among different categories of hindrance factors as well as also 14 hindrance factors significantly affecting digital banking of cooperative banks in Gujarat. Technical glitches, service interruption, security, and processing fees play important hindrances during digital banking services
2. **Neelabh Kumar, Ms Anuradha Maurya, Ms Anushree Srivastava, The Global Green Economy Leading to Sustainability: A Multidisciplinary Approach: EDITED BOOK, 1, 2024**, Digitalization has become critical as industries and institutions, including commercial banks, strive to provide better and more efficient service to their clients and day-to-day customers. Increasingly, information technology has become the backbone of banking industries, and banks are the backbone of every robust economy. A collapse of this sector will have a negative effect on the economy. Throughout India, the banking system has been transformed by economic and financial reforms. A major expansion has been witnessed in the Indian banking sector due to the use of e-banking, one of the most important and modern applications. A majority of bank services are offered through e-banking systems. Instead of transferring funds by check or cash, electronic banking uses electronic means to transfer funds directly between accounts. Bank incomes can be increased through electronic banking because it reduces banking costs. This paper examines how electronic banking affects Indian banks' profitability performance and describes the current state of electronic banking in India. The correlation and regression tests were used to assess the effect of electronic banking on banks' profitability in terms of Return on Assets and Return on Equity.
3. **Shefali Saluja, Arjun J Nair, Ethical Marketing Through Data Governance Standards and Effective Technology, 201-218, 2024**, An economy needs a well-functioning banking system—it is crucial for a country's economic growth and progress. With different economic factors influencing the banking sector, both domestically and globally, the role of the banking industry has changed over time. This has allowed the financial sector to explore new opportunities and expand its reach beyond national borders. The banking industry has undergone major transformations in response to shifts in trade and commerce, including the emergence of private sector banks, the integration of technology such as NEFT and smart cards, and changes to capital adequacy standards. These improvements have greatly increased the efficiency and productivity of the banking sector. The Indian banking industry is unique and has undergone three stages of development, from character-based lending to competitiveness-based lending, according to Singh. Despite the growth and expansion of the banking industry, it faces many operational risks, including various types of fraud and scams.
4. **Abhay Singh Chauhan, Richa Banerjee, Subeer Banerjee, Pacific Business Review International 15 (8), 2023**, The research is to see how E-banking affects the performance of a bank. As a measure of the electronic method of transactions, we used credit cards, debit cards, National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), and Point of Sale (POS), while Return on Assets (ROA) was used as a metric of profitability. The research focuses on India's top ten public sector banks, as determined by market capitalization. The findings reveal that digital payment instruments considerably influence return on assets, indicating that internet banking might help banks increase their profitability. Furthermore, the study shows that electronic banking has a significant favourable influence on bank profitability. Financial institutions were able to reduce their banking expenses after the advent of e-banking services. Furthermore, technical progress in the banking industry provides additional potential for banks to improve their interaction with customers, easier access to banking facilities by clients, and banks' market reach with e-banking. Keywords: E-Banking, Return on Assets (ROA), Profitability, Public Sector Banks, Covid-19.
5. **Apeksha Pandey, Jitendra Kumar Singh (2024)**, The technology is the key element of the development of the country. Each and every sector moves towards technology adoption. Technology adoption enhanced the performance of the products and services provided by the organization. In current era of technology has major role in the development of the banking sector in India. The recent technology in banking sector has even

more relevant as internet banking, mobile banking, ATM, online payment. Technology has revolutionary in banking sector. This research paper explores the dynamics of technology adoption in the Indian banking sector, focusing on key factors influencing adoption, challenges faced by banks, and implications for stakeholders. Drawing upon a comprehensive literature review, the paper analyzes regulatory reforms, customer preferences, organizational culture, security concerns, and cost benefits considerations shaping technology adoption. It highlights the significance of technology-driven transformation in enhancing customer experience, operational efficiency, and regulatory compliance, while addressing the need for overcoming challenges related to organizational inertia, cyber security, and cost management. The paper concludes by offering insights into the strategic imperatives for banks to navigate the evolving digital landscape and leverage technology for sustainable growth and competitive advantage.

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## Research Methodology

The methodology includes research design, Data collection method, Data Source and Sampling techniques to ensure an accurate and comprehensive study.

