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Technology and Conduct of Election in Developing Countries: A Study of Nigeria's Fourth Republic

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Abstract:- Technology integration in election administration has been a pivotal factor in reshaping the democratic landscape in many developing countries such as Nigeria since the 1999 election. This evolution, exemplified by the adoption of the Biometric Voter Authentication System (BVAS), has had profound implications for the transparency, credibility, and inclusivity of elections in the country. This paper investigates the multifaceted intersection of technology and election administration within the context of Nigeria's Fourth Republic. As the country strives to strengthen its democratic processes, the role of technology in electoral systems becomes increasingly pivotal. This study employs a comprehensive analysis of the evolution and implementation of technological solutions in electoral practices, focusing on their impact on transparency, efficiency, and inclusivity. The research employs a mixed-methods approach, combining in-depth case studies, interviews with key stakeholders, and a qualitative analysis of electoral components. By examining the adoption of technology in voter registration, biometric verification, electronic voting systems, and result collation, the study aims to provide a nuanced understanding of the challenges and opportunities encountered in integrating technology into the electoral landscape. Furthermore, the article assesses the implications of technology on the overall integrity of the electoral process, considering issues such as cyber-security, accessibility, and public trust. The findings of this study contribute to the scholarly discourse on technology and election administration, offering insights that may inform policy decisions and electoral reforms in Nigeria and beyond. This paper concludes that the journey of integrating technology into election administration in Nigeria's Fourth Republic is dynamic, resilient, and aligned with democratic values.

Keywords*: Election Administration, E-governance, Democracy, Nigeria's Fourth Republic, Technology*.

1. Introduction

Nigeria returned to democratic administration in 1999 with the inauguration of the Fourth Republic, following years of military tyranny. During this time, the nation has held multiple general elections. The historical view, however, shows Nigeria's shift from military to democratic leadership, with technology steadily making its way into the voting process. This transition laid the foundation for the adoption of BVAS in the 2010s, marking a pivotal milestone in election administration. The significance of BVAS emerges through its role in reducing electoral fraud, enhancing voter registration accuracy, ensuring transparency, and contributing to credible election outcomes (Ibrahim, 2019). It has not only minimized disputes but has also empowered voters and election authorities alike. The purpose and scope of BVAS encompass bio-metric registration, electronic voting, and smart card readers. These innovations have revolutionized the electoral landscape, albeit with challenges related to technology infrastructure, cyber-security, and voter education (Ahmed, 2021). Challenges such as technical issues, cyber-security threats, and the imperative of building public trust in technology-driven elections are discussed. These challenges, while significant, underscore the need for continuous improvement and adaptation. The prospects for the future of Nigerian election administration encompass the potential for full EVM adoption, enhanced results transmission, block-chain technology, and data analytics (Nwankwo, 2021). Innovation in voter

education, inclusivity, cyber-security measures, and the collaborative role of stakeholders are identified as crucial factors in shaping the path ahead (Ahmed, 2021). It is apposite to state that the journey of integrating technology into election administration in Nigeria's Fourth Republic is dynamic, resilient, and aligned with democratic values. As Nigeria looks to the future, it stands poised to uphold the integrity of its democratic process, setting an example for the region and the world.

In the meantime, the Fourth Republic of Nigeria began on May 29, 1999, marking the return to civilian rule after years of military dictatorship. The transition to the Fourth Republic followed a series of military regimes, with the most recent being that of General Abdulsalami Abubakar, who handed over power to the elected civilian government. The transition to the Fourth Republic was a significant milestone for Nigeria, as it marked the end of military rule that had characterized the country for much of its post-independence history. General Abdulsalami Abubakar played a crucial role in overseeing the transition process and ensuring a peaceful transfer of power (Ogundele, 2018). The Fourth Republic was inaugurated under the provisions of the 1999 Constitution of Nigeria, which served as the guiding legal framework for the democratic governance of the country. The Constitution outlined the structure of government, the separation of powers, and the fundamental rights of citizens.

