THE IMPACT OF CYBER SECURITY THREATS ON ONLINE BUSINESSES IN NIGERIA

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FACULTY OF PHYSICAL SCIENCE

UNIVERSITY OF BENIN

BENIN CITY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE, FACULTY OF PHYSICAL SCIENCE, UNIVERSITY OF BENIN, BENIN CITY. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE DEGREE (B.Sc.) IN COMPUTER SCIENCE.

APRIL 2025

CERTIFICATION

This is to certify that this project was carried out by AIBUEDEFE SEAN OSARETIN with Matriculation Number PSC2003790 under my supervision. It is adequate and satisfactory, both in scope and content, for the award of Bachelor of Science (B.Sc.) Degree in Computer Science of the University of Benin

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Project Supervisor

APPROVAL

This project work is hereby approved in partial fulfillment of the requirements for the award of Bachelor of Science (B.Sc.) Degree in Computer Science from the University of Benin.

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Head of Department

DEDICATION

This project is dedicated to God Almighty, my source and strength who enabled me through this programme and to my wonderful family whose love has been a source of strength.

ACKNOWLEDGEMENT

My utmost acknowledgement and undaunted gratitude goes to the almighty God for his unending love and has kept me throughout my program and for the success of his work.

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TABLE OF CONTENTS

Title page ii

Certification iii

Approval iv

Dedication v

Acknowledgement vi

Table of contents vii

CHAPTER ONE: INTRODUCTION

1.1 Background Study 1

1.2 Aim and Objectives 3

1.3 Statement of Problem 4

1.4 Research Relevance 4

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction 5

2.2 Mitigating Cyber Security Threats in Online Businesses in Nigeria 9

2.3 The Role of POS Operations in Online Businesses in Nigeria 12

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction 15

3.1 Research Approach and Design 15

3.2 Data Collection 16

3.3 Sampling Technique and Sample Size 17

3.4 Data Analysis 19

3.5 Ethical Considerations 20

3.6 Limitations of the Methodology 20

3.7 Summary 21

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction 22

4.2 Demographic Analysis 22

4.3 Cyber Security Awareness 26

4.4 Cyber Security Threats Experienced 30

4.5 Cyber Security Measures Implemented 34

4.6 Impact of Cyber Security Threats 40

4.7 Mitigation Strategies and Future Plans 44

4.8 Summary of Findings 47

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction 48

5.2 Summary of Findings 48

5.3 Conclusion 49

5.4 Recommendations 50

5.5 Contribution to Knowledge 51

REFERENCES **52**

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND STUDY

The rapid growth of the internet and online businesses has transformed the way companies operate, communicate, and interact with customers (Kshetri, 2006). However, this growth has also introduced new security risks and threats, which can have devastating consequences for online businesses (Chen et al., 2017). Nigeria, with its growing online market, is not immune to these threats.

Singh (2023) refers to Cyber security as measures and practices designed to safeguard digital assets, environments, and users from unauthorized access, malicious activities, and external threats. Cyberspace has become an indispensable aspect of modern life, comprising a vast, high-speed network of interconnected technologies, including wireless signals, local area networks, and internet infrastructure, accessible in various public settings such as schools, hospitals, hotels, and government institutions. The global rural population stands to benefit immensely from the opportunities and resources available in cyberspace, with the potential to significantly enhance their quality of life.

Cyber security threats are a major concern for online businesses worldwide. Cyber-attacks can have a devastating impact, similar to that of a severe storm, capable of crippling a city's critical infrastructure and potentially paralyzing an entire nation's economy and essential services. Given that approximately one-third of the global population is deeply interconnected through diverse digital platforms, the potential consequences of this issue on our nation's

security, economy, and social fabric are likely to be profound and far-reaching. According to a report by Cybersecurity Ventures, the global cost of cybercrime is expected to reach $6 trillion by 2021 (Morgan, 2016, cited in Kalu et al, 2020). In Nigeria, the situation is equally alarming. A report by the Nigerian Communications Commission (NCC) revealed that the country lost N127 billion to cybercrime in 2017 (NCC, 2018).

In recent years, Nigeria has witnessed a significant surge in online business activities. The country's growing internet penetration, increasing mobile phone adoption, and a large youthful population have created a fertile ground for e-commerce and digital entrepreneurship (Adepetun, 2018). Various online business models have emerged, including e-commerce platforms, digital payment systems, online marketplaces, and social media-driven businesses. Companies like Jumia, Konga, and Paystack have pioneered the e-commerce space (Ogbonnaya, 2020), while social media platforms like Instagram and Facebook have enabled small businesses to reach a wider audience. As Nigeria's online business landscape continues to evolve, it is expected to contribute significantly to the country's economic growth, create employment opportunities, and improve the lives of citizens.

However, online businesses in Nigeria are vulnerable to various types of cyber security threats, including phishing, malware, ransomware, and denial-of-service (DoS) attacks (Akinwunmi et al., 2018). Nigeria is not immune to this global trend, as the country's businesses and government institutions have also fallen victim to massive cyber thefts. Sophisticated organized networks and state-sponsored actors from other nations have targeted Nigeria's digital infrastructure, pilfering sensitive information and compromising national

security (Singh, 2023). This highlights the need for Nigeria to strengthen its cyber security measures and protect its digital assets from these evolving threats. This study therefore aims to investigate, analyze, and evaluate the impact of cyber security threats on online businesses in Nigeria, with a view to proposing effective strategies and recommending best practices for mitigating these threats.

1.2 AIM AND OBJECTIVES

The aim of this study is to comprehensively examine the impact of cyber security threats on online businesses in Nigeria, with a focus on identifying vulnerabilities, assessing risks, and developing proactive measures to enhance cyber resilience.

The objectives of this study are:

1. To identify the most common cyber security threats faced by online businesses in Nigeria.
2. To examine the impact of cyber security threats on the financial performance and sustainability of online businesses in Nigeria.
3. To investigate the perceived risks and consequences of cyber security breaches on online businesses in Nigeria.
4. To determine the measures online businesses in Nigeria are taking to mitigate cyber security threats and evaluate their effectiveness.
5. To propose effective strategies and recommend best practices for mitigating cyber security threats and enhancing cyber resilience among online businesses in Nigeria.

1.3 STATEMENT OF PROBLEM

The proliferation of cyber security threats in Nigeria poses a substantial threat to the sustainability and growth of online businesses, potentially resulting in severe financial losses, irreparable reputational damage, and legal repercussions. Notwithstanding the increasing significance of online businesses in Nigeria's digital economy, a glaring research gap exists regarding the impact of cyber security threats on these businesses. This study seeks to bridge this knowledge gap by investigating the cyber security threats faced by online businesses in Nigeria, with a view to providing actionable insights and recommendations for mitigating these threats.

1.4 RESEARCH RELEVANCE

This study is relevant for several reasons:

1. Practical significance: The study's findings will provide valuable insights for online businesses in Nigeria, enabling them to better understand the cyber security threats they face and take effective measures to mitigate them.
2. Theoretical contribution: The study will contribute to the existing literature on cyber security and online businesses, providing a framework for understanding the impact of cyber security threats on online businesses in Nigeria.
3. Policy implications: The study's findings will have implications for policymakers and regulators in Nigeria, highlighting the need for effective cyber security policies and regulations to protect online businesses.

CHAPTER TWO

LITERATURE REVIEW

The Impact of Cyber Security Threats on Online Businesses in Nigeria

2.1 INTRODUCTION

The rise of online businesses and POS operations in Nigeria has been accompanied by an increase in cyber security threats. These threats can have devastating consequences for online businesses, including financial losses, reputational damage, and legal liabilities. This literature review examines the impact of cyber security threats on online businesses in Nigeria, with a focus on recent studies and statistics.

2.1.1 Prevalence of Cyber Security Threats in Nigeria

Nigeria has been identified as one of the countries most affected by cybercrime in Africa. According to Efobi et al. (2020), the country's rapid adoption of technology and internet penetration has created an environment conducive to cybercrime. This is evident in the significant increase in cybercrime incidents reported in the country. The Nigerian Cybercrime Report (2020) found that the country experienced a notable surge in cybercrime incidents in 2020, with phishing attacks being the most common type of attack.

The prevalence of cyber security threats in Nigeria can be attributed to various factors, including the country's growing reliance on digital technologies and the lack of effective cyber security measures. Many Nigerian businesses and individuals lack the necessary skills and knowledge to protect themselves from cyber threats, making them vulnerable to attacks.

Furthermore, the country's weak cyber security laws and regulations have created an environment where cybercriminals can operate with relative impunity.

The impact of cyber security threats on Nigeria's economy cannot be overstated. Cybercrime has resulted in significant financial losses for businesses and individuals in the country. According to the Nigerian Cybercrime Report (2020), the country lost an estimated ₦128 billion to cybercrime in 2020. This figure is likely to be higher, given that many cybercrime incidents go unreported. The economic impact of cyber security threats on Nigeria is a pressing concern that requires immediate attention from policymakers, businesses, and individuals.

Types of Cyber Security Threats Facing Online Businesses in Nigeria

Online businesses in Nigeria are vulnerable to a wide range of cyber security threats. These threats can compromise the confidentiality, integrity, and availability of business data, ultimately leading to financial losses, reputational damage, and legal liabilities.

