

ENCOURAGING ELECTION PARTICIPATION OF NIGERIAN CITIZENS WITH
THE ADOPTION OF ONLINE VOTER REGISTRATION

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Abstract

This study explores the landscape of election processes in Nigeria and the emotional viability of incorporating online voter registration to the current system. I provide background information on Nigeria's current voter registration system and the historical use of information and communication technology (ICT) in Nigeria's election processes. To guide the design and understand the benefits of an online voter registration tool, I explore how similar tools are used in other nations, the value added to their democracy, security concerns, and lessons learned from their usage studies. I obtain primary data from Nigerian citizens and residents, pulling from their experiences and insights on the issues they face with registration today in order to identify opportunities to improve the system. I also explore user feelings about online voter registration. I conclude by recommending actions to address immediate registration concerns and discuss future opportunities for research.

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Chapter 1: Introduction

Purpose of Study

For every true democracy, citizens should have an unencumbered right to vote in their government elections. Information and communication technology (ICT) involve the use of computer software and hardware to process information for both private and public use (Kroecker, 2010), and ICTs play a growing role in many forms of government (citation). This study analyzed different election systems across the globe and their use of ICT in voter registration. This information was then used to design an online registration tool to improve Nigeria's voter registration process and aid the Independent National Electoral Commission (INEC) in managing elections

Problem Statement

The implementation and use of information and communication technology (ICT) in Nigeria's voter registration process has been one of the driving forces of having an accurate democratic process in the country's national elections. Between 1999 and 2015, the registration process has gone from pen and sheet intake forms to a continuous electronic voter registration system. Though more efficient than ever, this electronic voter registration system is NOT web-based, and still requires residents to physically make a trip to a designated registration facility. Successfully registering can take a matter of days due to the long wait and potential discrimination by registration officials. Each iteration of Nigeria's voter registration system has attempted to tackle continued issues of duplicate, deceased and fake voters populating their database, yet Nigeria still struggles with inaccurate and even fraudulent data. The prototype designed in this study attempts to address these issues by utilizing Nigeria's expanding national identification number system as a supporting process for registration verification. This would allow citizens with internet access the convenience and efficiency of starting the registration process from home.

Research Questions

This project focused on three research questions, based on reviews of related election and registration research, on survey responses, and on in-depth interviews with the intended audience.

1. What problems do Nigerians face when trying to register to vote?
2. What areas of opportunity should be prioritized to improve the system?
3. How might implementing online registration impact Nigeria's election process

Background

Nigeria has a relatively short independent history, and for most of this time the country was ruled by military juntas. After Nigeria gained its independence from Great Britain on October 1st, 1960, the nation divided into three distinct regions: the Muslim North, dominated mainly by the Hausa and Fulani tribes, the Christian-and-Igbo-tribe dominated East, and the Yoruba-tribe-dominated West; each with their own regional interests. Nigeria established Sir Abubakar Tafawa Balewa as its Prime Minister with its independence. In 1963, the country became a republic and former Governor General Nnamdi Azikiwe became its first President. By 1966, a series of coups occurred shifting the political direction of the country. The first, on January 15, 1966, led by a group of young, South-Eastern Igbo soldiers, also known as the Majors, overthrew the government and assassinated the Prime Minister and leaders of the North and West (Bolashodun, 2016). Shortly after, another coup led by Military General Johnson Aguiyi-Ironsi established an administration that abolished the federation and instituted a unitary state. By July 1966, another coup of northern officers led by Major General Yakubu Gowon

restored Nigeria as a federal republic and divided the country into twelve states to give greater autonomy to minority ethnic groups (Jorre, 1972).

On May 1967, military governor Lt-Col Chukwuemeka Ojukwu declared eastern Nigeria an independent state named the Republic of Biafra. This led to the Nigerian Civil War, which lasted until Biafra was defeated in January 1970 and Ojukwu went into exile. Over 3 million lives were lost (Jorre, 1972). Major Gowon was ousted in 1975 and replaced by Brigadier Murtala Muhammed who restructured the country, adding 7 additional states to bring the total to 19, moving the federal territory to Abuja due to overcrowding in Lagos, reorganized and demobilized 100,000 troops, and reduced government spending on public sector development projects to expand the private sector (Library of Congress, 2008). His assassination and succession by Lt-Gen Olusegun Obasanjo did not dissipate his policies and Nigeria still held a multiparty election in 1979, with Shehu Shagari of the National Party of Nigeria being elected as president and reelected in 1983 (Meredith, 2005).

The democracy was short-lived as subsequent military coups followed, generally with promises to return to democracy and establish new political parties with state elections. Unfortunately, most of that progress was illusory, leading to annulled elections, imprisonments, and Nigeria's suspension from the Commonwealth of Nations (Library of Congress, 2008). The last military ruler was General Sani Abacha, who ruled Nigeria from 1993 until his death in 1998. His successor, Gen. Abdulsalami Abubakar, promised a transition to democracy, and established a new constitution on May 5th, 1999. Elections were held and retired Gen. Olusegun Obasanjo, who had previously governed Nigeria as

a military ruler, was elected the new president, starting Nigeria's modern era of democracy.

Leading up to the 1999 elections was the establishment of the Independent National Electoral Commission (INEC) in 1998. INEC serves as the electoral body that oversees elections in Nigeria. There are 12 commissioners, separated by zones, who oversee the 36 states and Federal Capital Territory. Since 1998, INEC has done their best to make sure democracy is upheld for Nigerian citizens by introducing and continuously improving information communication technology used for voter registration. This study explores how new technological approaches can further support INEC's goals.

Chapter 2: Review of Literature

Use of Information and Communication Technology in Nigeria

The implementation and use of information and communication technology (ICT) in Nigeria has been one of the driving forces of having an accurate democratic process in the country's national elections. From 1999 to present day, the registration process has gone from pen and sheet intake forms to a continuous electronic voter registration system that uses biometric voter cards (see Table 1). The goal of each change in technology was to improve registration as a whole, aiding in voter registration accuracy and preventing fraud during elections. Ayeni and Esan (2018) shared their sentiments, stating that "the introduction of these technologies: Electronic Voters Register (EVR), Automatic Fingerprints Identification System (AFIS) and Smart Card Reader (SCR) have reduced the incidence of multiple registration and multiple voting to the [bare] minimum while the development of an e-collation support platform has drastically reduced incidence of result manipulation at collation centers." The number of voters registered in 2011 was over 12 million more than 2007 due to the INEC improvements towards quality of machines and personnel used for the 2011 voters' registration. A loss of 6,106,035 voters on the registrar between 2011 and 2015 is due to the re-introduction of an improved AFIS in 2015 which led to the deletion of over 5 million double registrations from the EVR (Ayeni and Esan, 2018).

*Table 1**Historical timeline of registration technology and usage in Nigeria*

Year	Registration Technology	Registration Period	Data Captured
1999	Pen/Sheets and Typewriters	14 days	Personal details
2003	Optical Magnetic Recognition (OMR) Form and Automated Fingerprint Identification System (AFIS)	10 days	Personal details, fingerprints

2007	Direct Data Capture Machine (DDCM) and AFIS	4 months	Personal details, photographs, and fingerprints
2011	DDCM and AFIS with business logic	21 days	Personal details, photographs, and fingerprints
2015	DDCM and an Improved AFIS with business logic	Continuous Voter Registration (CVR)	Personal details, photographs, and fingerprints

At the time of Nigeria's 1999 general election, there was no database of voters or any additional technology introduced to address issues like double registration, leading to questionable credibility of the system (Ayeni and Esan, 2018). A manual register of voters was created in 2003 using Optical Magnetic Recognition (OMR) forms. Each form had a unique number that was assigned to the registered voter who then received a Temporary Voters Card (TVC) with the unique number, their personal information and a fingerprint. An Automated Fingerprints Identification System (AFIS) was then used to remove double registrants from the voter registrar. The benefits of using OMR were that: it was faster to create, it was more accurate than the previous method of pen and paper, the register could be updated on a continuous basis, and thumbprints were added as a security feature (Ayeni and Esan, 2018). The limitations of using OMR were that: there were no voter photographs, and an electronic registrar could not be created, and duplicate registrations could not be identified automatically.

Nigeria introduced Direct Data Capture Machines (DDCM) for their 2007 general election which included a computer system for capturing and storing voters' information, a scanner for taking fingerprints of registrants, a camera for taking pictures, back up batteries in case of power failure, an external hard drive for data backup, and a printer for printing TVCs (Ayeni and Esan, 2018). This technology was a first step towards eliminating double registration and double voting, aided by the development of an electronic voters register. Very Small Aperture Terminals (V-SAT) were installed in all

INEC local government and state headquarter offices to enable the transmission of election results between local government areas. To prepare for the 2011 general elections, INEC took on the mission of creating a new electronic register of voters, putting measures in place to deploy over six times the amount of DDCM from the previous election (from 22,000 units to 132,000), and to use a more effective AFIS to remove multiple registrants (Ayeni and Esan, 2018).

During the registration period for the 2015 general elections, an improved AFIS was used to find duplicate fingerprints in 2011's register and, paired with a new business rule, further reduced invalid registrations. The new business rule required voters to have prints from at least two fingers captured in the register. The INEC Voters Identification System (IVIS), also known as the Smart Card Reader (SCR), was adopted for the accreditation of voters. The Temporary Voter Card (TVC) introduced in the 2011 elections was replaced with the Permanent Voter Card (PVC) for reasons including quality, durability, security, and cost effectiveness. The SCR allowed for a three-part accreditation process: Identification - physical comparison of the card holder's face with the image displayed on the SCR after reading the PVC; Verification – the ability to read the information on the chip of the PVC; Authentication - comparison of the fingerprint stored on the card against what was physically presented and scanned by the reader (Ayeni and Esan, 2018).

