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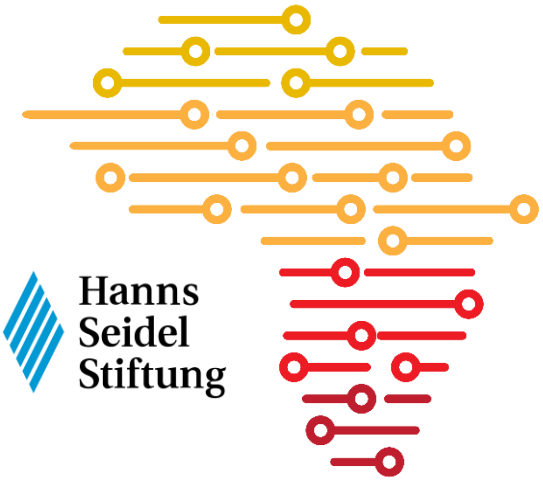
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Realising digitalised electoral process in Africa: Public policy implications from Kenya's electoral technology systems

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Abstract

Leveraging digital technologies in Africa's voting systems has recently become a battleground for political elites to influence election outcomes in Kenya, as elsewhere globally. Although the technology used in voting has received its fair share of criticism, it has consistently demonstrated that the public can get detailed results much earlier, including reduced electoral fraud and increased accuracy of results. However, whereas electoral bodies are making good progress in their digital institutional learning and transformation, a comprehensive policy gap remains. Without national policies on electoral system digitalisation, electoral technologies remain vulnerable to malpractices, such as hacking and data manipulation by political actors. In this paper, we argue that a comprehensive policy framework to guide the digitalisation of electoral systems could potentially improve and smooth the journey of democratisation of African countries. Electoral digitalisation policies can achieve a greater degree of authority and political independence, besides enhancing the efficacy of the technological systems over time. Most importantly, institutional acceptance and embedded cultures of technological change must be aligned with existing policies and legal frameworks. We show how this can work in Kenya, whose electoral systems have had tremendous experience and incremental digital technology transformation since 2013. We unpack the reciprocal relationships between technical and policy aspects of digitalising electoral systems, pointing out how and what aspects need to be covered in designing a national policy when creating digital electoral

systems in developing country contexts. Doing so also displays some critical challenges confronting the administrative transition to electoral technology systems.
Keywords: data protection, electoral technology, technology adoption, policy digitalisation, elections, digital technology, digital publics

Introduction: A need for sound digitalisation policies

This paper unpacks digitalisation policies or techno-policies for electoral administration and management, which have recently become part of the organisational forms across African countries and other regions. This discussion is essential today when African countries' electoral systems deal with newer and rather intricate challenges from digitalising their election administration and management processes. While much has been said, little is known about policy challenges and institutional evolution imprints featured in the recent digitalisation of African electoral systems. This paper makes a modest attempt to address this knowledge gap. It shows that digitalising electoral systems should consider designing elaborate context-specific policies modelled around the country's political realities and levels of technological transformation. Digitalising the electoral system effectively considers the broader governance environment, including transformative public sector organisations, democratic norms and societal attitudes towards digital technologies to ensure a credible and transparent electoral process. In other words, the experimentation with digital technologies in election administration takes its cue from how these technologies have also transformed public policy and governance spaces in a country (Aniche et al., 2021; Arthur et al., 2023; Darmawan, 2022; Omotayo and Adekunle, 2021; Onyango, 2023b).

This transformation could explain why most African electoral systems are still keen on leveraging digital technologies despite the growing problems with electronic voting and administration (see, for example, Amoah, 2022). Leveraging technological tools in the electoral process has prevailed in its potential to improve transparency, speed and accountability in election outcomes. Advocates of digitalised electoral voting systems and administration believe it would ensure considerably more involvement of ordinary citizens in the election process, thus increasing electoral participation and monitoring of elections (Adeshina and Ojo, 2020). In Africa's developing political contexts, it is hoped that adopting digital electoral technologies would resolve problems associated with manual paper systems, deter political leaders' uncouth malpractices and enhance best electoral administration practices to improve electoral legitimacy (Achieng and Ruhode, 2013). This should happen in three main ways. First, digitalised electoral processes should ensure the efficient and robust functioning of the electoral bodies. Second, digitalising electoral systems should reduce the scope for electoral manipulation by politicians and officials of the electoral bodies and, third, ensure greater transparency and clarity in relation to the outcomes of the election (Adeshina and Ojo, 2020; Amoah, 2022).

