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The Impact of Cyber Security Culture on Malaysian Adults' Susceptibility to Phishing Emails in the Banking Sector

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Abstract

The study focused on the connection between Malaysian adults' knowledge of email phishing and cyber security awareness issues. The study is restricted to adult Malaysians who have bank accounts. Cybercriminals are likely to target adults who regularly get emails from banks as soft targets since they can send phishing emails. This study used quantitative research techniques and required the gathering of primary data. The study adopted a deductive methodology based on accepted notions. Utilizing SPSS, questionnaires were used to gather and evaluate the data. The ideal sample size for this study is 97 participants. Potential study participants were found using a convenience sampling technique. The respondents were contacted either personally or via social media. The results showed that characteristics such as cyber security awareness, how frequently a person uses online banking services, and cyber security culture had a substantial impact on the likelihood that an adult Malaysian banking customer may receive a phishing email pertaining to banking. The results also showed that cyber security awareness and cyber security culture have a big impact on the likelihood that adult banking clients in Malaysia will receive a phishing email with the aim of financial fraud. This research highlights the necessity of focused campaigns on cyber security awareness and a strong corporate culture in Malaysian banks to reduce the risk of phishing attacks and improve overall cyber resilience.

Keywords: *Cyber Security Awareness, Cybercriminals, Cyber Security Culture, Frequency of Online Banking, Phishing Email*

1.0 Introduction

Cybercrime awareness was a critical factor in thwarting criminal activities targeting bank customers online. In Malaysia, the cybercrime rate was alarmingly high, with Kaspersky products having detected and blocked tens of thousands of phishing attempts aimed at banking and e-commerce transactions. Despite efforts by the Commercial Crime Investigation Department (CCID) to raise awareness, cybercriminals continuously adapted and found new ways to succeed. In 2021, reported cyber threats in Malaysia encompassed fraud, intrusion, malicious code, and cyber harassment, affecting over 10,000 adults, highlighting the low cybercrime awareness among Malaysians.

Since 2015, phishing websites have surged by 51%, a concerning trend. Email phishing accounted for 29% of cyberattacks compromising privacy, with 45% targeting businesses. Banu and Banu (2013) noted that the increase in new internet users lacking knowledge about cybercrimes contributed to the persistence of phishing attacks, which exploited this ignorance. Phishing activities thrived due to low digital literacy levels in society. If cybercriminals hadn't found success, they wouldn't have invested so much effort. Addressing this issue required educating the public to bridge the knowledge gap, with a particular focus on email phishing, which was twice as prevalent as other forms (Alabdan, 2020). A weak cybersecurity culture and a lack of awareness among adults about email phishing were significant contributors to the problem.

Many Malaysians relied on online banking, which exposed them to various cybercrimes, including email phishing. Cybercriminals often impersonate trusted entities to deceive targets into sharing personal information. Given the widespread use of online banking among Malaysian adults, this research aimed to evaluate their awareness of email phishing risks, seeking to address this critical cybersecurity issue.

2.0 Literature Review

Internet banking was projected to be the primary banking channel in Malaysia by 2030 due to its convenience (Supayah & Ibrahim, 2016). However, the rise of online banking also increased cybersecurity risks, particularly identity theft through phishing activities. These activities, which included spear phishing, pharming, and evil twins, significantly affected internet banking in Malaysia. Email phishing scams were common, where fraudsters posed as legitimate entities and tricked victims into clicking malicious links that installed malware on their devices. This allowed the fraudster to access sensitive information and potentially steal money from the victim’s bank account. As such, bank customers were advised to be vigilant when handling banking information online and to ignore any emails requesting personal information (Mohd Zaharon et al., 2021). Bank employees were also advised to treat emails requesting personal login details with suspicion to protect customer data. Banks were encouraged to install protective anti-phishing solutions in mail servers to detect emails from suspicious sources.