Ayeni and Esan (2018) concluded that the incorporation of information communication technology in election management in Nigeria has curbed electoral fraud, fostered credible elections, and added credence to INEC transparency. They recommended that the current electronic voter register be updated due to some registered voters being deceased, many permanent voter cards (PVC) remaining unclaimed, and some lingering multiple registrations. The application designed in this study intends to utilize Nigeria's growing adoption of a national identification system, sitting at 36 million (18% of the population) registered as of 2019 (Okere, 2019), with the hopes that registration data can be authenticated and verified against the national ID system in order to address issues of multiple registrations and deceased persons. Since the national

identification card has a data chip, a person's voter registration information can be stored on it, eliminating the need to use a PVC. While receiving the physical identification card can face issues similar to receiving the PVC, the incorporation of the national identification number (NIN) in the online registration can reduce problems overall as citizens receive their national identification number (NIN) soon after registering for the identification program. The National Identification Program also provides mobile (vehicle) registration (National Identity Management Commission, n.d.), extending their reach to get people registered. Additional recommendations provided by Ayeni and Esan (2018) included updating and revalidating the register before every general election, providing training and certification courses for INEC ICT staff, and the removal of voters from the register who do not collect their PVC.

Internet Access in Nigeria

Nigeria is the second largest economy on the continent of Africa and one of its largest telecom markets. Over 100 million users are connected to the internet, according to the Nigerian Communications Commission (Russon, 2020). Access to the internet is quickly becoming democratized due to the expansion of smartphones in Africa, with more than 95% of internet users going online using mobile broadband, according to Coleago Consulting, a telecoms consultancy firm working in the African region (Russon, 2020). Still, Nigeria's broadband access faces problems.

Broadband speed. Nigeria has a mean download speed of 1.56 Mbps, placing it in the bottom quarter of global broadband speed rankings for 2019 conducted by the UK analytics firm Cable (Kazeem, 2020). The Nigerian National Broad Band Plan 2020-2025 aims to deliver download speeds of at least 25 Mbps in urban areas and 10 Mbps in rural areas with "effective coverage" across 90% of the population by 2025 (Nigerian Communications Commission [NCC], 2020). With Facebook and Google already having plans underway to encircle Africa with high-capacity undersea cables, there's hope to boost internet penetration in Nigeria (Kazeem, 2020).

Infrastructure blocks. Individual state governments hold the right to charge telecoms operators and internet providers before they can lay infrastructure like fiber-optic cables. Most states keep their fees high, making it more expensive for service providers to set up infrastructure to boost internet coverage in these states far away from urban centers (Kazeem, 2020).

Nigeria's Voter Registration Process

The Independent National Electoral Committee (INEC) documents the process and requirements for Nigerian voter registration on their FAQ page (INEC Nigeria, n.d.). To be eligible to register as a voter in Nigeria, one must be a Nigerian citizen and current resident, be at least 18 years of age, work or originate from the Local Government Area (LGA) covered by the registration area, and not be subject to any incapacity to vote under any law in Nigeria. Citizens must go to the INEC designated registration center closest to their LGA during the continuous voter registration (CVR) period. A potential voter may be asked by a Registering Officer for any of the following documents: birth or baptismal certificate, national identity card, international passport, driver's license, or any other document that could prove the identity, age, and nationality of the applicant.

Nigeria's CVR means that once you are registered, you no longer need to register again; you need only update information that has changed like your address. The CVR period pauses registration 30-60 days prior to a general election. When registration is complete, voters are given a temporary voter card (TVC). This card must be present with them when they pick up their permanent voter cards (PVC). Voters can check the status of their registration in the following ways:

1. viewing their status on the Display of Register at their LGA
2. checking the INEC portal and entering their voter identification number (VIN)
3. texting their last name and last 5 digits of their VIN to INEC at 089171646879

If a voter has misplaced their TVC when going to collect their PVC, they will have to verify their identity on the distribution list at their INEC LGA Office. If their name is on the register, they are required to fill an attestation form to collect their PVC. A voter’s card contains their name, the state they are registered in, the name of their LGA, their registration area/center code, their voter’s identification number, their picture, and an embedded chip that contains all the required biometrics (including fingerprints and facial image). As of Nigeria’s 2019 elections, there were 84,004,084 people registered to vote, with 86.63% of voters actually collecting their PVC (Figure 1).

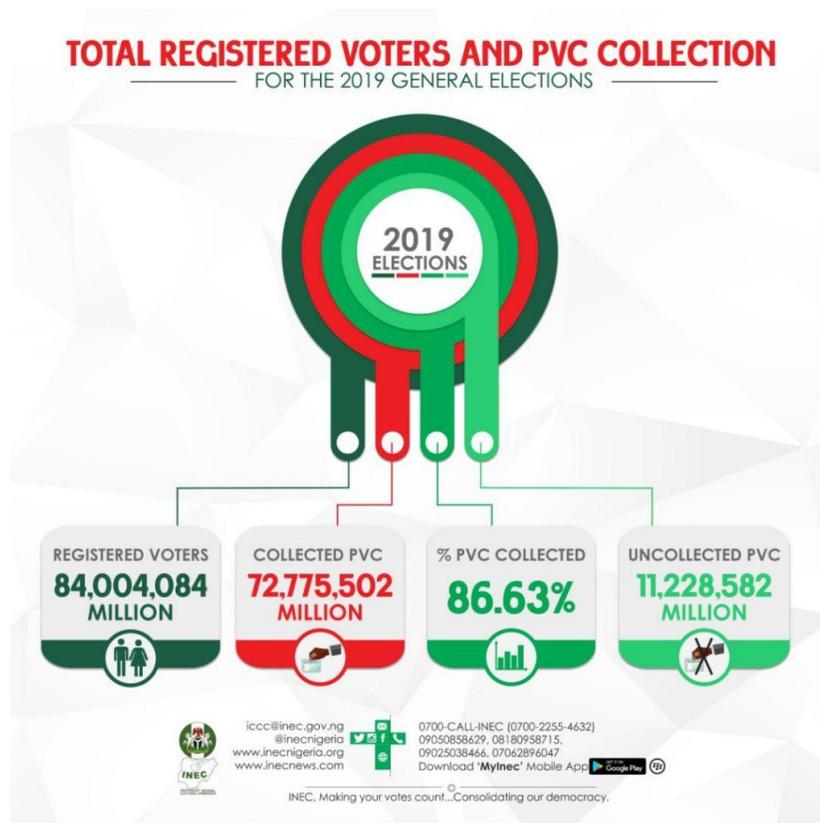


Figure 1. Nigerian 2019 Voter Registration breakdown (sourced from INEC website).

Registration Hinderances

An observation by the Human Rights Organization of Nigeria's 2007 elections, found 2 states in Nigeria's northern region (Gombe and Katsina states) had widespread violence and vote-rigging that reflected the rest of the country (Human Rights Watch,

2007). Voter intimidation and violent clashes between parties denied a large number of voters the opportunity to cast their votes. In places where voting did occur, there were cases of ballot box stuffing. During the 2011 election, some of the country's 36 states reported more votes being cast than the number of eligible voters (Muhammad & Stein, 2015).

The introduction of the permanent voter card (PVC) in for the 2015 elections was meant to aid in validating voters who cast their ballot with the registered information. However, in the months before the original voting date, Independent National Electoral Commission (INEC) officials struggled to distribute the PVCs in some states. INEC officials openly warned about fraud, stating that some politicians were buying PVCs from registered citizens in order to reduce the voting strength of their opponent during election (Muhammad & Stein, 2015).

The collection of PVCs was also plagued by a variety of problems, ranging from corruption to logistics. In Cross River state, people were forced to pay a fee, supposedly for the fuel that INEC officials used to run generators that operated their equipment. With 80% of voters not living where they were forced to register, it became more difficult for them to pick up their PVC (Awodipe, T., Thomas-Odia, I., & Todo, T., 2018). A good number of the registration centers in Lagos were no longer operational by the time of the election, and the available centers had a limited number of officials to attend to the people in line. Some residents claimed that people were able to pay off officials to be seen earlier and that centers were closing early to prevent people from registering (Awodipe, T., Thomas-Odia, I., & Todo, T., 2018). Similar to Cross River, the people waiting in line were required to make cash settlements for the INEC officials which were used to pay their transport fees, fuel money, and lunches.

While this application does not address the suppression of the vote, it can assist in tackling issues related to the permanent voter card. Individuals who register using an existing national identification card would not have to go through the hassle of retrieving an additional voter card. Queue times could potentially be shorter for those registering to

vote without an existing identification card; information intake and biometric intake could be split into two different queues at registration centers.

Issues Related to Rural Registration

While the PVC uses biometric data (fingerprints and photographs) for securing and identifying individuals, it was poorly adopted among rural voters. Iwuoha (2018) argued that public perception of biometric technology, the limited availability of proper infrastructure, and the distance between polling stations and dwellings of rural voters all affect the latter's adoption of biometric technology. As an example, the lack of an effective electricity supply impinged on the functioning of biometric technology and other ICT components used during the Nigerian 2015 elections. Since INEC transmits its informational programs through digital media like televisions, the issue of poor electricity supply greatly limits rural citizens' exposure to voter education.

There aren't enough registration and polling stations to reflect Nigeria's population growth and residential patterns. The current voting infrastructure contains 120,000 stations across 8,809 wards (registration areas). This has been in place since 1996, when Nigeria had an estimated population of 100 million. Nigeria's estimated population has risen to over 175 million, with many new rural communities where no registration centers exist within reasonable distance. Additionally, election day in Nigeria always comes with a restriction of movement. Iwuoha (2018), found that taxi and motorbike services were not transporting certain elderly men and women to their respective polling units in the most remote rural locations. This excluded many rural voters, especially women and the elderly, who could not travel long distances, from taking part in the electoral exercise.

Biometric identification systems are currently in use for voter registration in over 34 low- and middle-income countries. While Iwuoha appreciated the confidence that INEC officials have in the value added by PVCs, he also pointed out that there is no attention to "understanding the level of spatial differentiations in rural voters' behavior in specific localities during the conducting of elections." Iwuoha's study asked what were

the social factors that impinge on the voting behavior of dwellers in rural communities, and how did the use of biometric technology impact the adoption challenges of rural voters during the electoral process? In response to these questions, Iwuoha (2018) answered that the nonpolitically inclined rural voters are informed by social realities including negative perceptions and/or increasing apprehension about biometric technology systems, the non-availability of proper infrastructure, and the significant distance between polling stations and their homes. Additionally, suspicion, fear, contextual discrimination, and feelings of endangerment and political encroachment over ethnic heritage, all affected the perception of rural voters with regard to biometric technology.

