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## Approaches to a secure, sustainable, and diversified Nigerian economy in a cashless society

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### Abstract

The pervasive reliance on cybersecurity innovations by enterprise organizations for secure electronic file-sharing networks across all business transactions is critical to realizing Nigeria's sustainable diversified economy (SDE) for long-term economic growth. According to the literature, people are increasingly moving away from using cash for transactions as a result of technological advances, with only 32% of payments involving cash in the United States, 53% in the Middle East, Africa, and Nigeria, and a comparably low 58% identifying going cashless as their preferred option. Although card payments are widely preferred worldwide, Nigerians continue to be among the most likely people to keep money in their homes rather than adopting the ongoing cashless trend; the estimated percentage of cash that is kept outside of the banking system relative to the total amount of cash in circulation in the Nigerian economy is 85%. Poor organizational systems, enterprises, risks, and security threats further impede the transition from a cash-dominated economy to a cashless economy. In the age of cashless transactions, this study outlines tactics for a safe, diversified, and sustainable Nigerian economy. The conceptual framework for this study was chosen to be the security of Enterprise Information Systems (EIS). The author conducted a narrative review of previous studies and peer-reviewed articles published in the last five years, and the findings provided important insights into how to manage information security systems for organizations in a cashless economy. The findings suggest that effective adherence to security policies, control over policy enforcement, and enterprise definitions to leverage a sustainable, diverse economy can prevent or mitigate organizational security issues. The study's conclusions broaden appropriate security management procedures and preventative measures for Nigeria's transition to cashless transactions

**Keywords:** Security enterprise definition; Cybersecurity challenges; Sustainable diversified economy; Cashless economy; Security threats; Enterprise security policies; Payment Card Industry Data Security Standards

### 1. Introduction

Nigeria, as one of Africa's greatest economies, has witnessed substantial economic growth over the years, primarily due to its oil and gas sector. However, the country has security, sustainability, and economic diversification concerns. Nigeria has been actively migrating to a cashless society in recent years, supporting electronic transactions and digital payments to increase efficiency, transparency, and financial inclusion. The transition to a cashless economy has various advantages, including reduced dangers associated with physical cash handling, more financial inclusion, and increased economic output. However, this transition brings with it new issues that must be addressed to ensure the Nigerian economy's security, sustainability, and diversification. Nigerians are most likely to be among the largest populations that keep money in their homes rather than following the current cashless trend [21], and [30]. Statistics show that outside of commercial banks' vaults, more than 85% of the cash in circulation is in Nigeria's economy [30]. This could be due to ignorance or illiteracy. Furthermore, poor organizational systems, security risks, and hazards make the shift from a cash-dominated economic environment to a cashless economy even more difficult as technology becomes more

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ubiquitous with interconnected and interdependent facilities. The reliance on digital transactions exposes individuals, businesses, and financial systems to cyberattacks, fraud, and data breaches, which remains a major anxiety [43]. Adopting a cashless economy will require ensuring the strength of security measures and fostering public confidence in digital payment systems. Sustainability is yet another important factor to take into account.

The oil and gas industry has historically been a major source of income for Nigeria's economy, but it also carries risks because of the country's vulnerability to changes in global oil prices and environmental issues. Diversification into other industries, such as manufacturing, services, technology, and agriculture, is necessary for a sustainable economy to lower vulnerability and advance long-term economic stability. Developing approaches that work is essential if Nigeria is to have a cashless economy that is diversified, secure, and sustainable. These approaches ought to tackle the problems posed by security risks, advance sustainable economic principles, and stimulate industry diversification. By implementing these approaches into practice, Nigeria can improve the general well-being of its people, draw investments, increase employment opportunities, and strengthen its economy. This background information provides a contextual understanding of the opportunities and challenges associated with Nigeria's transition to a cashless economy, in addition to highlighting approaches for a secure, sustainable, and diverse Nigerian economy in the cashless era. This study sheds light on the particular security, sustainability, and diversification challenges that Nigeria's economy is facing as it moves towards becoming a cashless society. It highlights the detrimental effects of these challenges on economic growth and stability as well as the necessity of developing solutions to deal with them and promote a more stable, sustainable, and diverse economy [7]. The objectives of this research are to delve into different facets of the problem statement and offer analysis, recommendations, and insights for resolving the issues the Nigerian economy is facing as it moves towards a cashless society.