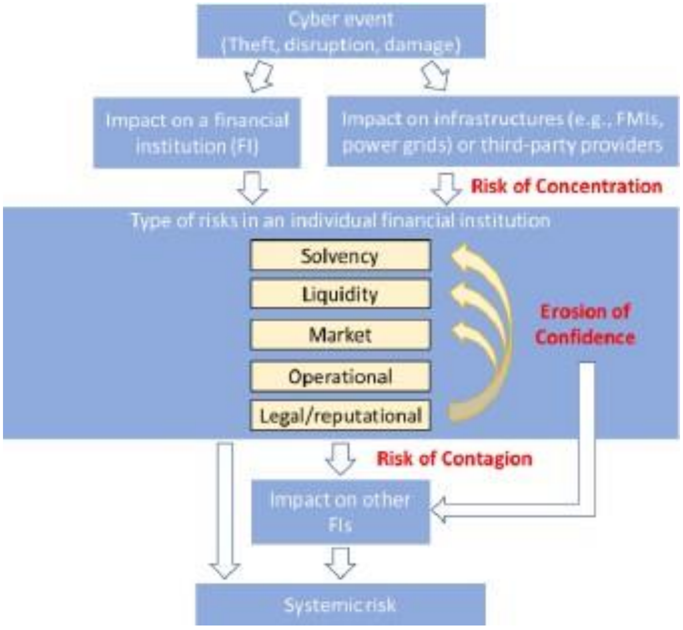
2.1 Theoretical Review

Using the Systemic Cyber Risk Disruption theory, this study investigates the relationship between cyber security culture and susceptibility to phishing emails among adult Malaysians working in the banking industry. The interconnectedness of cyber security practices inside organizational cultures is emphasized by this theoretical framework, which also shows how strong cyber security cultures may successfully disrupt and reduce phishing attempts. This study intends to offer insights that help improve cyber resilience and security measures within Malaysian banks by investigating how cultural norms, awareness programs, and organizational rules affect people's vulnerability to phishing scams.

2.2 Phishing Concept and its Perpetration

Phishing aims to misrepresent identity to persuade a target victim to provide helpful information to cybercriminals. Phishing targeting bank customers requires cybercriminals to masquerade as bank representatives so that the customers can unknowingly share their banking information, enabling the perpetrators to access bank accounts and siphon money from customers' accounts. Phishing activities have evolved, while customer awareness lags. The most common form of phishing is perpetrated through identity theft.

Figure 1 - Effects of a cyber event on financial institutions (FIs)


Cyber event
(Theft, disruption, damage)
Impact on a financial institution (FI)
Impact on infrastructures (e.g., FMIs, power grids) or third-party providers
Risk of Concentration
Type of risks in an individual financial institution
Solvency
Liquidity
Market
Operational
Legal/reputational
Erosion of Confidence
Risk of Contagion
Impact on other FIs
Systemic risk

Source: *Kang (2020)*

The figure illustrates the cascading effects of a cyber event on financial institutions (FIs) and systemic risk. A cyber event, such as theft, disruption, or damage, impacts a financial institution directly or indirectly through infrastructures like financial market infrastructures (FMIs) or power grids. This leads to various risks within the institution: solvency, liquidity, market, operational, and legal/reputational risks. These risks can cause an erosion of confidence, resulting in a concentration risk within the institution and a contagion risk spreading to other financial institutions. Ultimately, this can escalate to systemic risk, threatening the stability of the broader financial system. This figure underscores the interconnectedness and potential widespread impact of cyber threats on financial stability.

Cybercriminals use different tactics to acquire customers' personal banking data and access their accounts illegally. Below is an account of phishing and identity theft and a discussion of the various steps involved in a typical phishing attack.

2.3 Identity Theft Eroding Users' Trust

An increase in internet coverage and usage by bank customers has been at the heart of the rising phishing crimes. Identity theft occurs when the perpetrators use the internet to target bank customers and mischievously persuade them to share personal details. The banking stakeholders are increasingly becoming sensitive about identity theft as it is the leading cause of digital-related crimes in the United States of America.

In Malaysia, there is a rise in the number of fraudulent computer activities reported, as disclosed by statistics from Malaysian Computer Emergency Response (MyCert). In 2021, cyber threat incidents reported were broadly classified into fraud, intrusion, malicious codes, cyber harassment, and intrusion attempts, amongst others affecting over 10,000 adults in Malaysia. During the first 6 months of 2022, Kaspersky products also detected and blocked 27,458 phishing-related attempts targeting banking-related transactions and 91,895 targeting e-commerce shops in Malaysia. Phishing victims reported that the perpetrators used deceptive mechanisms to direct them to fake websites, where their usernames and passwords are stolen and used to the perpetrators' advantage. The increase in these crimes results in the breaching of information security by compromising the integrity of confidential personal data.

2.4 Phishing Modus Operandi

According to (Basit et al., 2020), phishing emails before the mid-2003s were sent to target clients' emails in the form of text emails, where the perpetrators faked the logo of the target company to persuade customers to click the emails. However, in 2004, cybercriminals started deploying novel programming tactics and replaced the URL of the targeted company to resonate with the one displayed on the target's victims' address bar to be similar to the company they impersonated. The effect was that the cases of cybersecurity concerns reported globally increased, leading to losses of millions by victims.

Furthermore, since this was a new tactic, the victims were easily persuaded to provide their personal information because the cyber awareness culture did not match the evolving tactics the cybercriminals used in their practices. Jampen et al. (2020) found that since 2004, adult American citizens have received millions of emails from Phishers annually. These are significantly huge numbers, which indicates that email phishing poses a significant challenge in combating banking-related cyber-crimes.