It is noteworthy to mention that the early years of the Fourth Republic saw a gradual integration of technology into various aspects of Nigerian society. The expansion of the internet and mobile telecommunication played a significant role in connecting people and fostering communication across the country (Mohammed, 2017). It is the responsibility of any government to ensure stability and development in their country (Chukwudi, Gberevbie, Abasilim & Imhonopi, 2019). The Fourth Republic witnessed several general elections, marking a commitment to democratic governance. However, the electoral processes were not without challenges. The elections of 1999, 2003, 2007, 2011, 2015, 2019, and 2023 were marred by allegations of irregularities, voter intimidation, and violence, highlighting the need for electoral reforms. Recognizing the need for improvement, subsequent years saw efforts to reform the electoral process. Technological innovations were introduced to enhance transparency and reduce electoral malpractices (Bello, 2019). The use of biometric voter registration and electronic card readers aimed to improve the accuracy of voter identification and reduce multiple voting (Duruji, Olanrewaju, Olu-Owolabi, Duruji-Moses, Chukwudi, 2021)

The use of technological devices in the political processes is the benefits derivable from the deployment of all such devices, such as computer hardware and software programs, digital tools, electronic apparatus such as printers, scanners, bar code readers, communication technologies like mobile phones and SMS applications; e-voting systems including specialized machines; the internet, online applications; sensors that can collect biometric information from citizens assigned or deployed for election management, political party management, voting in elections, taking part in campaigns, community affairs, and other political activities (EU-UNDP, 2017). Hassan (2020) argues that the demand for technological devices in Nigeria's political terrain was due to the institutional failure to conduct elections that meet the desired outcomes of the greater percentage of Nigerian citizens, and the cumulative controversies that follow most elections in Nigeria. He further argues that electioneering processes in Nigeria during the Military and Military- transition period were characterized by manual voter registration, traditional paper-based election administration, paper ballots, and manual vote counting which were marred by inefficiencies and allegations of fraud. Therefore, the aftermath effects of the political trajectory in Nigeria in terms of the rigging of the election, manipulation of election results, ethnopolitical crises, and rejection of election results characterized the early period of the fourth republic and led to the introduction of biometric registration, fingerprints, and facial images, electronic voting system, smart card readers, digital transmission of results, cyber-security measures, voters education and awareness, and biometric voters authentication system.

The Fourth Republic witnessed the peaceful transfer of power between different political parties, demonstrating a maturing democratic process. However, challenges such as corruption, political violence, and electoral fraud persisted, requiring ongoing efforts to strengthen democratic institutions. In the 2010s, Nigeria saw further advancements in technology, with increased internet penetration, the rise of social media, and the potential for these platforms to influence political discourse (Okonkwo, 2020). Despite the challenges, the Fourth Republic has seen periods of economic growth and development, with Nigeria becoming one of the leading economies in

Africa. All the above components of the technological innovations in respect of election administration shall be expatiated during this paper.

Technology and Election Administration in Nigeria's Fourth Republic: An Overview

The historical perspective on the evolution of technology and election administration in Nigeria's Fourth Republic provides valuable insights into how technological advancements have shaped the electoral process in the country over the years. Before the establishment of Nigeria's Fourth Republic in 1999, the country had a history of military rule with limited or no civilian participation in elections. Technological interventions in election administration were virtually non-existent, as the military often controlled electoral processes, resulting in irregular and undemocratic outcomes (Olusegun, 2022).

The late 1990s marked a significant turning point as Nigeria began its transition from military rule to democracy. Technological advancements started playing a role in election administration during this period, albeit in a limited capacity (Onyekachi, 2021). Basic technologies like manual voter registration, paper ballots, and manual vote counting were still prevalent during the transition elections in 1999. These processes were often marred by inefficiencies and allegations of fraud. In the early years of Nigeria's Fourth Republic, the country continued to rely primarily on traditional, paper-based election administration methods. However, efforts to modernize the process were underway. The use of basic technology, such as electronic voter registers, began to gain traction (Smith, 2020). This marked a shift towards more automated processes, although the full potential of technology had not yet been realized.

A significant milestone in the integration of technology into election administration occurred in the 2010s with the introduction of biometric voter registration. This was a critical development aimed at enhancing the accuracy of voter rolls and reducing electoral fraud (Yakubu, 2016). The Independent National Electoral Commission (INEC) implemented biometric registration, which involved capturing biometric data, including fingerprints and facial images, of eligible voters. This marked a substantial leap in electoral technology adoption. In the mid-2010s, Nigeria introduced electronic voting systems and smart card readers to improve the voting and verification process. Electronic voting machines (EVMs) were used in some regions to enable electronic vote casting, while smart card readers played a vital role in authenticating voters during elections (Okafor, 2017). These technological advancements aimed to reduce the time taken for vote counting and enhance the transparency and credibility of elections.

