

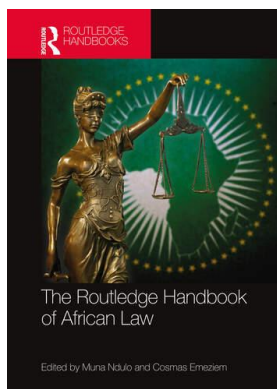
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# LAW AND THE REGULATION OF NEW TECHNOLOGIES IN AFRICA

*Olufunmilayo B. Arewa and Ayodeji O. Fakolade*

## Introduction

Many call our current era “the digital age,” largely because of the importance of technology and technological innovation as guiding forces and core instruments in the economic, business, and sociocultural spheres. Johnson (2006, 1) noted that “contemporary American society is often characterized as ‘technological’ or ‘techno-scientific.’” Technologies today facilitate widespread dissemination of information and visual images, and rapid communication with millions of people across the globe. Many aspects of such technologies of dissemination are positive developments that enhance lives. At the same time, there is a flip side to such technologies that can be more troubling. For example, we have long recognized that the digital era is unfolding in ways that may magnify, in some instances, existing inequalities. Significant dialogue exists concerning the digital divide, which highlights ways in which access to and uses of technology may be unevenly distributed (Wyatt et al. 2000; Wilhelm 2004; Leggon 2006). Leggon (2006, 98) described the digital divide as relating to the “growing gap between those with access to telephones, modems, computers, and the Internet, and those without such access: the information rich versus the information-poor.” As a result, the digital divide has consequences that extend far beyond the digital world. Cohen (2007) in her article, “Cyberspace As/And Space,” explained:

A “digital divide” is never only digital; its consequences play out wherever political and economic decisions are made and wherever their results are felt. Legal scholars have long worried about the structure of speech markets for exactly this reason, but most legal discourse about the structure of speech markets is highly abstract. Changes in speech markets are experienced locally, in the spatial distribution of bookstores, libraries, newsstands, broadcast franchises, protests, collaborations, and innumerable other activities. In addition, it is equally important to consider how a digital divide might alter other resource distributions that inhere in social space. If the haves increasingly shop online while the have-nots shop in “real space,” the real-space distribution of goods, services, and employment patterns likely will change, and with it the real-space distribution of all of the activities that make up the commerce of daily life.

*Cohen 2007, 242*

Technology is inextricably linked to sociocultural context. Consequently, technology both reflects and in turn profoundly influences the sociocultural contexts in which technology is created, deployed, and used (Leonard 2003). These contexts mean that technology is not a neutral force; rather, the creation and uses of technology may reflect and reinforce such contexts or negate and deny them. Legal and regulatory frameworks both affect and reflect changing technology contexts. How such frameworks interact with new technologies is thus of critical importance.

### **The development and uses of new technologies in Africa**

Many countries in Africa have experienced an information and communication technology (ICT) revolution in recent years. New technologies include widely recognized technologies connected to the diffusion of mobile phones and mobile applications (Murphy and Carmody 2015). A disruptive technology is one that creates new markets and new value networks that disrupt existing markets and networks. Disruption is at least, in some instances, a core aspect of entrepreneurial innovation, while the ability to confront such disruption may be a key element in business success (Schumpeter 1942, 132; Christensen 1997, xvii). Disruptive and other ICTs have profoundly influenced economic growth throughout the world. They have also had a substantial influence on businesses and significant human impact on users, creators, and others that interact with, experience, and use such technologies.

New technologies are used for a variety of purposes in Africa. Such technologies are used in sectors including health care, financial services, industry, telecommunications, agriculture, social media, internet, ecommerce, and education. The use of these technologies may also be beneficial. Potential benefits include improved health care, improved quality of life, greater accountability and transparency, facilitation of greater social engagement, enhancement of communication, and creation of Indigenous technologies (Avila et al. 2010; Deloitte 2010; Naylor et al. 2011; Haq and Abdullah 2012). The visibility of new technologies in African countries is growing rapidly, including technologies involving drones and automation, data information and biometrics, and increasingly, omnipresent social media technologies.

