Troubleshooting INEC's Bimodal Voters Accreditation System (BVAS)

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Abstract—The Independent National Electoral Commission (INEC) developed the Bimodal Voters Accreditation System (BVAS) to increase the efficiency and reliability of the voter accreditation procedure. However, since its deployment, a number of challenges have surfaced, including technological difficulties, worries about security, the dependability and accuracy of biometric data, and insufficient training. These difficulties are highlighted in this seminar, along with some potential remedies. Technical issues must be fixed through routine maintenance, software updates, and backup systems in order to address these concerns. To increase the accuracy of biometric identification, technological and data validation system investments are required. Comprehensive training programs for election officials and voter education efforts can overcome insufficient training. To ensure the accuracy of biometric data, security measures such strong encryption and authentication should be put in place. By resolving these concerns, INEC can encourage an election that is more efficient, credible, and transparent while boosting democracy and public confidence in Nigeria's electoral system.

Indexed Terms—INEC, Data Management, Hardware Infrastructure, Software Updates, Integration.

I. INTRODUCTION

The Independent National Electoral Commission (INEC) of Nigeria uses a technological system known as the Bimodal Voters Accreditation System (BVAS), or BVAS for short. Its objective is to strengthen the legitimacy and efficiency of the election's voter accreditation process. The BVAS, which combines biometric (fingerprint) and visual identification forms of identification, is used to authenticate and accredit voters.

Voter fingerprints are collected and confirmed by the BVAS for biometric identification. Each voter's fingerprint is registered in a database, and to ensure accurate identification during the accreditation process, the registered data is compared to the voter's fingerprint. This biometric part of the BVAS aims to prevent voter impersonation and multiple voting by making sure that each voter can be uniquely identified using their fingerprints.

- STATEMENT OF PROBLEM

By limiting impersonation and multiple voting, BVAS seeks to increase trust and accuracy. However, BVAS encounters technological difficulties, which are the focus of this essay. These issues include hardware limits, network connectivity issues, and security issues.

- AIM AND OBJECTIVES

The study offers suggestions for technical, hardware, software, and data management advancements in order to address the aforementioned difficulties and boost BVAS effectiveness. The following objectives are necessary to accomplish this goal:

i. To identify and analyze the technical challenges, such as connectivity issues, hardware and software issues, data management issues, and system compatibility, that are related to the implementation of the BVAS in Nigeria.
ii. To solve the outlined issues and enhance the BVAS's implementation, including techniques for enhancing the technical, hardware, software, and data management aspects of the system.

II. LITERATURE REVIEW

The Independent National Electoral Commission adopted the Bimodal Voter Accreditation System (BVAS) in 2021, according to Bayo (2022). With the use of voter fingerprint and facial recognition, this biometric technology was created to validate Permanent Voter Cards (PVCs) and enable human recognition.

- HOW IT WORKS

In order to authenticate voters, the device scans the bar code or QR code on the PVC or voter's register, accepts the last six digits of the voter identity number, or enters the voter's last name manually. The voter's biometric data is then captured using the BVAS's bimodal system, which uses both facial recognition and fingerprint technology, to confirm that they are the legal owners of the PVC. During voter registration, the BVAS also serves as the INEC Voter Enrolment Device (IVED). Additionally, its utilization has rendered incident forms unnecessary for accreditation (Bayo 2022).