### **1.1. Problem Statement**

As Nigeria moves toward becoming a cashless society, it is currently experiencing difficulties with sustainability, diversification, and security. These challenges hinder economic stability, growth, improvement, and resilience, requiring the development and implementation of effective strategies to ensure a secure, sustainable, and diversified economy that can thrive in the cashless era

### **1.2. Conceptual Framework**

Enterprise Information Systems (EIS) security was adopted as the conceptual framework for this study. The term "Enterprise Information Systems (EIS)" refers to integrated software applications that support a variety of business processes and functions within a company. These systems typically include a variety of functionalities, such as resource planning, customer relationship management, supply chain management, and human resource management [57]. Enterprise Information Systems (EIS) are defined as "large-scale software packages that support business processes, information flows, reporting, and data analytics in complex organizations" [35]. The Enterprise Information Systems (EIS) security conceptual framework provides a systematic approach to ensuring the security of information systems within an organization. In the context of cybersecurity in a cashless era, EIS encompasses various components and principles to guide the design, implementation, and management of information security encompasses various components and principles to guide the design, implementation, and management of information security [5], [26], and [33]. As identified by researchers, these components included: governance and policy, which establishes rules, regulations, and decision-making processes to ensure effective management, control, and alignment of information systems within an organisation [18]. Risk management is the identification, assessment, and mitigation of risks associated with an organization's information systems with the goal of protecting assets, minimising vulnerabilities, and ensuring business continuity [31], in the context of EIS, secure payment systems are those that use secure technologies, protocols, and practices to protect sensitive payment information, secure financial transactions, and stop fraud [20], and threat intelligence and monitoring to proactively collect, examine, and keep an eye on data regarding possible dangers and weaknesses to the company's information networks in order to successfully prevent security incidents and address them when they arise [32], and [59]. Additional components include vendor and supply chain security, incident response and business continuity, user awareness and training, data privacy and compliance. These elements collectively address the unique issues and concerns related to the growing reliance on digital transactions and financial systems [14], [25], and [58].

In order to ensure a diversified and sustainable economy, it is imperative that digital payment systems and financial inclusion be made accessible. Ensuring that a large number of people and businesses adopt the cashless economy guarantees that everyone has an equal chance to reap the benefits of financial services and digital transactions. Increased financial inclusion may be achieved, as suggested by [44], via extending the availability of mobile banking services, creating agent networks, and putting in place financial education initiatives. These initiatives have the potential to bring banking services to remote and underserved areas, allowing people to participate in the formal

financial system and access a variety of digital payment options. Enhancing financial inclusion and access to digital payment systems is one critical approach to securing a sustainable and diverse economy in Nigeria's cashless era [10], [8], and [12], which emphasises the importance of improving access to banking services and promoting financial literacy as key factors for achieving financial inclusion in the cashless era. Improving access to banking services and promoting financial literacy among underserved populations is critical to ensuring that all citizens participate in the cashless economy in an equitable manner.

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## 2. Literature Review

Research from the literature showed that by educating people and companies on how to successfully navigate the cashless ecosystem, gaps in the security of a sustainable, diversified economy in the cashless era may be filled [37], [45], and [47]. This empowerment is accomplished by offering comprehensive financial education programmes to support the adoption of cashless payment systems [13], [17], [29], and [51]; enabling people to acquire the knowledge and abilities needed to make wise financial decisions through financial literacy [3], [23], and [56]; securely managing digital transactions [10], [12], and [42]; and taking advantage of digital payment systems in a cashless era [11], [40], and [41]. Governmental organisations, financial institutions, and other stakeholders need to collaborate together to promote financial inclusion and access [4], [9], and [52]. In order to increase the accessibility of digital financial services, the importance of collaborations between banks, telecom providers, and technology companies is emphasized. These collaborations can remove obstacles to entry and offer creative ways to reach underprivileged communities by utilizing already-existing networks and infrastructure.

