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A EMPIRICAL STUDY ON CYBER SECURITY ISSUES AFFECTING ONLINE BANKING AND ONLINE TRANSACTIONS IN INDIA

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ABSTRACT

Cybersecurity is essential for protecting online banking and financial transactions in India, as digital payments continue to rise. Cyber threats like phishing, malware, and identity theft put individuals and financial institutions at risk, making strong security measures necessary. This study aims to identify major cybersecurity challenges in online banking, assess public awareness, and evaluate the effectiveness of existing laws in preventing cyber fraud. It also explores improvements in security measures and compares India's cybersecurity framework with global standards. The study identifies phishing attacks as the most common threat. While awareness of cybersecurity risks exists, many users still follow weak security practices. Existing laws like the IT Act and RBI guidelines need stricter enforcement. The research method used here is an empirical method, 200 samples have been collected, and a survey is conducted in Chennai. Advanced security technologies such as biometrics, AI-driven fraud detection, and blockchain can improve digital transaction safety. Improving cybersecurity education, enforcing laws, and raising awareness through campaigns are crucial for secure online banking. Strengthening policies and adopting advanced security measures will protect financial data and boost confidence in digital transactions, ensuring a safer financial system in India.

KEYWORDS - Cyber-infrastructure, social-networking, Data breach, Identity theft, cybersafety, cyber-ethics.

INTRODUCTION

Cybersecurity in online banking and transactions is a critical concern in India due to the rise of digital payments and financial fraud. With increasing internet penetration and smartphone usage, securing financial data against cyber threats has become essential. Cybercrimes like phishing, malware attacks, and identity theft pose significant risks to individuals and institutions.

Evolution of Cybersecurity in Online Banking

India's cybersecurity landscape has evolved with the digital revolution. From traditional banking to internet banking and now mobile banking, security measures have progressed from simple passwords to biometric authentication, encryption, and AI-driven fraud detection. The push for digital transactions post-demonetization (2016) further accelerated cybersecurity advancements.

Factors Affecting Cybersecurity in Online Transactions

Key factors include weak passwords, lack of user awareness, outdated security systems, phishing attacks, malware threats, and insider fraud. The rapid growth of fintech and UPI-based payments has also increased the attack surface for cybercriminals.

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Government Initiatives for Cybersecurity

The Indian government has implemented measures like the IT Act (2000), the National Cyber Security Policy (2013), and RBI guidelines on digital payment security. Initiatives like CERT-In, Data Protection Bill, and the Digital India campaign aim to strengthen cybersecurity infrastructure.

Current Trends in Cybersecurity

Emerging trends include AI-driven fraud detection, blockchain for secure transactions, biometric authentication, multi-factor security layers, and advanced encryption technologies. Cybersecurity awareness campaigns and regulatory updates are also shaping the digital banking landscape.

Comparison with Other Countries

Developed nations like the US and UK have stringent cybersecurity laws, real-time fraud monitoring, and robust data privacy regulations like GDPR. In contrast, India is still developing comprehensive cybersecurity frameworks and battling challenges like weak enforcement and digital literacy gaps. However, India's rapid adoption of fintech solutions positions it as a growing leader in digital banking security.

Aim: This study aims to identify major cybersecurity challenges in online banking, assess public awareness, and evaluate the effectiveness of existing laws in preventing cyber fraud.

OBJECTIVES

- To find out major issues faced in online banking and online transactions regarding cybersecurity measures
- To find out whether the society is aware of the cyber banking issues happening.
- To find out whether Effectiveness towards the existing laws that regulate and prevent the fraud by online transactions

LITERATURE REVIEW

1. **Roger Smith (2009): Aim:** To elucidate the concept of cloud computing as an on-demand IT resource delivery model, emphasizing its primary components: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). **Method:** The study provides a conceptual analysis, defining each service model and discussing their roles within the cloud computing paradigm. **Findings:** The research highlights that cloud computing offers scalable and flexible IT resources, enabling organizations to access computing infrastructure and services without significant upfront investments.
2. **Frank Cilluffo and Ron Ritchey (2010): Aim:** To discuss security concerns associated with cloud computing, emphasizing the challenges of securing a decentralized, limitless collaborative platform. **Method:** The study involves a comprehensive review of existing security frameworks and analyzes their applicability to cloud environments. **Findings:** The authors identify that traditional security measures are insufficient for cloud infrastructures, highlighting the need for advanced security protocols to address issues such as data breaches, unauthorized access, and compliance with regulatory standards.
3. **Neil Robinson and Lorenzo Valeri (2011): Aim:** To analyze technological challenges in cloud computing and argue that its benefits depend on addressing security, privacy, and trust issues. **Method:** The research employs a qualitative approach, reviewing case studies and existing literature to assess the impact of security, privacy, and trust on cloud adoption. **Findings:** The study concludes that while cloud computing

offers significant advantages, unresolved issues related to data security, user privacy, and trust in service providers pose substantial barriers to its widespread adoption.