Iwuoha's (2018) study concluded that voters in Nigeria's remotest communities generally face deficits such as the non-availability of proper infrastructure and long distances between polling stations and their homes. Poor electrical power supply and internet service impinged on the functioning of the biometric technology and other ICT components deployed during the elections. This largely limited rural voters' exposure to the digital media channels such as television through which voter education is promoted; resulting in a "tangible lack of vital voting information, poor voter education, and little adaptation to new voting methods among the rural population." Similarly, Evrensel's (2010) analysis of voter registration across Africa documented the difficulties of transporting biometric equipment across dangerous terrain, and pointed out that theft of the ICT machines enables corruption or the complete loss of the information. Evrensel (2010) also points to the difficulty in registering rural voters close to their homes due to the limited number of voters a smart card reader can accept at any given polling station.

Online Voter Registration

In the United States, 39 states and Washington, D.C. have implemented online voter registration as of 2020. There is even some limited support for online voting. The Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) allows military service members to cast online ballots for local and national elections in accordance with

their state's specific electronic voting laws. As of 2019, 25 states allow some form of electronic voting (ballots returned through email, fax, etc.). Only 4 states (Arizona, Colorado, Missouri and North Dakota) allow voting through a web portal. Alaska previously allowed this option but discontinued the practice in 2018.

According to their 2015 report *Online Voter Registration: Case Studies in Arizona and Washington*, the Pew Charitable Trusts (2015), states across the USA are increasingly adopting online voter registration to reduce costs, enhance government efficiency, and build a more accurate voter list. Arizona first pioneered online voter registration in 2000, followed by Washington state in 2008. Arizona experienced a reduction in per-registration costs from 83 cents per paper registration to 3 cents per online registration. Other states have also experienced significant cost savings in processing registrations. Highlights from the report follow.

Expanding access to voters without a state-issued ID. By the end of 2014, five states allowed citizens without a state ID or driver's license to complete voter registration over the Internet. Minnesota accepted and verified social security numbers to confirm identity and eligibility. Delaware and Missouri accepted signatures from touch screen devices in lieu of signatures transferred from the motor vehicle agency.

Mobile Optimization. Several states either added mobile capabilities to their site functions or launched with a mobile version, while others developed mobile versions. Prior to the 2014 election, Colorado averaged 15 percent of online registration transactions that were submitted via a mobile device. At the time of the Pew Charitable Trusts report (2015), nine states offered mobile-optimized versions, and four more were expected to have versions available in the near future.

Accessibility features and multilingual services. Some states reported that their online registration site met the requirements of the Americans with Disabilities Act. Maryland revised its site after working with the University of Baltimore to improve accessibility and usability. Ten states reported that their sites were optimized for non-English languages. California offered online voter registration services in Spanish, Chinese, Hindi and 6 other languages of Asia (Pew Charitable Trusts, 2015).

Collaboration with local jurisdictions. Seventeen states required a review of the registration by local election officials before submitting to their statewide database. Arizona and South Carolina bypassed this review. Only a few states consulted with local election officials about the design and use of online voter registration, including California and Oregon, who set up committees for feedback on their development. Most states reported that transactions were transferred electronically instantly or in daily batches.

Benefits of Online Voter Registration

The Pew Charitable Trusts (2015) reported some of the realized benefits of the states that implemented online voter registration. Most states reported that development and implementation costs were comparatively minimal. The costs associated with implementing these systems were often recouped in the savings of registering voters online in lieu of paper submissions. Voter satisfaction and reduced burdens on election officials were reported as the major benefits of their systems, followed by cost savings and increased accuracy. Local election officials praised the improved integrity of the voter rolls stemming from reduced dependency on illegible handwritten applications. Figure 2 shows the expenses incurred for establishing online voter registration for the states that offered it in 2015. From the data, states often reported less than \$100,000 in expenses.

Most States Spent Less Than \$300,000 for Online Voter Registration Systems

Reported costs were often below \$100,000

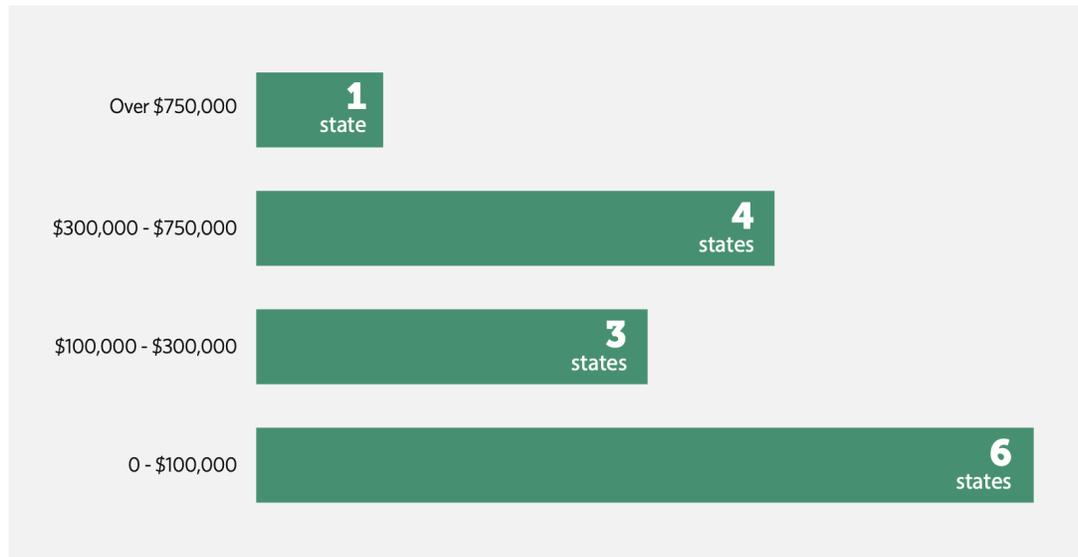


Figure 2. Costs of Designing and Implementing Online Voter Registration (PCT, 2015)

Security Concerns of Online Voter Registration

Voter fraud and voter registration fraud are big concerns in any election. In an interview with the National Conference of State Legislatures (2013), J. Alex Halderman, director of the Center for Computer Security & Society at the University of Michigan, provided insight on some of the vulnerabilities of online voter registration. Developers of online voter registration systems in the United States thought that a driver’s license number was private enough to be used to verify someone’s identity; however, some states generate that number by name and date-of-birth. With enough effort, those numbers can be generated by malicious users to gain access to a voter’s registration information. A bigger concern would be the security of the voter registration database as it is now in a location to be modified over the internet. Developers need to make sure that the system has adequate security testing and voters are notified of any changes.

For example, Lynch (2016) offered useful measures to reduce cyber risks to voter registration systems. This included: Limiting access to the database and using two-factor

authentication for those with access, periodically auditing the data logs to analyze changes, using captcha for online voter registration, and training staff on phishing. Halderman concluded the interview by expressing that online voter registration is a great tool to have as we make it secure but voting over the internet shouldn't be implemented until security technology has advanced (National Conference of State Legislatures, 2013).

The Importance of Voter Turnout

In the United States, voter turnout is correlated with levels of government funding, and localities with higher turnout generally receive more funding from the federal government (Martin, 2003), while areas with lower voting rates have less impact on their representatives' policy positions (Martin & Claibourn, 2013). From Iwuoha's (2018) study of Nigeria's 2015 general elections, registered voter turnout on aggregate since 1999 elections has been at an average of 55.13 percent. The specific national election voter turnout was 52.5% in 1999, 69% in 2003, 54% in both 2007 and 2011 and 47% in 2015. While it can be argued that Nigeria's democracy isn't truly representative of the people with a little more than half of registered voters showing up to elections over time, Nigeria's voter turnout was not far behind the United States 2016 Presidential election; with 61.4% voter turnout.

Ways to increase voter turnout

McElwee's (2015) research on inclusive turnout and public policy in the United States concluded that voters have more representation than those who do not, and that voting plays a significant role in the distribution of government resources as well as in the size of government and in who benefits from public policies. Taking these lessons, McElwee (2015) posed possible solutions to improve voter turnout as follows:

Same Day Registration and Robust Compliance with the National Voter Registration Act. McElwee (2015), sourcing elections expert Tova Wang, found that Same Day Registration (SDR) can boost turnout, especially with the young, low-income people, and people of color. Policies like SDR can reduce class bias in voter turnout.

SDR can also increase the effectiveness of “get out the vote” operations to further boost turnout.

Move Registration Systems Toward Automatic Voter Registration. Citizens have the burden of registering to vote when this can be the ownership of the government. Millions of people who want to vote do not have the chance to because of registration deadlines. Automatic voter registration would hold the government responsible for registering eligible citizens and ensure that everyone who wants to vote can do so.

The Case Against Online Voting

With every online tool that uses personal information, one of the top concerns for its user base is the security of their data. This is no different with an online election process. The idea of online voting has appeal and the potential to increase participation; however, online voting won’t work at this time due to concerns of authentication, privacy, and integrity. Authentication allows us to be certain that voters are who they say they are. Privacy allows a voter’s ballot submission to be kept secret. Integrity makes sure votes are not tampered with. For these reasons I cannot recommend introducing online voting in Nigerian elections at this time.

Integrity

In October 2019, the Northwest Territories (NWT) of Canada held online voting to elect members of the Northwest Territory Legislative assembly using the Montreal-based Simply Voting platform. Prior to the actual elections, security experts suggested people in the territory should be most concerned with ballot transparency. OpenNWT founder David Wasylciw argued against online elections, stating that paper ballots allowed a candidate to scrutinize, count and double check votes (Terrible Idea, 2019). If a candidate wants a recount of the result tally, there is limited opportunity to recalculate voter submissions as opposed to having physical ballots that can be recounted.

There is also the issue that a recorded vote may not be what the voters chose. Voting online gives space for the manipulation of information presented to a user during transmission, much more so than with a printed voter ballot. Alesksander Essex, a

professor of computer science at Western University in London, Ontario, says he was able to create and install a browser plugin that changed what people saw on a Simply Voting demo website (Terrible Idea, 2019). Proponents of online voting are attempting to implement ways to improve voter security. For example, Vice President of Simply Voting, Brian Lack, stated there were measures in place to scrutinize the integrity of votes. This included a receipt code that voters can enter into the Simply Voting website to make sure their vote was recorded correctly. Another example of the potential problems comes from Australia's New South Wales (NSW) pilot program's integrity issues using their iVote system. There was a bug where votes were recorded as alphabetic letters instead of the required digits, rendering those votes uncountable (Halderman and Teague, 2015).