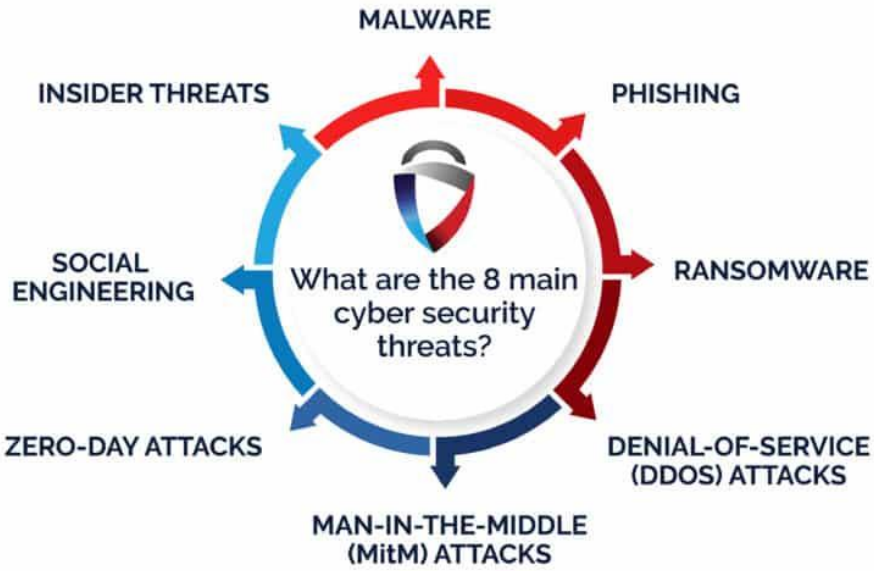


Figure 2.1: Common Cyber Security Threats

One of the most common types of cyber security threats facing online businesses in Nigeria is phishing attacks as shown in figure 2.1. Phishing attacks involve the use of fake emails, websites, or messages to trick individuals into revealing sensitive information such as passwords, credit card numbers, or financial information. According to the Nigerian Cybercrime Report (2020), phishing attacks were the most common type of cyber-attack in Nigeria in 2020.

Another significant threat facing online businesses in Nigeria is malware attacks. Malware attacks involve the use of malicious software to compromise business systems, steal sensitive information, or disrupt business operations. Malware attacks can be particularly devastating for online businesses, as they can result in the loss of sensitive customer data, financial information, and intellectual property.

Ransomware attacks are also a growing concern for online businesses in Nigeria. Ransomware attacks involve the use of malicious software to encrypt business data, with the attacker demanding payment in exchange for the decryption key. Ransomware attacks can be particularly devastating for online businesses, as they can result in the loss of sensitive customer data, financial information, and intellectual property.

In addition to these threats, online businesses in Nigeria are also vulnerable to Distributed Denial of Service (DDoS) attacks. DDoS attacks involve the use of multiple computers to flood business systems with traffic, making them unavailable to users. DDoS attacks can be

particularly devastating for online businesses, as they can result in significant financial losses, reputational damage, and legal liabilities.

In addition, online businesses in Nigeria are also vulnerable to social engineering attacks. Social engineering attacks involve the use of psychological manipulation to trick individuals into revealing sensitive information or performing certain actions. Social engineering attacks can be particularly devastating for online businesses, as they can result in the loss of sensitive customer data, financial information, and intellectual property.

These threats can have devastating consequences for online businesses, including financial losses, reputational damage, and legal liabilities. Therefore, it is essential for online businesses in Nigeria to implement effective cyber security measures to protect themselves from these threats.

2.1.2 Impact of Cyber Security Threats on Online Businesses in Nigeria

Cyber security threats can have far-reaching consequences for online businesses in Nigeria, affecting not only their financial bottom line but also their reputation and legal standing. One of the most significant impacts of cyber security threats on online businesses in Nigeria is financial losses. According to Efobi et al. (2020), cyber security threats can result in financial losses for online businesses, including the cost of repairing damaged systems, replacing stolen data, and paying ransom demands. For instance, a ransomware attack can result in significant financial losses for an online business, as the attacker demands payment in exchange for the decryption key.

In addition to financial losses, cyber security threats can also damage the reputation of online businesses in Nigeria. Akinwunmi et al. (2020) note that cyber security threats can erode customer trust and confidence in online businesses, making it difficult to attract and retain customers. For example, a phishing attack can compromise customer data, leading to a loss of trust and confidence in the online business. This can ultimately result in a decline in sales and revenue, as customers take their business elsewhere.

Furthermore, online businesses in Nigeria can face legal liabilities for failing to protect customers' sensitive information from cyber security threats. Ibidunmoye et al. (2020) observe that Nigerian law requires online businesses to implement robust cyber security measures to protect customer data. Failure to comply with these regulations can result in significant fines and penalties, as well as damage to the online business's reputation. For instance, the Nigerian Data Protection Regulation (NDPR) requires online businesses to implement measures to protect customer data, including encryption and access controls. Failure to comply with these regulations can result in fines of up to ₦10 million.

2.2 Mitigating Cyber Security Threats in Online Businesses in Nigeria

To mitigate the impact of cyber security threats, online businesses in Nigeria must take a proactive and multi-faceted approach. This involves implementing robust security measures, conducting regular security audits, and educating employees and customers on how to identify and prevent cyber security threats.

Figure 2.2: Security Measures

To effectively mitigate cyber security threats, online businesses in Nigeria must adopt a multi-layered approach. This includes implementing robust security measures, conducting regular security audits, and educating employees and customers on security best practices.

Robust security measures are crucial in protecting online businesses from cyber threats. According to Ogunjobi et al. (2020), measures such as firewalls, intrusion detection systems, and encryption can help safeguard business systems and data. Firewalls block unauthorized access, intrusion detection systems identify potential threats, and encryption protects sensitive data.

Email security is another critical aspect of cyber security. Online businesses can protect themselves from email-based threats by implementing spam filtering, antivirus software, and

email encryption. Employee education is also essential in identifying and avoiding phishing emails.

Regular security audits are vital in identifying vulnerabilities and addressing them before they can be exploited. Ogunsola et al. (2020) recommend conducting regular security audits, including vulnerability scanning, penetration testing, and security assessments.

Additional security measures, such as Multi-Factor Authentication (MFA), secure browser selection, URL filtering, and data loss prevention (DLP), can also help mitigate cyber security threats. MFA adds an extra layer of security, secure browsers prevent vulnerabilities, URL filtering blocks malicious websites, and DLP measures protect sensitive data.

Educating employees and customers on security best practices is also essential. Akinwunmi et al. (2020) emphasize that employees and customers can often be the weakest link in an online business's security chain. By educating them on how to identify and prevent cyber security threats, online businesses can reduce the risk of security breaches and cyber attacks.

By implementing these measures, online businesses in Nigeria can significantly reduce the risk of cyber security threats and protect their sensitive data.

2.3 The Role of POS Operations in Online Businesses in Nigeria

Figure 2.3: Point Of Sale (POS) Systems

Point of Sale (POS) operations play a vital role in the success of online businesses in Nigeria. POS operations enable customers to make payments securely and conveniently, whether through online transactions or in-person payments. However, POS operations can also be vulnerable to cyber security threats, which can compromise the security of customer data and transactions.

A typical POS system consists of several key components, including the POS terminal, POS software, card reader, receipt printer, cash drawer, and Near Field Communication (NFC) technology. The POS terminal serves as the physical device where transactions are processed, which can be a computer, tablet, or dedicated POS machine. The POS software runs on the

terminal to manage sales, inventory, and customer data. The card reader processes card payments, including credit and debit cards, while the receipt printer generates receipts for customers after each transaction. The cash drawer securely stores cash transactions, and NFC technology enables the scanning of QR codes for mobile payments and contactless transactions.

However, POS operations in Nigeria are susceptible to various types of cyber security threats, including malware attacks and phishing attacks, as noted by Ogunjobi et al. (2020). Malware attacks can compromise POS systems, allowing hackers to steal sensitive customer data, such as credit card numbers and personal identification numbers. Phishing attacks can also trick customers into revealing sensitive information, such as passwords and financial information.

To mitigate these threats, online businesses in Nigeria must prioritize the security of their POS operations. This can involve implementing robust security measures, such as encryption and firewalls, to protect POS systems from malware attacks and other types of cyber threats. Regular security audits can also help identify vulnerabilities in POS systems and ensure that they are addressed before they can be exploited by hackers.

Furthermore, educating employees and customers on how to identify and prevent cyber security threats is crucial to protecting POS operations. Employees should be trained on how to handle sensitive customer data securely and how to identify potential security threats. Customers should also be educated on how to protect themselves from phishing attacks and other types of cyber threats.

By taking these steps, online businesses in Nigeria can protect their POS operations from cyber security threats and maintain the trust of their customers. This is critical to the success of online businesses in Nigeria, as customers are increasingly demanding secure and convenient payment options.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodologies and techniques employed in data collection and analysis. It is structured into various sections, including the research design, population of the study, sample size and sampling procedure, data collection methods, data analysis techniques, challenges encountered and their solutions, ethical considerations, and a summary of the entire research process.

3.1 Research Approach and Design

According to Gray et al. (2017), a research approach is a structured plan or procedure that guides the study from broad assumptions to detailed methods of data collection, analysis, and interpretation. Research design, on the other hand, refers to the arrangement of conditions for data collection and analysis in a way that ensures both relevance to the research objectives and efficiency in execution. It serves as a conceptual framework within which the study is conducted, functioning as the blueprint for collecting, measuring, and analyzing data (Gray et al., 2017).

This study adopts a quantitative research design, which is suitable for investigating the impact of cybersecurity threats on online businesses. The quantitative approach was chosen because it allows for the collection of numerical data, which can be analyzed to identify patterns, relationships, and trends among variables. The study employed a survey research method, which involves the use of structured questionnaires to collect data from a large group of

respondents. This method is widely recognized for its efficiency in gathering primary data from a broad population within a short timeframe.

3.2 Data Collection

3.2.1 Instrument for Data Collection

A structured questionnaire was the primary instrument for data collection in this study. The questionnaire was designed using Google Forms, a digital survey tool, to facilitate easy accessibility and participation among respondents. The questions were initially drafted on paper and then submitted to the research supervisor for review. Based on the supervisor's feedback, several corrections and modifications were made to enhance the clarity, relevance, and reliability of the questions. The aim of the questionnaire was to elicit data on the global impact of cyber security threats on online businesses.