4. **Jonathan Cave and Tony Starkey (2011): Aim:** To highlight legal uncertainties and regulatory issues affecting trust in cloud service adoption. **Method:** The authors conduct a legal analysis, examining existing regulations and their applicability to cloud computing services. **Findings:** The study reveals that ambiguities in data ownership, jurisdictional challenges, and compliance requirements contribute to hesitancy among potential cloud service users, suggesting a need for clearer legal frameworks.
5. **Christopher S. Yoo (2011): Aim:** To explore cloud computing's architectural and policy implications beyond just data privacy concerns. **Method:** The paper provides a policy analysis, discussing how cloud architecture influences issues such as data control, interoperability, and market competition. **Findings:** Yoo argues that cloud computing necessitates a reevaluation of existing policies, particularly concerning data sovereignty, antitrust laws, and the role of standardization in promoting a competitive market.
6. **Joshua S. Parker (2012): Aim:** To discuss government agencies adopting cloud computing for cost savings and efficiency, enabling better data storage and future analysis. **Method:** The study analyzes government case studies where cloud solutions have been implemented, assessing the outcomes in terms of cost and operational efficiency. **Findings:** The research indicates that cloud adoption in the public sector leads to reduced IT expenditures and improved data management capabilities, facilitating enhanced data analytics and service delivery.
7. **Jared Carstensen (2012): Aim:** To note that cloud computing has moved beyond hype, but security concerns remain a major challenge, leading some IT organizations to prefer private cloud environments. **Method:** The author conducts a survey of IT professionals to gauge perceptions of cloud security and adoption trends. **Findings:** The survey results suggest that despite recognizing the benefits of cloud computing, many organizations opt for private clouds to maintain greater control over security and compliance aspects.
8. **Bernard Golden (2012): Aim:** To explain how virtualization in cloud computing challenges traditional security methods, requiring dynamic solutions for a changing infrastructure. **Method:** The study involves a technical analysis of virtualization technologies and their impact on existing security protocols. **Findings:** Golden identifies that virtualization introduces new vulnerabilities, such as hypervisor attacks, necessitating the development of adaptive security measures tailored to virtualized environments.
9. **Minakshi Lahiri and James L. Moseley (2013): Aim:** To describe cloud computing as a transformative IT trend facilitating easy access, storage, and data sharing. **Method:** The authors perform a literature review, examining various case studies and reports on cloud computing implementations. **Findings:** The study concludes that cloud computing significantly enhances organizational agility by providing scalable resources and fostering collaborative workflows through improved data accessibility.
10. **Vidyanand Choudhary and Joseph Vithayayhil (2013): Aim:** To examine

how cloud computing adoption impacts a firm's IT department and vendor competition. **Method:** The research utilizes an economic analysis, assessing market data to understand shifts in IT spending and vendor dynamics post-cloud adoption. **Findings:** The authors find that cloud computing leads to a reduction in in-house IT infrastructure roles, prompting IT departments to focus more on strategic initiatives. Additionally, the pay-as-you-go model intensifies competition among vendors, driving innovation and cost-effectiveness.

11. **Larry Combs (2013): Aim:** To define cloud computing as a distributed computing model where users pay for computing infrastructure monthly instead of large upfront costs. **Method:** The paper provides a financial analysis, comparing traditional IT investment models with cloud-based subscription services. **Findings:** Combs demonstrates that the cloud model lowers the barrier to entry for small and medium-sized enterprises by converting capital expenditures into operational expenditures.
12. **Karim Djemame et al. (2012): Aim:** To investigate the legal issues surrounding risk assessment in cloud computing, particularly focusing on data protection and security. **Method:** The authors conduct a comprehensive analysis of legal frameworks and propose the development of a risk inventory to address inherent legal risks in cloud environments. **Findings:** The study emphasizes the necessity for clear legal guidelines and risk assessment tools to manage data protection and security challenges in cloud computing.
13. **T. Ramluckan and B. van Niekerk (2014): Aim:** To discuss the role of cloud computing in crisis management and the security measures required for various crisis scenarios. **Method:** The paper reviews case studies where cloud computing has been implemented in crisis situations and analyzes the associated security protocols. **Findings:** The authors find that cloud computing offers flexible and scalable solutions for crisis management but highlight the need for robust security measures tailored to specific crisis contexts.
14. **V. Greiman (2014): Aim:** To analyze the legal challenges in cloud computing, focusing on data control in sectors such as national security, law enforcement, and intellectual property. **Method:** The study conducts a legal analysis of existing statutes and regulations affecting cloud computing in sensitive sectors. **Findings:** Greiman identifies significant legal ambiguities regarding data ownership, jurisdiction, and compliance, suggesting the need for updated legal frameworks to address these challenges.
15. **Nayan B. Ruparelia (2016): Aim:** To examine the cost-benefit aspects of cloud computing, including various pricing models. **Method:** The author performs an economic analysis comparing traditional IT infrastructure costs with cloud-based solutions under different pricing schemes. **Findings:** Ruparelia concludes that cloud computing can offer cost advantages, particularly for small and medium-sized enterprises, by converting capital expenditures into operational expenditures and providing flexible pricing options.
16. **Nayan B. Ruparelia (2016): Aim:** To discuss the holistic nature of cloud security, addressing compliance, data integrity, and jurisdictional concerns. **Method:** The study reviews existing security frameworks and regulations, assessing their applicability to cloud

environments. **Findings:** The research highlights that effective cloud security requires a comprehensive approach that encompasses technical measures, regulatory compliance, and clear policies on data governance.