Authentication

In a security analysis of the New South Wales iVote System, Halderman and Teague (2015) identified authentication issues during their live voting. A situation occurred where voters using truncated ID numbers (fewer digits than official ID numbers) were able to log in and vote. At this time, online voting systems continue to face vulnerabilities.

Privacy

One of the important foundations of a democracy is ballot secrecy; a voter should be able to trust that their ballot cast is private. Earlier in this paper, I mentioned how votes being cast in unsupervised locations can put the voters at risk of vote buying and coercion. Adding to that, an unsecured data or wi-fi connection can make the information being transmitted susceptible to interception and decryption.

Halderman and Teague's (2015) New South Wales assessment showed that the iVote system failed to properly separate ID numbers from votes or voters, allowing the NSW Election Committee to trace votes back to the voters. In another society where individuals can be persecuted for their political allegiance during elections, that kind of vulnerability can put someone's life at risk.

Voter registration security issues

As previously discussed, keeping the voter registration system secure is also an important foundational measure integral to election security. These problems must be addressed before online voting even begins to be feasible.

A case study for this would be the 2016 United States National Elections. In a report from the U.S. Senate Select Committee on Intelligence, 18 states had their voter registration systems scanned for vulnerabilities and Russian interference. The scanning found that 6 states had vulnerabilities that would allow malicious actors to modify or delete voter registration data. Luckily, there was no evidence that could confirm any modifications took place, but the risk was still there (Lynch, 2018). However, this data from the 2016 U.S. election provides two assurances: 1) data security for an online voter registration system—such as the one in this project—is possible, and 2) data security must be actively pursued; it does not happen automatically.

Chapter 3: Methods

The goal of this study was to identify issues that resulted from Nigeria's current voter registration system, identify opportunities for improvements, and explore the feasibility of an online voter registration tool. To capture the needs of the potential users of the tool, I centered the research on primary data collection which includes interviews and a survey. I then iteratively designed a prototype of the tool and conducted usability testing with potential users.

In order to conduct this study with participants that would provide valuable insights to voter registration in Nigeria, participants were recruited through social, political, and kinship networks. Participants were chosen that were Nigerian citizens and met the Independent National Electoral Commission's (INEC) minimum age for registration eligibility (18 years of age). There were no participation criteria based on current voter registration status, race or gender. State guidance for the COVID-19 pandemic limited interviews and usability testing to voice or video conference after March 13, 2020.

Informed Consent and Procedures

Participants were provided with a consent form describing the purpose of the respective research being conducted. Raw survey data and recordings of interviews and usability tests were deleted at the end of the study; however, aggregate survey results and anonymous excerpts from transcripts can be used in other publications. A sample consent form is included in Appendix E.

Surveys

The survey had 74 participants respond and was administered remotely through Google Forms. Responses were captured anonymously. Google Forms was chosen because it could be easily distributed via a shared link. It also allowed the use of conditional questions as the participants went through the survey. Google Forms

automatically aggregates quantitative response answers; open text answers were coded by the researcher.

Interviews

Survey data was supplemented by a smaller sample of in-depth interviews. A total of 10 participants were interviewed. The interviews lasted between 25 and 35 minutes each. Two of the interviews were conducted in person at the participant's home. The remaining eight interviews were conducted through recorded phone calls. The interviews were later transcribed for analysis. Interview questions served as guides to solicit both quantitative and qualitative insights related to their experience with Nigeria's voter registration system, their needs as pertaining to the current registration process, and their opinion and recommendations towards an online registration system. These insights, in tandem with the survey results, were then used to determine if an online voter registration tool would be beneficial and what important features should be a part of the design.

Usability Testing

There were 10 participants involved with testing the voter registration tool. Some of the usability testing participants previously participated in the in-depth interviews. Video conferencing was used to conduct the studies and to share and record screens. The testing was separated into 2 rounds (5 participants each), with revisions to the prototype after the first round and additional critiquing from my academic advisor. Participants were given 10 tasks to complete. The tasks were created around registration, account access, and resource finding. These tasks reflect the activities that visitors of the tool are most likely to use. Testers took as much time as needed to complete the task, notifying me when they thought they were done. Additional questions were asked to evaluate the participant's experience after completion of the test. Screenshots of the prototype can be found in Appendix A.

Chapter 4: Results

Surveys

An overwhelming majority of the participants, 63 out of 74, indicated that they have been registered to vote (see Table 2). One participant who was not registered to vote had previously attempted to register. This participant attributed not completing registration to long queues, little organization, and a lack of information at the registration site. They also felt that the use of a manual system hindered the process. In total, 41 participants experienced difficulties when they tried to register while 27 did not (see Table 2). The common themes presented by those who experienced difficulties were system failures (no power supply, card reader malfunctions, fingerprint scanner not working), long lines and wait times, traveling long distances from their neighborhood to register, and insufficient INEC staff members available to support the large number of people registering. One comment I would like to call out mentioned the mistreatment of illiterate voters: “Some of the INEC officials don’t have the patience for people who need help with entering their information, so they just tell them to come back with someone.”

With regards to the INEC website, 73 of the 74 participants were aware of the INEC website. The sole participant who did not know of the website has also never attempted voter registration. Almost 58 of the participants have used the INEC website to look up information on how to register. Surprisingly, 15 participants did not find it necessary to use the INEC website (see Table 2). Participants were asked about potential benefits to using online voter registration (see Table 2). There were 3 participants that felt online voter registration would not provide any benefit, 25 that felt indifferent, and 47 that felt it would be beneficial. Respondents were also asked to provide pros and cons.

Table 3 summarizes the pros and cons provided. These pros and cons reflect many of the same points shared by elections experts cited in the literature review, including costs, ease of use, and security concerns. Additional issues specific to Nigeria included the need for more registration zones, removal of duplicate registrants, and inclusion of remote citizens. All of these issues were seen as reasons to pursue online registration.

However, there was a big concern about barriers to adoption by vulnerable groups: seniors, people with literacy issues, and rural residents with lack of power and internet.

Table 2

Survey Results

Question	Results
Are you (or have you ever been) registered to vote?	Yes – 63 No – 11
Have you ever experienced difficulties when trying to register to vote?	Yes – 41 No – 27 Has not tried registering – 6
Have you ever used the INEC (Independent National Electoral Commission) website to find information about registration?	Yes – 58 No – 15 Did not know about the website – 1
Do you think online voter registration would provide any benefit to Nigerian citizens?	Yes – 47 No – 3 Maybe – 24

Table 3

Pros and Cons of Online Voter Registration

Pros	Cons
Helps reduce the number of duplicate registrations	People who do not have access to internet or cannot afford cellular data will be at a disadvantage.

Can provide a way to check registration status	Senior citizens and citizens with literacy issue may trouble adapting to online technology
Can increase registration participation	The system is at risk of being hacked
It will save time	Accuracy of the information provided when registering A lack of steady power may interrupt functionality

The participants who used the INEC website typically viewed it positively, as indicated by terms such as "educative," "encouraging," "useful," "satisfactory" and "helpful." There were, however, outliers to these positive comments. One participant had trouble finding voter registration information, and was only able to access the voter register verification platform. This could reflect an issue of wayfinding on the INEC website. A few participants stated that the INEC website was not comprehensive and needed improvement, although they did not identify any specific improvements needed.

When asked to rate the current overall voter registration process on a scale of 1 (extremely hard) to 5 (extremely easy), more than half of the responses rated the process at 3 (see Figure 3). From the comments on difficulties with registering, to the majority positive reaction to the INEC website, this 3 rating could be inferred to indicate mixed feelings from respondents. I am 95% confident that the percentage of people in Nigeria with mixed feelings about the registration process is between 45% and 67%. The Adjusted Wald Confidence Interval calculation can be found in Appendix G.

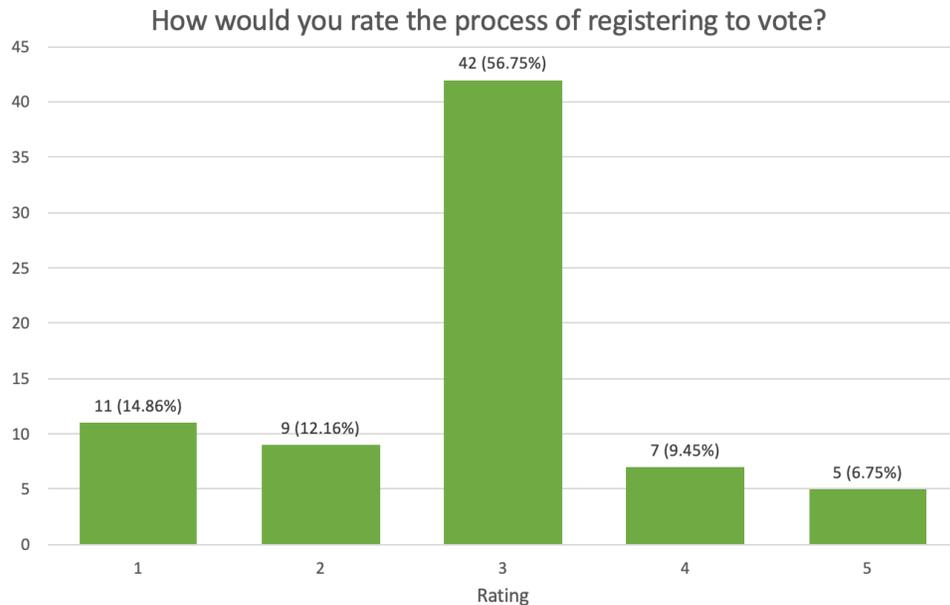


Figure 3. Rating of the voter registration process

While analyzing the recommendations participants gave to improve the voter registration process, the recommendations fell into seven categories:

- Continuous Registration - being able to register year-round
- Uniform Identification – allowing one card for citizens to verify their identity
- Organization – providing enough manpower at registration sites to handle crowds and run tasks
- Equipment – fixing faulty equipment and purchasing new ones
- Digital Solutions – creating options to complete the process online
- Registration Zones – create more and closer spaces for people to register
- Information & Instruction – improving communication of registration material

Figure 4 shows a frequency map of how often these recommendations occurred. Improving the equipment and adding more registration zones were the most frequent suggestions. Table 4 highlights some of the quotes pertaining to these categories.