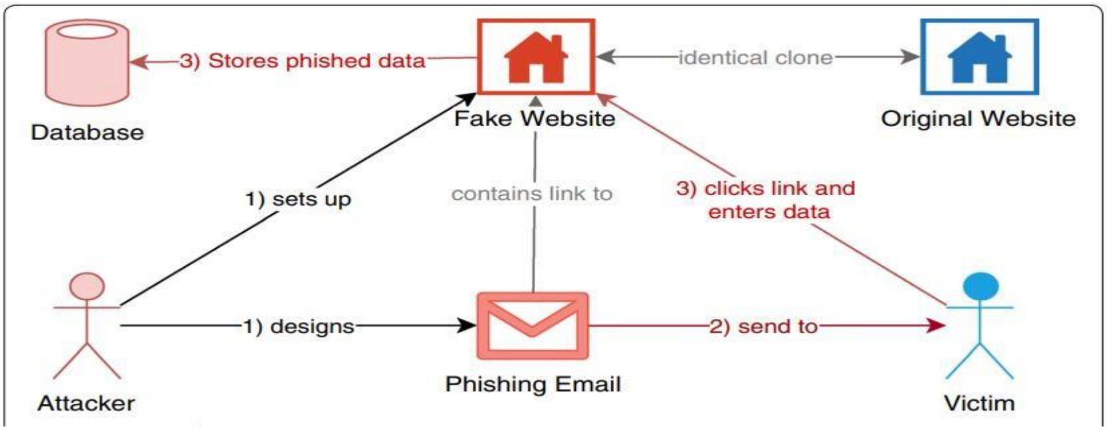
2.5 Use of Fraudulently Acquired Data to Perpetrate Crimes

There are six stages that cyber criminals sequentially follow to execute a phishing attack. These are planning, launching, gathering data, determining ways to use the collected data, perpetrating the crime, and laundering the proceeds (Guan Gan et al., 2008).

2.6 Planning the Attack

At this phase, the phishing perpetrators usually determine their target clients and evaluate the nature of the data they want to acquire to achieve the intended goals. The attack method and messaging are selected at this stage. Examples of standard attack methods include email phishing, deceptive downloads, and pharming (Stafford & Capstone, 2020). Nowadays, there exist websites that offer cybercriminals assistance by providing them with links they use to perpetrate crimes.

Figure 2 - ***Example of an Email-Based Phishing Attack***



Source*: Jampen et al., (2020)*

Figure 2 shows how cybercriminals use fake websites to send phishing emails to banking customers. They set up a website identical to clone websites similar to the bank's and use it to send emails to the customers. Since they use bank logos and fake letterheads, unsuspecting victims click on the email and provide the cyber criminals with the data they require to perpetrate cybercrimes. Cybercriminals store the data acquired in a database and can use it to execute criminal activities like money laundering or siphoning customer accounts. Unless customers understand cybersecurity threats, the attackers can easily persuade them to provide their banking details, increasing cybercrime propensity amongst the baking customers.

2.7 Launching attacks

The launching phase entails sending out the information, referred to as the bait, to the target victims. The most common form of bait are emails and deceptive downloads (Stafford & Capstone, 2020). Other perpetrators recruit insiders to help with information harvesting from unsuspecting banking customers. Once installed, the downloads monitor the customers' details, which the perpetrators later use to execute crimes.

2.8 Gathering data

In this stage, the perpetrators define the mechanisms of gathering personal data from an unsuspecting victim. When cybercriminals perpetrate cyberattacks, they aim to steal data (Narayanan et al., 2018). Methods used in data gathering include users entering the data in a spoofed website or email, using malicious software to capture data by monitoring the keystrokes made by the bank customers, and spying on data input on customer screens, amongst other options.

2.9 Determine the usage of gathered data.

After acquiring the customer's data, the next step is deciding how to use it to access their banking information. The perpetrators must study the information required for authorization of online banking to enable them to use it without detection (Jaccard & Nepal, 2014). They also examine the credit limits set and transaction history to avoid flagging their activities by the banking system (Zong et al., 2019). Lastly, they contain the value of their target customers' accounts so that they get maximum returns from their crimes.