### Research Design

This study follows a descriptive and analytical research design. The descriptive aspect aids in understanding the many risk factors connected with e-banking, while the analytical method investigates the effects of these risks on banking operations and client trust. Qualitative and quantitative data will be combined to provide a comprehensive study of risk factors and security solutions

**Quantitative Data Collection:** A structured survey was conducted to collecting the data of approx. 400 customers, assessing the perception of towards the e-banking operation of BoB. In this survey, we use a statistical method for analyze the survey responses measure the frequency of cyber threat and assess the impact of fraud incidents on banking operations.

**Qualitative Data Collection:** Semi- Structure interviews were conducted with the Bank employees to gain deeper insights into strategic challenges and opportunities

### Data Collection

The study will rely on primary data sources to ensure comprehensive into the risk landscape of e- Banking at Bank of Baroda.

#### Primary Data Collection:

Surveys:

This data has been collected from the Surveys. The surveys will include questions regarding customer awareness of potential cybersecurity threats, their experiences with online fraud or security breaches, and their overall confidence in the bank's digital services.

Interviews:

Data has been collected through the Interviews. In the following method to conduct a interview with cybersecurity experts, IT Professional and Employees of the bank to gain insights into the risk managing strategies and cybersecurity measures that Bank of Baroda has implemented to mitigate potential risk.

#### Sampling Techniques:

Population:

The participants in this study comprise individuals and professionals who have direct or indirect involvement in the e-banking activities of Bank of Baroda (BoB). This includes three primary categories: customers, employees, and industry specialists. The customer group features both retail and corporate users who actively engage with BoB's digital banking offerings, which encompass internet banking, mobile banking, and digital payment solutions. These customers vary from those who regularly carry out daily transactions to occasional or infrequent users who might encounter cybersecurity threats due to a lack of awareness. The employee group is made up of BoB personnel participating in the management of e-banking operations, including IT security experts, customer service agents, and risk management personnel. Their contributions are vital to ensuring adherence to cybersecurity protocols and reducing the risks of online fraud.

#### Sample Size:

A target sample size of approximately 250 – 300 respondents will be set, which will allow for analysis and generalization of findings.

#### Sample Unit:

The Age Group Between 18 to 25

#### Research Instrument

- Interview
- Questionnaire

**Results and discussion:**

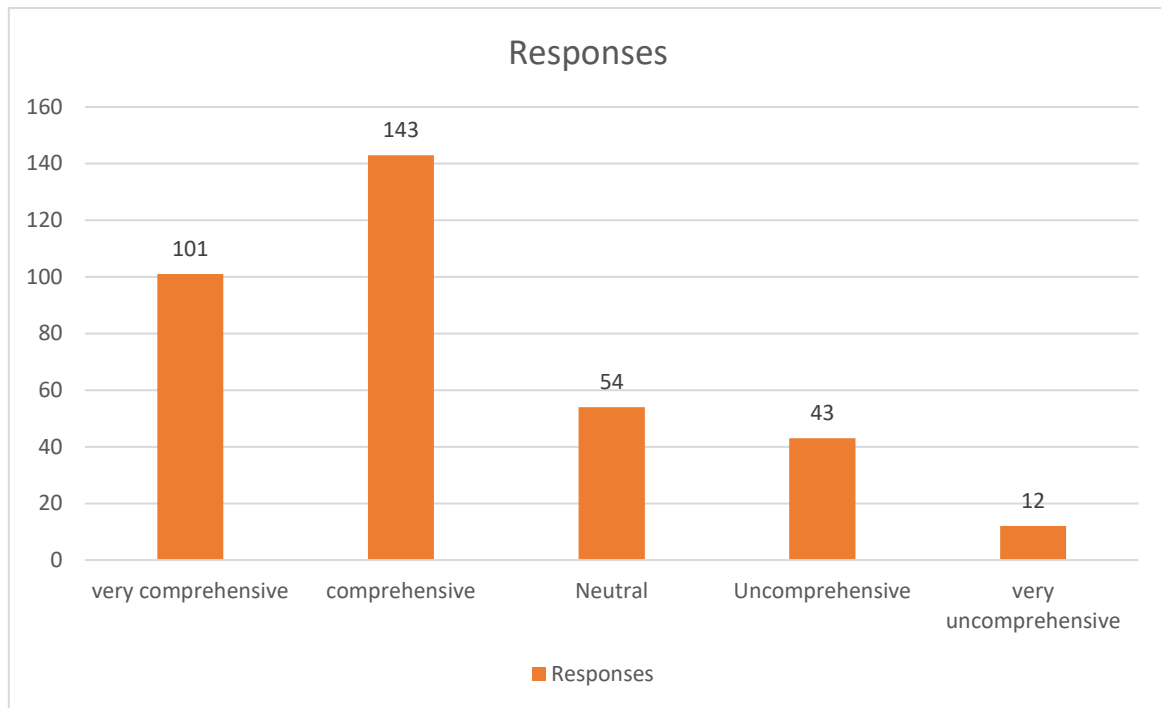
**1. Name the bank in which you have your digital banking facility?**