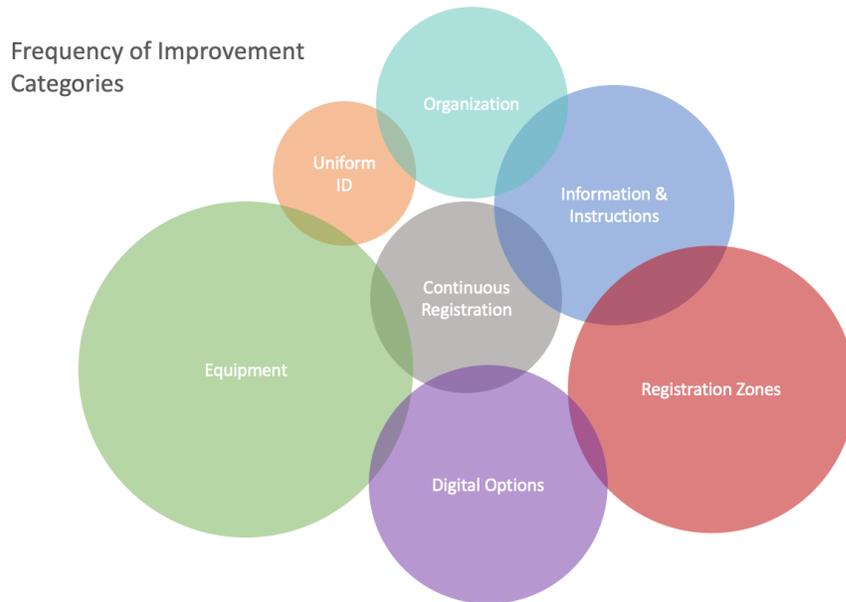


Figure 4. Frequency of improvement categories

Table 4

Improvements to the Voter Registration Process

Continuous Registration	Uniform Identification	Organization	Equipment
“Allow year-round registration”	“Have a uniform ID like National Identity Card Number to enable easy verification and to eliminate double registration”	“Employment of experts to man the registration exercise”	“I would like INEC to acquire a high-tech direct data capturing machine used in registration for easy, fast and efficient service”

“We need to have total continue registration where an individual can walk into INEC office and register to vote M-F”	“BNV is working perfectly, if they can adopt that pattern, I guess that will lead to the end of the problem”	“Better crowd control”	“The fingerprint scanner’s qualities should be improved to meet the prevailing weather conditions in Nigeria”
Digital Solution	Registration Zones	Information & Instruction	
“Let INEC make it an online process”	Expand the zones and centers for voter registration”	“Provide adequate provision of voting material”	
“It could also be done online to reduce the stress of queuing and time wasting”	“We have churches, schools, and markets that can be put to use”	“Creation of more public awareness for the rural dwellers”	

Interviews

The interviews provided further details about Nigeria’s voter registration process that were not covered by the Independent National Electoral Commission (INEC) website. The concerns captured from the participants were organized into 3 key themes:

The verification system is faulty. Even with purges against the voter registration system in the past, the issue of invalid voters is still persistent. There don’t seem to be sufficient systems in place to validate people trying to register. Systems across different registration centers don't share information quickly enough. For example, someone can register in one locale and then immediately go to another locale and register again. A competent verification system would be able to flag that. One participant explained that voters are able to submit address changes using INEC’s registration

transfer process. They used the service in a recent election, but their information was not successfully updated. They weren't aware of this until they went to a polling station to cast a ballot:

"I went to the polling place and waited this long time in line just for them to tell me they did not have my information."

"A flawed transfer system could lead to a voter's information ending up in multiple locations, allowing for multiple votes during an election."

Citizens express apathy towards the government. There is no communication to citizens how votes are trending during elections. In the United States, voting results are quickly reported in real time. Nigerians won't know who has won an election until weeks after election day. Some of the participants felt that this lack of transparency allows corrupt officials to manipulate the results and thus render their votes meaningless. Stemming from that, individuals who aren't registered may be discouraged from making the effort to register if their vote may not be counted in the end. One participant felt that officials did not do enough groundwork nor reach out to enough people to encourage people to register and vote. One participant recounted a story of a local Maryland candidate for office driving people to the polls to exercise their rights, even if the people had no intention of giving him their vote. This participant wanted to see that level of involvement amongst Nigerian officials. Unfortunately, coercion, bribery, and violence is rampant in parts of the country and is almost accepted as part of the culture. The impact of normalizing this behavior further deters citizens from participating in elections in the belief that elections don't truly represent the people.

Current registration and voting options exclude many citizens. A lot of Nigerians who want to participate in elections do not have the opportunity to do so. Four of the participants interviewed reside in the United States. They traveled to Nigeria to register in person as there was no remote option. Participation in elections also required travel as INEC does not allow absentee voting like the United States. These participants wished that remote options were available to increase participation of Nigerian citizens who may live outside the country, even if such options were to be restricted to

temporarily relocated individuals like students. For example, military personnel, police officers, and young adults in the National Youth Service Corps are utilized for a lot of operations during elections and dispersed across the country. Chances are they won't be able to vote since INEC requires you to vote in the same area you registered. This deprives a huge segment of the population of their voting rights. In addition, citizens in more remote areas do not always have the means to get to registration centers due to limited mobility and long distances, so the current process disenfranchises populations who are rural and/or poor.

Usability Testing

The registration tool was designed to address the issues raised during the survey and the interviews, while preserving the integrity of the registration process as much as possible. Usability of the registration tool was measured by completion of the 8 tasks listed in Table 5. High level qualitative observations were categorized by resource finding, registration and account access. Table 6 showing the grouping of the tasks related to the categories.

Table 5

Completion Rate of Tasks

Task	Description	Completion Rate
Task 1	You've just been made aware of the registration tool, so you visit the website to look for information about your local registration site. Show me how you would find that.	10/10
Task 2	If you wanted to find more general information about registration, show me how you would do that.	9/10
Task 3	Let's say you're now ready to register to vote. Show me how you would do that on the website.	10/10

Task 4	Now that you’ve created your account, how would you start the process to take your photo and fingerprints?	10/10
Task 5	Let’s return to the home screen. This time imagine that you have a National Identification Number. Show me how you would register to vote using that number.	10/10
Task 6	Let’s return to the home screen. Imagine that you already have registered for an account in the past. Show me the actions you would do to login to your account.	10/10
Task 7	Let’s say that you forgot your account number. Return to the home screen and show me steps you would take to request that information.	10/10
Task 8	This time you know your account number, but you forgot your password. Let’s return to the home screen so you can show me how you would find out your password.	10/10

Table 6

High Level Observations

	Resource Finding	Registration	Account Access
Completion Rate	Task 1 (10/10)	Task 3 (10/10)	Task 7 (10/10)
	Task 2 (9/10)	Task 5 (10/10)	Task 8 (10/10)
	Task 4 (10/10)	Task 6 (10/10)	

Resource Finding

Overall, locating information pertinent to registration was easy for participants. Finding the local registration site and information about how to take photographs and fingerprints were straight forward due to explicit calls to action in the menu bar.

Issue. However, one participant had an issue when looking up additional resources for registration. The successful completion of Task 2 required the user to navigate to the Help link in the toolbar. One participant assumed the “Independent National Electoral Committee” text on the left side of the page linked to the INEC website where they can find resources (see Figure 5). At the end of the test I asked what they thought the Help button in the toolbar linked to. They assumed it was for contacting and submitting a support ticket about their account, not about finding additional information about voter registration.

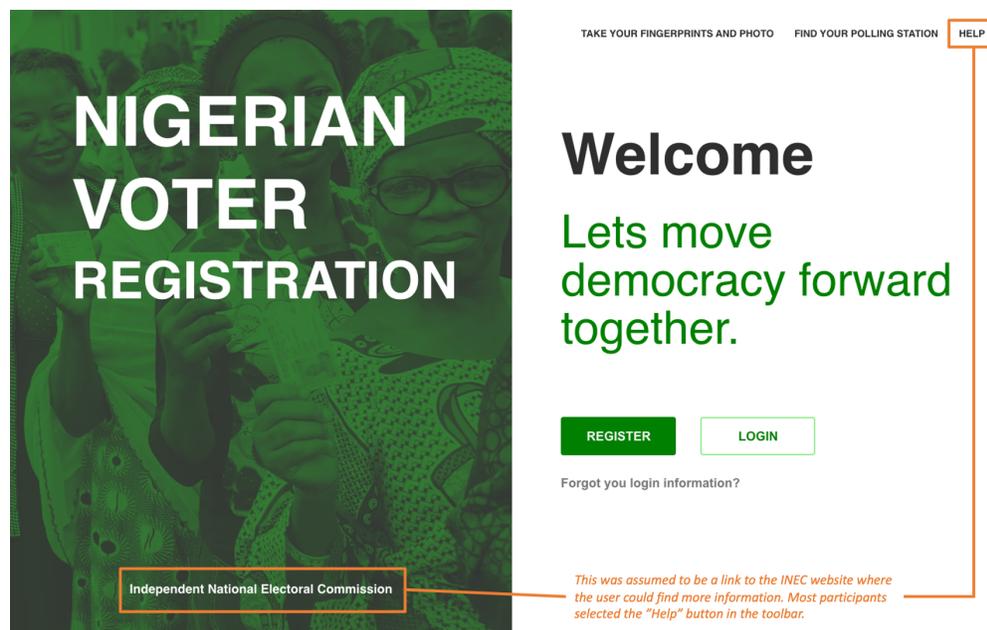


Figure 5. Prototype Resource Finding

Recommendation. That was actually a good callout to how my design could be interpreted differently than my intention. Improvements to link clarity needed to be made. While the INEC text on the page was meant to display ownership of the application and link to their website, the Help link was intended to provide a page for FAQs about

registration. The other links were explicit so this one should follow the action pattern. Additionally, adding a link to get help as a top layer of navigation is a good change (see Figure 6).