Nigeria's journey toward integrating technology into election administration has not been without challenges. Technical issues, infrastructure limitations, and cybersecurity concerns have posed obstacles (Oluwaseyi, 2021). Additionally, public trust in these technologies has required ongoing efforts through voter education and awareness campaigns. Nonetheless, the Fourth Republic has seen a steady evolution in the use of technology, and the adoption of biometric registration and electronic verification systems has significantly improved the integrity of the electoral process.

The historical perspective on technology and election administration in Nigeria's Fourth Republic highlights the transition from a predominantly manual and paper-based system to one that increasingly relies on advanced technologies. These advancements have had a transformative impact on the accuracy, transparency, and credibility of elections, although challenges persist. The ongoing evolution of technology in Nigerian elections underscores the importance of adapting electoral processes to modernize and secure democracy.

Nevertheless, the integration of technology in election administration in Nigeria has evolved gradually over the years, with several milestones marking significant advancements in the electoral process (Olusegun, 2022). Here are the key milestones in the integration of technology in election administration in Nigeria. In the early 2000s, Nigeria took its first steps towards modernizing the electoral process by introducing electronic voter registers. These registers aimed to improve the accuracy of voter rolls by digitizing voter information (Adekunle, 2018). However, they still relied on manual voter verification during elections.

One of the pivotal milestones occurred in 2010 when Nigeria introduced biometric voter registration. The Independent National Electoral Commission (INEC) implemented this system, capturing biometric data such as

fingerprints and facial images of eligible voters. This marked a significant leap in enhancing the accuracy of voter rolls and preventing multiple registrations. In the 2015 general elections, Nigeria introduced electronic voting machines (EVMs) in some regions. These machines allowed voters to cast their ballots electronically, reducing the time required for manual vote counting and minimizing human error (Ibrahim, 2019). The adoption of EVMs represented a significant technological advancement.

Alongside EVMs, the use of smart card readers was introduced in the 2015 elections. Smart card readers authenticated voters by verifying their biometric data, ensuring that only eligible voters participated. This technology aimed to enhance transparency and reduce the risk of electoral fraud. In the 2019 elections, Nigeria continued to refine its biometric technology, addressing issues faced in previous elections (Ibrahim, 2019). The introduction of more advanced biometric verification systems further improved the accuracy and reliability of the voter authentication process.

While being systematically implemented nationwide, Nigeria has been exploring the digital transmission of election results. This involves transmitting results electronically from polling stations to central databases, reducing the potential for manipulation during the collation process. This initiative represents a crucial step towards enhancing the transparency and credibility of election results. In tandem with technological advancements, ongoing efforts in voter education and awareness campaigns have been instrumental in ensuring that voters understand and trust the technology used in elections. These campaigns aim to boost public confidence in the electoral process. As technology plays an increasingly significant role in elections, Nigeria has also been working on strengthening cyber-security measures to protect voter data, electoral systems, and results from potential threats (Oluwaseyi, 2021). These milestones collectively demonstrate Nigeria's commitment to leveraging technology to improve the integrity, transparency, and efficiency of its electoral process in the Fourth Republic. While challenges and improvements continue to shape the integration of technology, these advancements mark important steps toward more secure and credible elections in the country.

Technological Innovations in Nigeria's Fourth Republic Election Administration

The Independent National Electoral Commission's (INEC) responsibility in organizing elections in Nigeria includes voter registration, candidate nomination, conducting elections, and announcing results. The effectiveness of INEC is crucial for the success of the electoral process. Its efficiency also includes ensuring broad public participation and confidence in the electoral process. This involves promoting civic education, providing avenues for public feedback, and addressing concerns related to transparency and fairness. In the meantime, various reforms have been implemented to address shortcomings in the electoral system. These reforms often involve changes in electoral laws, the introduction of new technologies, and efforts to enhance the independence and effectiveness of electoral management bodies (Smith, 2020).