17. **Maziar Peihani (2017): Aim:** To explore cloud computing's impact on financial institutions, discussing its disruptive nature and adoption challenges. **Method:** The paper analyzes case studies of financial institutions that have adopted cloud technologies, focusing on operational and regulatory impacts. **Findings:** Peihani finds that while cloud computing offers scalability and efficiency benefits, financial institutions face challenges related to regulatory compliance, data security, and integration with legacy systems.
18. **Ijeoma Onyeji-Nwogu (2017): Aim:** To examine cloud adoption issues in developing countries, including high broadband costs and limited electricity access. **Method:** The study conducts surveys and interviews with stakeholders in developing regions to identify barriers to cloud adoption. **Findings:** The research indicates that infrastructural challenges, such as unreliable power supply and expensive internet connectivity, significantly hinder cloud computing adoption in developing countries.
19. **Simon Handler and Lily Liu (2020): Aim:** To explain how major cloud providers like Google and Microsoft utilize their own cloud services to develop products like G Suite and Office 365. **Method:** The authors analyze the integration strategies of leading cloud service providers, focusing on their internal use of cloud infrastructure to enhance product offerings. **Findings:** The study reveals that by leveraging their cloud platforms, companies like Google and Microsoft achieve greater efficiency, scalability, and innovation in their product development processes.
20. **Daniel Fiott (2020): Aim:** To discuss the ambiguous terminology in digitalization, including cloud computing, and the challenges in comprehending its full implications. **Method:** The paper provides a critical analysis of the language used in digital transformation discourse, examining how vague terminology can lead to misunderstandings and misaligned expectations. **Findings:** Fiott argues that the lack of precise definitions in digitalization, particularly concerning cloud computing, complicates policy-making and strategic planning, advocating for clearer and more consistent terminology.

METHODOLOGY

The research method adopted for the paper is such an empirical research. The methodology used by the researcher is a Simple random sampling method to collect samples. The sources used are primary sources such as questionnaires, surveys and secondary sources such as books and journals. The total sample size collected through questions is 200. The independent variables used were age, occupation, gender,qualification,income.Statistics tools used by the researcher are bar graphs,complex graphs.

HYPOTHESIS

Null hypothesis: There is no significant relationship between the occupation and major issues faced in online banking and online transactions regarding cybersecurity measures

Alternative hypothesis: There is a significant relationship between occupation and major issues faced in online banking and online transactions regarding cybersecurity measures.

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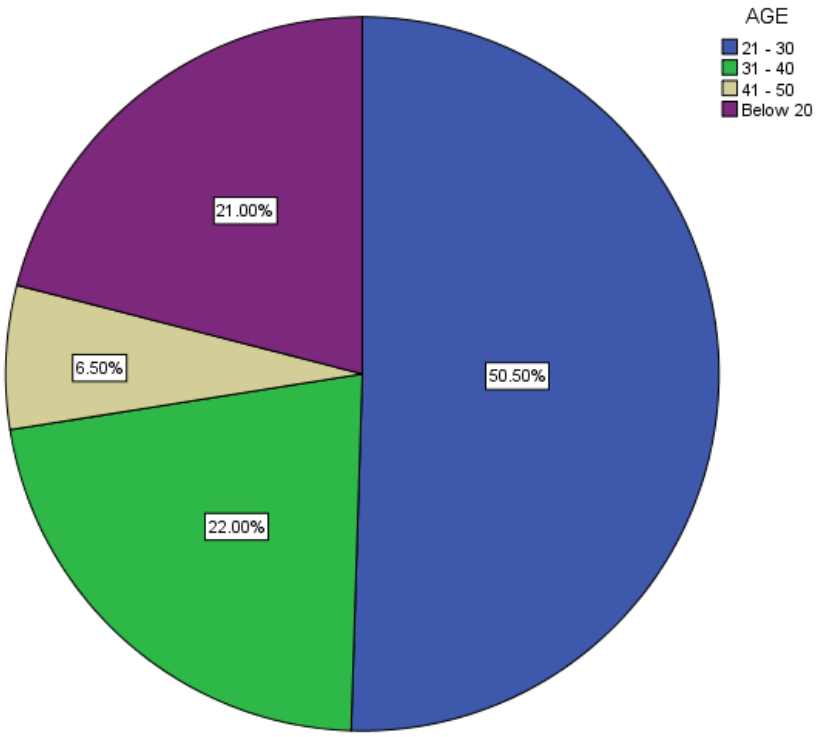
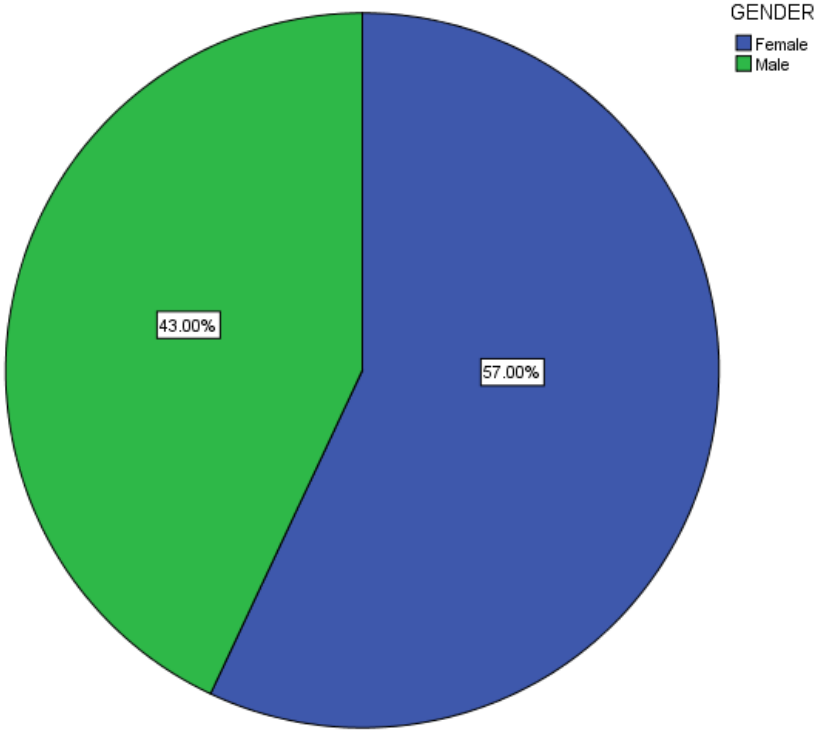
ANALYSIS