Figure 6. Updated Prototype Resource Finding

Registration

All users were able to complete the registration tasks without issue. General feelings were that the steps made sense and were easy to follow.

Recommendation. One participant brought up the idea of using their Bank Verification Number (BVN) to register since the BVN card also contains the same information as the National Identification Number (NIN). The Central Bank of Nigeria, which establishes the BVN system, is a government owned entity. While my design was created as a means to incorporate Nigeria’s push for nationwide identification with the NIN, sourcing another accredited system to obtain and verify personal information personal information make sense (see Figure 7).

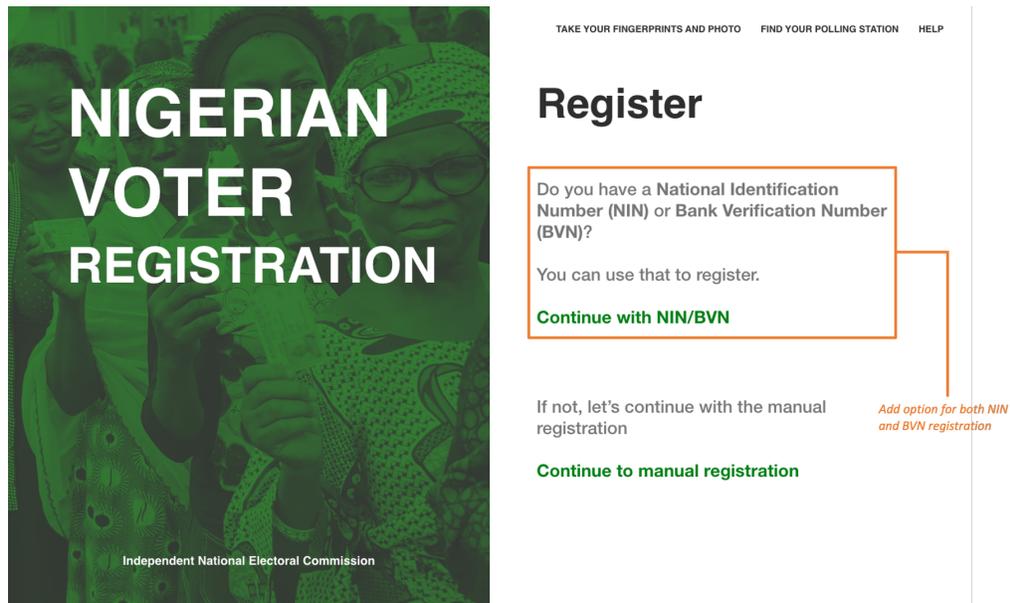


Figure 7. Addition of BVN to Registration

Account Access

All users were able to complete the tasks to login and recover account numbers and password. There were no voiced comments on these tasks.

Recommendation. After additional review, further methods of security could be added to prevent fraudulent attempts to access people's accounts like 2-factor authentication and captchas (see Figure 8).

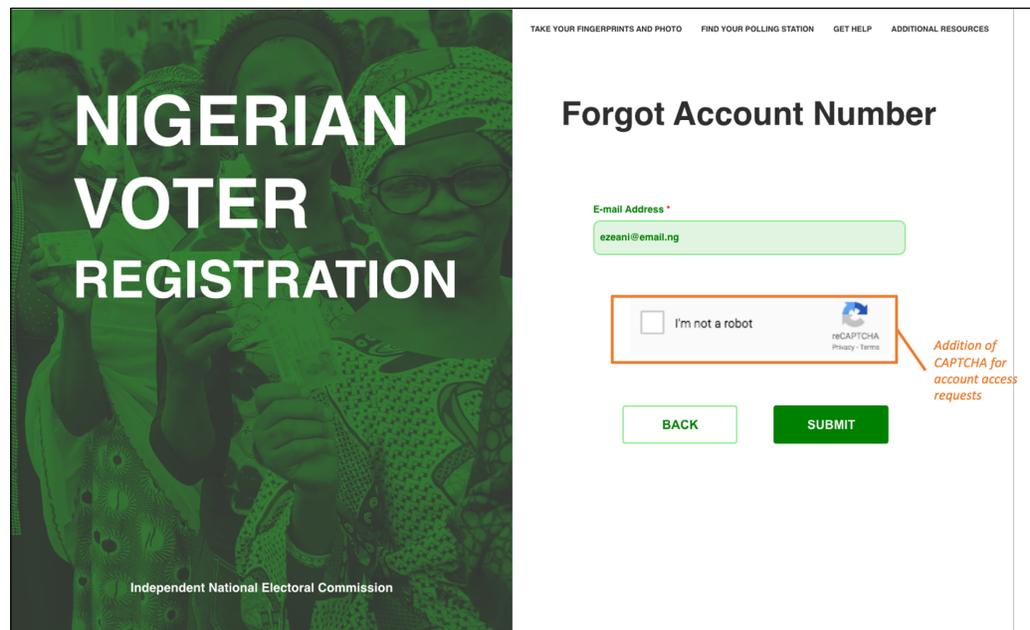


Figure 8. Addition of CAPTCHA for account access requests

Observations of Usability Testing

All tasks were completed fairly quickly, which is an improvement on current in-person queue times that participants have mentioned could take hours. That can be attributed to the nature of the tasks not being complex, the task having linear actions to complete, or the tasks being simple in nature. When the participants completed their tasks, they were asked to give their general impressions of the tool, how likely it would be for them to use it if implemented, and would they recommend it to others. Most participants said they would like to use the online registration if given the opportunity as it would afford them the comforts of registering from home. There were a few concerns expressed about security for an online system, but they were directed at voting online, not

necessarily registration. Incorporating the National Identification Number and the Bank Verification Number was well received as a means to verify the person registering and lessening the workload of gathering documents to register. The overall design of the registration tool was deemed to be easy to use and aesthetically pleasing. While best practices were used to provide plain language instructions in the prototype, incorporating aria attributes and secondary languages in the developed tool would allow more access for citizens using screen-readers and for citizens not proficient in reading English.

Chapter 5: Discussion

Answers to Research Questions

What problems do Nigerians face when trying to register to vote? Nigerians who want to participate in election activities face both technological and systemic problems. The prevailing issues in registration activities can be attributed to faulty and outdated equipment, poor integrity of registration data, and inefficient ways to communicate election information. This application can lower the cost of revamping current registration technology by allowing internet ready devices owned by citizens (personal computers and phones) to process registration requests. At the same time, the alternative methods for citizen verification, paired with the National Identification Number system, can improve the integrity of the voter registrar.

There are issues with voter registration that this project does not address. While out of scope for this application, there are systemic issues facing Nigerian citizens. Nigeria has a history of corrupt politicians interfering with citizen registration and disingenuous practices in elections that has led to apathy towards the government and reduced participation in elections. Rural citizens find it hard to trust and participate in election activities and have low access to information and on-site registration locations. These issues must be addressed through social and political activism.

What areas of opportunity should be prioritized to improve the system? The first priority would be for INEC to encourage more participation in elections. This could be achieved by creating more accessible areas for election activities and increasing efforts to distribute registration information to citizens. The next priority would be updating the technology used in registrations. The equipment should efficiently and effectively process registration data into a national database and allow for periodic audits to maintain integrity. If INEC faced less pressure to collect biometric data in so many places, and less pressure to staff so many registration offices, they might have the resources they need to improve their back-end equipment and data processing. The third priority would be

policy changes to allow citizens to participate in elections outside of their registration zones. Voter turnout can improve if registered voters still feel they are involved.

How would implementing online registration impact Nigeria's election process? Implementing online voter registration as an additional alternative to in person registration has the potential to increase participation in elections. Online registration would be more convenient and faster than in-person registration for those who have the privilege of internet and data, although physical registration must still be active for people without internet access and people with literacy issues who need in-person assistance. Online registration could also work as a catalyst to allow remote citizens to participate in election activities. Security measures such as periodic auditing and user authentication will need to be in place in order to prevent the kinds of fraud that impact the current system.

Chapter 6: Conclusion

What started as a design to digitize voter registration led to the examination of voter concerns and opportunity zones of Nigeria's voter registration process as a whole. Nigeria is still a developing nation and its modern democracy is only 20 years old. INEC has taken initial steps of improving their internet communication technology to address some of the existing issues affecting registration, but this study provided insight and recommendations that can greatly improve their efforts. An online approach to election activities poses a high security risk, but if INEC takes the appropriate steps to allow voter registration over the internet in tandem with in person registration, they are likely to see greater participation in elections.

Recommendations

I took the research obtained in the literature review, responses from the surveys, insights from the interviews, and feedback from the usability testing to compile my recommendations to address immediate concerns and future growth opportunities for voter registration in Nigeria.

Immediate Concerns

The Independent National Electoral Commission should prioritize improving the government's relationship with and the public opinion of its citizens. Increased transparency in the election process will reestablish trust amongst citizens and increase their willingness to register to vote. Utilizing public spaces in local communities for registration and voting activities will give more citizens, especially those in rural areas, access to participate in government affairs. Using public spaces for voting would allow INEC officials to greatly increase their efforts to disseminate election information and materials by providing them in more accessible areas for citizens beyond their zoned registration center and the INEC website. Historically INEC has only audited their voter registrar when they update or change the technology being used. Instituting periodic audits of the voter registry will greatly reduce issues stemming from data integrity well before the time of elections. If funding allows, upgrading information and communication technology used to register citizens can lessen the disparate nature of

these registration systems. All of these efforts will improve verification efforts and assist with curbing fraudulent registrations.

Future Growth Opportunities

A push to roll out the National Identification Number is key in improving the efficiency of voter registration and verification. The NIN can be used to quickly extract information and validate a voter trying to register. If costs for voter registration were reduced, more money would be available to support the drive for implementing the NIN. A formal tool for online voter registration can be developed to provide convenience for individuals with internet access and a National Identification Number to quickly complete registration from the comfort of their home. Individuals with internet access who do not have a national ID can still start the registration process from the comfort of their home, saving processing time when they travel to an official site. Research shows that the overall cost of implementing online voter registration in the United States is low compared to typical election expenditures (The Pew Charitable Trusts, 2015). Nigeria may also benefit from using online registration as it may lessen the number of registration machines that need replacement and maintenance; however, initial infrastructure cost could see a modest increase in federal spending before costs decrease. Measures should be taken to secure the underlying process and database infrastructures and lessen fears from voters about hacker manipulation.