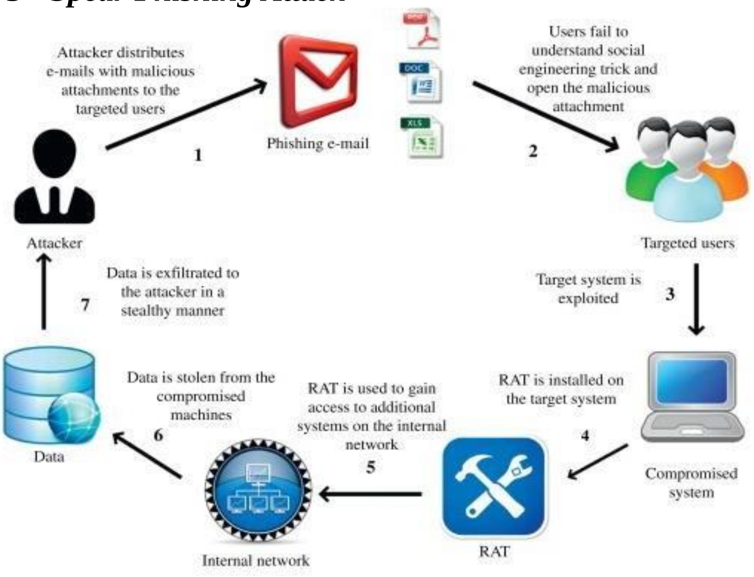
2.10 Perpetrate fraudulent activities.

The fraud committed by perpetrators varies depending on various circumstances. The banking information may compel the victims to make lumpsum payments so that the perpetrators do not share their personal information on different platforms. On the other hand, they could use it to siphon money out of customer accounts, leading to financial loss (Humayun et al., 2020). The perpetrators could use the information on credit cards and debit cards to make unauthorized purchases without their victim's knowledge.

2.11 Laundering proceeds

Once the perpetrators of cybercrimes successfully execute their activities, their next focus is hiding their identity to avoid being detected by the authorities. The existence of money in virtual form enables the perpetrators to transfer it to different platforms and channels to mislead the authorities about their identity. This cash movement complicates tracking and tracing cybercriminals because they use fake accounts across other financial networks, making it difficult for the authorities to trace them (Guan Gan et al., 2008).

Figure 3 - Spear Phishing Attack


Attacker distributes e-mails with malicious attachments to the targeted users
1
Phishing e-mail
DOC
XLS
Users fail to understand social engineering trick and open the malicious attachment
2
Targeted users
Target system is exploited
3
Compromised system
RAT is installed on the target system
4
RAT
RAT is used to gain access to additional systems on the internal network
5
Internal network
Data is stolen from the compromised machines
6
Data
Data is exfiltrated to the attacker in a stealthy manner
7
Attacker

***Source**: (K Sood & Enbody, 2014)*

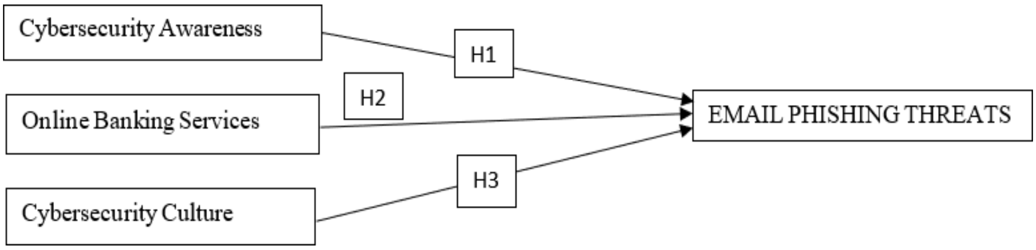
Figure 3 shows how cybercriminals use emails as an avenue to perpetrate cyber-related fraud. An email with an attachment is sent out randomly by the attacker. If the user fails to detect that the email is malicious and opens it, the system targeted by the attacker is prone to further attacks perpetrated by installing RAT (Remote Access Trojan) in the target system. RAT becomes the avenue the cybercriminal uses to access internal networks and steal data from the compromised device. The attacker then infiltrates the data and uses it in a compromised manner. Cybersecurity awareness, especially on email phishing and the perpetration of cybercrimes using email phishing, is a critical subject today because of the advanced use of online banking services. Besides, the communication received from the bank in the form of emails is a suitable avenue that cybercriminals could use to persuade banking customers to provide them with personal data while masquerading as legit communication from the bank.

2.12 Related Research and Findings

Cybercrime success is largely due to victims' unawareness of phishing attacks, despite security measures implemented by institutions (Ifeanyi Akazue et al., 2022). Technological advancements often outpace these measures, enabling criminals to continue their activities. Email phishing, the most prevalent form, involves sending deceptive emails that appear to come from legitimate organizations (Hodge et al., 2019). Increasing public awareness about phishing is crucial in combating these crimes. Current security features for email authentication are easily guessable, often using client account numbers or identity details, leading to weak password management and increased phishing threats (Lee & Yim, 2020). Banks should consider alternative encryption methods for email communication to maintain confidentiality and regain trust from customers who have previously fallen victim to phishing attacks (Aonzo et al., 2018).