However, digitalised electoral processes have not been without problems. Election outcomes have become even more disputed and highly contested in some African countries (Amoah, 2022; Laakso

and Kariuki, 2023; Odote and Kanyinga, 2021). Electronic voting, for instance, has become like a *black box* in countries such as Kenya, where they have presented, especially in the initial stages, visibly flawed electoral processes that undermined the democratic process entirely (Odote and Kanyinga, 2021). Most of these challenges are designed by the incumbent to fail (Amoah, 2023), and some stem from voters' discomfort and distrust of the electronic platforms, such as those recently established in Nigeria's Oyo state (Omotayo and Adekunle, 2021). Issues about the regime's interests confront electronic voting, including public trust in electoral institutions, the efficiency of the process and impartiality regarding electoral management (Amoah 2022; Mensah 2021). These deficits cast doubt on and draw more attention to the efficacy of ongoing political reforms across the region and the need for practical policies on digital electoral processes.

As Odote and Kanyinga (2021: 559) show in the case of the 2017 Kenyan elections, '[e]lectoral technology can reinforce or undermine democratic processes, both of which are dependent on the interests of the incumbents or other powerful groups'. Another related challenge is dependent on human behaviour and respect for the rule of law. The problem with the rule of law in most African countries has expectedly led to a declining level of citizen trust in the electoral process. Equally, with the contestation of most election outcomes, the focus has also shifted to the neutrality of other government institutions, including electoral officials, the judiciary and security agencies, in the electoral process. The efficiency issue may be deliberately caused by institutional capacity issues such as poor planning in procuring electoral materials, voting process, tabulation of results and late declaration of results (Okechukwu, 2022).

This notwithstanding, African states should consider leveraging electoral technology systems seriously. This requires clear electoral digitalisation policies sensitive to their transforming democratic governance systems (Oloruntoba and Falola, 2018; Onyango, 2023a). Digitalising the electoral process depends on a country's broader political development, which calls for high societal consensus on democratic norms. The digitalisation of electoral systems should be considered a process underpinned by institutional learning and democratic normative transformations. It should be characterised by levels of democratic growth (Odote and Kanyinga, 2021). In this way, digital technologies are only electoral administration tools but not the solution to electoral hygiene or legitimacy problems common across most African countries today. So, whereas in some instances, electronic voting seems to guard against electoral malpractices and boost public confidence in the short term, it can prove ineffective in achieving the intended objectives in contexts where democratic practices are yet to be well entrenched in society. It has been suggested in recent experiences across Africa (Amoah 2022),

including in relatively democratic systems such as the United States of America, that digitalising electoral process relies on very complex procedures that can break down at any time (Adekunle, 2020). Experience shows that electoral technologies can increase widespread suspicion of systems and data manipulation and encourage complacency towards traditional forms of election oversight (cf. Adekunle, 2020; Odote and Kanyinga, 2021).

Subsequent policies should be able to address such challenges while also allowing flexibility for innovation. It has been claimed that effective policy for electoral technological systems could strengthen electoral processes in developing African states, where Election Management Bodies (EMBs) have limited capacities and a lack of transparency. Studies have shown that digitalising electoral systems needs careful planning, which involves complex logistics to provide accurate data input, excellent training of staff and sufficient leadership (Adekunle, 2020; Malloch-Brown, 2017; Masuku, 2006). The policy design should emphasise that all the digital technological components must be tested, and replacements must be availed in case any devices break down. Furthermore, where the manual (paper) electoral processes come in or complement digital platforms should be clarified. For instance, if competitive procurement processes result in a different firm conducting voter registration than the firm selected to provide the database for managing the electoral register, it is essential to ensure the compatibility of the two software sets. In some cases, this may be a minor challenge. However, in a country such as Malawi, for instance, due to a lack of clear policies and legal framework, it took a longer duration and a considerable amount of resources to achieve this, which left inadequate time to audit and clean the register of voters (see Chikapa-Jamali, 2023).