FIG 1



Legend: fig 1 represents the age of the respondents

FIG 2



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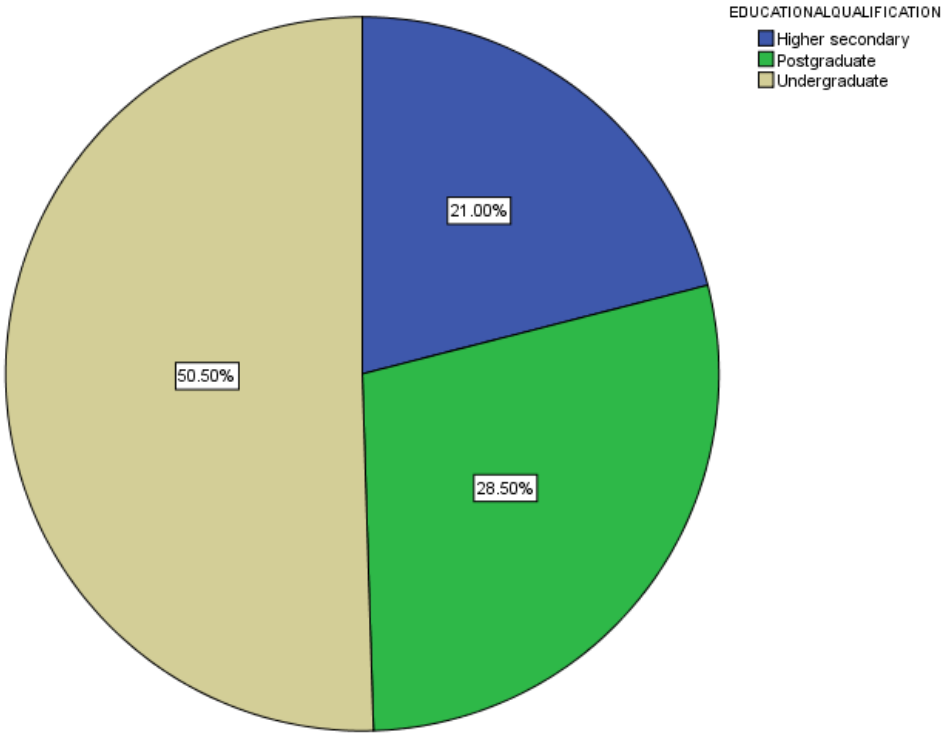
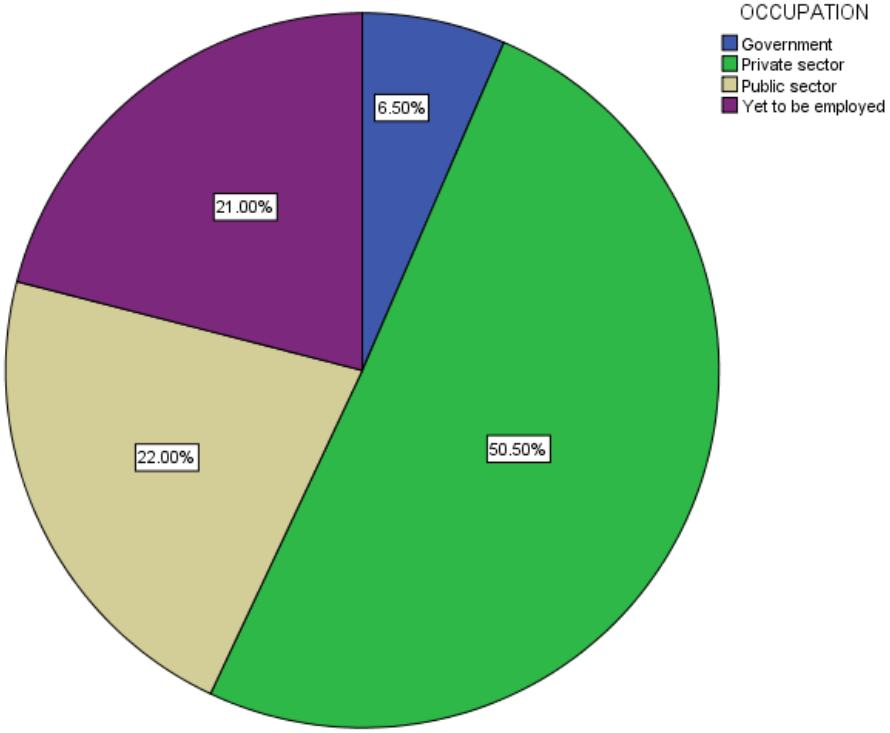
Legend: fig 2 represents the gender of the respondents