### **Drones and automation**

Unmanned aerial vehicles (UAVs, or drones) in Africa are used for health, energy, security, recreation, and other purposes (Rise Africa Rise 2017). Drone users in Africa are taking advantage of opportunities to deploy drones in ways that are novel and pathbreaking (Bright and Stein 2018). In Rwanda, a leading country for drone policy, drones are used to deliver blood to a significant number of blood transfusion centers (Ackerman and Strickland 2018; Bright and Stein 2018). Drones have been used to deliver birth control and other medical supplies to rural parts of Ghana (Cousins 2016). They have also been used to deliver test kits for human immunodeficiency virus (HIV) to rural parts of Malawi (UNICEF 2017) and in Ethiopia, they are used to deliver sterile tsetse flies, as part of measures to tackle sleeping sickness (Summers 2016).

Drones have also been used in Africa, including by external powers such as the United States, as part of surveillance activities to combat a range of activities, including terrorism, drug smuggling, and illegal maritime activities. The Nigerian Air Force uses drones for intelligence, surveillance, and reconnaissance activities aimed at combatting terrorism (Air Force Technology 2018; Runsewe 2016). The US Department of Defense has or has had drone bases in the past in Ethiopia, Somalia, and Niger (Hudson and O'Grady 2016; Goldbaum 2018; Schmitt 2018). The Pentagon uses its drones as part of its intelligence, surveillance, and

reconnaissance activities aimed at combatting terrorism, arms trafficking, and drug smuggling in Africa (Penney et al. 2018). In 2017, Atlan, a technology startup in Morocco, was reported to be using drones to track illegal maritime activities in Morocco's waterways (Taiwo 2017).

Drones have also been used in Africa in a range of commercial contexts. In Nigeria, they are used for environmental observations in the country's oil and gas industry (Fandrich and Iden 2018), while photographers also use them for aerial photography and other recreational uses. And they are used throughout Africa in varied medical and agricultural contexts (Lee 2018).

Automation, although not a new phenomenon, is intensifying. As a 2018 International Monetary Fund report noted, “[d]igitalization, artificial intelligence and machine learning hold the potential for altering the nature of the production process, and lifting productivity and growth, but they are also changing the landscape of work. As machine-learning techniques advance, the range of automatable workplace tasks are increasing.” (Brusevich et al. 2018, 5).

Banks in Nigeria have begun implementing Robotic Process Automation (RPA) technology, which is aimed at automating business processes:

Using RPA tools, a company can configure software, or a “robot,” to capture and interpret applications for processing a transaction, manipulating data, triggering responses and communicating with other digital systems. RPA scenarios range from something as simple as generating an automatic response to an email to deploying thousands of bots, each programmed to automate jobs in an ERP system.

*Boulton 2018*

See, also, Okeowo (2018) on “*Robotics: Why Nigeria Should Be More Serious With Software Business?*”

RPA tools are used in banking operations in Nigeria. Union Bank and Diamond Bank use RPA technology with their existing infrastructure and systems for their banking operations (Adegbesan 2018; *Daily Post* 2018; *TechLoy* 2018; Union Bank 2018). Union Bank has also stated that its use of RPA technology has reduced its automated teller machine (ATM) reconciliation time by over 60 percent (Paypers 2018). Stanbic IBTC Bank has also recently deployed robots for several aspects of its operations, including anti-money laundering transactions and risk management (Bello 2018).

Drones and automation technologies may offer significant potential for development in Africa. The effective growth of such technologies will depend, to a significant degree, on the legal and regulatory enabling environment. See, for example, McQueen (1999); Leonard (2003); Alzouma (2005); Kolsky (2010); Mount (2011); Knegoyon (2012); O’Neill (2012); Swanwick (2012); Subramanya (2013); Miglani (2014); Visvanathan (2015); Kazeem (2016a, b); *Premium Times* (2016); sUAS News (2016); Ekwealor (2017); APA News 2018; Dottie (2018); Taylor (2018).