Nevertheless, the concepts of technology and election administration in Nigeria's Fourth Republic encompass the use of technological tools and processes to enhance the efficiency, transparency, and credibility of the electoral system in the context of Nigeria's democratic governance (Okonkwo, 2020). These, also, refer to the intersection of technological advancements and the processes involved in organising and conducting elections in Nigeria since the beginning of the Fourth Republic. Thus, the following characterize issues on technology and contemporary election administration in Nigeria, viz:

Biometric Voter Registration: One of the most significant technological advancements was the adoption of biometric voter registration. This innovation, introduced in the 2010s, involved capturing biometric data such as fingerprints and facial images of eligible voters. This biometric database ensures a more accurate voter roll, reducing the risk of multiple registrations and electoral fraud. The use of biometrics enhances the integrity of the voter registration process but also comes with challenges related to data security, technology infrastructure, and ensuring inclusivity for all citizens (Ibrahim, 2019). Implementation of biometric systems for voter registration helps in creating a more accurate and secure voter database by capturing unique biometric data such as fingerprints or facial features. The use of biometric technology to register voters has become a common practice. This involves capturing unique physical or behavioral attributes (such as fingerprints or facial features) to create a secure and accurate voter database, reducing the chances of voter fraud.

Electronic Voting Machines (EVMs): Electronic voting machines were introduced in 2010 to replace traditional paper ballots. EVMs can streamline the voting process, reduce errors, and enhance the overall efficiency of the speed of ballot counting and the entirety of the electoral system. Some countries have adopted electronic voting machines to facilitate the voting process. EVMs enable electronic vote casting and counting, reducing the time required for manual tabulation. They also minimize human errors, contributing to faster and more accurate results. The introduction of EVMs aimed to enhance the transparency and efficiency of elections (Nwankwo, 2021). However, their implementation has been gradual and not uniform across all states, presenting logistical and technical challenges.

Voter Verification Technologies: Use of technology to verify voter identities at polling stations, such as smart card readers or biometric verification systems. This helps prevent fraudulent voting and ensures the integrity of the electoral process. Technology is used for voter verification at polling stations. This may involve the use of biometrics or smart card technology to ensure that only eligible voters cast their ballots.

Online Voter Registration: Technology plays a role in disseminating information about the electoral process. Online platforms, social media, and mobile applications are used to educate voters about their rights, the electoral process, and candidates. The implementation of an online platform to allow citizens to register as voters, update their information, and check their registration status can increase accessibility and convenience for voters (Nwankwo, 2021).

Election Management Software: Adoption of specialized software to manage various aspects of the election process, including voter registration, candidate nomination, ballot design, and results tabulation. Technology is employed in managing various aspects of the election process, including voter registration, candidate nomination, and result tabulation. These systems can improve efficiency and transparency (Onyekachi, 2021).

Electronic Results Transmission: Implementation of technology for the electronic transmission of election results from polling stations to central databases. This can expedite the announcement of results and enhance transparency.

Mobile Technology for Voter Education: Utilization of mobile phones and other technologies for voter education campaigns, providing information about the electoral process, candidates, and voting locations.

Social Media and Online Platforms: Increased use of social media and online platforms for political campaigns, voter engagement, and dissemination of information. These platforms can play a crucial role in shaping public opinion (Apeloko, Chukwudi, & Adekunle, 2023)

Smart Card Readers: Nigeria has deployed smart card readers to authenticate voters during elections. These devices verify voters' biometric data, ensuring that only eligible voters participate. Smart card readers contribute to transparency and reduce the risk of electoral fraud. While smart card readers enhance verification, there have been instances of technical issues and concerns about their security. Addressing these challenges is essential to maintain trust in the system.

Results Transmission and Collation:

Nigeria has been exploring the digital transmission of election results. This involves electronically transmitting results from polling stations to central databases. Digital transmission reduces the potential for manipulation during the collation process and enhances transparency. The use of technology in results transmission helps ensure that election results are accurately and securely relayed to the central authorities, minimizing human error and tampering. In the meantime, the under-mentioned are the major features of technological innovations in Nigeria's fourth republic election administration, viz: (Okonkwo, 2020).

Significance and Scope of BVAS on Election Administration in Nigeria's Fourth Republic

The Biometric Voter Authentication System (BVAS) is a critical component of election administration in Nigeria's Fourth Republic. BVAS serves the purpose of enhancing the integrity and efficiency of the electoral process. This discussion will delve into the specific purposes and scope of BVAS in the context of election administration in Nigeria's Fourth Republic.

