Impact of Cyber Risk Management Framework on Fraud Prevention in Nigerian Banks: A Theoretical Review

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Abstract
The study examined the impact of cyber risk management framework on fraud prevention in Nigerian banks. A cyber risk management framework provides banks with a structured approach for identifying, assessing, monitoring, mitigating, and responding to cyber threats. In the Nigerian banking environment, the effectiveness of these mechanisms is particularly important because the increasing sophistication of cybercriminals has made traditional fraud controls alone insufficient. It encompasses practices such as cybersecurity governance, risk assessment, access control, continuous monitoring, incident response, and recovery. The study recommended that Nigerian banks should strengthen their cyber risk identification mechanisms by conducting regular vulnerability assessments, threat identification, system audits, and cybersecurity reviews. This will enable banks to identify potential points of fraudulent exploitation early and take preventive measures before cyber threats result in financial losses. Banks should institutionalise regular and comprehensive cyber risk assessments across their digital banking platforms, payment systems, information assets, and third-party service providers. Identified high-risk areas should be prioritised for immediate corrective action to reduce opportunities for cyber-enabled fraud.

Keywords: *Cyber risk management, fraud prevention, cyber threats, cybersecurity governance*

Introduction

The rapid digital transformation of the Nigerian banking sector has significantly improved the speed, accessibility, and convenience of financial services, but it has also increased banks' exposure to cyber-related threats and technology-enabled fraud. The growing use of mobile banking, internet banking, electronic payment platforms, and other digital channels has created new opportunities for fraudsters to exploit weaknesses in banks' information systems. Consequently, cyber risk management has become an important component of effective banking governance, internal control, and fraud prevention. Recent studies emphasize that strengthening cybersecurity capabilities, risk identification, monitoring, and response mechanisms can reduce the vulnerabilities through which financial fraud is perpetrated (Aldasoro et al., 2022; Basel Committee on Banking Supervision, 2023). A cyber risk management framework provides banks with a structured approach for identifying, assessing, monitoring, mitigating, and responding to cyber threats. It encompasses practices such as cybersecurity governance, risk assessment, access control, continuous monitoring, incident response, and recovery. In the Nigerian banking environment, the effectiveness of these mechanisms is particularly important because the increasing sophistication of cybercriminals has made traditional fraud controls alone insufficient.

The Central Bank of Nigeria (CBN, 2022) has continued to emphasize cybersecurity, operational resilience, and effective risk management as essential elements of a sound financial system.
Fraud prevention therefore depends not only on conventional internal controls but also on the ability of banks to anticipate and manage technology-driven risks. A well-designed cyber risk management framework can strengthen early detection, protect sensitive customer and institutional information, reduce unauthorized transactions, and improve banks' ability to respond promptly to cyber incidents. However, weaknesses in cybersecurity governance, employee awareness, technological infrastructure, and incident-response capabilities may create opportunities for fraudulent activities. This makes it necessary to examine whether the implementation of cyber risk management frameworks actually translates into stronger fraud prevention in Nigerian banks. Against this background, the study examines the impact of cyber risk management framework on fraud prevention in Nigerian banks, with the aim of determining how effective cyber risk identification, assessment, monitoring, prevention, and response mechanisms contribute to reducing fraudulent activities within the banking sector.

Theoretical Framework

The theoretical framework provides the intellectual foundation for explaining the relationship between the cyber risk management framework and fraud prevention in Nigerian banks. The present study is anchored on Routine Activity Theory (RAT) developed by Cohen and Felson (1979), complemented by the Technology–Organization–Environment (TOE) Framework developed by Tornatzky and Fleischer (1990). The selection of these theories is based on their relevance to the nature of cyber-enabled fraud and the organisational conditions required for effective cybersecurity management. Routine Activity Theory explains fraud from the perspective of opportunity and guardianship, while the TOE Framework explains the technological, organisational and environmental conditions that influence the implementation of cybersecurity mechanisms.