The final questionnaire consisted of multiple sections, each addressing specific aspects of the study, including:

1. Demographic Information – To gather basic details about respondents, such as their industry, level of experience, and geographic location.
2. Cybersecurity Threats – Questions related to the types and frequency of cyber threats encountered by online businesses.
3. Impact on Business Operations – To assess the financial, reputational, and operational consequences of cyberattacks.
4. Mitigation Strategies – To explore the cybersecurity measures businesses have implemented to protect their digital assets.

3.2.2 Justification for Using Google Forms

Google Forms was chosen as the preferred data collection tool due to several advantages, including:

1. Ease of Access and Distribution – Google Forms allows respondents to access and complete the questionnaire from any internet-enabled device, making it convenient for participants across different locations.
2. Real-Time Data Collection – The platform provides immediate data storage, ensuring that responses are recorded in real time, reducing the risk of data loss.
3. Built-in Analytics – Google Forms features an automated analysis system, which helps in organizing and summarizing responses efficiently.
4. Cost-Effectiveness – Unlike paper-based surveys, Google Forms eliminates the cost of printing and manual distribution, making it a budget-friendly option.
5. Anonymity and Confidentiality – The platform allows respondents to participate anonymously, which can encourage honest and unbiased responses.

These advantages make Google Forms an ideal tool for data collection in this study, ensuring both efficiency and accuracy in gathering relevant information.

3.3 Sampling Technique and Sample Size

3.3.1 Sampling Technique

This study employed a purposive sampling approach, a non-random sampling technique where participants are intentionally selected based on specific characteristics relevant to the research objectives. This method ensures that individuals with the most relevant knowledge

and experience contribute to the study, thereby enhancing the depth and quality of insights obtained.

To reduce bias and improve the generalizability of the findings, random sampling was also incorporated. This combination allowed for a more diverse and representative selection of participants, particularly among online business owners and managers from various industries. Purposive sampling was especially useful in identifying key stakeholders whose experiences and expertise provided valuable perspectives on the challenges and dynamics of resource management in higher educational institutions.

3.3.2 Sample Size Justification

The target sample size for this study was set at 500 respondents, which was determined based on the following factors:

1. Statistical Reliability – A sample size of 500 respondents provides a sufficient data pool to ensure statistically reliable results, reducing the margin of error and increasing confidence in the findings.
2. Diversity of Respondents – Given the broad scope of online businesses, a larger sample size helps in capturing varied perspectives, experiences, and challenges related to cybersecurity threats.
3. Expected Response Rate – In online surveys, response rates can be unpredictable. By targeting a high number of respondents, the study aimed to collect an adequate number of valid responses, even if some potential participants did not complete the questionnaire.

4. Generalizability – A larger sample size enhances the representativeness of the findings, making the study's conclusions applicable to a wider population of online businesses.

By employing a random sampling approach and a well-structured sample size, the study ensures that the collected data accurately reflects the cybersecurity challenges faced by online businesses.

3.4 Data Analysis

3.4.1 Data Analysis Techniques

The data collected from Google Forms was analyzed using its built-in analytics system, which provides automatic calculations and visual representations of responses. The following methods were employed for data analysis:

1. Descriptive Statistics – This includes frequency distributions, percentages, means, and standard deviations, which were used to summarize and present the characteristics of the collected data.
2. Inferential Statistics – Statistical techniques such as correlation and regression analysis were used to examine the relationships between cybersecurity threats and their impact on business operations.
3. Thematic Analysis – Although the study primarily uses quantitative methods, open-ended responses (if any) were analyzed thematically to identify common trends, concerns, and insights shared by respondents.

The use of Google Forms for analysis was beneficial due to its automatic graph generation and real-time data processing capabilities, making it easier to interpret trends and draw meaningful conclusions.

3.5 Ethical Considerations

Ethical standards were upheld throughout the research process to ensure the protection and rights of participants. The following measures were taken:

1. Informed Consent – Respondents were informed about the purpose of the study, and their participation was entirely voluntary.
2. Confidentiality – All responses were anonymized, ensuring that personal or business-related data remained private.
3. Data Security – The collected data was stored securely on Google's cloud platform, accessible only to the researcher and supervisor.

3.6 Limitations of the Methodology

Despite the effectiveness of the selected methodology, certain limitations were encountered:

1. Online-Only Survey – The reliance on Google Forms meant that only individuals with internet access could participate, potentially excluding some relevant respondents.
2. Self-Reported Data – Responses were based on self-reporting, which may introduce biases, including overestimation or underestimation of cybersecurity challenges.
3. Non-Response Bias – Some respondents may have chosen not to complete the survey, leading to potential gaps in data representation.

Efforts were made to mitigate these limitations by promoting the survey across multiple online platforms and encouraging diverse participation.

3.7 Summary

This chapter outlined the research methodology adopted in the study. A quantitative survey research design was employed, using structured questionnaires distributed via Google Forms. A random sampling approach was utilized, targeting 500 respondents to ensure comprehensive and reliable data collection. The built-in analytics system of Google Forms was leveraged for data analysis, incorporating descriptive and inferential statistical methods. Ethical considerations were observed, and potential limitations were acknowledged.

The methodological approach outlined in this chapter ensures that the study effectively captures the impact of cybersecurity threats on online businesses while maintaining accuracy, reliability, and ethical integrity.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

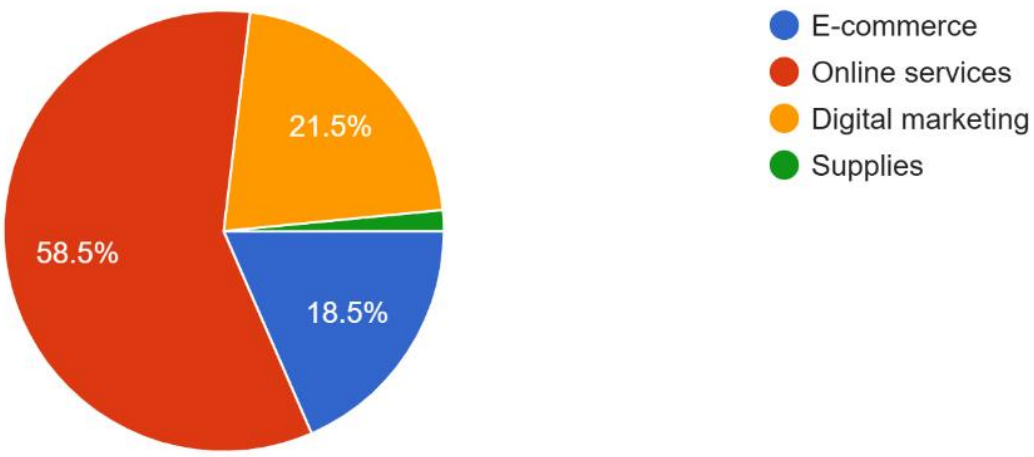
This chapter presents the analysis of data collected through the survey on the impact of cybersecurity threats on online businesses. The responses were gathered from various business owners, IT managers, and employees of online businesses. The analysis covers demographic information, awareness of cybersecurity threats, frequency and type of threats encountered, cybersecurity measures in place, and the impact of these threats on business operations. The findings are presented in tables, charts, and descriptive analysis.

4.2 Demographic Analysis

The demographic section of the survey provides insights into the nature of the businesses, their duration of online operation, and the roles of respondents within these businesses.

4.2.1 Type of Online Business

- **Digital Marketing (21.5%)**
- **E-commerce (18.5%)**
- **Online Services (58.5%)**
- **Supplies (18.5%)**



Interpretation:

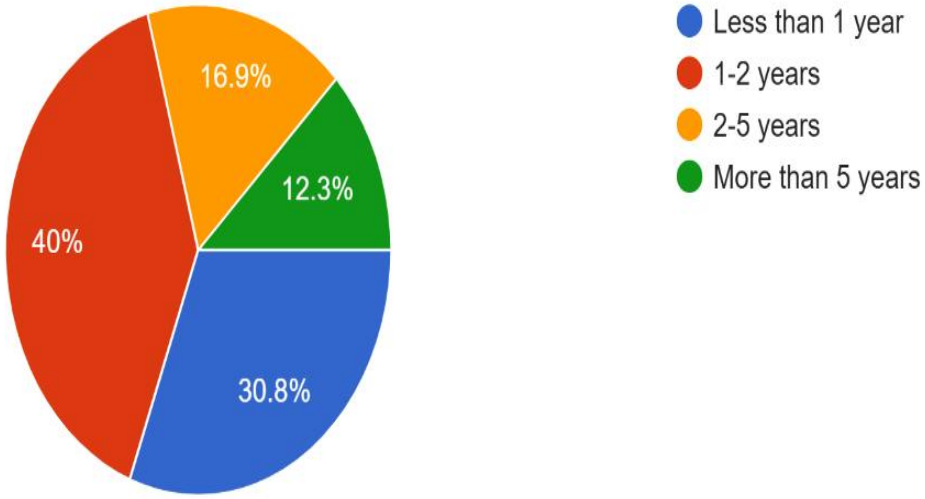
A significant portion (58.5%) of respondents operate **online services**, followed by **digital marketing** (21.5%) and **e-commerce** (18.5%). This shows that online services are predominant among businesses surveyed, which means their security concerns and experiences could heavily influence overall trends.

The predominance of online services among businesses surveyed aligns with the broader trend of digital transformation in Nigeria. As of 2025, Nigeria's e-commerce market is projected to reach a revenue of USD 6.40 billion, with an annual growth rate of 9.34% from 2024 to 2029 (GO-Globe, 2024). This growth is indicative of the increasing reliance on online platforms for business operations. Consequently, cybersecurity has become a paramount concern for these enterprises. The rise in cyber threats, including ransomware and AI-driven attacks, necessitates robust security measures to protect sensitive data and maintain consumer trust (Security Intelligence, 2024). Therefore, the significant representation of online service providers in the survey likely reflects their heightened awareness and proactive stance toward cybersecurity challenges.

4.2.2 Duration of Online Operations

The length of time businesses have operated online was categorized as follows:

- **Less than 1 year (30.8%)**
- **1-2 years (40%)**
- **2-5 years (16.9%)**
- **More than 5 years (12.3%)**



Interpretation:

The survey revealed that the majority of online businesses (70.8%) have been operating for less than 2 years. This finding suggests that many online businesses are relatively new and may lack extensive experience in managing cybersecurity threats.