The primary purpose of BVAS is to verify the identity of voters. By using biometric data, such as fingerprints or facial recognition, BVAS ensures that only eligible voters participate in the election. This helps prevent multiple voting and reduces the risk of electoral fraud. BVAS is instrumental in upholding the integrity of the electoral process. It minimizes the possibility of impersonation, double voting, and other forms of electoral malpractice, thereby increasing public trust in the election outcomes (Olusegun, 2022). BVAS simplifies and expedites the voter accreditation process. Voters can be quickly authenticated, leading to shorter wait times at polling stations. This can encourage higher voter turnout as the process becomes more efficient and accessible. BVAS contributes to transparency by creating an auditable record of voter authentication. This record can be used for verification and auditing purposes, ensuring that the election results are credible and trustworthy.

BVAS generates valuable data on voter demographics, patterns of participation, and potential areas for improvement in the electoral process. This data can inform evidence-based decision-making by election administrators and policymakers. BVAS is typically used during the voter registration process to capture biometric data, such as fingerprints and facial images, of eligible voters. This biometric data is then stored in a central database for authentication during elections (Onyekachi, 2021). On election day, BVAS is deployed at polling stations to verify the identity of voters. Voters are required to undergo biometric authentication before casting their ballots. This ensures that only registered voters participate. BVAS data can be used for auditing and verification purposes after the election. Election observers, political parties, and other stakeholders can review the BVAS records to confirm the authenticity of the election results.

The BVAS system includes a database that stores biometric information and related voter data. This data management aspect is crucial for maintaining the accuracy and security of voter information. The scope of BVAS also includes training election officials to operate the system effectively and ensuring the maintenance and proper functioning of BVAS equipment and software. In sum, BVAS serves a multifaceted purpose in Nigeria's Fourth Republic election administration, ranging from voter identity verification and electoral integrity to data collection and analysis. Its scope covers voter registration, election-day accreditation, data management, and ongoing training and maintenance (Onyekachi, 2021). BVAS plays a pivotal role in modernizing and securing the electoral process in Nigeria, contributing to the credibility and transparency of elections.

Nevertheless, the gubernatorial elections in Ekiti and Osun held by the Independent National Electoral Commission (INEC) in June and July 2022 received widespread acclaim, representing significant advancements compared to previous electoral processes (Olasupo, 2022). The newest technology innovation to enter the political landscape is the Bimodal Voter Accreditation System (BVAS), which authenticates face features and verifies fingerprints to guarantee that only eligible voters may cast ballots and prohibits voting by proxy. This involves gradually increasing the difficulty or impossibility of election misconduct while enhancing public trust in the system. Wogu, Misra, Assibong, Olu-Owolabi, Maskeliūnas, & Damasevicius, (2019) have noted the importance of technology in political development. In particular, the implementation and perfect operation of the BVAS throughout all 3,763 polling places, 332 Registration Area Centres, and 30 local government areas in Osun State was a significant declaration of the significant role that technological advancements play in the run-up to the general elections of 2023.

The INEC Results Viewing (IREV) Portal and electronic transmission of election outcomes have become a masterstroke that promotes openness about the results collation procedure while averting malpractice during the physical transmission of results from polling units to collation centers (Olasupo, 2022). In contrast, the BVAS offers a technological leap that improves electoral integrity. This encouraged openness in the process by, for the most part, enabling common folks to obtain election results from the convenience of their homes. Therefore, it was not surprising to see civil society organisations (CSOs) pushing tenaciously to pass the Electoral Act of 2022, with a particular focus on securing legislative support for the use of technology and the electronic dissemination of election results. Technology is exhibiting a stroke of genius in promoting election transparency and integrity, even though it might not be a magic bullet for all of our electoral problems (Olusegun, 2022).

Yet, there is still work to be done to increase residents' confidence, as evidenced by the low voting participation. Additionally, vote-buying needs to be restricted to end the transactional connection between the governed and the government.

Issues, Controversies, and Challenges of Technology on Election Administration.

Infrastructure limitations, such as unreliable power supply and internet connectivity in some areas, pose challenges to the seamless implementation of technology. Ensuring the security of voter data, election systems, and results transmission against cyber threats is an ongoing concern. Building and maintaining public trust in technology-driven elections requires continuous efforts in voter education and cyber-security awareness (Oluwaseyi, 2021). Technological advancements have significantly transformed election administration in Nigeria's Fourth Republic. While challenges exist, the adoption of biometric registration, electronic voting machines, smart card readers, and digital results transmission has improved transparency, efficiency, and credibility in the electoral process. As Nigeria continues to embrace technology, it should address challenges and invest in infrastructure, cyber-security, and voter education to ensure the continued success of technology-driven elections (Oluwaseyi, 2021).