### **Data and information—Biometrics**

Biometric recognition refers to the automatic identification of a person based on a person's physical (for example, fingerprint, face, voice, iris scans) or behavioral (for example, signatures) characteristics or traits (Biometrics Research Group 2009). The use of biometrics for varied purposes has increased recently in Africa (African Business Magazine 2017; Davies 2017; Cooper and Ferreira 2018; Muthuri, Monyango, and Karanja 2018; Toesland 2021). Biometrics are being used in political processes, in the financial sector, the telecommunications sector, and for identity management. A 2018 joint Strathmore University and Privacy International report

has noted that the use of biometrics in political processes has swept across Africa, as biometrics have been adopted in electoral processes by 75 percent of African countries (Muthuri, Monyango, and Karanja 2018, 1). Part of the rationale for the use of biometrics is the low trust of majority of citizens with electoral bodies. Consequently, those adopting biometrics typically assume that the use of biometrics will increase confidence, effectiveness, and efficiency in elections. This assumption has, however, not yet been substantially validated. According to Muthuri, Monyango, and Karanja (2018, 1), “Despite such costs, the adoption of biometrics has not restored the public’s trust in the electoral process, as illustrated by post-election violence and legal challenges to the results of the 2017 Kenyan elections.”

Biometrics are used in Nigeria for the registration of mobile telephone subscriber identity module (SIM) cards, opening bank accounts, the issuance of drivers’ licenses, and international passports. They are also used in the electoral process for the national identity management scheme and for other purposes (Comms Week 2017; Perala 2018; Dermalog 2020; M2SYS Technology 2020). The use of biometrics has helped to create identity databases, and therefore, provided data for planning and also for crime prevention and resolution. There are, however, significant challenges with the use of biometrics in countries in Africa (Kazeem 2016a, b; *The Nation* 2017; Diuto 2018; Uchechukwu 2020).

### **Social media and access to information**

A “‘social’ phenomenon has swept through the popular culture in the past few years, as millions of people joined online communities and started using online social platforms” (Chui et al. 2012). In 2019, the number of global users of social networks was estimated at 2.77 billion, an increase from 2.46 billion in 2017 (Clement 2019). In the media realm, social media has provided people with an opportunity for communication outside of traditional media channels. It has also given people the ability to push back against national and international media control. Social media is also widely used for political debate in Africa. Portland’s analysis has suggested that 10 percent of African hashtags in 2015 were related to political issues and politicians, while only 2 percent of hashtags in the United States and United Kingdom were related to political issues and politicians in 2015 (Portland 2016, 2018). #NigeriaDecides, related to the 2015 general elections in Nigeria, was a top 2015 political hashtag (Baker 2015; Moore 2015).

Social media may also be used to highlight social issues and government inaction. In April 2014, 276 girls were kidnapped from the government secondary school in Chibok, Borno State, Nigeria. As of April 2018, 112 of the girls were still missing (BBC News 2018). The Nigerian government initially provided little information about government activities or knowledge about the fate of the girls. The #BringBackOurGirls viral hashtag was used to bring worldwide attention to it (Shearlaw 2015). The kidnapping of the Chibok girls and the failure of President Goodluck Jonathan’s administration to rescue them contributed to President Jonathan’s electoral defeat by President Muhammadu Buhari in 2015.

Access to social media in Africa has been hindered in recent years by various policies, including internet shutdowns and tax policies.

### **Existing legal and regulatory approaches**

The development and deployment of new technologies in Africa highlight significant challenges that such technologies pose for existing legal and regulatory frameworks. As Lawrence Lessig (2006, 5) has noted, “[c]yberspace demands a new understanding of how regulation works.

It compels us to look beyond the traditional lawyer's scope—beyond laws, or even norms. It requires a broader account of 'regulation,' and most importantly, the regulation of a newly salient regulator."

Lessig's discussion of cyberspace also draws attention to broader questions of architecture in the design, development, and deployment of new technologies and the values that underlie such architecture. He highlights incentives to best achieve desired values and poses questions as to control. New technologies often require smart regulation that is flexible and that reflects a good understanding of underlying technologies and the potential courses of development of such technologies.