Strengthening cybersecurity measures is imperative as Nigeria moves towards a cashless economy because it's a critical defence against fraud in digital payment systems and cyber threats [6], and [43]. Resilient cybersecurity measures aid in defending against cyber threats and fraud, thereby guaranteeing the security and integrity of digital payment transactions, as claimed by [39] and [15]. Furthermore, effective cybersecurity protocols employ safeguards to guarantee the confidentiality and integrity of digital payment transactions [5], and [46]. They also foster cooperation, awareness-raising, and preventative actions to mitigate cybersecurity risks and safeguard users and organisations within the digital payment ecosystem [2], and [28]. In addition to protecting the financial infrastructure, bolstering cybersecurity measures also promotes user experience improvements, trust-building strategies, and user confidence [48], and [54]. It also makes it easier for digital payment systems to be widely adopted and offers cybersecurity strategies, user experience improvements, and trust-building measures to improve the security and dependability of digital payment platforms [50]. Cybersecurity frameworks play a critical role in reducing risks associated with the cashless economy and in identifying potential points of compromise and vulnerabilities in digital payment systems through regular risk assessments. Financial institutions and other stakeholders can put in place suitable security measures and fix vulnerabilities before they can be exploited by proactively assessing risks. The security risks connected to mobile and digital payment platforms are assessed and managed using a variety of risk assessment frameworks, approaches, and strategies. They include, among others, OCTAVE (Operationally Critical Threat, Asset, and Vulnerability Evaluation), a risk assessment framework developed by CERT (Computer Emergency Response Team), STRIDE (Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service, Elevation of Privilege), CVE (Common Vulnerabilities Exposures) DREAD (Damage, Reproducibility, Exploitability, Affected Users, Discoverability), CVSS (Common Vulnerability Scoring System) that focuses on identifying and prioritizing information security risks, and others [16], and [36], which collectively assist organisations in assessing risks, vulnerabilities, and potential threats in a system or application. Several researchers have suggested the use of encryption technologies and protocols, such as Secure Sockets Layer (SSL) and Transport Layer Security (TLS), to protect data transmission between users and payment systems [1], [15], and [39], provide confidentiality and integrity, and safeguarding sensitive information and preventing unauthorized access [15], and [39]. Encryption technologies are critical to ensuring the security of digital transactions [1].

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## 3. Methodology

In this study, the author adopted a narrative review approach to examine important information based on existing systems centered on ensuring a sustainable, diverse economy in a cashless era. By summarising and synthesising existing literature in a narrative format, the narrative review methodology aims to provide a comprehensive and interpretive summary of existing literature on a specific topic [27], [34], and [53]. It entails synthesising and analysing prior research findings, typically in the form of narrative descriptions, in order to investigate key themes, trends, and gaps in the literature. Unlike systematic reviews, which adhere to a strict protocol, narrative reviews allow for greater flexibility in study selection and data extraction. The author likewise reviewed, analyzed, and synthesized prior research findings. A narrative review is often adopted where analysis and synthesis of different and related research findings are

required to draw nuanced understanding, and holistic interpretations or conclusions based on the reviewers' own experience, existing theories, and models [24]. This approach allows for reflexivity, the inclusion of multiple sources of data, including both quantitative and qualitative research, and exploring collaboration, and complex and multifaceted topics with participants throughout the research process [19], [34], and [55]. Narrative reviews have the ability to promote a more nuanced understanding of review methodologies by synthesising diverse evidence and providing rich contextual insights. The narrative methodology explicitly explained the methodological commitments of narrative inquiry by adopting the search criteria that explicitly included in the review process, keywords and term identification, article identification, quality assessment, data extraction, and data synthesis. Data triangulation methods were adopted to gain a comprehensive understanding of the approaches for a secured sustainable diversified Nigeria economy in a cashless era, while also considering the objectives of the study. Data triangulation involves using multiple sources or methods to collect data on the same topic, in order to gain multiple perspectives for maximizing reliability and validation of data and findings to build coherent justification of data interpretation that relates to the study case or phenomenon. [22], [38], and [49].