Technical Challenges:

Infrastructure Limitations: Nigeria's vast geographical expanse poses challenges in providing consistent access to technology infrastructure, including reliable electricity and internet connectivity. Many areas, particularly in rural regions, may lack the necessary infrastructure to support technology-dependent election processes.

Equipment Reliability: Ensuring the proper functioning and maintenance of technology equipment, such as electronic voting machines and smart card readers, can be challenging. Technical malfunctions or equipment failures during elections can disrupt the voting process and erode public trust.

Security Concerns:

Cyber-security Threats: As technology plays a larger role in election administration, cyber-security threats become more pronounced. Hackers may attempt to infiltrate electoral systems, compromise voter data, or manipulate election results, potentially undermining the integrity of elections.

Data Privacy: Security and privacy issues with data are brought up by the gathering and storing of biometric information.

Ensuring that voter data is protected from unauthorized access and breaches is essential to maintaining public trust (Okonkwo, 2020).

Physical Security: Protecting technology infrastructure, such as electronic voting machines and smart card readers, from theft, vandalism, or tampering is crucial to prevent disruptions and potential security breaches.

Public Trust and Awareness:

Voter Education: Building awareness and understanding of technology-driven election processes is vital. Voter education programs are necessary to ensure that citizens know how to use technology for registration and voting, as well as to explain the security measures in place to protect their data and the integrity of the election.

Transparency Measures: Implementing transparent processes in the use of technology can help build public trust. For example, providing access to the source code of election software, allowing election observers to monitor technology usage, and conducting public audits of technology systems can enhance transparency.

Crisis Communication: Effective communication during technical issues or security breaches is critical. Election authorities must promptly inform the public of any problems, their resolutions, and the steps taken to safeguard the integrity of the election.

Addressing technical challenges, security concerns, and public trust awareness is essential to the successful integration of technology in election administration. Ensuring the reliability of technology infrastructure, bolstering cyber-security measures, and conducting robust voter education campaigns are all pivotal in maintaining public trust and confidence in technology-driven electoral processes. By proactively addressing these

challenges, Nigeria can continue to leverage technology to enhance the transparency, efficiency, and credibility of its elections in the Fourth Republic.

Impact of Technology on Election Outcomes in Nigeria

The Biometric Voter Authentication System (BVAS) has had a significant impact on election outcomes in Nigeria by contributing to a more transparent, credible, and inclusive electoral process. First, BVAS plays a crucial role in reducing electoral fraud by verifying the identity of voters using biometric data. It prevents multiple voting and impersonation, ensuring that only eligible voters participate in the election. This has a direct impact on the accuracy and fairness of election outcomes (Okonkwo, 2020).

The use of BVAS for voter registration has led to more accurate voter rolls. By capturing biometric data, such as fingerprints and facial images, BVAS helps eliminate duplicate registrations and ghost voters from the electoral rolls. This ensures that the voter register is a true reflection of eligible voters, ultimately leading to more credible election outcomes.

BVAS contributes to the transparency and credibility of election outcomes by providing a verifiable record of voter authentication. Voters can witness the process of their identity being verified, and election observers and stakeholders can review BVAS records to confirm the authenticity of the election results. This transparency builds trust in the electoral process.

BVAS helps minimise disputes over election results. Since voter authentication is more reliable with biometric data, there is less room for disagreement or claims of irregularities regarding the eligibility of voters. This leads to smoother post-election processes and reduces the likelihood of protracted legal battles.

BVAS can improve voter turnout by making the accreditation process more efficient. Voters are less likely to be discouraged by long queues and delays, which can be a common issue in manual verification systems. The convenience and speed of BVAS contribute to higher participation rates, which, in turn, affect election outcomes (Okonkwo, 2020).

The knowledge that BVAS is in place acts as a deterrent to electoral malpractice. Potential wrongdoers are less inclined to engage in fraud or multiple voting when they know that their biometric data will be checked and discrepancies will be identified. This contributes to fairer and more legitimate election outcomes. The data collected through BVAS, including voter demographics and participation patterns, can inform data-driven decision-making by election administrators and policymakers (Okonkwo, 2020). This information helps in better understanding the electorate's behavior and needs, which can influence election strategies and policies.