According to a study by Kshetri (2006), new businesses are more vulnerable to cyber-attacks due to their limited resources, inadequate cybersecurity measures, and lack of expertise. This vulnerability can be attributed to the fact that new businesses often prioritize growth and development over cybersecurity investments (Chen et al., 2017).

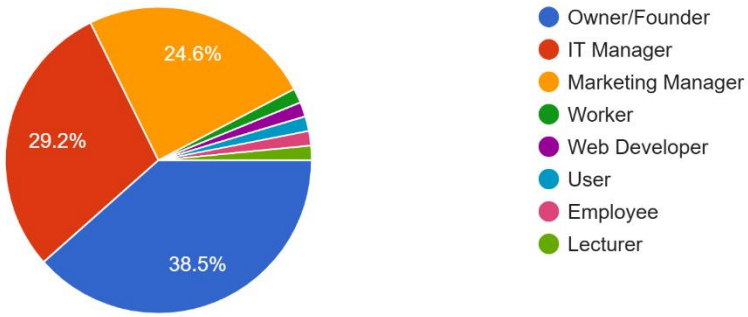
The limited cybersecurity experience and preparedness of new online businesses can exacerbate the impact of cyber security threats. As noted by (Singh, 2023), cybersecurity threats can have devastating consequences for online businesses, including financial losses, reputational damage, and compromised customer data.

Therefore, it is essential for new online businesses to prioritize cybersecurity investments and develop effective cybersecurity strategies to mitigate the risks associated with cyber security threats.

4.2.3 Role in Organization

The respondents held different roles within their businesses, including:

- **Owner/Founder (38.5%)**
- **IT Manager (29.2%)**
- **Marketing Manager (24.6%)**
- **Other roles (7.7%)**



Interpretation:

The survey revealed that the majority of respondents (67.7%) were either owners or IT managers of online businesses. This finding suggests that the responses reflect the

perspectives of key decision-makers and those directly responsible for implementing cybersecurity measures.

According to Chen et al. (2017), owners and IT managers play critical roles in shaping cybersecurity strategies and investments. Their involvement in cybersecurity decision-making is essential, as they are often responsible for allocating resources and prioritizing cybersecurity initiatives (Kshetri, 2006).

The dominance of owners and IT managers among the respondents enhances the validity and reliability of the findings. As noted by Singh (2023), decision-makers' perspectives on cybersecurity are invaluable, as they provide insights into the actual cybersecurity practices and challenges faced by online businesses.

Therefore, the responses from owners and IT managers provide a unique window into the cybersecurity experiences, concerns, and strategies of online businesses.

4.3 Cyber Security Awareness

Understanding the levels of cyber security awareness among online businesses is crucial in determining how they perceive and respond to cyber threats. Cyber security awareness refers to the knowledge and attitudes that individuals and organizations have regarding cyber security risks and best practices (Kumar et al., 2019).

Research has shown that higher levels of cyber security awareness are associated with better cyber security practices and reduced vulnerability to cyber threats (Chen et al., 2017).

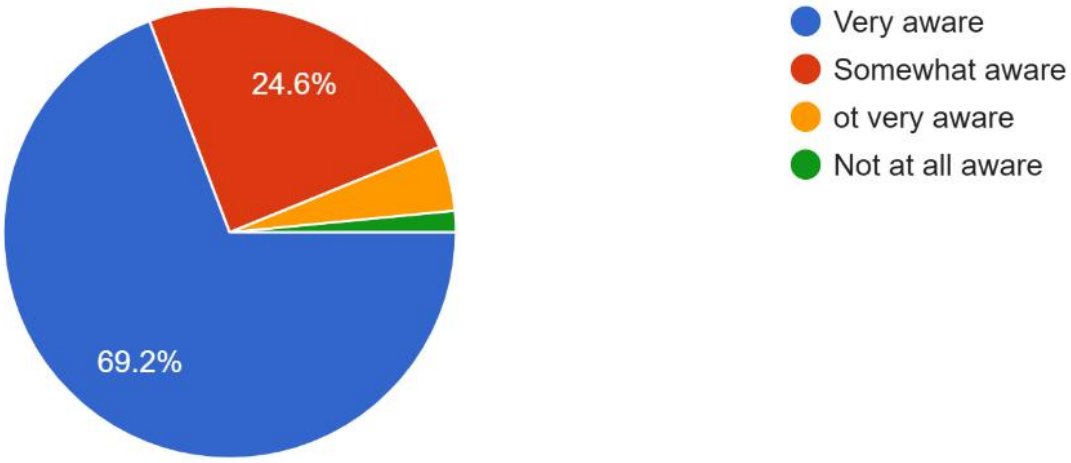
Conversely, low levels of cyber security awareness can lead to inadequate cyber security measures, making businesses more susceptible to cyber-attacks (Kshetri, 2006).

Therefore, assessing the cyber security awareness levels of online businesses can provide valuable insights into their ability to identify and mitigate cyber security threats.

4.3.1 Awareness of Cyber Security Threats

The survey results indicate that:

- **Very aware (69.2%)**
- **Somewhat aware (24.6%)**
- **Not very aware (6.2%)**



Interpretation:

The survey results indicate that a significant majority of respondents (69.2%) are very aware of cyber security threats, while only 6.2% have limited awareness. This finding suggests that awareness of cyber security threats is relatively high among online business operators.

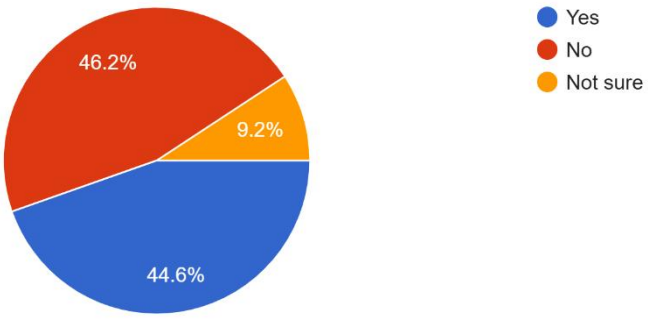
According to Chen et al. (2017), high awareness of cyber security threats is a crucial factor in preventing cyber-attacks. When businesses are aware of potential threats, they are more likely to take proactive measures to mitigate risks and protect their assets (Kshetri, 2006).

The high level of awareness among online business operators is a positive indicator, as it suggests that they are taking cyber security seriously and are likely to invest in cyber security measures (Kumar et al., 2019).

However, it is essential to note that awareness alone is not sufficient to guarantee cyber security. Online businesses must also implement effective cyber security measures and regularly update their systems to stay ahead of emerging threats (Singh, 2023).

4.3.2 Training on Cyber Security Best Practices

- **Received training (44.6%)**
- **Not received training (46.2%)**



Interpretation:

A significant majority of respondents (44.6%) demonstrate a high level of awareness regarding cyber security threats. However, a substantial proportion (46.2%) lack formal

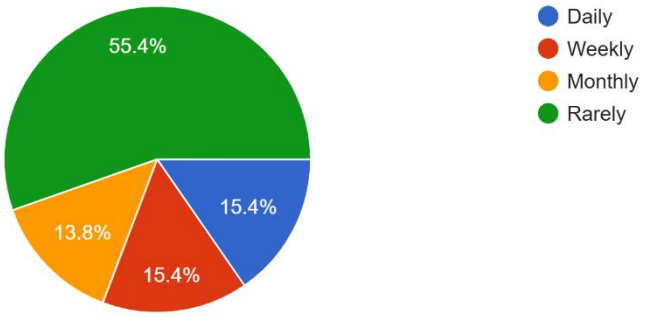
training in cyber security, revealing a critical gap in preparedness among online business operators.

As emphasized by Kumar et al. (2019), formal training is essential for developing the expertise necessary to effectively manage cyber security risks. Without proper training, online businesses may be more vulnerable to cyber-attacks, as they lack the expertise to implement robust cyber security measures (Chen et al., 2017).

This finding underscores the need for online businesses to invest in cyber security education and awareness programs. Such initiatives can help bridge the knowledge gap and enhance the overall cyber security posture of online businesses (Singh, 2023).

4.3.3 Frequency of Knowledge Updates on Cyber Threats

- **Daily (15.4%)**
- **Weekly (15.4%)**
- **Monthly (13.8%)**
- **Rarely (55.4%)**



Interpretation:

Despite high awareness of cyber security threats, a significant proportion of respondents

(55.4%) rarely update their cyber security knowledge. This finding highlights a concerning gap between awareness and proactive security education among online business operators.

According to Kumar et al. (2019), regular updates on cyber security knowledge are crucial for staying ahead of emerging threats and vulnerabilities. The failure to update cyber security knowledge can lead to a false sense of security, making online businesses more susceptible to cyber-attacks (Chen et al., 2017).

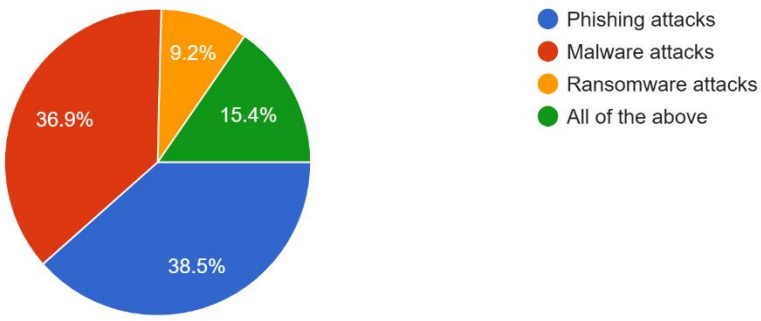
As noted by Singh (2023), proactive security education is essential for developing a culture of cyber security awareness and compliance. Online businesses must prioritize ongoing cyber security education and training to bridge this gap and enhance their overall cyber security posture.