### 3.1. Data Collection

Data were gathered through narrative reviews of peer-reviewed journals on approaches to ensuring a diverse and sustainable economy in a cashless era. This method can be used to gain insight into a comprehensive and interpretive summary of existing literature on a specific topic, as indicated by [19]. The author reviewed a couple of findings that came from peer-reviewed, and other related texts from the ProQuest databases, ScienceDirect, PubMed, Google Scholar, ACM Digital, JSTOR, and EconLit among others databases. Phrases and terms were used as key search words in the databases for related literature on approaches to securing a sustainable diversified economy in a cashless era. Data were also collected from relevant documents including interviews with focal groups. The reviews incorporated 54 references. Ninety-three per cent (93%) of the total references incorporated in the study are peer-reviewed, while (94%) are peer-reviewed journals that are within the last 5 years.

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## 4. Discussions

The study's findings suggest the following approaches for a secure, diverse, and sustainable Nigerian economy in a cashless society. To combat cyber threats and protect digital transactions, cybersecurity infrastructure should be implemented and strengthened by investing in advanced technologies, establishing robust security protocols, and encouraging collaboration. To ensure a secure and trustworthy cashless environment, stakeholders should implement and establish clear and comprehensive regulations and guidelines for digital financial services, including anti-money laundering (AML) and counter-terrorism financing (CTF) measures, data protection, and consumer rights, Authentication, Authorization, and Accounting (AAA) security framework to regulate access to computer financial resources, upholds rules, and audits usage. Stakeholders should adopt and develop sophisticated fraud detection systems that use artificial intelligence (AI) and machine learning algorithms to detect and mitigate fraudulent activities in digital transactions, thereby protecting individuals and businesses from financial losses. It is vital to promote and carry out widespread financial education campaigns, financial literacy, and cybersecurity awareness campaigns to educate the Nigerian population about the benefits, risks, and responsible use of digital financial services. Individuals will be able to make more informed decisions and protect themselves from fraud and scams as a result of this. The efficiency, reliability, and security of payment systems in Nigeria may be improved by strengthening payment infrastructure and financial literacy levels. This approach suggests using well-defined interface development processes to create user-friendly and acceptable digital wallets, online payment gateways, and mobile money platforms by investing in infrastructure development, adopting international standards (Protecting Cardholder Data with Payment Card Industry Data Security Standards (PCI DSS)), and promoting interoperability. This finding is consistent with the findings from previous studies as well as the study's conceptual framework. In order to guarantee efficient management, control, and alignment of information systems within an organisation, the government should promote cooperation and public-private partnerships that complement governance and policy that create rules, regulations, and decision-making procedures. This finding aligns with the study's conceptual framework since these tactics, when applied comprehensively and under sound governance, can help Nigeria develop a safe, long-lasting, and diverse cashless economy.

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## 5. Conclusion

This study highlighted the vital approaches needed to improve a secured, sustained, and diversified cashless economy in Nigeria through financial education initiatives, digital device cybersecurity awareness, and the implementation of these standard security frameworks: counter-terrorism financing (CTF) measures, general data protection and consumer rights, authentication, authorization, and accounting (AAA), e.t.c. Furthermore, Nigeria's cashless society

cannot be secured without the participation of government stakeholders to ensure that financial institutions adhere to the Payment Card Industry Data Security Standards (PCI DSS) compliance policy for cardholder data protection. Once these approaches discussed are implemented, it will encourage the populace to embrace the transition to a cashless economy.

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### Author short biography

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She is a graduate of Computer Science from Federal Polytechnic Oko and also has a PGD and Masters in Computer Science from Nnamdi Azikiwe University Awka. Basically, with over ten years of professional teaching experience in Computer Sciences at the Polytechnic level and over five years of research experience for numerous projects in the field, she enjoys solving problems and is always on the lookout for new information, one who strives to accomplish development goals despite time constraints by delivering top-notch outcomes. Research Areas include Cybersecurity and cyber threat intelligence.