FIG 3



Legend: fig 3 represents the educational qualification of the respondents

FIG 4



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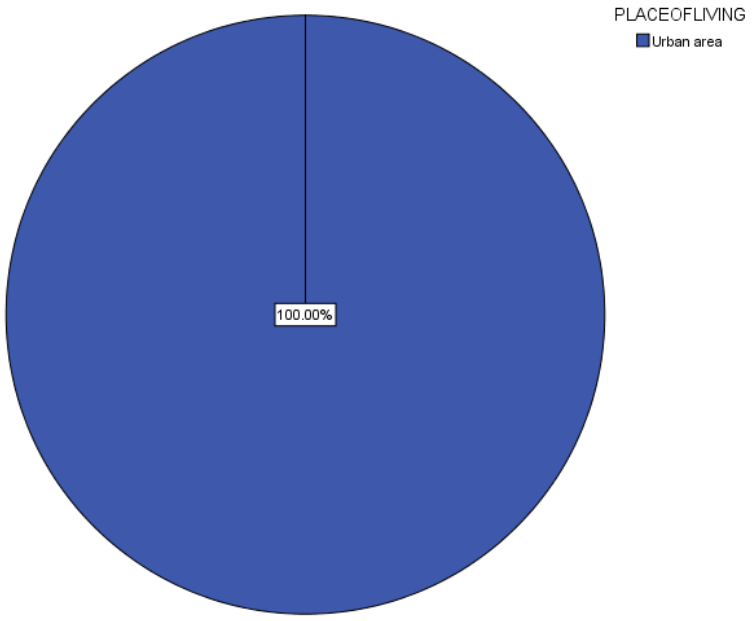
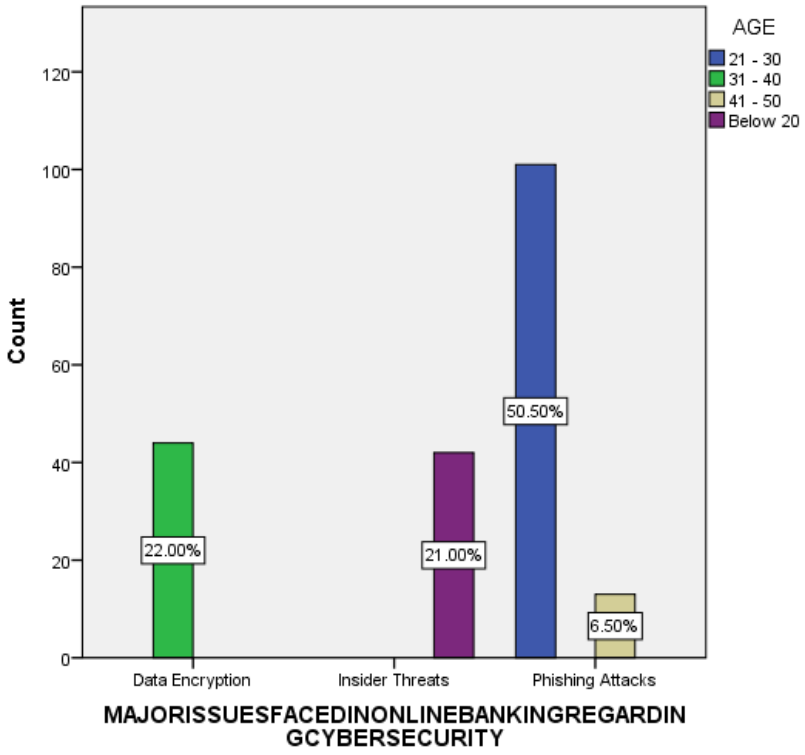
Legend: fig 4 represents the occupation of the respondents

FIG 5



Legend: fig 5 represents the place of living of the respondents

FIG 6



Legend: fig 6 represents the major issues faced in online banking and online transactions regarding cybersecurity measures compared with the age of the respondents