New technologies in Africa raise significant questions related to legal reform that are both like and unlike those present elsewhere in the world. New technologies in Africa and elsewhere often lead to debates about how laws and regulations should apply to such technologies. These are essentially questions about the legal and regulatory mismatch that might be one consequence of the introduction of new technologies. Thus, mobile phones, mobile phone apps, Uber, and other varied new technologies and services have required reassessment and varying degrees of reform of legal and regulatory approaches that might have been put in place well before the advent of such technologies. Recognition of the need for broad legal changes in response to new technologies have also had an impact on a broad range of legal arenas, including legal education, laws relating to the administration of law, evidence rules, and e-discovery practices, just to name a few. In Nigeria, for example, evidence laws were reformed in 2011 and civil procedure rules in 2012 to recognize the reality of the impact of new technologies on the administration of law (see, for example, Government of Nigeria [2011; 2012]—the Nigeria Evidence Act of 2011, and the High Court of Lagos State [Civil Procedure] Rules 2012; and Idaeho [2018] on the Digitalization of the Supreme Court of Nigeria). Similarly, automation, cloud computing, artificial intelligence (AI), and other technologies will require yet more attention to the need for technology-inspired legal reform. Crafting suitable laws and regulations in the context of new technologies is a global issue that confronts policymakers, companies, users, and others today.

In many African contexts, however, questions of legal reform are complicated by the reality of pervasive colonial legal legacies that give testament to problems of borrowing that have long had an impact on legal systems through Africa. Lawmaking tendencies during the precolonial and colonial eras have persisted during the postcolonial era, giving greater urgency to the need for comprehensive legal reform in Nigeria and other countries in Africa. Although South Africa at the end of Apartheid engaged in a comprehensive legal reform process (Penna 1990), few other examples exist of such reform in the postcolonial era. Notably, Rwanda has undertaken several recent reforms in the commercial law area (Rugege 2007), including a shift from a commercial law system, based on German and Belgian civil law, to a common law legal system (Mellersh 2016).

In general, however, the distinction between law during colonialism and law after independence was not marked in many countries in Africa, particularly in the case of laws governing everyday business and economic relations. Significant continuities in legal and business frameworks have thus been the norm in Nigeria and other African countries following independence. Such legal frameworks were not typically intended to promote economic opportunities for most Africans, or to enhance development prospects, or to encourage local companies to compete against colonial commercial interests. This failure to disrupt the more deleterious of such frameworks at independence has had detrimental consequences for economic opportunities in many contexts. Moreover, the manner of creation of legal frameworks, in Nigeria and other countries both during and after colonialism, has often involved problematic patterns



of borrowing that reflect a continuing external orientation. This externalized vision of law has left insufficient space for disruption of postcolonial legal frameworks and approaches to legal reform that are truly transformative and innovative.

The inadequate state of these legal frameworks has also been compounded in some countries with the legacies of laws that were made during military or authoritarian rule. Such laws typically did not involve any significant legislative process and were not enacted by any legislature. Rather, such laws were typically put in place by military or authoritarian leaders who exercised both executive and legislative powers. The majority of such laws were thus neither made in a participatory way, nor with a deliberate aim of ensuring that such laws were fit for the purposes for which they were made. Such laws have also been typically enacted in the context of weak judicial institutions (Mingst 1988). Mingst noted in her article on judicial reforms in sub-Saharan Africa: “Thus, at independence, instead of the judiciary developing its own legitimacy, executive-inspired and defined political necessities took precedence. The model at independence essentially duplicated the colonial experience,” concluding, “for these reasons, the judiciary may actually play a very minor, perhaps irrelevant role in African societies” (Mingst 1988, 138).