Digitalising policy design for electoral systems requires other forms of human input. Codes must be created for programs, servers must be protected, and digital registers must be maintained. Data security is also needed. Such realities increase the need to formulate and implement highly effective policies to ensure a smooth and transparent electoral process. Like Kenya, African states with such digital electoral policies should simplify the user interfaces for integrating emerging technologies, additional timelines and training requirements. This goes in tandem with consideration of the kinds and scope of resources needed. The logistical challenges involved during the electoral process mean that things can and often need to be corrected when leveraging digital technologies in electoral systems. For instance, in the last two general elections in Kenya, there have been cases in which the biometric registration or verification devices had failed to reach polling stations in good time, power cuts occurred, or insufficient battery life of the devices stopped them from working, halting the

election process[1]. The scale of these challenges usually varies at different points in the electoral process. As a rough rule, biometric registration has worked much better than biometric verification; this is simply because the time pressure is so much more intense whenever millions of voters must be processed in a single day. This was evident in Chad in 2016, where the technological systems eliminated double registration.

However, the actual voting during the general election was still marred by challenges. The technological methods used in Kenya for the biometric registration process in 2013 worked relatively well, delivering a register that appeared more transparent than any previous one. However, no policies were in place to guide the use of the register for verification. Hence, the intended success was not achieved (Kamau, 2017). As in other policy sectors, electoral digitalisation policies should regulate and monitor the speed, efficiency and credibility that should come with leveraging digital technologies. The existing management structures should synchronise technology leveraged in the election processes to uphold fairness, justice and respect for the rule of law. Moreover, techno-policy incorporates appropriate resources and infrastructures, such as Internet coverage and access. As seen in Onyango (2023c) and recent works in Africa, as elsewhere in the developing contexts, the use of the Internet to digitalise public policies and governance combines legal and political tools to provide efficiency and accountability. For example, Kenya's Independent Electoral and Boundary Commission (IEBC) employs online tools and platforms to accelerate and facilitate the election process. However, this primarily depends on Kenya's investment and existing Internet infrastructure and IEBC resources to harness this to manage elections effectively and efficiently.

As such, digitalisation or techno-policies should consider the country's level of technological infrastructure and offer alternative courses of action in situations where digital methods fail. These alternatives should be appropriately communicated and well understood by political parties, citizens and other stakeholders for accountability purposes to ensure a transparent process. Digitalising electoral processes may allow interested individuals with Internet access to monitor the vote counting as it is streamed. This leads to creating ideas and content for individuals and media and prioritising important issues in formal politics (Vydra and Klievink, 2019). With access to such information, independent actors can participate in practices such as petitioning and providing policy-informed cases in courts. In this way, digitalisation policy may be helpful when addressing the legitimacy of

[1] See, for example, https://www.theafricareport.com/238112/kenya-why-does-the-electoral-commission-struggle-with-elections-each-time/ retrieved on 29/08/2023

election results since digitalisation develops new ways of conducting elections that may, however, challenge its adaptation and acceptance (Oke et al., 2021).

Today, incorporating technology in managing a country's elections demands a dynamic process to address adaptation and acceptance challenges, including tensions between public offices and the disruptive effects of technological advancements. Public or electoral officers need to identify appropriate or context-specific technological tools to enable free and fair management, effective communication and administration of elections. For example, in '2022, Kenya published more than 99% of tally reports in real-time on election day. By making timely information available to all stakeholders, authorities improved the audibility of election results and made this the most transparent election in Kenya's history. IEBC relied on a robust, election-specific technology solution.'[2] Also, introducing more specialised tools allows for the interoperability of technological devices, which improves their opportunities and limitations concerning their end-user functionalities. The interactive process that develops then determines the strategies that evolve with the introduction of technology in public offices.

Political dynamics and the contentious nature of political actors can pose a dilemma regarding the validity of the decisions made by the authorities. For instance, when the elections were first digitalised in 2013 in Kenya, several political actors were discontent with the results. But, over the years, electoral technology in Kenya has availed opportunities and interactive learning from emerging challenges. Kenya has used a combination of digital technological gadgets to register voters and run the elections despite several technical mishaps. Cell phones and laptops ran out of batteries, while some polling stations needed more outlets, primarily in rural areas (Marjorie and Reuben, 2020). Many employees lacked enough training, while others could not access the necessary PINs. In 2013, the Result Transmission Systems (RTS) could not handle the amount of uploaded data. However, the issue appears to have been resolved later, as this was uncommon in the 2022 elections.