Morris et al. (2020) analyzed the evolution of phishing methods, noting that technological advancements have facilitated the prevalence of phishing. The rise of cloud computing and mobile phone usage necessitates anti-phishing techniques to mitigate cybercrime risks. Browser vulnerabilities and an increase in phishing websites are primary contributors to phishing attacks. Athulya and Praveen (2020) studied various phishing attacks and their emergence, suggesting that internet users adopt anti-phishing strategies to detect online phishing activities. Bhardwaj et al. (2020) observed that phishers continually innovate their tactics, making detection difficult. They propose that educating internet users about phishing is the most effective countermeasure.

Figure 4: Research Framework



Source*: Own creation*

Figure 4 shows the research framework and the relationship between the three hypotheses and the research model examined in the study. Cybersecurity awareness, frequency of online banking services, and cybersecurity culture are the independent variables in the research used to examine the susceptibility of banking customers to phishing email threats.

2.13 Hypotheses Development

Cyber security awareness is crucial so that individuals do not become easy targets of phishing scams. Cybersecurity knowledge has been highlighted in many research methodologies as an essential factor in handling phishing risks. In this work, Morris et al. (2020) proved that information and training campaigns designed to enhance cybersecurity skills had a notable, positive impact on people’s ability to identify phishing emails. These programs teach recipients about potential phishing attacks and give advice, for example, about how to recognize such variants; They underline the importance of not clicking on potentially dangerous links and not sharing your personal information. In a survey conducted by Lee and Yim (2020), they concluded that due to irreversible poor knowledge among the population concerning threats, which have been avoided by implementing protective measures within an institution, cybercrime becomes immensely successful. Phishing remains rampant and fighting these crimes requires improvement in the social awareness of commoners.

Hypothesis 1*: Correlation between cybersecurity awareness and the susceptibility of adult Malaysian citizens to phishing emails*

There is a possibility that individuals frequently employing online banking services may easily fall prey to phishing emails. According to Zong et al., (2019), the more often the persons use the banking services on the Internet, the higher the probability for them to fall for phishing. Those who become involved more frequently in online banking affairs are at a higher risk of falling victim to fraudulent messages disguised as genuine ones originating from the user's bank. This means that customers who frequently engage in online banking are likely to be more exposed to such risks compared to those, who seldom use this service. Phishing emails are a type of spam that mimics e-mails from known companies to get the recipient to divulge their identity, bank account information, passwords, or similar data. Therefore, it is possible to argue that the users of Internet banking may be more vulnerable to these kinds of attacks than others who do not use Internet banking often.

Hypothesis 2: *Correlation between the frequency of using online banking services and the susceptibility of adult Malaysian citizens to phishing emails*

When organizations have a strong cybersecurity culture, the menace posed by phishing emails can be managed. Jaccard and Nepal (2014) mentioned that managers and employees who received the phishing emails were less likely to fall for them if in their organization cybersecurity was given importance. The study also revealed that since customers that interact with businesses understood the importance of cybersecurity, and the received policies, they were quicker to identify and report phishing emails hence minimizing the impacts of the threat. This highlights the need to ensure that individuals and organizations take necessary measures in constructing a favorable environment for addressing cyber threats and preventing cybercrimes. This consists of facilitating reporting of allegedly malicious emails or security concerns among the staff swiftly. In their study, Narayanan et al., (2018) determined that firms with working report recognition had higher chances of identifying and deterring, phishing.

Hypothesis 3: *Correlation between cybersecurity culture and the susceptibility of adult Malaysian citizens to phishing emails*

The existing security assets that support the confirmation of messages put in use are often weak and can be easily predicted using identities or client account numbers making weak password control and phishing threats the leading challenges according to Guan Gan et al., (2008).

2.14 Research Gaps

A review of past research shows that there is an agreement among researchers that the level of phishing awareness among internet users is wanting. The evolution of phishing activities complicates efforts to address phishing threats amongst internet users. However, it is unclear from previous research whether age affects the propensity to phishing attacks. In addition, though there is research done on the impact of phishing on banking data, the generalization of the findings does not shed light on the success rate of email-related phishing activities that target obtaining banking customers' data. In the Malaysian market, a few research have been conducted targeting email-phishing exposure in adults receiving regular communication from banks. These research delve into phishing challenges in Malaysia, but none has focused on how the adults that subscribe to internet banking are likely to become victims of email cybersecurity threats perpetrated through email pining. This finding validates the need to research the susceptibility of banking email phishing targeting adult Malaysian citizens.

3.0 Methodology

The study employed a research method appropriate for investigating how cyber security culture affects Malaysian individuals working in the banking industry's susceptibility to phishing attacks. To gather primary data for this study, quantitative methods based on surveys were utilized. Convenience sampling was used as the sampling approach and 97 individuals were chosen based on their availability and willingness to take part. Researchers attempted to encompass a varied set of adult Malaysians who frequently use online banking services by contacting potential respondents through social media platforms as well as in-person contacts. Google Forms was used to collect data, guaranteeing participant privacy while gaining information on their views on cyber security culture, phishing dangers, and other pertinent aspects. The 31 closed-ended questions in the survey ensured accuracy and clarity while also providing a 5-point Likert scale for measurement, all of which were intended to elicit thorough responses.