Routine Activity Theory

Routine Activity Theory was developed by Cohen and Felson (1979) to explain the occurrence of criminal activities through the interaction of three essential elements: a motivated offender, a suitable target and the absence of a capable guardian. The theory proposes that criminal activity is more likely to occur when these three conditions converge within a particular time and environment. The central proposition is that the presence of motivated offenders alone does not necessarily produce crime; rather, crime becomes more likely when offenders encounter suitable targets that lack effective protection. The relevance of Routine Activity Theory to contemporary banking has increased with the expansion of electronic and digital financial services. Banking customers and institutions now conduct significant financial activities through internet banking, mobile applications, automated teller machines, electronic payment platforms and other digital channels. These platforms create potential targets for cybercriminals because they contain valuable financial information and provide opportunities for unauthorised transactions. Recent research has demonstrated that Routine Activity Theory remains useful in explaining online fraud because digital environments can create convergence between offenders, vulnerable targets and inadequate guardianship (Parti, 2023). In the context of the present study, motivated offenders represent cybercriminals who seek to obtain financial benefits through activities such as phishing, identity theft, unauthorised account access, manipulation of electronic transactions and other forms of

cyber-enabled fraud. Suitable targets include bank accounts, customer information, payment platforms, electronic transactions and other valuable digital assets. The capable guardian represents the mechanisms established by banks to protect these targets from cyber threats. This conceptualisation makes the theory particularly appropriate for examining the five dimensions of cyber risk management adopted in this study. Cyber risk identification enables banks to recognise vulnerabilities that may make their systems suitable targets. Cyber risk assessment enables the institution to determine the extent and seriousness of those vulnerabilities. Cybersecurity controls provide direct protection against unauthorised access and manipulation. Continuous cybersecurity monitoring enhances the capacity to detect suspicious activities, while cyber incident response and recovery enables the bank to contain attacks and restore secure operations.

The concept of capable guardianship has also been extended to the cyber environment. Mabunda (2024) argues that cybersecurity technologies, including artificial intelligence and machine-learning capabilities, can function as a form of "cyber capable guardian" by detecting and responding to cyber threats that conventional guardians may not be able to identify effectively. Similarly, recent research on phishing and cybercrime identifies cybersecurity management and online security practices as important forms of digital guardianship capable of reducing opportunities for cyber victimisation. The theory is further supported by empirical evidence concerning financial institutions. Research published in Computers & Security applied Routine Activity Theory to data-breach risks in financial institutions and found that factors relating to target suitability, accessibility of sensitive information and the presence of guardian's influence perceptions of data-breach risk. This provides a direct theoretical connection between cybersecurity protection and the reduction of opportunities for financial crime.

Routine Activity Theory therefore suggests that fraud prevention in Nigerian banks can be strengthened by increasing the effectiveness of capable guardianship. When banks identify their vulnerabilities, assess cyber risks, establish appropriate security controls, continuously monitor their digital environments and respond rapidly to incidents, they reduce the opportunities available to motivated offenders. The theory consequently provides the principal theoretical foundation for examining the impact of cyber risk management on fraud prevention.

Technology–Organization–Environment Framework

The Technology–Organization–Environment Framework was developed by Tornatzky and Fleischer (1990) to explain how organisations adopt and implement technological innovations. The framework proposes that technological adoption and implementation are influenced by three broad contexts: technological, organisational and environmental factors. The technological context concerns the technologies available to an organisation and their characteristics; the organisational context relates to organisational resources, structure, managerial support and human capabilities; while the environmental context encompasses external factors such as regulation, competition, industry characteristics and other institutional pressures.

The TOE Framework is relevant to the present study because the effectiveness of cyber risk management in Nigerian banks depends not only on the availability of cybersecurity technologies but also on the organisational capacity to implement and sustain them. A bank may acquire advanced cybersecurity systems, for example, but such systems may not effectively prevent fraud if employees lack the required skills, management does not provide adequate support, or cybersecurity policies are poorly implemented. The technological context is particularly relevant to cybersecurity controls and continuous cybersecurity monitoring. Banks require appropriate

technologies for authentication, encryption, intrusion detection, transaction monitoring, access management and threat detection. The effectiveness of these technologies depends on their suitability, compatibility with existing banking systems and ability to respond to evolving cyber threats. The organisational context relates to the bank's internal capacity to manage cyber risks. Management commitment, employee competence, financial resources, cybersecurity policies, organisational structure and internal governance can determine whether cybersecurity mechanisms are properly implemented. Cyber risk identification and assessment, for instance, require competent personnel who can identify vulnerabilities and evaluate their potential implications for banking operations. The environmental context is also important because Nigerian banks operate within a regulatory and competitive environment that influences cybersecurity practices. Regulatory requirements, particularly those established by financial-sector regulators, can encourage banks to establish cybersecurity governance structures, risk-management processes and incident-response mechanisms. Consequently, cyber risk management is influenced not only by the internal characteristics of individual banks but also by the wider institutional environment.