Further Research

Future studies would benefit from a larger and more diverse sample. My reach extended to individuals who ranged from middle class to well off, who were active in government affairs, who had stable access to the internet, and who were knowledgeable about the voter registration process in Nigeria. Inclusion of senior citizens, people with literacy issues, and people who originate from rural locales would improve the design of the online tool and its supporting services. As the prototype only had 2 rounds of testing and design improvements, additional rounds with more participants and iterative improvements would also be beneficial. Based on the survey results, the adjusted Wald binomial confidence interval would lead to being 95% confident that the percentage of

people registered to vote in Nigeria is between 75% and 92%. However, I feel the actual percentage is likely to be lower due to the unusually high economic and educational status of the survey respondents.

Moreover, internet and database security issues were outside the scope of this project. Widespread use of online voter registration in other jurisdictions indicates both that security is possible, and that it doesn't happen automatically. Security assurance testing would clearly be a necessary step.

This research was inspired in part by a request to help develop an online voting tool for use in Nigerian elections. I wanted to research the feasibility of doing so, which led to the much-needed study of Nigeria's current voter registration system. An online implementation of voter registration proved more feasible than online voting as this study has shown and could be a benefit for the Independent National Electoral Commission (INEC). I plan to make this paper available to members of INEC through my father, a former commissioner. I hope that the study can provide opportunities to audit and improve the current registration process and inspire development of an online registration tool.

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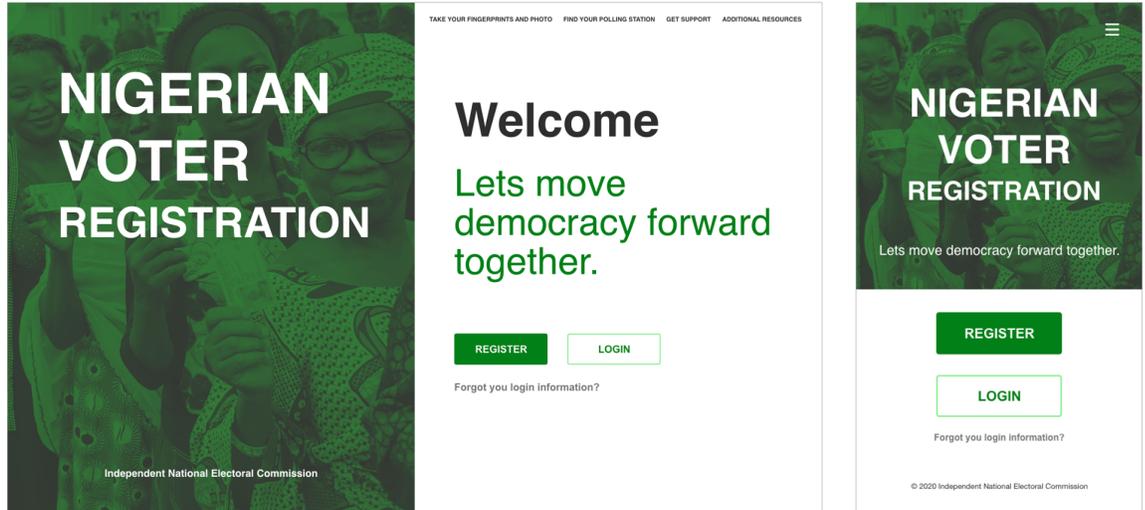
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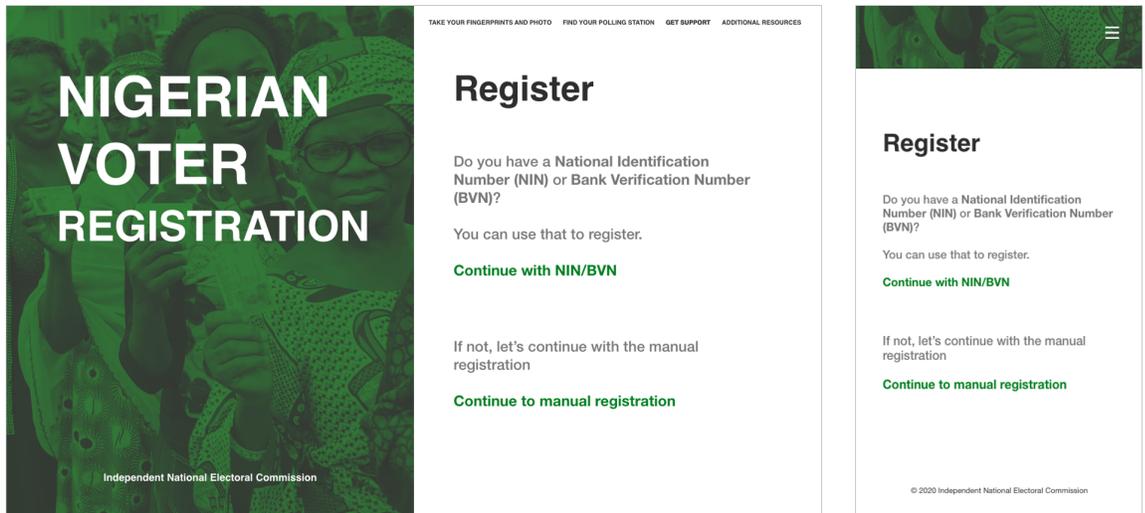
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Appendix A: Selected Screenshots of Voter Registration Tool

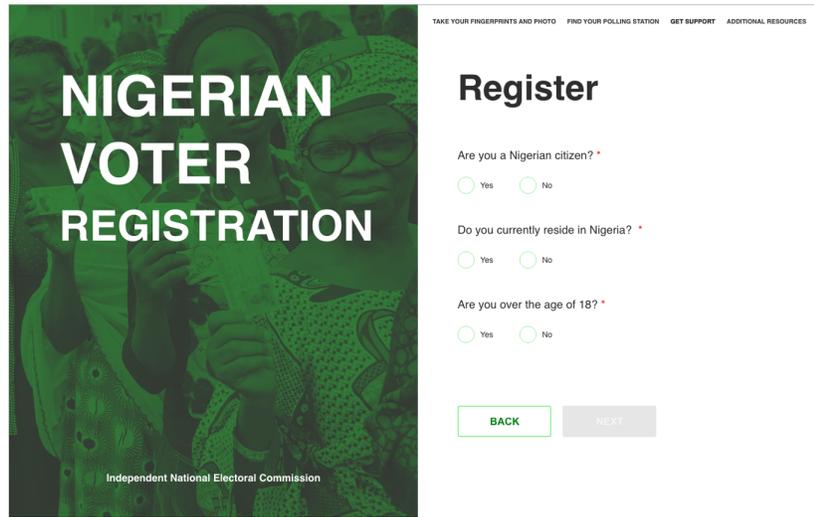
Landing Screen



Registration Type Selection



Eligibility Filtering



NIGERIAN VOTER REGISTRATION
Independent National Electoral Commission

TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

Register

Are you a Nigerian citizen? *

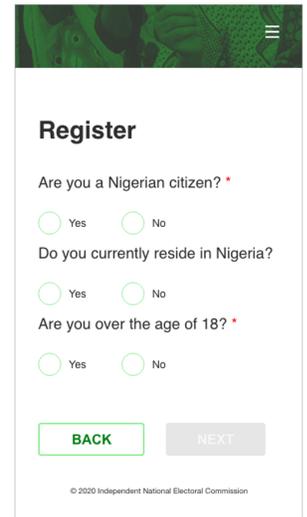
Yes No

Do you currently reside in Nigeria? *

Yes No

Are you over the age of 18? *

Yes No



Register

Are you a Nigerian citizen? *

Yes No

Do you currently reside in Nigeria? *

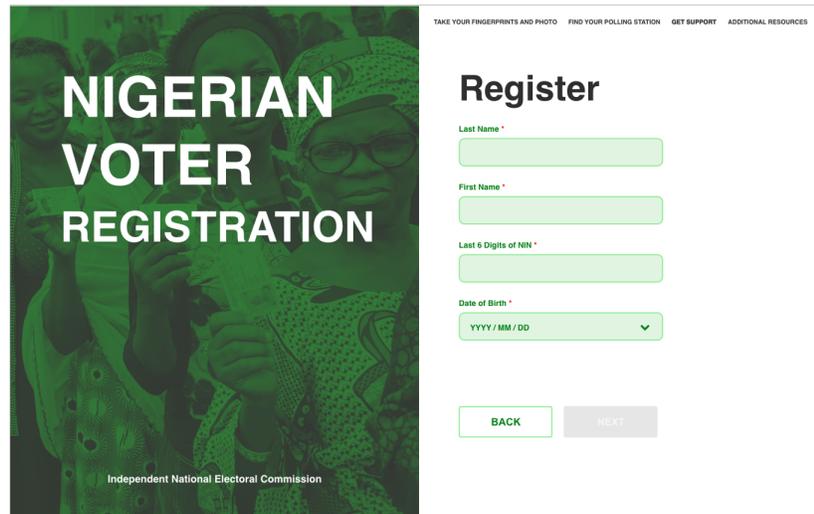
Yes No

Are you over the age of 18? *

Yes No

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NIN Registration



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TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

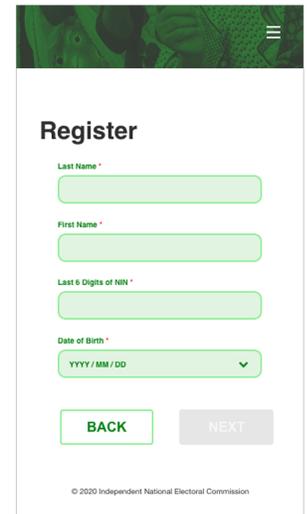
Register

Last Name *

First Name *

Last 6 Digits of NIN *

Date of Birth *

Register

Last Name *

First Name *

Last 6 Digits of NIN *

Date of Birth *

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Manual Registration



TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

Register

Last Name * Suffix

First Name *

Middle Name

Date of Birth *

Gender *

Register

Last Name * Suffix

First Name *

Middle Name

Date of Birth *

Gender *

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Registration Validation



TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

Registration Confirmation

Thank you for registering online with INEC.