Most of the above problems are not technological problems but managerial problems. A lack of critical processes affected the efficient integration of election technology. For instance, although the 2011 Elections Act stipulated 90 days after voter registration, this period was shortened to 60 days, adding pressure to IEBC and forcing it to work under tight schedules that affected its planning. Enough planning time may have improved the integration of electronic gadgets into the election process. The

[2] See https://www.smartmatic.com/case-studies/article/kenya-fostering-transparency-through-technology/ retrieved on 29/08/2023

Carter Centre acknowledges that 'despite the serious shortcomings of the IEBC's management of technology and release of information, the paper-based procedure for counting and tallying presented enough guarantees to preserve the expression of the will of Kenyan voters' (Passanti and Pommerolle, 2022). Overall, electoral technologies have recently become a vibrant test and battleground for Kenyan political elites because they have been perceived as the key to winning political seats. This was displayed in political parties' intensified investments in technological platforms and personnel. Technology has been at the centre of election result disputes about whether elections were verifiable, fair and transparent in successive elections.

Therefore, the Kenyan case is instructive in understanding electronic administration. It highlights the need for more transparency in adopting technological systems in the electoral process that, since 2013, have undermined public confidence in the electoral processes, even when considerable improvements have been made. The rejection of presidential election results by opposition leaders in August 2017 did not just indicate that several specific challenges had existed. Instead, it also pointed out the possibility that technological systems facilitated electoral malpractices. To be precise, there was a lack of clear policies to guide the integrity of the technological systems (Ngetich and Ayaga, 2016). This accusation resonated with a section of the Kenyan electorate. The confidence of opposition voters in the electoral processes was eroded following experiences with previous rigging and hacking allegations. In other words, digitalising the electoral system has not dealt with the legacy of public distrust in the electoral process, that is, whether it is now foolproof from the incumbent's manipulations – what has been recently called the *deep state*.

Data collected for this paper explored digitalisation policy implications in electoral systems in Kenya and how dynamic institutional structures influence technology integration into elections. The study was motivated by consistent electoral mismanagement, institutional mistrust, lack of transparency in electoral systems and failure of technology to drive free, fair and credible elections. A descriptive study design was used to examine electoral participation, data integrity and transparency of technological electoral processes as dependent variables. The emphasis was placed on electoral technology when considering the manner in which data integrity and transparency systems resonate towards ensuring credible use of technology to deliver verifiable transmission of results. The study involved a documentary analysis of digitalisation policy aspects of electoral management and administration in Kenya. This involved analysis of court reports and election management acts, data from IEBC reports, briefs, policy guidelines, journals and newspaper opinions. This elaborate introduction to the design and study context of digitalisation policies is followed by an overview of electronic administration and

management of elections in Kenya to unpack the digitalisation pathways of the electoral process. Data discussion subsections follow this before the conclusion.

Digitalising the electoral process in Kenya

Forms of electoral technologies in Kenya

Kenyans have responded well to the digitalisation of electoral systems. A national Ipsos (2017) survey in Kenya indicated that more than half (58%) agreed that adopting technological systems in elections contributed to free and fair elections. In the survey, respondents preferred new voting technological systems, citing that they were more robust. Since 2013, Kenya's electoral system has been transformed through the introduction of digital technologies to manage and improve credible voter participation in the electoral process. Biometric registration has been applied in recording the fingerprints of voters, faces and other biometric data; biometric identification verifies this data electronically at the polling station to clear an individual to vote. Similarly, Optical Mark Recognition (OMR), Direct Recording Electronic (DRE), and Optical Character Recognition (OCR) systems provide alternative technologies that are used in recording the choices of voters. Further, electronic systems are often based on mobile phone applications – for counting and collating votes (Amougou-Mbarga and Tsowa, 2023).