British Colonial Office records highlight the extent to which varied legal frameworks were externally determined and driven by the needs of British colonial and commercial interests. They also highlight what might be characterized as a portfolio approach to colonial policies and lawmaking. This portfolio approach meant that British colonial office officials often paid close attention to cultivating the overall British colonial portfolio of varied countries in diverse locations, often at the expense of local priorities and local needs. Legal and policy decisions undertaken with a portfolio mindset are likely to diverge, sometimes significantly, from those undertaken on a country-by-country basis. As a result of externalized portfolio approaches to lawmaking, insufficient attention was given to the implications of such legal frameworks within local contexts. Furthermore, legal frameworks in each colonial possession might diverge from other similarly positioned colonial possessions, merely because of differences in the dates on which English law was received and the dates of independence. Such divergence is largely due to variations in the body of English law at different points in time. At the time of independence, existing colonial legal frameworks and patterns of commercial relationship were not significantly disrupted, which continues to influence legal frameworks and institutions in Africa and elsewhere today. This lack of disruption is in part a consequence of typical patterns of legal borrowing, which have tended to be agglomerative in African colonial and other contexts.

At independence, most colonies retained the vast majority of laws and regulations enacted during the colonial and precolonial eras. The Nigeria Independence Act, 1960, noted the following: “Generally speaking, all instruments in force as part of the law of Nigeria immediately before the grant of independence should presumably be kept in force by suitable general provisions in the independence constitution so far as they are consistent with that constitution, and thereafter be subject to amendment or repeal by the competent authorities in the independent Federation” (National Archives 1960).<sup>1</sup> Furthermore, much of the legal negotiation and discussion leading up to Nigerian independence focused on constitutional law issues and questions related to the broad construction of the legal system, including separation of powers. In contrast to high level discussions about independence, the fabric of everyday laws that affected the vast majority of the population, including in business and commercial law realms, remained largely unchanged and, even when modified, continued to rely heavily on English law models with little and insufficient examination of laws and policies in other countries with common law or mixed common law legal systems, including Australia, New Zealand,

Canada, South Africa, and the United States. Legal discussions leading up to independence highlight implicit assumptions made by both colonial powers and representatives of the soon to be independent states about the status of English law as a desirable legal model, the location of key laws within the broader legal fabric, and the level at which necessary legal reforms should be made. These assumptions have had a significant influence on economic opportunities and outcomes in Africa and are an important context from which to assess continuing questions about development in Africa. The ways in which legal borrowing occurred and the focus on English law meant that weaknesses and gaps in English law were often not evaluated but rather incorporated, often with insufficient scrutiny, into legal frameworks in Nigeria and other countries in Africa.

A significant legal hangover from the colonial era still exists in relation to a broad range of legal and regulatory frameworks that derive from colonial era law, including rape laws and other laws in India, sedition laws in Malaysia, permit and censorship laws in some African countries, and sale of goods laws and intellectual property laws in Nigeria (Kolsky 2010; Subramanya 2013; Miglani 2014; Arewa 2021). As a result of this colonial hangover, political and economic incumbents in many African countries continue to use the tools, policies, laws, and processes created and deployed during and prior to the colonial era. The pervasive presence of colonial hangover is readily apparent in the retention of legal traditions such as customary barrister robes and wigs in Africa, where lawyers continue cloak themselves in colonial dress, despite the fact that such practices are waning in Britain itself (McQueen 1999; Mount 2011; Knegoyon 2012; O'Neill 2012; Swanwick 2012; Visvanathan 2015). Although it might have been expedient to use the colonial era legal frameworks for some time, the continued use of such frameworks has become more disadvantageous than beneficial in Africa. Moreover, such frameworks should have been subject to the required scrutiny after a limited period of time. This would have ensured that only the aspects of such frameworks that were appropriate for both a country's objectives and peculiarities were retained as legal frameworks.

Colonial legal relics have significant implications for digital era participation, particularly because ICT policies and laws relating to business, entrepreneurship, and innovation in Africa continue to lag other areas of the world. The limited number of legal forms available to emerging businesses, in many African contexts today, continue to reflect outdated external legal frameworks. The absence of alternative entity forms has significant implications for the costs of formation of new businesses and the ability of local entrepreneurs to form businesses and compete with external entrepreneurs that come from countries with more comprehensive and favorable legal frameworks.

### **Legal and other challenges of new technologies**

New technologies in Africa are often characterized as having the potential to uplift Africa and provide economic opportunities that might disrupt past patterns and enable technology leapfrogging:

[T]he Information Society is unquestionably perceived as a chance for Africa, a chance to blend into a world of economic opportunities and social well-being. They [the participants at a World Summit on the Information Society, Ghana, 2005] think that information and communication technologies (ICTs) are the instruments through which the growing marginalization of Africa can be tackled. These expectations and assumptions are now pervasive in the development literature.