You will receive a verification number through an email or text.

Enter your verification number here:

Verification Number *

Registration Confirmation

Thank you for registering online with INEC.

You will receive a verification number through an email or text.

Enter your verification number here:

Verification Number *

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Login



TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

Login

Account Number *

Password *

Forgot your login information?

SUBMIT



Login

Account Number *

Password *

Forgot your login information?

SUBMIT

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Account Recovery



TAKE YOUR FINGERPRINTS AND PHOTO FIND YOUR POLLING STATION GET SUPPORT ADDITIONAL RESOURCES

Forgot Account Number

If the email address you entered matches an account in our system, you will receive a message with instructions to receive your account number.

HOME



Forgot Account Number

If the email address you entered matches an account in our system, you will receive a message with instructions to receive your account number.

HOME

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Appendix B: Demographics of Interview and Usability Testing Participants

*Table Appendix B1**Interview Participant Demographics*

Participant	Age	Gender	Nigerian Registration Status	Country of Residence
P1	55	F	Not Registered	USA
P2	60	M	Registered	Nigeria
P3	59	M	Registered	USA
P4	49	M	Registered	Nigeria
P5	36	F	Registered	USA
P6	37	M	Registered	USA
P7	42	M	Registered	Nigeria
P8	56	M	Registered	Nigeria
P9	51	F	Registered	Nigeria
P10	28	F	Registered	Nigeria

*Table Appendix B2**Usability Test Participant Demographics*

Participant	Age	Gender	Nigerian Registration Status	Country of Residence
P1	55	F	Not Registered	USA
P2	60	M	Registered	Nigeria
P3	59	M	Registered	USA
P4	36	F	Registered	USA
P5	37	M	Registered	USA
P6	28	F	Registered	Nigeria
P7	31	M	Not Registered	USA
P8	37	M	Not Registered	USA

NIGERIAN ELECTION PARTICIPATION

49

P9	43	M	Registered	Nigeria
P10	26	F	Registered	Nigeria

Appendix C: Survey Questions

1. Are you (or have you ever been) registered to vote? (Yes/No)
2. Have you ever used the INEC (Independent National Electoral Commission) website to find information about registration? (Yes/No/Unaware of Website)
3. How was your experience using the INEC website to find information about voter registration?
4. Have you ever experienced difficulties when trying to register to vote? (Yes/No)
5. What difficulties did you experience when trying to register?
6. Did these difficulties prevent you from registering?
7. Do you feel the instructions for registering to vote were straightforward? (Yes/No)
8. How would you rate the process of registering to vote? *On a scale from 1 (extremely hard) to 5 (extremely easy)
9. Was it difficult to identify/locate your local registration center? (Yes/No)
10. What improvements, if any, would you like to see done to the registration process?
11. Do you think online registration would provide any benefit to Nigerian citizens? (Yes/No/Maybe)
12. How do you think the voter turnout numbers reflect the actual number of registered voters? *On a scale from 1 (inaccurately represents) to 5 (accurately represents)
13. What do you see as the pros and cons of online voting?

Appendix D: Interview Guide

Script

Hello, _____. My name is Sylvester Ezeani and I'm interviewing you for an online voter registration service that I am designing. You were chosen because you belong to the ideal demographic of the tool and I your insight could help tailor a better experience.

Discussion Guide

Establish User Knowledge:

1. Are you currently registered to vote in Nigeria?
2. Have you ever tried registering to vote?
3. Describe the process of registering to the best of your knowledge.
4. What do you know about Nigeria's National Identification Number?
5. Do you have a National Identification Number?

Experience:

1. Do you feel that registering to vote is a straightforward task?
2. If someone asked YOU how to register to vote, what tips from your experience would you share with them?
3. To the best of your knowledge, what percentage of your close friends and immediate family members would you guess are registered to vote?
4. What do you think are the top reasons someone would not, or could not, register to vote?

Recommendations:

1. What would you consider, if any, as needed improvements to the current registration system?
2. Would an online option seem beneficial to people?

Appendix E. Interview Consent Form

Principal Investigator: Sylvester Ezeani

Title of Study: Interview for Nigerian Voter Registration Tool

You are invited to participate in this interview about **Nigeria's voter registration process**. I am interested in finding out your views about the current voter registration process in Nigeria. During this session your voice will be recorded.

Your participation in this interview should take approximately **40 to 60 minutes of your time**. Your participation will be **confidential**, and you will not be contacted again in the future. No identifying information will be shared in the output of this research. **All data collected as part of this research will be deleted at the end of the project. Identifiers will be removed from the information and after such removal, the information could be used for future research studies or distributed to another investigator for future research studies without additional informed consent from the subject.** You will not be paid for being in this study. This interview does not involve any foreseeable risk to you and there are no direct benefits. However, the benefits of your participation may impact Nigerian society by providing insight on improving the current voter registration system.

You do not have to be in this study if you do not want to be. I will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact me, **Sylvester Ezeani** at **sylvester.ezeani@ubalt.edu**. If you have any questions about your rights as a research participant, you may contact the **University of Baltimore Institutional Review Board (IRB)** at **(410) 837-4057**. An IRB is a group of people that reviews research studies to make sure that participant rights and safety are protected.

Thank you in advance for your participation in this study.

SIGNATURE FOR CONSENT

I consent to this session being voice-recorded.

The above-named investigator has answered my questions and I agree to be a research participant in this study. By signing this consent form, I am acknowledging that I am at least 18 years of age.

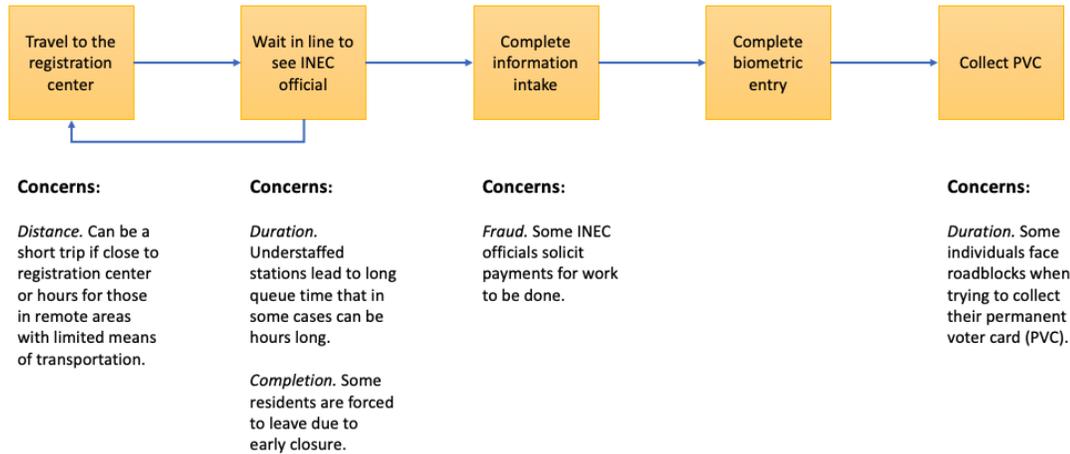
Participant's Name: _____ Date: _____

Participant's Signature: _____ Date: _____

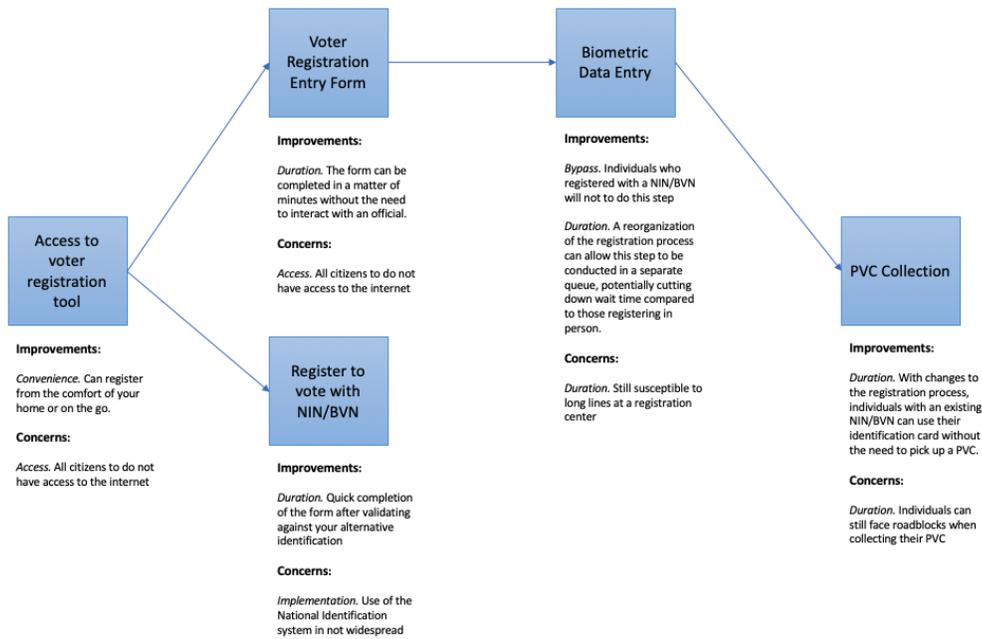
Investigator's Signature: _____ Date: _____

Appendix F. Service Flow

Current Registration Flow



Online Registration Flow



Appendix G. Adjusted-Wald Binomial Confidence Interval

95% confident that the percentage of people registered to vote in Nigeria is between 75% and 92%

- x = number of participants registered to vote (63)
- n = number of participant responses (74)
- $P_{adj} = 0.83$
- $N_{adj} = 77.84$
- 95% Confidence interval = 0.84 ± 0.08 (0.75, 0.92)

95% confident that the percentage of people in Nigeria with mixed feelings about the registration process is between 45% and 67%

- x = number of participants registered to vote (42)
- n = number of participant responses (74)
- $P_{adj} = 0.55$
- $N_{adj} = 77.84$
- 95% Confidence interval = 0.56 ± 0.11 (0.45, 0.67)