The digitalisation of Kenya's electoral systems was proposed to bolster transparency, integrity and a quicker way of transmitting results after the 2007/08 post-election violence. In the subsequent elections of 2013, 2017 and 2022, a technology-enabled electoral system was adopted to biometrically register voters, identify them during elections and electronically transmit election results. It was observed that public participation in electoral processes had been successful, with biometric voter registration boosting the electoral roll from 14.3 million in 2013 to 19.6 million in 2017 and 22.1 million in 2022. Thus, there have been pockets of recorded success, improved efficiency in managing elections, and citizen awareness and participation.

The widespread use of technological systems in the August 2017 polls still did not prevent the presidential elections from being declared ‘illegal, null and void’ by Kenya's Supreme Court. More specifically, the equipment used during electoral processes has become increasingly hi-tech for actors and citizens to have adequate information about their application. However, despite these process- and skill-related challenges, the output of the election processes reflects the broader appeal of digital technologies and the need for a policy guiding the use of technological systems. The digitalisation of

the electoral process in Kenya has refined techno-policies as new practices and approaches are being introduced to improve the effectiveness of electoral voting and respond to the legal lacunas.

Table 1 shows that IEBC has leveraged four types of technology to enhance the effectiveness and efficiency of the electoral process. The implication was to adhere to the Election Act's code in section 44: to ensure that elections are accountable, accurate, simple, transparent, verifiable and secure. The table illustrates the types of technology systems adopted in Kenya.

Table 1: Types of technology systems in Kenya's electoral process

Types of electoral technology	Functions
Biometric voter registration system (BVRS)	This technology was employed to aid in voter registration at the centres where voters were expected to vote by capturing their fingerprints, facial images and civil data. Biometric systems ensure that voters are uniquely identified through multiple methods. Besides names, the system can identify a voter through fingerprints, IDs and facial features. BVR ensures that voters' records are efficient and fast to access and includes providing security and privacy information. Moreover, the system improves reliability and integrity and eliminates duplicates.
Electronic voter identification system (EVID)	EVID is the poll-book that verifies and confirms voters electronically on polling day. EVID technology curbs impersonation by ensuring that only registered persons are capable of voting. Candidate Registration System (CRS) technology strives to improve the accuracy of ballot papers and enhance efficiency through accurate data capture, data exchange and processing of records.
Results transmission system (RTS)	This is the last technological engagement with the voter. This platform allows the electoral body to transmit personal results electronically at the end of vote counting. The process enables provisional real-time streaming of election data to stakeholders and media through enhanced transparent visualisation and display of results at tallying centres.

Candidate Registration System (CRS)	This technology is meant to capture data on voters during party registration. Cross-matching the political party register and voters register is conducted to verify candidates' compliance and details as proof for ballot printing.

Source: Authors

In leveraging the above technologies, the IEBC has improved the way in which individuals can access voter registration and monitor election results instead of waiting for the final total votes to be announced by the few who hold power. Towards this end, blockchain-enabled RTS technology has been leveraged by the IEBC to trace or reduce tampering of election results, hence improving the transparency of the election process. Also, through biometric technology, Kriegler's report shows that the IEBC identified ghost voters who registered twice or deceased individuals whose voting credentials were still active (see Ndung'u, 2020). Overall, digitalised electoral systems in Kenya can be said to have improved integrity issues in the election process, besides making the process highly effective. Election officials in Kenya have used technology to respond to some of the most detrimental challenges, especially those affecting candidate registration, voter registration, identification of voters and transmission of results.

However, the electoral process still needs to ensure clarity of the process, understanding of the emerging challenges, how technology can solve such problems and sufficient time to plan, learn, test and refine the technological solutions before implementing them. In other words, a comprehensive policy would go a long way to reducing the challenges that have come with the digitalisation of electoral systems. For voters, digitalisation has proven challenging due to systematic institutional problems riddled with mismanagement of public organisations, political interest projected by bureaucrats in management of how systems should behave, or work and lack of local capacity of institutions and technical skills required for deployments. The core arguments of all reported and disputed cases have revolved around the proper deployment and transparency of electoral technologies, including deliberate interference to predetermine the outcomes. The Supreme Court of Kenya, which is the highest appellate body, nullified the 2017 elections and noted that:

> IEBC's ICT systems were compromised and infiltrated, and public officials interfered with data. Further, it was noted that the electoral body bungled the whole transmission system and did not follow proper procedures in transmitting and tallying votes. Therefore, simultaneous transmission of results from polling stations to national tallying should facilitate the verification

process to act as insurance against fraud by eliminating intermeddling and human intervention in the tallying chain – Supreme Court Judge's Ruling 2017.