- RELATED LITERATURE ON THE CHALLENGES WITH THE BVAS

The implementation of an integrated system that consists of an Electronic Voting Machine (EVM), Internet Voting (i-Voting), and Mobile Voting (m-Voting) for conducting elections in the country was suggested in the study by Ayo, et al. (2008) on e-voting implementation in Nigeria: the success factor. This would improve participatory democracy. In a similar vein, Musa et al. (2011)'s work on the development of a multi-modal trust-based e-voting system. The authors recommend that voters employ a multimodal authentication mechanism when they cast ballots. To prevent time wastage during voting, especially when one of the authentication methods failed, these approaches include biometric equipped voter cards, finger print authentication, and the usage of PINs (Personal Identification Numbers). Additionally, Abu-Shanab et al. (2010) in their article e-Voting System: a tool for e-Democracy advocated and emphasized the significance of using an electronic voting system to conduct elections nationwide due to its advantages for voter turnout, convenience, and improvement of the electoral process' integrity. They also examine the elements that affect the adoption of an electronic voting system in a university setting. In addition, Yekini et al. (2012) proposed the design of an automated voting machine that will automate all election processes in Nigeria's future elections as part of their work on computer-based automated voting machines for elections. Similar research was done by Ajiboye et al. (2013) on the modeling and evaluation of an electronic voting system for a long-lasting, reliable election. They put forth a model for assessing electronic voting systems using fuzzy logic. A positive result was reached when the developed model was tested and simulated with a student union election at a Federal University in Nigeria. Seven design criteria for a secure e-voting system were proposed by Gerlach (2009), including: proven security, trustworthy design, published source codes, vote verification, voter accessibility, ensure anonymity, and expert oversight.Momodu and Omogbhemhe (2013) modelled the specifications and implementation of an electronic voting system that might be utilized to conduct elections in Nigeria using several Unified Modeling Language (UML) artifacts.

- RELATED LITERATURE RECOMMEDATIONS

The Bimodal Voters Accreditation System (BVAS) can be troubleshooted in a number of ways, according to computer-based research (2023), to address the problems and issues that have been found. Here are some potential solutions to the issues:

i. Routine Software Updates and Maintenance: Implementing a proactive maintenance schedule for the BVAS devices can help to swiftly identify and fix any technical problems or difficulties. The voting machines will function optimally as a result of doing this.
ii. Deep training and capacity building: By providing election officials and poll workers with in-depth training on how to use the BVAS machines, it will be possible to reduce errors and delays throughout the certification process. Training should cover subjects including using hardware, navigating software, using troubleshooting techniques, and handling common issues that might arise.
iii. Infrastructure Development: Developing infrastructure can help overcome connectivity problems and ensure smooth data transmission between BVAS machines and the main database. Examples include expanding network coverage,

improving power supply stability, and expanding internet access.The integrity and confidentiality of the BVAS data can be protected by implementing stringent data security standards, such as encryption, access controls, and regular security audits. As a result, there is a lower possibility of data breaches, database tampering, or unauthorized access.

iv. More uniformly distributed BVAS machines will help reduce wait times and streamline the certification process, especially in rural and densely populated areas. enhanced machine dispersion leads to better voter access and enhanced system effectiveness.

v. Improvements to the user interface, accessibility features, and ergonomics of the BVAS machine can be found by doing user research and feedback analysis. By altering the design in response to user feedback, the certification process can be made more user-friendly and less confusing for the user.

vi. Technical Support and Help Desk: Establishing a specialized technical support team and help desk will enable election officials and users to receive prompt assistance for any BVAS-related issues they may encounter. As a result, fewer voting interruptions occur since technical problems are rapidly resolved.

The BVAS can overcome challenges and work more effectively by implementing these troubleshooting techniques, resulting in a smoother voter certification process and increasing the credibility of the electoral system.

- METHODOLOGY

Mixed methods, encompassing both qualitative and quantitative approaches, are used in the research methodology. Journals, publications, newspapers, INEC booklets, websites, and commentary from members of civil society and other INEC stakeholders are some of the materials used. Limited interviews, a narrow geographic reach, and probable bias are some of the study's drawbacks.