	Responses	Percentage
Bank of Baroda	166	47%
SBI bank	59	16.7%
HDFC Bank	51	14.4%
ICICI Bank	36	10.2%
Kotak Mahindra Bank	22	6.2%
IDFC First Bank	17	4.8%

**Interpretation:**

The data shows the distribution of respondents' digital banking facilities across various banks. The most popular bank for digital banking is Bank of Baroda, with 47% of responses. SBI Bank follows with 16.7%, while HDFC Bank and ICICI Bank account for 14.4% and 10.2%, respectively. Kotak Mahindra Bank and IDFC First Bank have smaller shares, with 6.2% and 4.8% of respondents, respectively. This suggests that Bank of Baroda is the dominant choice for digital banking among the surveyed individuals, with a notable preference for other major banks as well.

**2. How comprehensive do you find the privacy of your e-banking service?**



**Interpretation:**

The data shows that most respondents find the privacy of their e-banking services to be adequate. **40.5%** find the privacy **comprehensive**, and **28.6%** consider it **very comprehensive**, indicating a high level of satisfaction with the privacy measures in place. **15.3%** are **neutral** about the privacy, while **12.2%** find it **uncomprehensive** and **3.4%** believe it is **very uncomprehensive**. This suggests that while most users feel their privacy is well protected, there is still a portion who are dissatisfied with the level of privacy offered.

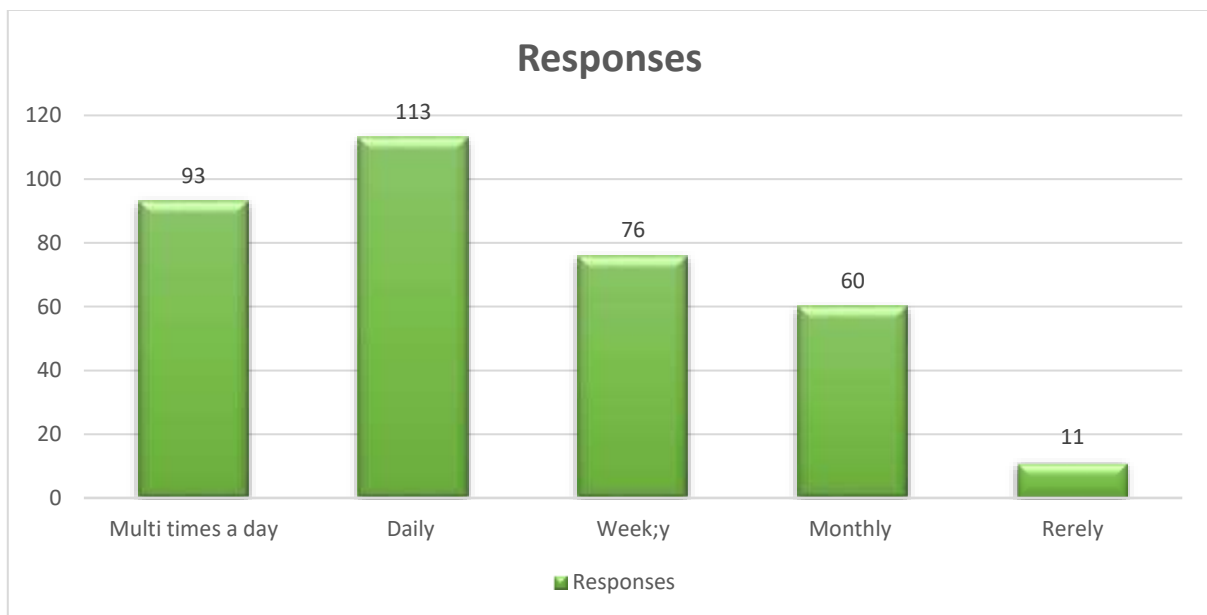
**3. Problem and challenges faced by the customers while using e-banking services**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Attitude
Technical issue	157	25	53	47	71	Negative