The TOE Framework therefore complements Routine Activity Theory by explaining why the effectiveness of capable guardianship may differ across banks. While Routine Activity Theory establishes that capable guardianship can reduce opportunities for fraud, the TOE Framework explains the organisational and environmental conditions that enable banks to develop such guardianship in the first place.

Literature review

Cyber Risk Identification

Cyber risk identification refers to the systematic process of recognising potential cyber threats, vulnerabilities and weaknesses that may expose a bank's information systems and financial resources to fraudulent activities. It involves identifying vulnerable applications, unauthorised access points, weak authentication procedures, exposed customer information, insider threats and other conditions that could be exploited by cybercriminals. Aldasoro et al. (2022) explain that cyber risk has become an important source of vulnerability for financial institutions because the increasing interconnectedness of financial systems creates multiple channels through which malicious actors can gain access to critical financial information and services. In the banking environment, effective identification of these risks is therefore necessary for understanding where fraudulent activities are likely to originate. The importance of cyber risk identification becomes more evident as banking services increasingly move toward digital platforms.

Javaheri et al. (2024) observe that financial technology environments are exposed to diverse cybersecurity threats, including phishing, malware, identity theft, unauthorised access and attacks against digital applications. These threats can create opportunities for fraudulent transactions when vulnerabilities remain unidentified. Similarly, Yassin and Almaiah (2026) argue that weaknesses in authentication, outdated software, insecure applications and inadequate endpoint protection constitute important vulnerabilities within modern banking systems. In Nigeria, Akujobi et al. (2026) identify legacy-system vulnerabilities, insider threats, weak controls and cybersecurity governance gaps as some of the factors associated with cyber fraud in the banking sector. This suggests that identifying vulnerabilities before they are exploited is an important aspect of fraud prevention. A bank that systematically identifies its cyber risks is better positioned to introduce appropriate preventive controls and reduce the opportunities available to fraudsters. Cyber risk

identification can therefore be considered an important dimension of cyber risk management with potential implications for fraud prevention in Nigerian banks.

Cyber Risk Assessment

Cyber risk assessment involves the systematic evaluation of identified cyber threats and vulnerabilities in terms of their likelihood of occurrence and potential impact on banking operations. It enables financial institutions to determine the risks that require urgent attention and to allocate resources according to the level of exposure. According to Aldasoro et al. (2022), financial institutions face cyber risks whose effects can extend beyond individual organisations because interconnected financial systems can transmit operational and financial disruptions across institutions. Effective assessment is therefore necessary for determining the seriousness of cyber threats and their possible consequences. Yan Azura et al. (2025) maintain that cyber risk management in online banking requires an integrated assessment of technological vulnerabilities, potential threats and the consequences associated with successful cyberattacks. Their position suggests that banks should not simply identify cyber threats but should evaluate the extent to which those threats could affect critical banking operations. Yassin and Almaiah (2026) similarly emphasise the need to evaluate vulnerabilities according to the nature of the threats that could exploit them, particularly in systems involving online transactions and sensitive financial information. The relationship between cyber risk assessment and fraud prevention lies in the ability of banks to prioritise areas that present the greatest opportunities for fraudulent exploitation. For instance, if risk assessment reveals that a particular electronic banking channel has inadequate authentication or transaction-verification mechanisms, management can direct resources towards strengthening that channel. Effective assessment can consequently prevent banks from concentrating resources on relatively minor risks while leaving critical vulnerabilities exposed. Cyber risk assessment is therefore expected to contribute to fraud prevention by helping Nigerian banks understand, prioritise and address cyber vulnerabilities capable of facilitating fraudulent activities.