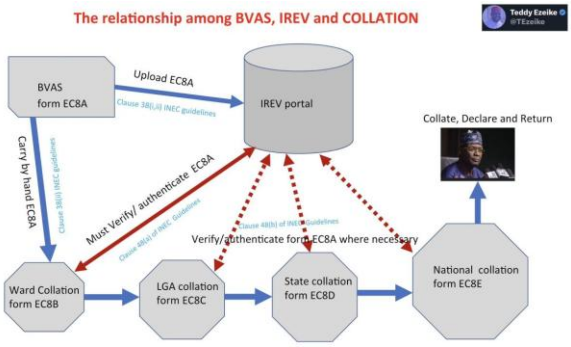
III. DISCUSSION

Nigeria uses the Bimodal Voter Accreditation System (BVAS) to read Permanent Voter Cards (PVCs) and verify voters using their fingerprints for voting at polling places. Its two main purposes are to perform facial or fingerprint authentication on voters during accreditation and to confirm the validity of PVCs. On election day, BVAS takes the place of the Z-pad for uploading real-time results. The BVAS uses Android and functions like a smartphone in terms of its camera and SIM card. The INEC Results Viewing Portal (IREV), a repository for scanned results from polling units, receives data taken by BVAS and uploads it.

The BVAS machine
Retrieved from Google images

- INEC RESULT VIEWING PORTAL (IREV)

Based on a variety of criteria, IREV makes election results accessible to the general public. Collation procedures entail moving data from lower levels (EC8A, EC8B, EC8C, EC8D, EC8E) for aggregating to higher levels (EC8B, EC8C, EC8D, EC8E). In accordance with the rules and directives established by INEC, BVAS is essential for accurate voter identification and electronic data transfer into IREV. To ensure accuracy, collection personnel compare IREV-uploaded data with data collected by BVAS. As a result, the three processes of BVAS, IREV, and collation become interdependent.



The relationship between the BVAS, IREV and Collation

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- CHALLENGES WITH THE BVAS

BVAS installation has run into problems. These include technological difficulties, limited facilities, a lack of training for government employees, worries

about the security and integrity of data, and problems with user experience. For the BVAS to operate efficiently, several issues must be resolved.

- HARDWARE CHALLENGES

The BVAS faces challenges with its hardware infrastructure, including poor network connectivity issues (the BVAS responds slowly to cellular network provision in rural areas) and complex body designs (the BVAS is comparable to a smartphone because they both operate on the same principles and system). Last but not least, there are issues with quality control and standardization, which suggests that we are now unable to certify the BVAS' standardization or determine whether it was produced in compliance with current technological norms. Reaching out to the BVAS production units to build on a better cellular receiving model that can embrace the most recent 5G network performance is one way to address these issues. To accomplish this, working with telecom providers is crucial. In addition to reaching out to the BVAS production company to design a machine that is more slick-looking and adheres to current computer-based trends in user interface and user experience, it is crucial to provide technical instruction on how to use the BVAS. The final step would be to enforce quality control by also contacting the BVAS production company and any technologically regulating bodies to run a quality assurance check on the BVAS model in order to ensure that it is current with computer-based trends and that the system is free of any vulnerabilities that could allow for hacking during voting operations.

- SOFTWARE BOTTLENECKS

The BVAS, a software-based system for voter accreditation, may experience performance, usability, and maintenance issues, including slow system/software responsiveness because of the RAM size being low, usability being affected as a result of response lags, which in turn lowers user experience of the model, and lastly, a lack of frequent system updates and upgrades to remove bugs. Election authorities can improve software's performance by upgrading the RAM and system processor, switching to the most recent version of Android OS, and updating the operating system to address the issue of the INEC officials' poor user experience. Lastly, the BVAS should be updated regularly from the production units as this would help to remove bugs and any other false elements found in the BVAS. Usability studies, user-centered design, and thorough training should all be used to improve user interface design. A committed team should meticulously plan, test, and support routine software upgrades and maintenance. These steps guarantee the BVAS runs without a hitch and improve user convenience during elections.