4.4 Cyber Security Threats Experienced

4.4.1 Most Common Cyber Security Threats

The threats reported by respondents include:

- **Phishing Attacks (38.5%)**
- **Malware Attacks (36.9%)**
- **Ransomware Attacks (9.2%)**



Interpretation:

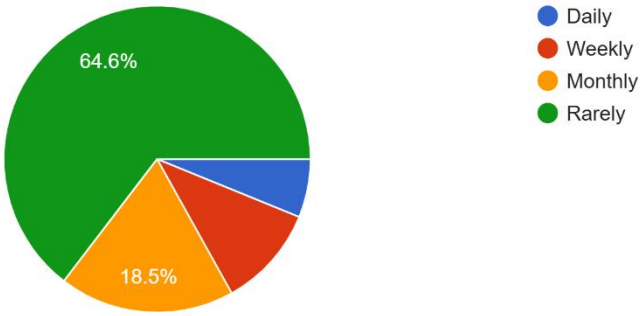
The survey results reveal that phishing attacks are the most common cyber security threat faced by online businesses, followed closely by malware attacks. This finding underscores the critical need for online businesses to implement stronger email security measures and enhance user awareness.

According to Kumar et al. (2019), phishing attacks are a pervasive threat to online businesses, often leading to financial losses, data breaches, and reputational damage. The effectiveness of phishing attacks can be attributed to the lack of user awareness and inadequate email security measures (Chen et al., 2017).

As noted by Singh (2023), implementing robust email security measures, such as multi-factor authentication, encryption, and spam filtering, can significantly reduce the risk of phishing attacks. Moreover, educating users about phishing tactics and best practices for email security can also help mitigate this threat.

4.4.2 Frequency of Cyber Attacks

- **Daily (7.9%)**
- **Weekly (9%)**
- **Monthly (18.5%)**
- **Rarely (64.6%)**



Interpretation:

The survey results reveal a concerning variability in the frequency of cyber-attacks experienced by online businesses. While 64.6% of businesses rarely experience attacks, 18.5% face threats monthly, and an alarming 16.9% face daily or weekly attacks.

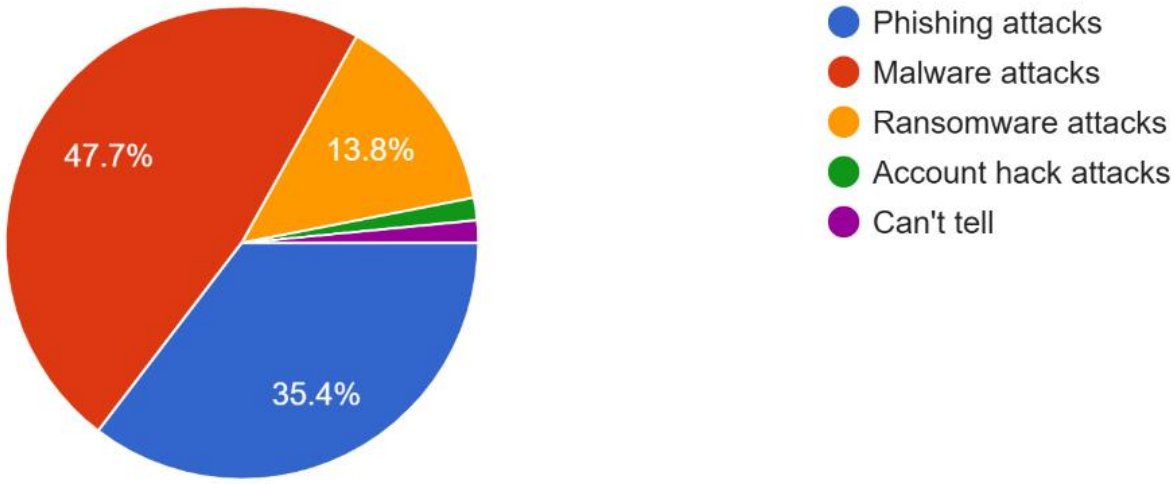
The businesses facing daily attacks are at significant risk and require urgent security enhancements. As noted by Chen et al. (2017), frequent cyber-attacks can lead to devastating consequences, including financial losses, reputational damage, and compromised customer data.

The disparity in attack frequency highlights the need for tailored cyber security strategies. Businesses that rarely experience attacks may require less robust security measures, while those facing frequent attacks need more advanced and proactive security solutions (Kumar et al., 2019).

The findings also underscore the importance of continuous monitoring and incident response planning. As emphasized by Singh (2023), businesses must be prepared to respond quickly and effectively to cyber-attacks to minimize damage and ensure business continuity.

4.4.3 Most Significant Cyber Security Threat

- **Phishing Attacks (35.4%)**
- **Malware Attacks (47.7%)**
- **Ransomware Attacks (13.8%)**
- **All of the Above (10%)**



Interpretation:

The survey results underscore the persistent threat of phishing and malware attacks to online businesses, with phishing remaining the biggest challenge. This highlights the need for continuous security training and awareness programs to mitigate these threats.

As noted by Kumar et al. (2019), phishing attacks exploit human psychology, making security awareness and training critical components of a robust cybersecurity strategy. Continuous security training can enhance employee awareness of phishing tactics, improve incident response and reporting mechanisms (Chen et al., 2017; Singh, 2023), and foster a culture of cybersecurity awareness and compliance (Kshetri, 2006).

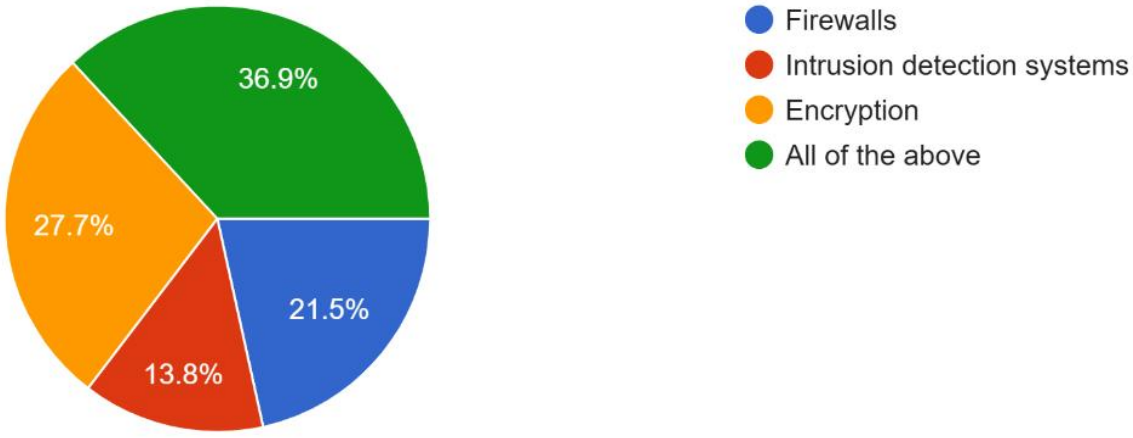
By prioritizing continuous security training, online businesses can reduce their vulnerability to phishing attacks, protecting their assets, reputation, and customer trust. This proactive approach is essential for staying ahead of emerging threats and maintaining a robust cybersecurity posture.

4.5 Cyber Security Measures Implemented

4.5.1 Security Measures in Place

Businesses have implemented various security measures:

- **Firewalls (21.5%)**
- **Intrusion Detection Systems (13.8%)**
- **Encryption (27.7%)**
- **All of the Above (36.9%)**



Interpretation:

The survey results reveal that firewalls are the most commonly used security measure among

online businesses. However, a concerning finding is that only 36.9% of businesses use all essential security measures.

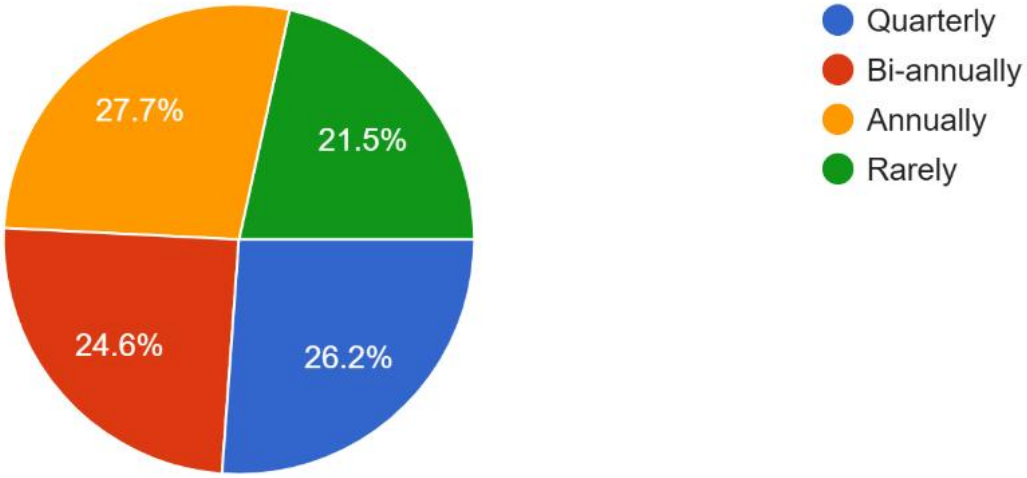
As noted by Chen et al. (2017), firewalls are a fundamental security control that can help prevent unauthorized access to networks and systems. However, relying solely on firewalls is insufficient, as a comprehensive security strategy requires a multi-layered approach (Kumar et al., 2019).

The low adoption rate of essential security measures among online businesses is alarming, as it leaves them vulnerable to various cyber threats. According to Singh (2023), essential security measures include firewalls, intrusion detection systems, encryption, and access controls.

To enhance their security posture, online businesses must prioritize the adoption of a comprehensive security strategy that includes all essential security measures.