Cybersecurity Controls

Cybersecurity controls represent the technological, administrative and procedural mechanisms used by banks to protect information systems, financial transactions and customer data against unauthorised access and manipulation. They include authentication controls, access restrictions, encryption, network security, application security, firewalls, transaction controls and segregation of duties. Javaheri et al. (2024) identify several technological and organisational security mechanisms as important responses to cybersecurity threats within financial technology environments. Their analysis suggests that cybersecurity protection requires a combination of technological safeguards and organisational practices. Onajero (2025), examining quoted deposit money banks in Nigeria, reports positive relationships between application security controls, access and authentication controls, network security controls and fraud-risk prevention. This finding is important because it demonstrates that cybersecurity controls are not only designed to protect information assets but can also contribute directly to reducing opportunities for fraud. David et al. (2025) similarly examined application, network and cloud security within Nigerian banks and emphasised the importance of security mechanisms in strengthening protection against technology-related financial risks.

Strong cybersecurity controls can make it more difficult for fraudsters to gain unauthorised access to customer accounts and banking systems. Multi-factor authentication, for example, can provide an additional layer of protection when login credentials are compromised, while access controls can restrict employees and other users to only the resources required for their duties. Encryption can also reduce the risk associated with the interception or unauthorised disclosure of sensitive financial information. The literature therefore indicates that effective cybersecurity controls are an important mechanism through which Nigerian banks can strengthen fraud prevention.

Continuous Cybersecurity Monitoring

Continuous cybersecurity monitoring refers to the ongoing observation and analysis of banking systems, networks, applications, transactions and user activities to identify unusual or suspicious behaviour. Unlike occasional security assessments, continuous monitoring allows banks to identify potential threats as they emerge. This is particularly important in digital banking because fraudulent transactions can be initiated and completed within a short period. Okikiola et al. (2026) found that Nigerian banks have adopted several cybersecurity measures, including multi-factor authentication, firewalls, encryption, system updates and staff training. However, the authors identified inadequate real-time monitoring as one of the challenges limiting the effectiveness of cybersecurity in combating financial fraud. Their finding suggests that the existence of security controls alone may not be sufficient if banks lack the capacity to continuously monitor their systems and detect suspicious activities.

Javaheri et al. (2024) similarly recognise intrusion detection and related monitoring mechanisms as important components of cybersecurity within financial technology. Continuous monitoring enables banks to identify abnormal login attempts, unusual transaction patterns, changes in user behaviour and other indicators that may signal fraudulent activity. Early detection provides an opportunity for banks to block suspicious transactions, suspend compromised accounts and investigate potential fraud before substantial losses occur. Continuous cybersecurity monitoring is therefore an important dimension of cyber risk management because it provides banks with the capacity to detect and respond to emerging fraudulent activities promptly.

Cyber Incident Response and Recovery

Cyber incident response and recovery refer to the processes through which banks detect, contain, investigate, manage and recover from cybersecurity incidents. The increasing sophistication of cyber threats makes it unrealistic for banks to rely entirely on preventive controls. Even institutions with strong cybersecurity systems may experience security breaches; consequently, their ability to respond quickly and restore affected services becomes important to limiting financial and operational losses. Yan Azura et al. (2025) emphasise that effective cyber risk management should incorporate response and recovery capabilities alongside preventive mechanisms. Their argument indicates that cybersecurity resilience depends not only on preventing attacks but also on an institution's ability to limit the consequences when an attack occurs. Aldasoro et al. (2022) similarly demonstrate that cyber incidents can generate operational disruptions and financial consequences for financial institutions, making resilience and recovery important elements of financial-sector risk management. Within Nigeria, Okikiola et al. (2026) argue that financial institutions require more proactive and integrated cybersecurity measures to address the evolving nature of financial fraud. Effective incident response allows banks to isolate compromised systems, block suspicious accounts, investigate security breaches and restore secure services. Recovery

mechanisms, including reliable backups and business-continuity arrangements, can further reduce the potential consequences of cyber incidents. The relevance of incident response and recovery to fraud prevention is therefore not limited to what happens after fraud has occurred. A rapid and coordinated response can prevent an initial cyber breach from developing into extensive financial fraud. Effective cyber incident response and recovery should consequently strengthen the capacity of Nigerian banks to contain cyber-enabled fraud and minimise the financial consequences of successful attacks.