The above points us to policy bottlenecks confronted by electoral administration and the extent to which the executive may have played hands in the process. Without clear digitalisation policies, it becomes a challenge to audit the applicability of electoral technologies, such as the transmission process tallying, and whether these processes conform to the general democratic principles of electoral fairness, transparency and representation. In addition, procurement processes of these technologies may be compromised without the guidance of a clear policy and, if left to general procurement policies, may not pay attention to components of what should be procured and how they should be procured.

Regulatory regime and infrastructural challenges of digitalising electoral systems in Kenya

Like most African countries, the high cost of digitalising electoral systems has pushed Kenya to seek external support in realising these systems. However, this engagement is primarily executive-led without an inclusive legislative and policy framework. While the Kenyan case may present an interesting case study, foreign assistance in digitalising African electoral systems is a familiar trend. For example, in Ghana's 2012 elections, the biometric voting costs were estimated to be US$ 267 million, equivalent to $19 per voter for a population of 14.2 million. Equally, Uganda spent US$ 4 per voter in 2016, Tanzania US$ 5.16 and Rwanda US$ 1.05, making it the most cost-effective. In Kenya's 2017 elections, the integrated technology cost was US$ 499 million and $25.50 per voter, with a voter population of 19.6 million, making it the most expensive election in the world.

Similarly, in 2022, the average cost per voter was $20, with 22,120,458 registered voters, making it the second most expensive election in Kenya above the average cost per registered voter index (ACRVI) benchmark of US$ 5 per voter. Other challenges associated with digitalising electoral systems relate to underinvestment in technological infrastructures. This includes failed electronic transmission systems, missing biometric data, the short battery life span powering Kenya Integrated Electoral Management (KIEM) kits and poor network infrastructure to support widespread technology deployment. At the same time, there is less investment in appropriate public sensitisation to digital electoral technologies and policies around them. For this reason, there is inadequate knowledge among a significant number of Kenyan citizens about the way technological systems work, with the consequent problem of differentiating between false claims about the limitations of the systems and plausible ones.

Most importantly, there have been concerns about the need for a more defined national policy to define the applicability and allocation of tasks in the manner in which the IEBC should collaborate with other actors, including political parties, civil society organisations and public agencies, on matters like the procurement processes of technological systems and applications during election administration. This may assist in dealing with the suspicious manner in which IEBC has been accused of procuring and applying electoral technologies in Kenya. The regulatory regime should also define how political parties deploy vote-tracking technologies or RTS to counter-check IEBC election results during the voting process.

Even though Kenya has adopted a regulatory and legal framework for using various electoral technologies in three areas, there is a need for these frameworks to be more comprehensive. Electoral technology and deployment still need to be more precise, with unclear guidance on data ownership over the electoral cycle. Even though Kenya recently enacted a data protection policy that prevents misuse of individual data and third-party vendors who provide proprietary software, the law still needs to clarify who and how election data are handled.

Issues highlighting data protection management and handling of personal information have yet to be scaled up and given prominence in the Kenyan electoral system. Emerging episodes of public officer criminality involving electoral technology management have undermined public confidence in the security, openness and reliability of these systems. For instance, during the voter verification process, it was unearthed that close to one million voters had had their constituencies switched, without their consent and knowledge of the national database, by public officers entrusted with managing voters' data. This was meant to influence the voting pattern to favour regions of public officers' interest or deny specific individuals the right to participate expressly.