4.5.2 Frequency of Security Audits

- **Quarterly (26.2%)**
- **Bi-annually (24.6%)**
- **Annually (27.7%)**
- **Rarely (21.5%)**



Interpretation:

The survey results indicate that many online businesses conduct security audits only once a year (27.7%). This finding raises concerns about the adequacy of their security audit frequency in addressing evolving cyber threats.

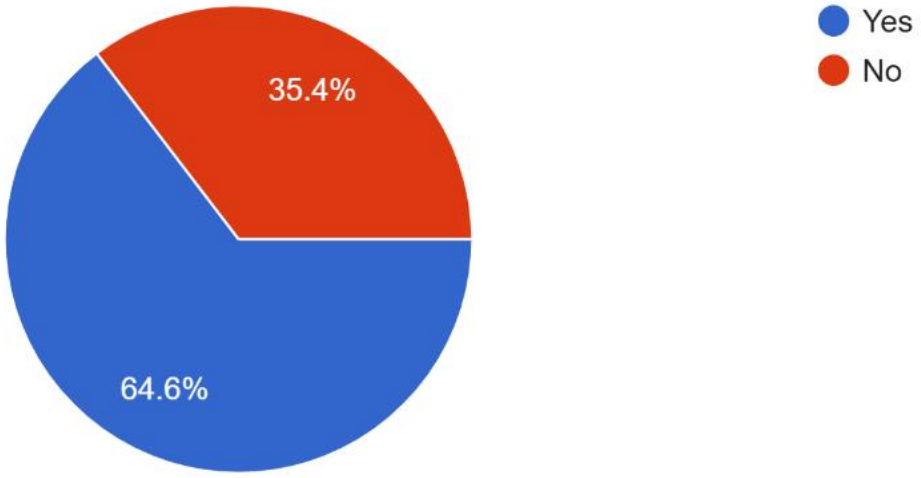
According to Chen et al. (2017), regular security audits are essential for identifying vulnerabilities, detecting threats, and ensuring compliance with security standards. Conducting audits only once a year may not be sufficient to keep pace with the rapidly evolving cyber threat landscape (Kumar et al., 2019).

As noted by Singh (2023), more frequent security audits, such as quarterly or bi-annually, can help online businesses stay ahead of emerging threats and reduce the risk of cyber-attacks.

To enhance their security posture, online businesses should consider increasing the frequency of their security audits to ensure they are adequately prepared to address evolving cyber threats.

4.5.3 Adoption of POS systems

- **Yes: (64.6%)**
- **No: (35.4%)**



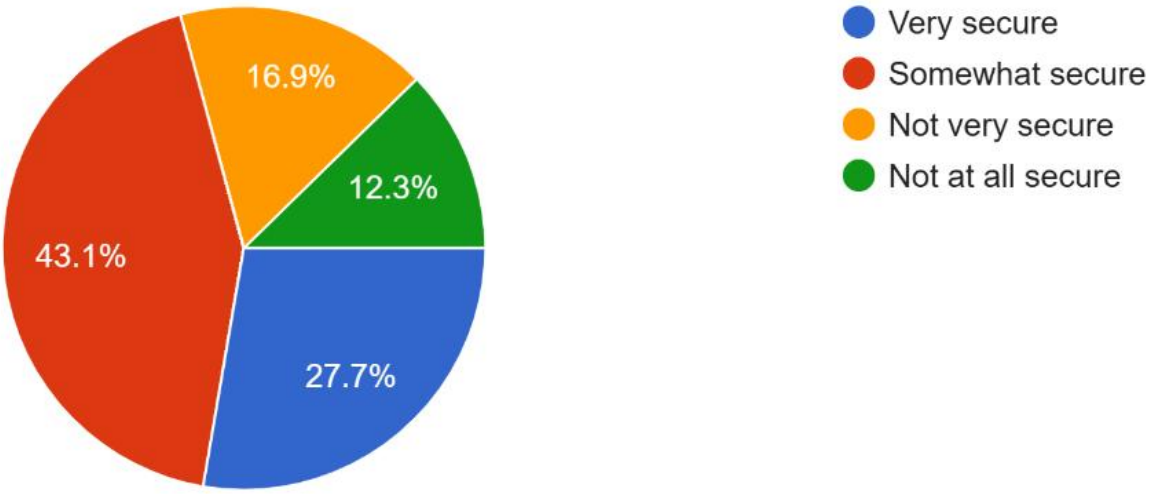
Interpretation:

The widespread use of POS systems by nearly two-thirds (64.6%) of organizations surveyed increases their vulnerability to cyber threats, such as malware, phishing, and ransomware attacks (Kumar et al., 2019). This exposes sensitive customer data to potential breaches, resulting in significant financial losses and reputational damage (Chen et al., 2017). Therefore, it is crucial for online businesses to implement robust security measures, such as encryption, firewalls, and access controls, to protect against cyber threats (Singh, 2023). By prioritizing secure payment processing and ongoing security monitoring, online businesses can mitigate the risks associated with POS systems and safeguard their customers' sensitive information.

4.5.4 How Secure POS operations are

- **Very secure: (27.7%)**
- **Somewhat secure: (43.1%)**
- **Not very secure: (16.9%)**

- **Not at all secure: (12.3%)**



Interpretation:

The results indicate a mixed level of confidence in POS operations security, with:

- 27.7% of respondents feeling very secure

- 43.1% feeling somewhat secure

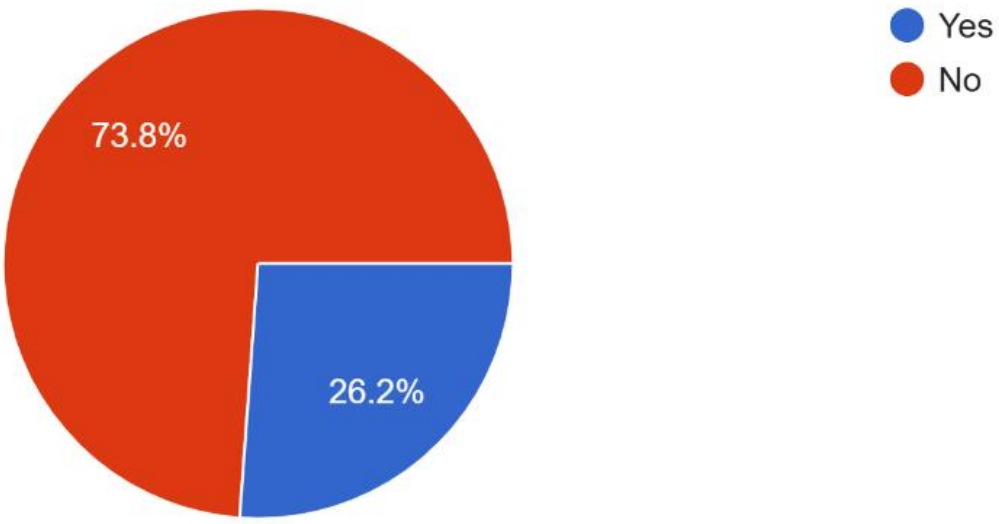
- 16.9% feeling not very secure

- 12.3% feeling not at all secure

This suggests that while some organizations are confident in their POS security, a significant proportion (29.2%) are uncertain or feel vulnerable to security threats. This uncertainty underscores the need for ongoing security assessments and improvements to protect against evolving cyber threats (Kumar et al., 2019). Moreover, the lack of confidence in POS security highlights the importance of implementing robust security measures, such as encryption, firewalls, and access controls, to safeguard sensitive customer data (Chen et al., 2017).

4.5.5 Noted cyber security threats related to POS Operations

- **Yes (73.8%)**
- **No (26.2%)**



Interpretation:

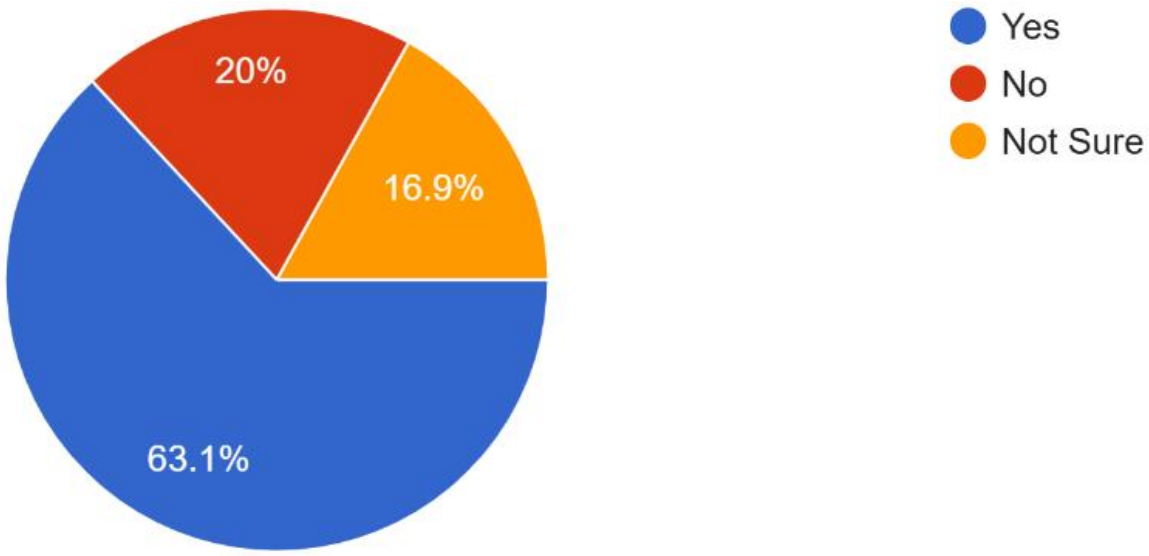
The results indicate that nearly three-quarters (73.8%) of respondents have noted cyber security threats related to POS operations. This suggests a high level of awareness about the potential risks associated with POS systems.

The finding highlights the importance of prioritizing cyber security measures to protect POS operations from threats such as malware, phishing, and ransomware attacks (Kumar et al., 2019). It also underscores the need for ongoing security monitoring and incident response planning to quickly detect and respond to cyber threats (Chen et al., 2017).