*Alzouma 2005, 339–40*



It is, however, important to distinguish between on the ground realities and hype surrounding the perceived benefits of new technologies in Africa. Any evaluation of the impact of new technologies' policies, laws, and practices in Africa must consider some key questions. These questions include: (1) how to define success; (2) at what level should the intervention take—that is, either institutional and top down, or on the ground and bottom up; (3) at what point in time should new technologies be deployed; and (4) what are the role of failure, the need for experimentation, and spillover effects. The innovation ecosystem for new technologies also needs to involve an appreciation for interwoven strands of different areas. These areas include: science, technology, engineering, and mathematics (STEM) education; business education; humanities and social sciences education that incorporates understanding of technology; policies that promote small business development; an understanding of a country's competitive strengths and weaknesses; social issues/human welfare; and flexible and experimental policy approaches.

A number of existing and potential challenges confront users of new technologies in Africa. Some of these challenges are applicable in virtually all the countries where such technologies are used and are also similar to challenges present elsewhere in the world. They include: addiction; poor government oversight and accountability; increased inequality; increased concentration/decreased competition; privacy challenges; security challenges; unemployment and underemployment; fake news and propaganda; hate speech; and physical, legal, technology and other infrastructures. Some of these challenges, especially increased inequality, and unemployment and underemployment, have been exacerbated by prior and existing challenges in Africa. These challenges validate the point that technology is both a reflection of and a profound influence on existing sociocultural contexts in which technology is created, deployed, and used (Leonard 2003, 1). These challenges also affirm that technology must be used with other measures to improve citizens' quality of life.

In addition to issues arising from general legal and regulatory contexts, specific challenges may also arise that are relevant to the use of particular technologies in certain countries. Some of these specific challenges related to the use of drones and automation, data and information-biometrics, and social media and access to information are examined in the following paragraphs.

### ***Challenges related to drones and automation***

Most of the technology used for drones and automation in Africa is derived to a significant degree from outside of Africa. This means that Africans do not participate substantially in the creation and development of such technologies, but are primarily consumers of them. This consequently deprives Africans of the economic opportunities and benefits that arise from their creation and development. African countries need to develop internal technology policies and agendas, both generally and specifically, for drones, automation, and other sectors. Such policies would include the development of capacity, including through relevant training in new technologies. The United States Consulate General in Nigeria and Global Air Media conducted a drone technology workshop for Nigerian students and women in June 2018 (APA News 2018). African countries should also utilize the expertise and experience of the African diaspora in the development of such Indigenous technologies. For example, Dr. Osatohanmwem Osemwengie from Nigeria builds drones for the US army (Taylor 2018).

The current Nigerian approach to regulation of drones highlights the importance of smart regulation of desired new technologies that facilitate their development. The Nigerian Civil Aviation Authority (NCAA) requires that users obtain a certificate to authorize their use of drones (sUAS News 2016).<sup>2</sup> The Nigerian drone regulations draw attention to the need for regulations, crafted to balance reasonable safety requirements that may mandate new regulation

with a regulatory approach that seeks to enable rather than disable emerging new technologies. Compliance with the 2017 Nigerian drone regulations is expensive (Kazeem 2016b), requiring payment of an amount that is approximately twice as much as Nigeria's annual per capita GDP.<sup>3</sup> This is unlikely to foster development of the drone industry in Nigeria. As one commentator notes: "In developed countries around the world, drones have very stringent laws guiding them. Nigeria should not be any different. The only problem is that the conditions set up to get a Permit for Aerial Aviation Services (PAAS) are so unrealistic they feel like an outright ban" (Ekwealor 2017).