KPMG's independent audit report revealed the following:

> Even though the Voters register was subject to the newly adopted Data Protection Act of 2019, which is anchored on ensuring that individuals have protection to exercise their privacy rights, it was revealed that the register had 226 143 illegal voters registered with IDs and passport numbers that did not belong to them, 246 465 deceased voters and 481 711 duplicate records. In addition, the report revealed that several cyber-security vulnerabilities were spotted and identified even though no substantial evidence emerged to suggest existing exposure was exploited to manipulate the overall integrity of the process. KPMG Report, 2022: 34[3]

[3] KPMG audit report: Independent audit of registers of voters, final audit report, June 16, 2022

The integrity and management of back-end databases that contain critical voters' registers are entrusted to external vendors with full access rights. Therefore, the possibility and risk of third-party technology contractors misusing access rights privileges, such as accessing back-end databases, has raised issues in the public domain. Experience has shown that not all vendors follow established best practices in the maintenance of voting systems, leading to cyber-security vulnerabilities (National Academies of Sciences, Engineering, and Medicine, 2018). For instance, in the 2022 Kenyan general election, there were massive illegal transfers of individual voters from their respective voting centres to other areas. Political parties also had the privilege of illegally registering people as their party members without individual consent. The Carter Centre highlighted this in the 2022 report:

> It is important for Kenya to ratify the Africa Convention on Cyber-Security and Protection of Personal Data[4] to strengthen the framework around cyber-security and strictly adhere to implementing the Kenya Data Protection Act 2019[5] . Carter Centre Report, 2022: 12.

In a series of systematic technological failures during elections in 2013, 2017 and 2022, there were missing details of individual voters or an inability to be identified through biometric means to enable one to vote. Despite improvements and alternative means of verification, voters whose data were missing felt that technology had denied them the opportunity to express their democratic choice. Moreover, the missing data raised integrity issues regarding whether IEBC officials with access rights deliberately tampered with data. To enhance institutional integrity and support risk audit in electoral technology management, Cater Centre, in its 2022 report, recommended the following:

> IEBC should adopt open-source software's cryptographic methods and modern digital signatures schemes for Results Transmission System (RTS) to safeguard better integrity, confidentiality, accountability, verifiability and availability, including conducting thorough third-party reviews for vendors. Carter Centre Report, 2022: 12.

It is noted that deploying new technology in managing elections in Kenya has helped improve the integrity, transparency, accountability and verifiability of the electoral technology in the election

[4] Africa Union Convention on Cyber Security and Personal Data Protection: on https://au.int/sites/default/files/treaties/29560-treaty-0048_-_african_union_convention_on_cyber_security_and_personal_data_protection_e.pdf

[5] See, https://www.dataguidance.com/notes/kenya-data-protection-overview

process. Even though this might be cited as public organisation improvement towards enabling citizens to participate in credible elections, related processes have been cited with mixed reactions, including waning public confidence mainly occasioned by a lack of voter education regarding technology deployment. For instance, Kenya's election process has faced hardships in some of its rural areas. Some regions in Kenya, especially the semi-arid areas, face challenges such as poor road networks and lack of access to the Internet. When applying technology to such places, there are high chances of mishaps. In the recent 2022 general elections, several rural areas were forced to use traditional voting means due to a lack of connection to the power necessary for electronic election gadgets. Such challenges cause a lack of uniformity and act as a platform that promotes election irregularities. However, should the underlying constraints be addressed, technology would increase the credibility of elections more efficiently.

Public confidence

Elections in Kenya continue to experience systematic challenges such as public mistrust, weak electoral management bodies (EMB) and political parties, rejection of election outcomes, the uneven playing field for actors, inaccurate voter registers and identification problems. While it may be deduced that some of these challenges are not peculiar to African countries, it has been noted that electoral integrity in Africa is more alarming than in the rest of the world. In addition, Kenya's public-led digitalised electoral management body has failed due to unclear national policy to guide this. Voters do not better understand their roles in leveraging election technology systems. This has led to missed opportunities to increase public participation and confidence in the voter registration system, including strengthening technology procurement, data protection, equipment testing and verification processes. Little or late support in funding essential technology deployment and other institutional-related factors have impeded the ability to communicate to the public how technology is used in elections. Most importantly, technical skills, especially in hiring credible IT staff, have been lacking in IEBC electoral body staffing.

During the last three general elections in Kenya that widely involved the adoption of technological systems, there was widespread failure of electronic voter identification kits in several polling stations. This forced the election officials to revert to manual registers. The entire election process became very complex, resulting in uncertainty over the definitive register since the printed versions differed slightly from the digital registers. The new electronic results transmission system, a technological innovation that had yet to be scrutinised or tested, also failed remarkably. Many rejected ballots were recorded in early result transmissions, an error the electoral body has never explained.