- DATA MANAGEMENT AND INTEGRATION CHALLENGES

The Bimodal Voters Accreditation System (BVAS) needs efficient data integration and administration. Lack of dynamic data quality, which prevents the BVAS from saving files in other formats like JPEG or JPG, as well as privacy and security issues stem from the fact that the BVAS lacks a security system that uses a two-step verification module to keep election data as safe and secure as possible. Additionally, it lacks software locks for specific programs used during voting, such as the file manager and gallery where images of the results are kept. Lastly, lack of disaster recovery for electoral data, meaning that the BVAS lacks the ability to restore erased files in the event that a bug wipes out the system's memory base or the data is unintentionally deleted. The solutions that have been suggested include integrating adaptable data storage and upload from the BVAS to the IREV to enable dynamism in file formats, working with software experts to integrate two-step verification for additional security measures for the safety of the electoral data in dedicated software, and allowing access control for data security. Regular cloud data backups are an excellent upgrade, as is scaling optimization. These steps guarantee a dependable BVAS that upholds voter confidence and protects the accreditation procedure during elections.

- TROUBLESHOOTING THE BVAS ON POLLING UNIT SITES

On polling unit sites, BVAS troubleshooting entails addressing connectivity issues, hardware issues, software issues, and data synchronization issues. The system should be restarted, software should be downloaded and updated if it is present, hardware should be cleaned, including the camera, fingerprint scanner, and touchscreen, and finally, network connections should be verified by connecting to the site's fastest network.

IV. CONCLUSION AND RECOMMEDATIONS

Recommendations to address technical, operational, and security issues with Nigeria's Bimodal Voter Accreditation System (BVAS). The suggested solutions include strengthening data backup and recovery software while improving security and workflow management, improving training programs for electoral officials on how to use the BVAS in tandem with system operating system improvements, standardizing operational procedures for the BVAS, and optimizing workflow management and security. The BVAS is a crucial tool for holding legitimate and transparent elections in Nigeria. The Independent National Electoral Commission (INEC) may increase public confidence, defend democratic principles, and support a more active democracy by aggressively implementing these suggestions. The advice covers upgrades to the hardware, routine upkeep, ongoing software updates, usability improvements, data security safeguards, data backup strategies, and standardized data practices. By putting these steps into practice, the BVAS will become more effective and secure, promoting credible elections and democratic advancement in Nigeria.

REFERENCES

1] M. Yakubu (2022). a review of the bimodal voter accreditation system used in elections, with a particular emphasis on the hardware and software capabilities, 35(1), 50–67, International Journal of Political Science.
2] M. Agbeti and C. Yartey (2022). Technology and Democracy: A Study of the BVAS in the Election Process Africa Spectrum, 36(2), 59-78.
3] International IDEA(2016). Comparative Study on the Strengthening of Democracy by Electoral Commissions and Biometric Technology for Elections (pg. 305–329). Springer.
4] Bayo, W. (2022). Everything to know about BVAS and how it'll be deployed for 2023 elections. Retrieved fromhttps://www.pulse.ng/news/local/everything-to-know-about-bvas-and-how-itll-be-deployed-for-2023-elections/jdb7nkz
5] Ikechukwu, O. (2023). 2023 General Elections: All you need to know about the BVAS. Retrieved from https://www.nigeriainfo.fm/news/homepagelagos/2023-general-election-all-you-need-to-know-about-the-bvas/
6] Independent National Electoral Commission. (2023, June 22). In *Wikipedia*. https://en.wikipedia.org/wiki/Independent_National_Electoral_Commission
7] Independent National Electoral Commission. (2022). Regulations and Guidelines for the Conduct of Elections, 2022. Retrieved fromhttps://inecnigeria.org/wp-content/uploads/2022/06/REGULATIONS-AND-GUIDELINES-FOR-THE-CONDUCT-OF-ELECTIONS-2022_updtd.pdf
8] Politivos (2022). The Roles of INEC in Nigerian Elections. Retrieved from https://politivos.com/inec-nigeria/