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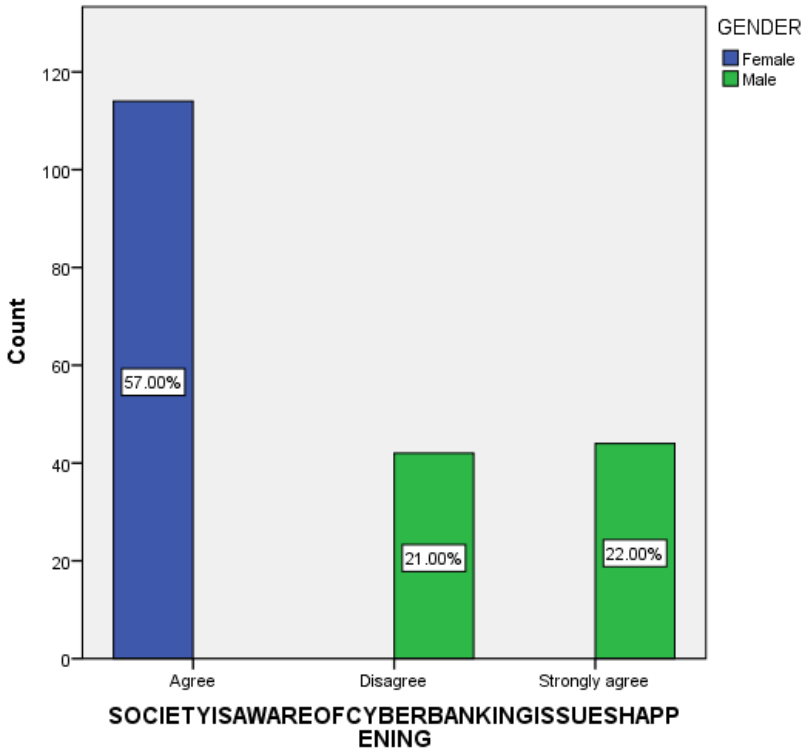
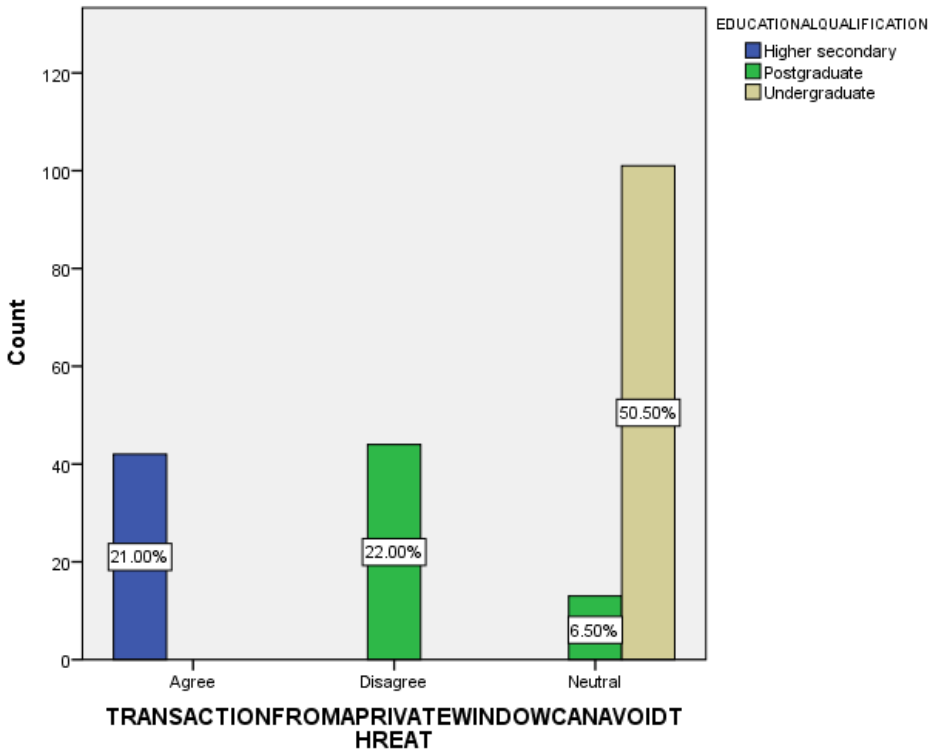
FIG 7



Legend: fig 7 represents whether the society is aware of the cyber banking issues happening compared with the gender of the respondents

FIG 8



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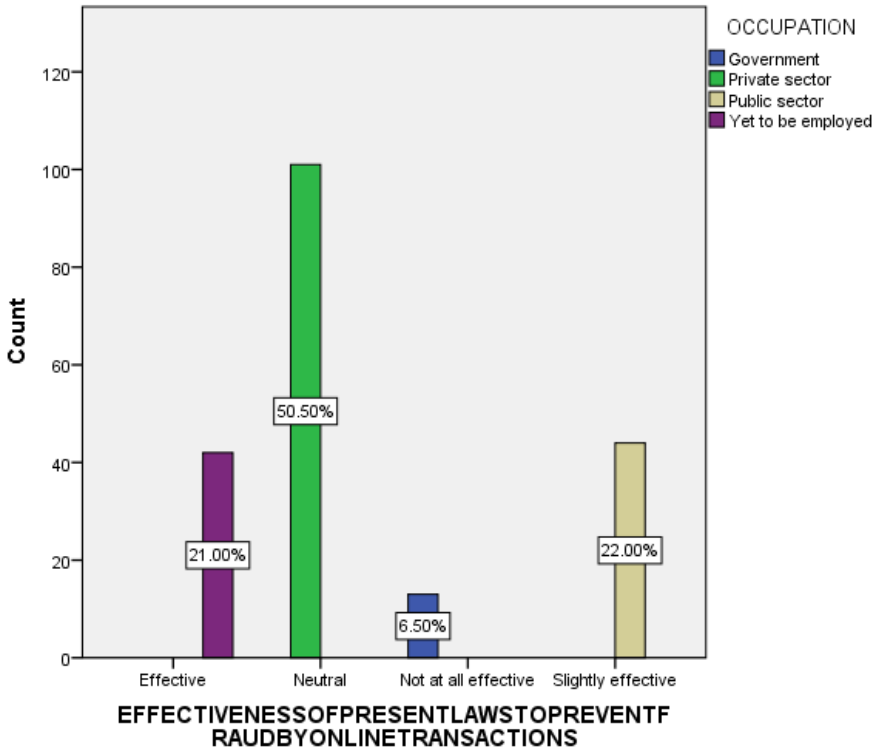
Legend: fig 8 represents whether Conducting transactions from a private window can prevent threats for people and online banking fraud compared with the educational qualification of the respondents.