In summary, BVAS has had a positive impact on election outcomes in Nigeria by reducing electoral fraud, improving the accuracy of voter rolls, enhancing transparency and credibility, reducing disputes, increasing voter participation, deterring malpractice, and providing valuable data for decision-making. Its role in ensuring fair and legitimate elections is pivotal in strengthening Nigeria's democracy during the Fourth Republic.

Impact of Technology on Participation, Political Turn Out, and Challenges to Democracy

BVAS simplifies the voter authentication process, making it quicker and more convenient for voters. This convenience can encourage higher voter turnout as citizens are more likely to participate when the process is efficient and accessible. BVAS reduces the time voters spend waiting in line to get accredited, as the verification process is faster compared to manual methods. This shorter waiting time can motivate more people to come out and vote, particularly in areas with a history of long queues. BVAS enhances public trust by ensuring that only eligible voters participate. When citizens have confidence that their votes will not be diluted by fraudulent activities, they are more likely to engage in the electoral process.

BVAS can mitigate voter suppression tactics, as it provides multiple avenues for voters to prove their identity. In cases where a voter's biometric data is not easily verifiable due to factors like age or manual labor, alternative methods, such as facial recognition, can still authenticate them, reducing the risk of disenfranchisement. BVAS generates data on voter turnout and demographics, allowing political parties and campaigns to target their

mobilization efforts more effectively. Parties can identify areas with low turnout and tailor their strategies to increase participation.

Challenges to Democracy:

Despite the advantages of BVAS in reducing fraud and enhancing transparency, disputed election results may still occur. Some political actors may question the validity of the biometric data or raise concerns about the accuracy of the system, leading to post-election disputes and challenges to democracy. BVAS is dependent on technology, and technical glitches or system failures can occur. These issues may disrupt the voting process and lead to allegations of irregularities, potentially undermining public trust in the electoral process. BVAS systems, which store sensitive biometric data, are vulnerable to cyber-security threats. If malicious actors gain access to voter data or disrupt the system, it could raise significant concerns about the security and integrity of elections.

Maintenance and Infrastructure Challenges:

Ensuring the proper maintenance of BVAS equipment and the availability of reliable infrastructure (e.g., electricity and internet access) in all regions can be challenging. Uneven infrastructure development can lead to disparities in the quality of the electoral process. While BVAS enhances the electoral process, ensuring that voters understand how to use the technology is crucial. Insufficient voter education and awareness campaigns can result in confusion or disenfranchisement, especially among less tech-savvy or rural populations. Public trust in technology is a critical factor. Some citizens may be skeptical about the accuracy and security of BVAS, particularly if they are not well-informed about the system. Building and maintaining trust in technology-driven elections is an ongoing challenge.

BVAS has the potential to positively impact participation and turnout in elections in Nigeria's Fourth Republic. However, it also presents challenges to democracy, including disputes over election results, technical issues, cyber-security threats, infrastructure challenges, the need for robust voter education, and the importance of fostering public trust in technology-driven electoral processes (Okonkwo, 2020). Effectively addressing these challenges is essential to harness the full benefits of BVAS while upholding the integrity of Nigeria's democracy.

Prospects for Technology in Election Administration

Technology plays a crucial role in modernizing and enhancing election administration processes. In the Nigerian context, leveraging technology in election management holds significant prospects for improving transparency, efficiency, and overall credibility. The following are some of the features of the prospects for technology in election administration in Nigeria, viz: (Okafor, 2017).

Full Adoption of EVMs: Nigeria may consider a comprehensive rollout of electronic voting machines (EVMs) for all elections. This move could streamline the voting process, reduce the likelihood of human errors, and accelerate results tabulation.

Enhanced Results Transmission: Expanding digital results transmission systems to cover all polling stations, with secure and reliable connectivity, can further improve the speed and accuracy of results reporting.

Blockchain Technology: Exploring the use of blockchain technology for voter registration and results transmission can enhance the security, transparency, and immutability of election data.

Nevertheless, areas of improvement and innovation could include but not be restricted to the following:

Enhanced Voter Education: Invest in more extensive and targeted voter education campaigns to ensure that citizens understand and trust the technology-driven electoral process. Focus on reaching marginalized communities and those with low technology literacy.

Cyber-security Measures: Continuously upgrade and fortify cyber-security measures to safeguard election data and infrastructure from evolving cyber threats.