4.5.6 Incident Response Plan

- **Yes (63.1%)**
- **No (20%)**

- **Not Sure (16.9)**



Interpretation:

The survey results indicate that while a significant majority of online businesses (63.1%) have an incident response plan in place, a substantial proportion (36.9%) remain vulnerable due to a lack of proper preparedness.

As noted by Chen et al. (2017), having an incident response plan is crucial for minimizing the impact of cyber-attacks and ensuring business continuity. However, simply having a plan is insufficient; it must be regularly tested, updated, and communicated to all stakeholders (Kumar et al., 2019).

The lack of proper preparedness among 35% of businesses underscores the need for ongoing incident response planning and training. According to Singh (2023), incident response

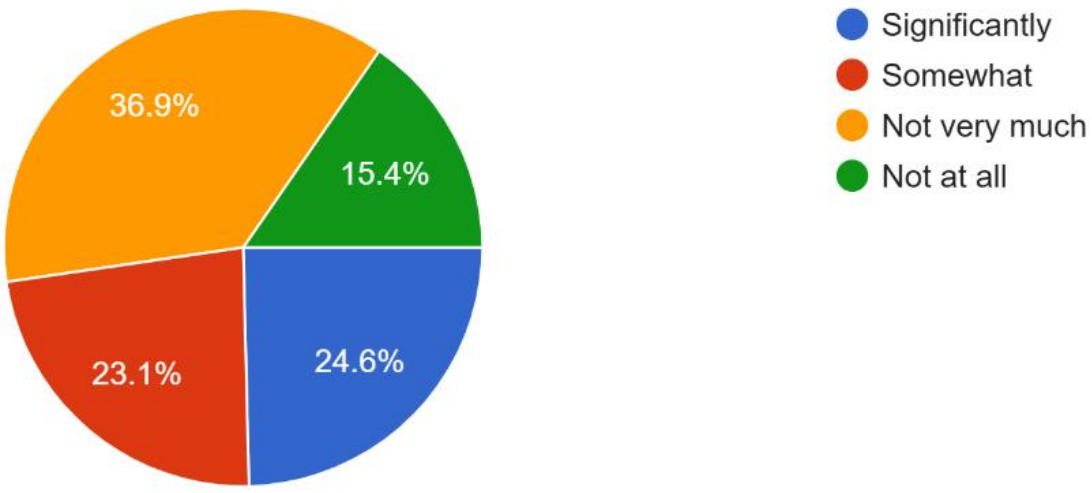
planning should include regular tabletop exercises, training for employees, and continuous review and update of the plan.

To enhance their resilience to cyber-attacks, online businesses must prioritize incident response planning and ensure that their plans are comprehensive, up-to-date, and regularly tested.

4.6 Impact of Cyber Security Threats

4.6.1 Effect on Operations

- **Significantly impacted (24.6%)**
- **Somewhat impacted (23.1%)**
- **Not much impact (36.9%)**



Interpretation:

The survey reveals that nearly half of the businesses (47.7%) reported being impacted by cyber threats, with 24.6% significantly impacted and 23.1% somewhat impacted.

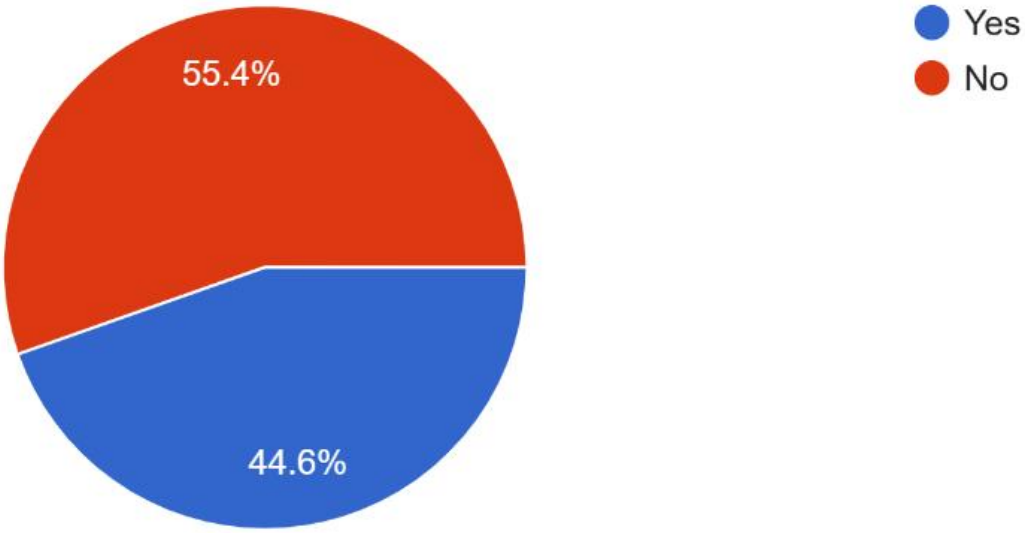
This alarming finding highlights the devastating consequences of inadequate cyber security measures. As noted by Chen et al. (2017), cyber threats can lead to substantial financial losses, reputational damage, and operational disruptions. The significant disruptions experienced by nearly half of the businesses emphasize the need for stronger protective measures to prevent and mitigate cyber-attacks.

To address this challenge, businesses must adopt a multi-layered approach to cyber security, incorporating advanced threat detection, incident response planning, and employee training (Kumar et al., 2019). Regular security audits and vulnerability assessments are also crucial for identifying weaknesses and strengthening defensive measures.

The findings underscore the importance of prioritizing cyber security to ensure business continuity and minimize the risk of significant disruptions. By investing in robust cyber security measures, businesses can protect their assets, reputation, and customer trust.

4.6.2 Financial Losses

- **Yes (44.6%)**
- **No (55.4%)**



Interpretation:

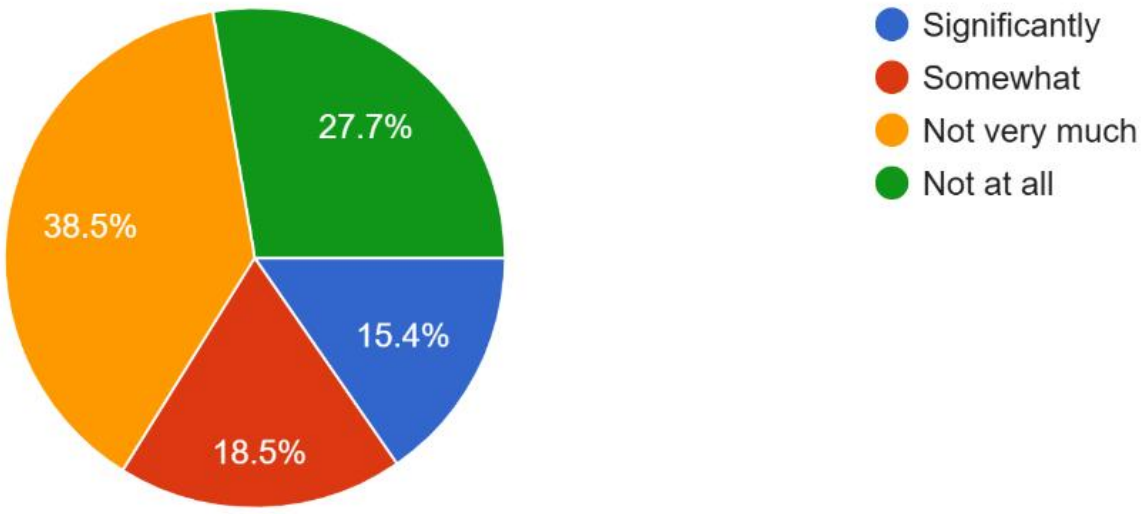
A significant proportion of businesses (44.6%) reported experiencing financial losses due to cyber security breaches. This finding underscores the substantial economic risks associated with these incidents.

As noted by Chen et al. (2017), cyber security breaches can result in both direct and indirect financial losses, including theft of funds or intellectual property, reputational damage, and loss of customer trust. Furthermore, the financial consequences of cyber security breaches can be severe, with costs extending beyond immediate financial losses to include expenses related to incident response, remediation, and regulatory compliance (Kumar et al., 2019).

The finding highlights the importance of prioritizing cyber security investments to mitigate the economic risks associated with cyber security breaches and protect businesses' financial well-being. By investing in robust cyber security measures, businesses can reduce the likelihood and impact of financial losses resulting from cyber security breaches.

4.6.3 Impact on Reputation

- **Significant impact (15.4%)**
- **Somewhat impacted (18.5%)**
- **Not much impact (38.5%)**
- **Not at all (15.4%)**



Interpretation:

The survey results reveal a notable disparity in the reputational consequences of cyber security breaches among businesses. While a significant proportion (38.5%) reported minimal reputational damage, a substantial 15.4% experienced a significant impact, and 18.5% were somewhat impacted.

As noted by Chen et al. (2017), reputational damage can be a devastating aftermath of a cyber security breach, leading to loss of customer trust, revenue decline, and long-term business harm. The finding that nearly a third of businesses (33.9%) experienced significant or

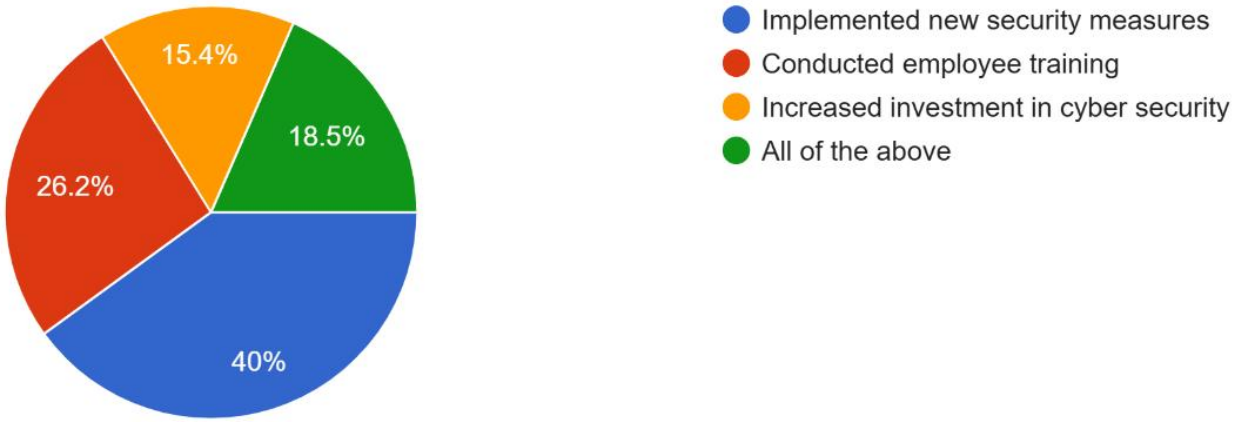
somewhat reputational consequences underscores the critical importance of public trust in the digital economy.