Using the Statistical Package for the Social Sciences (SPSS) for data analysis, the researchers used an explanatory research technique to examine the correlations between variables like sensitivity to phishing emails, frequency of online banking use, and awareness of cyber security. Data for the study were collected over one month using a cross-sectional approach. The methodology of this study facilitated a moment-in-time examination of the interactions between these variables, offering significant insights to policymakers, financial institutions, and consumers on the improvement of cyber security protocols and the reduction of risks related to phishing attacks.

4.0 Results and Discussion

A descriptive analysis was carried out to evaluate the normality of the data that were utilized in this research. These data were shown in a way that made it easier to visualize what the information was conveying. The standard deviation (a measure of variability) was used to show how the variables were distributed and how they varied from one another in terms of variation. This offered a more in-depth explanation of how the mean and the variable were connected. Moreover, it was notable that Skewness and Kurtosis, as presented in Table 1, had significant importance within the realm of descriptive statistics. The concept of skewness was employed to assess the level of symmetry in a distribution that encompassed values that might be positive, negative, or zero. An ideal distribution was characterized by zero skewness, indicating that the mean was equal to the median. However, a positive skewness was observed when the data was concentrated towards the left side. Additionally, the rightward skewing of the data was known as negative skewness.

Table 1 - Result of Descriptive Statistic

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error (Skewness)	Kurtosis	Std. Error (Kurtosis)
Susceptibility to phishing emails	121	1.5	5.0	3.75	0.71	-0.299	0.220	0.145	0.437
Cybersecurity Awareness	121	2.17	5.0	3.93	0.65	-0.646	0.220	-0.127	0.437
Frequency of using online banking	121	2.0	5.0	3.72	0.62	0.082	0.220	-0.281	0.437
Cybersecurity Culture	121	2.17	5.0	3.70	0.65	-0.046	0.220	-0.495	0.437

Source: *Primary Data*

Table 1 shows that the dependent variable for phishing email susceptibility had a negative skewness of -0.299. The skewness for the independent variables, on the other hand, showed values of -0.646, 0.082, and -0.046 for cybersecurity culture, frequency of utilizing online banking services, and cybersecurity awareness. The fact that every variable had a negatively skewed distribution may therefore be explained, except for the frequency of utilizing online banking services, which exhibited a positive skewness. Kurtosis was used to determine if the data set had a heavy or light tail in comparison with a normal distribution. High kurtosis had heavy tails and more outliers than low kurtosis, which had light tails and fewer outliers. The dependent variable, which was "Susceptibility to Phishing Email," had a kurtosis value of 0.145. The kurtosis values came in at -0.127, -0.281, and -0.495 in terms of the independent variables, respectively.

4.2 Pearson's Correlation Testing

The correlation is a statistical method employed to evaluate the potential linear relation between the dependent variable and the independent variables. The model is classified as the most straightforward and uncomplicated in the interpretation of collected data. The numbers depicted further elucidate that a value of 1 indicates a perfect correlation between the two variables. Moreover, in the case when r is equal to 0, there will be no apparent relationship between the two variables. In addition, the positive relationship between the two variables is shown when the value is greater than 0. Values below 0 or -1 represent a negative relationship between the two variables. To assess the association between Susceptibility to phishing emails, Cybersecurity Awareness, Frequency of using online banking services and Cybersecurity Culture this study utilized Pearson correlation analysis.

Table 2 - Pearson Correlation Analysis

	Cybersecurity Awareness	Frequency of using online banking services	Cybersecurity Culture	Susceptibility to phishing emails
Cybersecurity Awareness	1	0.478**	0.618**	0.612**
Frequency of using online banking	0.478**	1	0.575**	0.404**
Cybersecurity Culture	0.618**	0.575**	1	0.537**
Susceptibility to phishing emails	0.612**	0.404**	0.537**	1

***Source**: Primary Data*

Correlation between cybersecurity awareness and the susceptibility of adult Malaysian citizens to phishing emails

The correlation coefficient of cybersecurity awareness and susceptibility to phishing emails was 0.612. The p-value was 0.000 (lower than 0.05). Therefore, we conclude that the relationship of cybersecurity awareness and susceptibility to phishing emails factors is positive and significant. We conclude that there is a relationship between cybersecurity awareness and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

Correlation between the frequency of using online banking services and the susceptibility of adult Malaysian citizens to phishing emails.