> During the initial streaming of the election results, data flow stopped. It later transpired that there was a server failure, and therefore, the system could not cope with the large volume of data that was being transmitted. Ohito, The Standard, 4 August 2016.

These challenges have been attributed to a lack of policy framework to guide the use of technological systems in Kenya's electoral process and failure to commission and test the systems effectively. The lack of a clear policy framework has undermined the core reforms designed to protect electoral integrity following the disputed 2017 presidential elections (Kamau, 2017).

Conclusive remarks

African countries, mainly Nigeria, Ghana, Mozambique, Uganda, Zambia, Rwanda, Malawi, Kenya and Senegal, have attempted technological experiments in national elections. The view is that technology has guaranteed the principle of 'one man, one vote' and has increased integrity and transparency in African elections. In addition, technology administration has improved voter services and enhanced election audits and dispute adjudication. However, these efforts have not been accompanied by a clear national policy on how digital electoral technologies are being leveraged across the continent, leading to many avoidable challenges in realising credible elections. This paper has shown that, when considering the types of electoral technologies to be adopted in elections, appropriate policies should be in place to guide the adoption. This should identify which part of the electoral process such new technologies would be leveraged and what role each stakeholder and citizen should play. *Engagement* – policy communication, citizen participation, and stakeholder consultations – while leveraging these technologies should be paramount in the policy design to address legitimacy and ethical issues.

Digitalisation policy design for electoral systems should also consider the limitations and unintended consequences of adopting the new electoral technology systems. The policy should offer apparent alternatives without possibly reverting to issues technologies were meant to address. Zetes (2017) argues that Africa's new electoral technology systems often fail due to poor policies and a lack of focus on the broader management structures required for their implementation and function. In many contexts, research studies have questioned the policies formulated to guide the adoption of digital technologies in the electoral process and have highlighted how effective policy formulation and implementation can improve the efficiency of the electoral process. In addition, digital technology can encourage a narrow focus on sections of the electoral process, resulting in neglecting the broader political environment and calling for effective policies.

The widespread adoption of these technologies in sub-Saharan Africa has resulted in multiple drivers. As a result, political leaders, civil society groups, international and bilateral agencies for electoral support, incumbent regimes and electoral bodies have all supported this trend and demanded the formulation and implementation of policies to streamline the adoption of the new technologies in managing electoral processes. The motives of these groups are varied and have included the fact that effective policies for adopting technological systems in the electoral process have strengthened potentially vulnerable electoral systems in many developing countries. Electoral processes conducted electronically in several parts of the world have been challenged since the existing policy frameworks have been ineffective. The policy issue is important as these technologies are vulnerable to malpractice, which includes hacking and data manipulation (Nwangwu, 2015).

The adoption of technological systems in the electoral processes may lead to improved transparency in the voting process when there is the existence of a comprehensive policy framework to guide their adoption and rollout. With such policies, an electoral body can also achieve a greater degree of authority and political independence, and the efficacy of the technological systems can improve across successive elections. A sound policy framework could also ensure less damage to the autonomy of formal political institutions and could bring back public confidence in the electoral processes. For technology to succeed, there is a need to provide adequate training for staff, including creating contingency plans such as testing and plotting technological solutions. Most importantly, institutional acceptance and embedded culture of technological change must be aligned with existing policies and legal frameworks.

Therefore, there is a need for policies with broader management structures to guide the adoption of digital technologies in the electoral process. This would improve the efficiency of the electoral process and should include policies on technical staffing, institutional reorganisation and administration of the electoral process. Policies guiding the public on the technology and election process should be used and implemented through sustained communication to improve participation in the electoral process. Even though policies on data protection have been enacted, proper implementation approaches should guide the way in which third-party vendors manage voters' data to avoid misuse of personal data for malicious roles. To ensure personal data protection, there is a need for a strengthened framework around cyber-security policies and strict adherence to implementing the *Kenya Data Protection Act 2019*. In addition, to avoid overbudgeting and overspending on technology-related elections, policies guiding pricing and capping on a voting budget should be in place to guide future pricing.

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