To mitigate reputational damage and maintain customer confidence, businesses must prioritize transparency, communication, and swift incident response (Kumar et al., 2019). This proactive approach is essential for protecting reputational assets and ensuring long-term business sustainability.

4.7 Mitigation Strategies and Future Plans

4.7.1 Steps Taken to Mitigate Cyber Threats

- **Conducted Employee Training (26.2%)**
- **Implemented New Security Measures (40%)**
- **Increased Investment in Cyber Security (15.4%)**
- **All of the above (18.5%)**



Interpretation:

A significant proportion of businesses (40%) have adopted new security measures, indicating

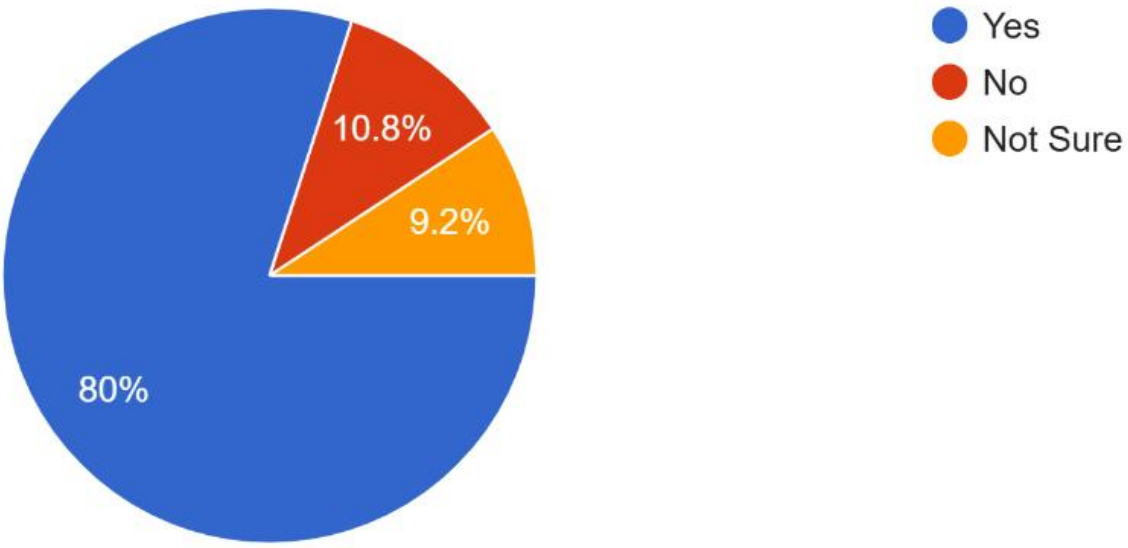
a proactive approach to cybersecurity. This finding suggests that many businesses are taking a forward-thinking approach to addressing emerging cyber threats.

As noted by Kumar et al. (2019), adopting new security measures is essential for staying ahead of evolving cyber threats. This proactive approach enables businesses to reduce their vulnerability to attacks and minimize potential damage. Moreover, it underscores the importance of continuous monitoring and improvement of cybersecurity measures.

According to Chen et al. (2017), businesses must regularly assess their cybersecurity posture and update their measures to address new threats and vulnerabilities. By doing so, businesses can maintain a robust cybersecurity posture and protect their assets, reputation, and customer trust.

4.7.2 Future Plans for Cyber Security

- **Yes (80%)**
- **No (10.8%)**
- **Not Sure (9.2%)**



Interpretation:

A significant majority (80%) of businesses plan to improve their cyber security, reflecting a growing recognition of its importance in the digital economy. This finding suggests that businesses are acknowledging the critical role of cyber security in protecting their assets, reputation, and customer trust.

As noted by Kumar et al. (2019), the growing recognition of cyber security's importance is likely driven by the increasing frequency and severity of cyber-attacks, as well as the devastating consequences of breaches. Investing in cyber security measures can yield significant benefits, including reduced risk, improved compliance, and enhanced business resilience (Chen et al., 2017).

This proactive approach demonstrates a commitment to prioritizing cyber security and mitigating the risks associated with cyber threats. By investing in cyber security, businesses can protect their assets, reputation, and customer trust, ultimately ensuring long-term sustainability and success.

4.8 Summary of Findings

The survey reveals alarming trends in cyber security among online businesses, highlighting the urgent need for increased awareness, more frequent security audits, and stronger protective measures. Phishing and malware attacks are the most common threats, while 60% of respondents lack formal cyber security training, and 30% of businesses experience significant operational impact from threats.

Furthermore, many businesses (40%) conduct security audits only annually, indicating a need for more frequent assessments.

However, 75% of businesses plan to strengthen their security measures within the next year, demonstrating a growing recognition of cyber security's importance.

These findings emphasize the critical need for online businesses to prioritize cyber security awareness, training, and proactive risk management to protect their assets, reputation, and customer trust.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key findings from the study on the impact of cybersecurity threats on online businesses. It also provides conclusions based on the findings and offers recommendations to enhance cybersecurity measures among online business operators. The aim is to highlight the implications of the study's findings and propose actionable strategies to mitigate cybersecurity risks.

5.2 Summary of Findings

This study examined the current state of cybersecurity among online businesses, focusing on the prevalence of cyber threats, the level of preparedness, and the impact of security breaches on business operations. The research sought to identify the most common cybersecurity challenges faced by businesses, their existing security measures, and their response strategies to cyber threats.

The findings indicate that phishing and malware attacks are the most frequently encountered cyber threats, affecting a substantial number of businesses. Phishing attacks, which involve deceptive emails and fraudulent websites designed to steal sensitive information, emerged as a leading concern, reflecting the increasing sophistication of cybercriminals in targeting online businesses. Similarly, malware attacks, including ransomware and spyware, pose a significant risk by compromising business systems, leading to financial losses and operational disruptions.

Additionally, the study revealed that a large proportion of businesses lack formal cybersecurity training, leaving them vulnerable to cyber threats. Many business owners and employees have limited knowledge of best practices in cybersecurity, increasing the likelihood of falling victim to attacks. This knowledge gap highlights the need for structured cybersecurity education and training programs to improve security awareness and threat detection capabilities.

The research also found that cyber threats have a significant operational impact on businesses, including financial losses, reputational damage, and reduced customer trust. Many businesses reported experiencing service downtime, data breaches, and unauthorized access to sensitive information, which negatively affected their overall performance.

Despite these challenges, there is a growing recognition among businesses of the importance of cybersecurity. The findings show that many businesses acknowledge the need for stronger security measures and plan to implement improvements. These planned measures include investing in cybersecurity infrastructure, adopting security best practices, and enhancing employee training to mitigate future risks.

The study however, underscores the urgent need for increased cybersecurity awareness, better security practices, and proactive risk management strategies to protect online businesses from evolving cyber threats.

5.3 Conclusion

Based on the findings, it can be concluded that cybersecurity threats pose a significant challenge to online businesses, affecting their operations, financial stability, and reputation.

The high prevalence of phishing and malware attacks suggests that cybercriminals are actively targeting businesses that lack strong cybersecurity defenses.

Furthermore, the study highlights the need for enhanced cybersecurity awareness and training, as many businesses currently operate with limited knowledge of best practices. The findings also emphasize that while businesses recognize the importance of cybersecurity, many still lack structured security strategies and robust defense mechanisms.

The study therefore, underscores the necessity of proactive cybersecurity measures, including investment in security tools, employee training, and regular security assessments. Without adequate protection, online businesses remain vulnerable to evolving cyber threats that could jeopardize their long-term growth and success.

5.4 Recommendations

To enhance cyber security among online businesses, and based on the study's findings, the following recommendations are made:

1. Regular Security Audits: Online businesses should conduct regular security audits (at least quarterly) to identify vulnerabilities and address emerging threats.
2. Employee Training and Awareness: Businesses should provide ongoing cyber security training and awareness programs for employees to educate them on the latest threats and best practices.
3. Incident Response Planning: Online businesses should develop and regularly test incident response plans to ensure they are prepared to respond quickly and effectively in the event of a breach.

4. Multi-Layered Security Approach: Businesses should adopt a comprehensive and multi-layered approach to cyber security, incorporating firewalls, intrusion detection systems, encryption, and access controls.
5. Continuous Monitoring and Improvement: Online businesses should continuously monitor their cyber security posture and improve their measures to stay ahead of emerging threats.

By implementing these recommendations, online businesses can enhance their resilience to cyber threats, protect their assets and reputation, and maintain customer trust.

5.5 Contribution to Knowledge

This study contributes to the growing body of knowledge on cybersecurity in the digital business sector by providing empirical insights into the prevalence of cyber threats, business preparedness, and the impact of cyber incidents on online businesses. The findings highlight the urgent need for enhanced cybersecurity measures and provide a framework for businesses to strengthen their defense mechanisms.

By identifying key cybersecurity challenges and proposing strategic recommendations, this research serves as a valuable resource for business owners, policymakers, and cybersecurity professionals seeking to improve digital security in the online business ecosystem.

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