ATM out-off cash	26	127	65	70	65	Negative
fear of threats and scams	95	47	58	117	36	Positive
the amount is deducted more than once for a single transaction	54	70	70	95	64	Negative
unsuitable location of ATM	67	70	52	91	73	positive
several Problem of using e-banking	61	70	56	56	110	positive

**Interpretation:**

The data highlights several challenges faced by customers using e-banking services. Technical issues appear to be the most common, with many users strongly agreeing that they experience them. Concerns about ATM cash shortages are also significant, with a notable number of users facing this problem. Security fears, including threats and scams, are a concern for many, though not universally felt. Issues like double transaction deductions and inconvenient ATM locations affect some users, but the frequency of these problems is lower. Lastly, while some respondents report multiple issues with e-banking, many users do not face significant challenges. Overall, technical difficulties and security concerns seem to be the most prevalent issues among e-banking users.

**4. How often do you use e-banking services for financial transaction?****Interpretation:**

The data shows that a significant portion of respondents use e-banking services frequently. 32% of individuals use e-banking services daily, while 26.3% use them multiple times a day, indicating a high level of regular engagement. 21.5% use e-banking services weekly, and 17% use them monthly. Only 3.1% use e-banking rarely, suggesting that most people rely on these services frequently for their financial transactions.

Mobile banking most widely used services (35.7%) as compare to the ATM services uses (28.9%). ATM cash shortages and multiple deduction for a single transaction are notable concerns. (62.6%) believe their e-banking services are up to date and (71.4%) feel their personal information is well protected. E-banking fraud awareness on the 45% frequently hear about e-banking frauds in the news, while 5.7% have never heard about them. On the above survey 45% rate customer services as effective (4 out of 5), 33.4% giving a neutral rating. Security concerns are a major issue, with a large percentage of users experiencing problems despite trusting their bank's security measures.

**Limitations:**

Customer preferences, digital security risks, and banking trends are all changing quickly. The data may soon become out of date, necessitating frequent revisions to stay current. It is possible that the survey will ignore the issues and experiences of those who continue to use traditional banking services because it solely focusses on users of digital banking. People with less technological know-how may misunderstand banking services or underreport

security issues. The survey does not appear to have means to confirm the correctness of responses, such as cross-checking transaction data or conducting follow-up interviews.

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### Conclusion and Future scope:

The survey findings highlight the widespread adoption of e-banking, particularly among young and educated individuals who prefer mobile banking for its convenience. While most users trust the security and privacy measures of their banking platforms, a significant portion has faced security challenges, technical issues, and concerns about fraud. Although customer service is generally rated positively, there is room for improvement in addressing security concerns more effectively. Additionally, password update habits and awareness of cybersecurity risks vary among users, indicating a need for better education on digital banking safety. To enhance user confidence and ensure a seamless banking experience, financial institutions should focus on strengthening security measures, addressing technical challenges, and improving customer support to meet the evolving demands of digital banking users.

The future of e-banking looks bright, driven by advancements in technologies like AI, blockchain, and 5G, which will enable more personalized, secure, and efficient services. Mobile banking, digital wallets, and biometric authentication will become the norm, offering seamless access to financial services. Open banking will foster innovation and collaboration with fintech, while blockchain will enhance transparency and security. Cloud computing will support scalability and cost-effective operations, and the rise of neobanks will make banking more accessible globally. Additionally, regulations will evolve to ensure security and compliance, while sustainability and green banking practices will become increasingly important. The future promises a more inclusive, customer-centric, and tech-driven financial landscape.

To control risks in e-banking, banks need to use strong security measures like encrypting data, requiring extra verification steps (such as passwords and fingerprints), and checking for any suspicious activity in real time. They must follow rules and regulations to keep customer information safe. Staff should be trained regularly on security practices, and there should be good checks in place to catch any mistakes or fraud. Banks also need to keep their systems updated and have backup plans in case of any problems, ensuring that customer data and money are always protected.

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