Empirical Literature

Empirical studies have increasingly established the importance of cybersecurity mechanisms in preventing fraud within the banking sector. As banking operations become more dependent on digital platforms, the relationship between cyber risk management and fraud prevention has attracted considerable research attention. Fatoki (2023) examined the influence of cybersecurity on financial fraud in the Nigerian banking industry using data obtained from 557 bank employees across six banks. The study found that measures such as security audits, multi-factor authentication, biometrics, antivirus and anti-malware systems, and automatic logout were important in addressing financial fraud. The study further emphasised the need for stronger monitoring and cybersecurity awareness among banking personnel. This finding establishes that cybersecurity mechanisms can reduce opportunities for fraudulent activities. However, Fatoki's study examined cybersecurity broadly without separating the risk-management process into identification, assessment, controls, monitoring, and incident response. Building on this position, Onajero (2025) investigated the role of information systems controls in fraud-risk prevention among quoted deposit money banks in Nigeria. The study examined application security controls, access/authentication controls and network security controls and found positive relationships between these controls and fraud-risk prevention. The findings are important because they move the discussion from cybersecurity generally to specific mechanisms through which banks can protect their systems and financial transactions. In particular, the study provides empirical support for the argument that cybersecurity controls constitute an important component of fraud prevention. Nevertheless, its focus remained largely on technological controls and did not consider the broader process of identifying and assessing cyber risks before controls are implemented. This limitation suggests the need to examine cyber risk management from a more comprehensive perspective.

In a related study, David et al. (2025) examined cybersecurity threats and fraud detection among selected Nigerian banks, focusing on cloud security, application security and network security. Using a survey design and data obtained from employees of selected tier-one banks, the researchers found that cybersecurity mechanisms were relevant to controlling technology-related fraud. Their findings complement Onajero's (2025) study by demonstrating that different layers of technological protection can contribute to fraud detection and control. However, while Onajero concentrated on information systems controls and David et al. concentrated on specific security technologies, neither study sufficiently examined continuous cybersecurity monitoring and incident response and recovery as components of a broader cyber risk management framework. Thus, the existing evidence points toward the need for a more integrated approach to cyber risk management. Further evidence is provided by Okikiola et al. (2026), who examined the role of cybersecurity in mitigating financial fraud in Nigeria's banking sector. The study focused on selected commercial banks and found that banks employ measures such as multi-factor authentication, system and software updates, staff training, firewalls and encryption to reduce

unauthorised access and internal threats. Importantly, the researchers identified inadequate real-time monitoring as a continuing challenge to effective fraud prevention. This finding extends the earlier studies because it demonstrates that the mere presence of cybersecurity controls may not be sufficient; banks must also continuously monitor their systems to identify suspicious activities and emerging threats. The study therefore provides empirical justification for treating continuous cybersecurity monitoring as a distinct dimension of cyber risk management.

The importance of an integrated cybersecurity approach is further demonstrated by Obi and Obiakor (2026), who examined cybersecurity and fraud prevention in the Nigerian banking sector, with particular attention to institutional cybersecurity frameworks, biometric verification, multi-factor authentication and cybersecurity awareness. Their findings indicate that cybersecurity mechanisms can contribute to reducing the likelihood of fraudulent activities. However, the study also suggests that the effectiveness of technological safeguards depends on how they are implemented and used by employees and customers. This observation is significant because it connects cybersecurity technologies with the wider organisational processes required to make those technologies effective. Unlike studies that concentrate on individual security tools, the present study considers cyber risk management as a continuing process involving identification, assessment, control, monitoring and response.

The findings of these studies can be linked together to demonstrate a progressive development in the empirical literature. Fatoki (2023) established the general importance of cybersecurity in reducing financial fraud; Onajero (2025) subsequently demonstrated the contribution of specific information-system controls; while David et al. (2025) provided further evidence concerning application, network and cloud security. Okikiola et al. (2026) extended the discussion by highlighting the importance of real-time monitoring and the limitations that arise when monitoring is inadequate. Obi and Obiakor (2026) further demonstrated that cybersecurity frameworks and authentication mechanisms can support fraud prevention, while also highlighting the importance of effective implementation.

Conclusion and Recommendations

The rapid digital transformation of the Nigerian banking sector has significantly improved the speed, accessibility, and convenience of financial services, but it has also increased banks' exposure to cyber-related threats and technology-enabled fraud. A cyber risk management framework provides banks with a structured approach for identifying, assessing, monitoring, mitigating, and responding to cyber threats. It encompasses practices such as cybersecurity governance, risk assessment, access control, continuous monitoring, incident response, and recovery. The study recommended thus:

1. Nigerian banks should strengthen their cyber risk identification mechanisms by conducting regular vulnerability assessments, threat identification, system audits, and cybersecurity reviews. This will enable banks to identify potential points of fraudulent exploitation early and take preventive measures before cyber threats result in financial losses.