Frequency of using online banking services and susceptibility to phishing emails had a correlation coefficient of 0.404. The P-value was established at 0.000. Thus, we conclude that the relationship between the frequency of using online banking services and susceptibility to phishing emails factors is positive and significant. We therefore conclude that there is a relationship between the frequency of using online banking services and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

Correlation between cybersecurity culture and the susceptibility of adult Malaysian citizens to phishing emails.

The correlation coefficient of cybersecurity culture and susceptibility to phishing emails was 0.537. The p-value was 0.000 (lower than 0.05). Therefore, we conclude that the relationship of cybersecurity culture and susceptibility to phishing emails factors is positive and significant. We conclude that there is a relationship between cybersecurity culture and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

4.3 Multiple Regression Testing

The connection between the dependent (Susceptibility to phishing emails) and independent variables (Cybersecurity Awareness, frequency of using online banking services, and Cybersecurity Culture) is investigated using multiple regression analysis.

Table 3 - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.646	0.418	0.403	0.548

Source*: Primary Data*

The resulting R-squared score was 0.418. This suggests that cybersecurity awareness, frequency of using online banking services and cybersecurity culture account for 41.8% of the variation in Susceptibility to phishing emails.

Table 4 - ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.180	3	8.393	27.974	<.001
Residual	35.104	117	0.300		
Total	60.284	120			

Source*: Primary Data*

If the p-value is less than or equal to 0.05, then the relationship between the two variables is significant, and the null hypothesis will be rejected; if the p-value is greater than 0.05, then there is no significance between the variables, and the null hypothesis will be accepted. The F-value and p-value for the regression analysis were 27.974 and 0.000, respectively. A p-value of less than 0.05 demonstrates that cybersecurity awareness, frequency of using online banking services, and cybersecurity culture factors influence the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

Relationship between cybersecurity awareness and the possibility of Malaysian banking customers receiving phishing email.

$H_0$1: There is no relationship between cybersecurity awareness and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.
H_a1: There is a relationship between cybersecurity awareness and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

In this research, the null hypothesis, $H_0$1 is rejected but the alternative hypothesis, H_a1is accepted. Cybersecurity Awareness has a positive impact on Susceptibility to phishing emails among banking customers. Additionally, research by Taylor and Antonucci (2014) showed that training initiatives aimed at raising cybersecurity awareness had a favorable influence on people's capacity to recognize phishing emails. These programs advise users about typical phishing tactics, offer tips for spotting strange emails, and stress the significance of avoiding clicking on dubious links or disclosing personal information. It is crucial to promote a culture of cybersecurity awareness among users and inside companies to successfully battle phishing threats. Regular training programs, awareness campaigns, and the sharing of best practices can help with this. Organizations and people may improve their protection against phishing email threats and lower their risk of financial loss, data breaches, and other negative outcomes by spreading cybersecurity knowledge.

Relationship between the frequency of using online banking services and the possibility of Malaysian banking customers receiving phishing email.

$H_0$2: There is no relationship between the frequency of using online banking services and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.
H_a2: There is a relationship between the frequency of using online banking services and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.

The null hypothesis is rejected, $H_0$2, and the alternative hypothesis, H_a2 is accepted as the relationship between the variables is significant. The frequency of using online banking services has a positive impact on Susceptibility to phishing emails among banking customers. Similarly, Florêncio and Herley (2009) noted that those who often use online banking services may be more vulnerable to phishing schemes. Individuals who often use online banking services must exercise caution and take precautionary actions to reduce the hazards brought on by phishing email attacks. This includes keeping security banking software up to date, using strong passwords, and being wary of dubious email communications. The frequency of utilizing online banking services and susceptibility to phishing email attacks may be related, according to research. People may be exposed to phishing attempts more frequently when they engage in online banking activities more regularly, making them more vulnerable to such risks. Phishing emails pretend to be from legitimate businesses to fool recipients into disclosing personal information like login passwords or financial information. The likelihood of running into phishing efforts increases as more people use Internet banking.

Relationship between cybersecurity culture and the possibility of Malaysian banking customers receiving phishing email.

$H_0$3: There is no relationship between cybersecurity culture and the possibility of adult Malaysian citizens receiving a banking-related phishing email.
H_a3: There is a relationship between cybersecurity culture and the possibility of adult Malaysian citizens receiving a banking-related phishing email.

In this research, the null hypothesis, $H_0$3 is rejected but the alternative hypothesis, H_a3is accepted. Cybersecurity Culture has a positive impact on Susceptibility to phishing emails among banking customers (Beta = 0.253, p-value of 0.020). Effective communication channels that enable staff to quickly report suspicious emails or security issues are characteristics of a good cybersecurity culture. According to research by (Alsharnouby et al., 2015), firms with established reporting processes were more likely to notice and stop phishing attempts. To effectively counter phishing email threats, firms must have a strong cybersecurity culture. Uchendu et al. (2021) study found that successful phishing attempts were less common in companies with a good cybersecurity culture. According to the study, customers at businesses with strong cybersecurity cultures were more likely to spot and report phishing emails, which reduced their vulnerability to such threats. This emphasizes the value of creating an environment that encourages cybersecurity awareness, education, and proactivity.