FIG 9



Legend: fig 9 represents Effectiveness towards the existing laws that regulate and prevent the fraud by online transactions compared with the occupation of the respondents

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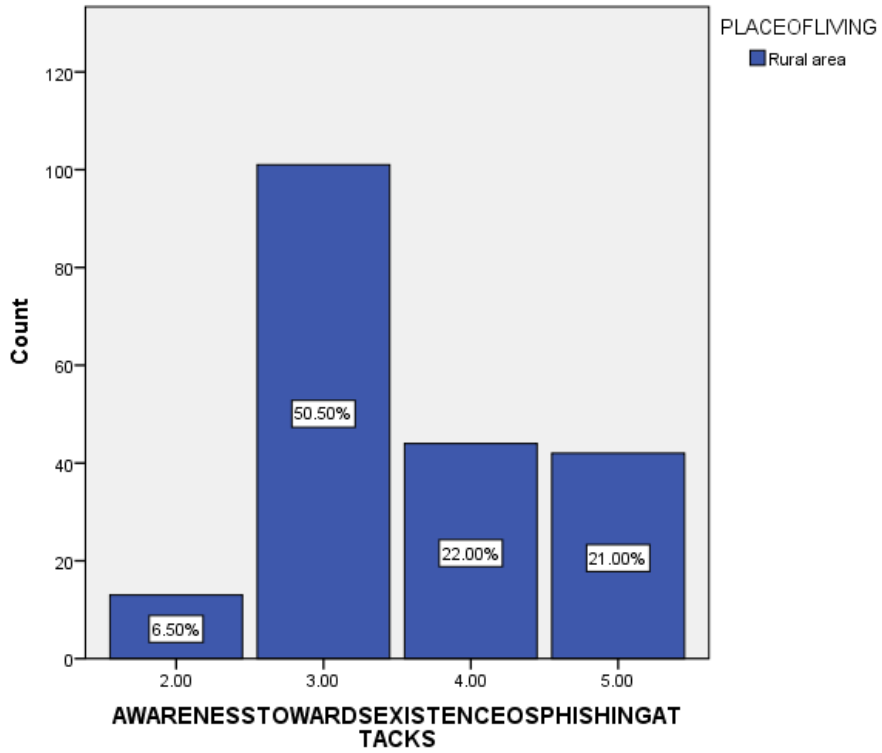

FIG 10

Legend: fig 10 represents Rate your level of awareness towards the existence of phishing attacks in the banking sectors compared with the place of living of the respondents

FIG 11

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
OCCUPATION * MAJORISSUESFACEDINONLINEBANKINGREGARDINGCYBERSECURITY	200	100.0%	0	0.0%	200	100.0%

OCCUPATION * MAJORISSUESFACEDINONLINEBANKINGREGARDINGCYBERSECURITY Crosstabulation

Count

		MAJORISSUESFACEDINONLINEBANKINGREGARDINGCYBERSECURITY			
		Data Encryption	Insider Threats	Phishing Attacks	Total
OCCUPATION	Government	0	0	13	13
	Private sector	0	0	101	101
	Public sector	44	0	0	44
	Yet to be employed	0	42	0	42
Total		44	42	114	200

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Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	400.000[a]	6	.000
Likelihood Ratio	392.501	6	.000
N of Valid Cases	200		

a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 2.73.