2 Banks should institutionalise regular and comprehensive cyber risk assessments across their digital banking platforms, payment systems, information assets, and third-party service providers. Identified high-risk areas should be prioritised for immediate corrective action to reduce opportunities for cyber-enabled fraud.

3. Nigerian banks should continuously strengthen their cybersecurity controls through multi-factor authentication, effective access controls, encryption, transaction limits, segregation of duties, and

privileged-access management. These controls should be regularly tested and updated to ensure that fraudsters cannot easily exploit weaknesses in banking systems.

4. Banks should improve continuous monitoring of electronic transactions, networks, customer accounts, and user activities through real-time surveillance and appropriate analytics. Suspicious transactions and unusual behavioural patterns should trigger immediate alerts and investigation to facilitate early fraud detection and prevention.

5. Nigerian banks should develop and regularly test comprehensive cyber incident response and recovery plans. Such plans should provide clear procedures for detecting, containing, investigating, reporting, and recovering from cyber incidents. Rapid response will help minimise financial losses and prevent compromised systems from being used for further fraudulent activities.

References

Aldasoro, I., Gambacorta, L., Giudici, P., & Leach, T. (2022). The drivers of cyber risk. *Journal of Financial Stability*, 60, 100989.

Basel Committee on Banking Supervision. (2021). *Principles for operational resilience*. Bank for International Settlements.

Central Bank of Nigeria. (2018). *Risk-based cybersecurity framework and guidelines for deposit money banks and payment service providers.* Central Bank of Nigeria.

Central Bank of Nigeria. (2022). *Risk-based cybersecurity framework and guidelines for other financial institutions.* Central Bank of Nigeria.

Cohen, L. E., & Felson, M. (1979). Social change and crime rate trends: A routine activity approach. *American Sociological Review, 44*(4), 588–608.

David, A. A., et al. (2025). Cybersecurity and fraud control in Nigerian banking institutions. *International Journal of Innovative Research and Development*, *2*(2), 23-32.

David, S., Offia, A. C., & Ekwunife, E. N. (2025). Cyber security threats and fraud detection: A study of selected banks in Nigeria. *Journal of Accounting and Financial Management, 11*(11), 269–290.

Fatoki, J. O. (2023). The influence of cyber security on financial fraud in the Nigerian banking industry. *International Journal of Science and Research Archive, 9*(2), 503–515.

Javaheri, D., Fahmideh, M., Chizari, H., Lalbakhsh, P., & Hur, J. (2024). Cybersecurity threats in FinTech: A systematic review. *Expert Systems with Applications,* 241, 122697.

Mabunda, S. (2024). Applying the Routine Activities Theory to cybercrime: A 'cyber' capable guardian. *Journal of Anti-Corruption Law,* 8, 60–84.

Obi, O. A., & Obiakor, J. (2026). Cybersecurity and fraud prevention in the Nigerian banking sector. *International Journal of Functional Research in Arts and Humanities*, *1*(1), 23-44

Okikiola, F. M., Arogundade, T. S., Onadokun, I., Oladiboye, O. E., & Adetunji, S. K. (2026). Strengthening financial integrity: The role of cybersecurity in mitigating financial fraud in Nigeria's banking sector. *FUDMA Journal of Sciences, 10*(2), 175–183.

Onajero, O. (2025). The role of information systems controls in fraud risk prevention in financial institutions: A study of quoted deposit money banks in Nigeria.

Parti, K. (2023). What is a capable guardian to older fraud victims? Comparison of younger and older victims' characteristics of online fraud utilizing routine activity theory. *Frontiers in Psychology*, 14, 1118741. https://doi.org/10.3389/fpsyg.2023.1118741

Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.

Yan Azura, Y. T., Azad, M. A., & Ahmed, Y. (2025). An integrated cyber security risk management framework for online banking systems. *Journal of Banking and Financial Technology, 9*, 85–104.

Yassin, A., & Almaiah, M. A. (2026). Cybersecurity threats and countermeasures in modern banking systems. *International Journal of Cybersecurity and Information Engineerin, 2(1)*,11-21