Table 5 - Results of Hypotheses

	Hypotheses	**Results of hypotheses**
$H_0$1	There is no relationship between cybersecurity awareness and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.	Rejected
H_a1	There is a relationship between cybersecurity awareness and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.	**Accepted**
$H_0$2	There is no relationship between the frequency of using online banking services and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.	Rejected
H_a2	There is a relationship between the frequency of using online banking services and the possibility of adult banking customers in Malaysia receiving a banking-related phishing email.	**Accepted**
$H_0$3	There is no relationship between cybersecurity culture and the possibility of adult Malaysian citizens receiving a banking-related phishing email.	Rejected
H_a3	There is a relationship between cybersecurity culture and the possibility of adult Malaysian citizens receiving a banking-related phishing email.	**Accepted**

Source: *Own Creation*

5.0 Recommendation

For future researchers, several suggestions and recommendations can be made to enhance the study on phishing sustainability in the context of Malaysian banking and beyond. Expanding the sample size is a crucial first step to improve the accuracy of results. Increasing the respondent pool to encompass a more diverse cross-section of Malaysian bank account holders, including different age groups, genders, economic backgrounds, and regional populations, would yield a more comprehensive dataset. This would allow for the discovery of subtle relationships and patterns that smaller samples might overlook. Additionally, researchers should consider broadening the scope of the study to cover various sectors beyond banking, including e-commerce, social networking sites, and healthcare. Phishing is a pervasive issue in these areas, and studying its vulnerability across different industries can provide a more comprehensive understanding.

To enhance data reliability, adopting experimental designs such as using simulated phishing emails in a controlled environment is advisable. This approach minimizes potential errors resulting from self-reporting in surveys. Advanced analytical techniques, including machine learning algorithms like Random Forests, Neural Networks, or Support Vector Machines, could be employed to identify intricate patterns and non-linear correlations related to phishing vulnerability.

Qualitative research methods like interviews or focus group discussions should be integrated with quantitative analysis to gain deeper insights into individuals' experiences, attitudes, and decision-making processes regarding phishing emails. This holistic approach can offer valuable insights into organizational procedures and policymaking in the dynamic digital landscape. Frequent users of online banking are especially vulnerable to phishing, so banks should regularly update clients on new phishing schemes and promote safe internet behavior through various channels. Encouraging a strong cybersecurity culture within banks should be a priority, involving clients and staff in fostering responsible behavior, enforcing regulations, and reporting phishing attempts.

Lastly, partnerships with technology and cybersecurity firms can bolster defenses. Integration of cutting-edge technology like Artificial Intelligence can aid in identifying and preventing phishing attempts. Collaborations may also lead to innovative products, such as AI-powered chatbots guiding users through secure online banking or tools for detecting phishing emails.

5.1 Study Implications

The research results imply the necessity to increase cybersecurity awareness, prudent attitude toward online banking, and an overall cybersecurity mentality among Malaysian banking institutions. The increased spear-phishing threats to the banking sector evident from this research suggest that these factors are intertwined and pose a significant threat to organizations and require a coordinated effort towards their prevention. Banks should ensure that there are comprehensive training programs for their employees to embrace cyber security, keenly incorporate proper authentication measures, and promote organizational culture expected in case of suspicious emails. This means that regulatory bodies should use these findings as a basis of applying measures that would overall improve general cyber resilience. Lastly, prevention and control of the increasing menace of phishing attacks requires the cooperation of various measures including the individual, financial institutions, and the authorities.

5.2 Conclusion

The research investigated the correlation between email phishing awareness and cybersecurity threats, with a focus on adult Malaysian banking customers. The findings affirmed a positive and significant relationship between cybersecurity awareness, the frequency of using online banking services, and cybersecurity culture, with susceptibility to phishing emails. Consequently, it was deduced that heightened awareness and adoption of secure online behaviors significantly reduced the risks associated with phishing emails.

Banks were advised to leverage these insights to implement controls that mitigated the threats posed by phishing emails to their clients' data. Bank Negara Malaysia could also have utilized these findings to enforce regulatory measures aimed at curbing cybercrimes perpetuated through email phishing. The study further elucidated the necessity for public education on email phishing, advising online banking users to routinely update their passwords. This research was not only a valuable resource for individuals who had never encountered phishing attempts but also served as a credible reference for future researchers exploring related topics. Ultimately, this study contributed significantly to the broader understanding of the cybersecurity initiatives needed to counter email phishing, thereby benefiting governments, financial institutions, and individual banking customers.

6.0 References

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