Legend: fig 11 represents the chi square test compared with the occupation and major issues faced in online banking and online transactions regarding cybersecurity measures

RESULT

(Fig 1) represents the age of the respondents in that 21% are below 20, 50.50% are between 21-30, 22% are between 31-40 and 6.5% are between 41-50. **(Fig 2)** represents the gender of the respondents in that 43% are male and 57% are female. **(Fig 3)** represents the educational qualification of the respondents in that 21% are higher secondary, 50.50% are undergraduates and 28.50% are postgraduates. **(Fig 4)** represents the occupation of the respondents in that 6.50% are Government employees, 50.50% are private sector employees, 22% public sector employees and 21% are yet to be employed. **(Fig 5)** represents the place of living of the respondents in that 100% of the population lives in urban area. **(Fig 6)** represents the major issues faced in online banking and online transactions regarding cybersecurity measures compared with the age of the respondents in that 22% said data encryption, 21% said insider threats, 50.50% and 6.50% phishing attacks. **(Fig 7)** represents whether the society is aware of the cyber banking issues happening compared with the gender of the respondents in that 57% have agreed, 21% have disagreed, 22% have strongly agreed. **(Fig 8)** represents whether Conducting transactions from a private window can prevent threats for people and online banking fraud compared with the educational qualification of the respondents in that 21% have agreed, 22% have disagreed, 6.50% and 50.50% said neutral. **(Fig 9)** represents Effectiveness towards the existing laws that regulate and prevent the fraud by online transactions compared with the occupation of the respondents in that 21% said effective, 50.50% said neutral, 6.50% not at all effective, 22% slightly effective. **(Fig 10)** Rate your level of awareness towards the existence of phishing attacks in the banking sectors compared with the place of living of the respondents in that 6.50% rated 2, 50.50% rated 3, 22% have 4, 21% have rated 5. **(Fig 11)** represents the chi square test compared with the occupation and major issues faced in online banking and online transactions regarding cybersecurity measures in that p value is < 0.05

DISCUSSION

(Fig 6) majority of them said that phishing attacks are the major issues faced in online banking and online transactions regarding cybersecurity because they exploit human vulnerabilities rather than solely relying on technical vulnerabilities. By impersonating trustworthy entities through deceptive emails, websites, or messages, attackers trick individuals into revealing sensitive information such as login credentials or financial details. The human factor makes it challenging to prevent entirely, as users may unknowingly fall victim to social engineering tactics. **(Fig 7)** majority of them have agreed to the statement whether the society is aware of the cyber banking issues happening in this the agreement that society is aware of cyber banking issues is likely due to increased media coverage, awareness campaigns, and the growing frequency of cyber incidents. High-profile data breaches and financial fraud cases have garnered public attention, making people more conscious of the potential risks associated with online banking. **(Fig 8)** majority of them said

neutral to the statement that whether Conducting transactions from a private window can prevent threats for people and online banking fraud because The neutral stance on conducting transactions from a private window may stem from the understanding that while using a private or incognito window can offer some privacy benefits, it does not provide comprehensive protection against all online threats or banking fraud. Private browsing mainly prevents the storage of local browsing data, but it doesn't address external threats like phishing attacks, malware, or compromised websites. **(Fig 9)** majority of them said neutral to the statement that rate your Effectiveness towards the existing laws that regulate and prevent the fraud by online transactions because The neutral stance on the effectiveness of existing laws regulating and preventing fraud in online transactions may indicate a perception that while laws exist, their enforcement and adaptability to evolving cyber threats are areas of uncertainty. Cybercrime is dynamic, and regulations may struggle to keep pace with rapidly changing tactics employed by fraudsters. **(Fig 10)** majority of them have rated 3 on the scale of 10 on Rate your level of awareness towards the existence of phishing attacks in the banking sectors because there may be a significant gap in public understanding about the prevalence and risks associated with phishing attacks. This emphasizes the need for increased education and awareness campaigns to inform individuals about the deceptive tactics used by cybercriminals in the context of online banking. **(Fig 11)** the chi square test compared with the occupation and major issues faced in online banking and online transactions regarding cybersecurity measures in this there is no significant relationship between the variables.

LIMITATION

One of the major limitations of the study in the sample frame. There is a major constraint in the sample frame as it is limited to a small area. Thus, it proves to be difficult to extrapolate it to a larger population. Another limitation is the sample size of 200 which cannot be used to assume the thinking of the entire population in a particular country, state, or city. The study's capacity to offer reliable and useful results was greatly impeded by the study's small sample size in comparison to the size of the population. As a result, it cannot be expected to be representative, and so no broad conclusions can be drawn. Language limitations prevented the most efficient translations of the questionnaire, which might have influenced understandings on both the author's and respondent's sides.

SUGGESTIONS

- Train your employees.
- Secure your networks.
- Use antivirus software and keep all software updated.
- Enable Multi-Factor Authentication.

CONCLUSION

Cybersecurity in online banking and financial transactions is a critical issue in India due to increasing threats like phishing, identity theft, and malware attacks. With the rise in digital banking, strong security measures are essential to protect financial data and prevent fraud. The major objectives of this study were to identify key cybersecurity issues, assess public awareness, and evaluate the effectiveness of existing laws in preventing online fraud. The major findings revealed that phishing attacks, weak passwords, and lack of encryption are the most common security threats. While many users are aware of cybersecurity risks, their preventive measures remain inadequate. Laws like the IT Act and RBI guidelines offer a framework for protection but require stricter enforcement. The study suggests strengthening cybersecurity education, implementing AI-driven fraud detection, promoting multi-factor authentication, and ensuring regular security updates. The future scope of this research includes developing advanced cybersecurity policies, integrating AI and blockchain for transaction security, and increasing legal

enforcement against cybercrimes. In conclusion, improving cybersecurity awareness, enforcing stronger laws, and adopting advanced security technologies will enhance online banking security, protect user data, and build public trust in digital financial systems.

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