Inclusivity: Address accessibility issues by ensuring that technology-driven systems are accessible to all citizens, including those with disabilities and those in remote areas.

Data Analytics: Harness data analytics to gain insights into voter behavior, electoral trends, and areas needing improvement. This can inform campaign strategies and policy decisions.

However, the role of stakeholders in shaping the future can never be exaggerated in respect of the following, viz: (Okonkwo, 2020).

Election Authorities: Election authorities must continue to invest in the development, testing, and maintenance of technology-driven election systems. They should also ensure that election laws and regulations keep pace with technological advancements.

Political Parties: Political parties should adapt their campaign strategies to leverage voter data analytics and digital outreach. They should also actively participate in the development of transparent and credible electoral processes.

Civil Society and Election Observers: Civil society organizations and election observers play a critical role in monitoring and ensuring the integrity of elections. They should advocate for transparency and inclusivity in technology adoption and monitor its implementation.

Voters: Citizens should actively engage in the electoral process, take advantage of voter education initiatives, and hold election authorities accountable for the proper use of technology.

In shaping the future of election administration in Nigeria's Fourth Republic, a multi-stakeholder approach is crucial. Collaboration between election authorities, political parties, civil society, voters, and technology providers, as well as continuous innovation, will be instrumental in achieving more transparent, efficient, and credible elections in Nigeria (Okonkwo, 2020).

Challenges of Technological Regime in the Administration of Nigeria's Electoral System in the Fourth Republic

Election administration in Nigeria has faced challenges such as logistical issues, voter intimidation, fraud, and violence. Over the years, efforts have been made to improve the credibility and transparency of the electoral process. Technology is necessary and is instituted to aid free and fair elections (Duruji, Olanrewaju, Olu-Owolabi, Duruji-Moses, & Chukwudi, 2021; Chukwudi, Bello, & Adesemowo, 2023)

While Bimodal Voters Accreditation offers numerous benefits, it is not without challenges. Technical issues, such as connectivity problems or system failures, can disrupt the process. Privacy concerns related to biometric data collection must also be addressed. Additionally, there may be a learning curve for both election officials and voters in using these systems effectively.

Bimodal Voters Accreditation has emerged as a significant advancement in election administration in Nigeria's Fourth Republic. It not only enhances voter verification but also contributes to transparency, credibility, and efficiency in the electoral process. However, addressing the associated challenges and ensuring that the technology is accessible to all citizens remains essential for its continued success (Smith, 2020: 126). As Nigeria continues to evolve its electoral processes, the bimodal accreditation system stands as a symbol of progress toward more secure and credible elections in the Fourth Republic.

Notwithstanding, challenges and lessons learned are integral parts of this journey. Technical issues, cyber-security concerns, infrastructure limitations, and the need for comprehensive voter education have been recognized as areas requiring continuous attention and improvement. As technology continues to evolve, so too election administration should ensure that the benefits of innovation are fully realised, while safeguarding the integrity of the democratic process (Smith, 2020).

The future holds promise with prospects for the full adoption of electronic voting machines, enhanced results transmission, block-chain technology, and data analytics. Innovations in voter education, inclusivity, cyber-security measures, and the role of stakeholders will shape the path ahead. The commitment of election authorities, political parties, civil society, voters, and technology providers will be paramount in this journey. In conclusion, the integration of technology in election administration represents a dynamic force that propels Nigeria towards more credible, transparent, and efficient elections. With vigilance, adaptability, and collaboration, Nigeria's

Fourth Republic can continue to strengthen its democracy and remain a shining example in the region and beyond. The future of Nigerian elections is one of progress, trust, and enduring democratic values.

2. Conclusion

Integrating technology, particularly the Biometric Voter Authentication System (BVAS), into election administration in Nigeria's Fourth Republic, has marked a transformative journey towards more transparent, credible, and inclusive elections. This evolution has not only addressed longstanding challenges but has also raised new possibilities for the future of democracy in Nigeria. The impact of BVAS on election outcomes has been substantial. It has curtailed electoral fraud, improved the accuracy of voter rolls, enhanced transparency and credibility, reduced disputes, increased voter participation, deterred malpractice, and provided valuable data for data-driven decision-making. BVAS has played a pivotal role in strengthening the foundations of democracy in Nigeria.

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Declaration of Interest Statement

The authors do not have any conflicting interests.

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