The NCAA, in conjunction with the Office of the National Security Adviser (ONSA), is responsible for issuing a Remotely Piloted Aircraft/Drones RPAS Operators Certificate (Drone Certificate to eligible users of drones). The requirements, with which applicants for a drone certificate need to comply, were developed with a primary focus on aviation, security, and revenue considerations and do not appear at present to take sufficient account of recreational uses of drones (Dottie 2018). The Nigerian regulations do not take sufficient account of different categories of licenses to cater to different uses of drones in Nigeria, unlike in Kenya, which has provisions for temporary drone permits, recreational and sport drones, drones for private activities, and drones for commercial activities.<sup>4</sup> Nigerian drone regulations are highly bureaucratic: "However, the worry lies in Nigeria's cumbersome bureaucratic processes. Obtaining permits from such high-level agencies for recreational and commercial use of drones could be a difficult, opaque and costly process" (Kazeem 2016a).

Consequently, individual users of drones find it difficult to comply with the requirements for the issue of a drone certificate, which includes having a paid-up share capital of approximately \$55,000. Furthermore, the complicated application process for drones in Nigeria is one of the reasons why the NCAA initially only issued one drone certificate to Oando Reservoir and Production Services Ltd in 2017 (*The Nation* 2017).

African countries also need to develop robust and sustainable ecosystems, and develop flexible legal and policy frameworks for drones and automation and other technologies. A good example of a more flexible approach to regulation and policy is Kenya's differentiated treatment and regulation of different categories of drones.<sup>5</sup> Another good example of a flexible approach to regulation and policy, albeit not in relation to drones, is Nigeria's Securities and Exchange Commission's (SEC) announcement in May 2018, that it would establish a regulatory sandbox "that will offer a 'safe space' in which start-ups" and other businesses "can test innovative products, services, business models and delivery mechanisms relating to the capital market in a live environment ... without immediately satisfying all the necessary regulatory requirements" (Diuto 2018). African countries also need to benchmark business, legal, and policy initiatives in terms of concrete goals and objectives, and review taxation and other revenue generation-focused policies that may hinder innovation for drones, automation, and other new technologies.

### ***Challenges related to data and information—Biometrics***

One of the biggest challenges with the use of biometrics and other data is the lack of adequate data protection and safeguards. Despite the extensive use of data in many African countries by both public and private bodies, there are little and insufficient policies and laws for information security, privacy, and data protection (Muthuri, Monyango, and Karanja 2018). Although some countries, for example Kenya and Nigeria, have constitutional provisions that guarantee a right to privacy, there are no specific data protection laws. One of the reasons Cambridge Analytica carried out its operations in Africa, which included presidential elections in Nigeria and Kenya, is the lack of adequate privacy and data protection measures in African countries (Dahir 2018;

Plaut 2018). African countries also need to develop robust and sustainable ecosystems and flexible legal and policy frameworks for information security, privacy, and data protection.

Another challenge with the use of biometrics in Africa is the existence of multiple and separate databases. For example, in Nigeria over six government agencies are authorized to collect and utilize biometrics, and all the agencies have developed separate databases (Adepetun 2017). The Nigerian Identity Management Commission (NIMC), however, has the mandate to integrate the multiple government databases into one centralized database (Ohwovoriole 2017). NIMC is also required to facilitate adequate data protection and the enactment of a data protection law in Nigeria.

Some of the other challenges include the need to examine the technology underpinnings of broader policy initiatives in Africa. This should include the basis for the development of technological development within Africa and for technologies that could also be exported outside of Africa. African countries also need to benchmark business, legal, and policy initiatives in terms of concrete goals and objectives for biometrics.

### ***Challenges related to social media and access to information***

Social media companies, such as Facebook, WhatsApp, Twitter, and Instagram, have changed how we communicate in profound ways. Social media and the internet have disrupted incumbent media organizations and significantly affected varied communicative activities. The impact of seemingly disruptive social media has, however, been uneven. Despite the advent of social media in African countries, governments in many of these countries continue to exert significant control over access to information. Social media technologies may have had less of an impact in giving citizens access to verified and credible information. Furthermore, social media does not always enhance access to information, as it may facilitate rumors and fake news. As recent events surrounding Facebook demonstrate, social media may also be subject to manipulation in nontransparent ways.

Governments in Africa, and elsewhere, have undertaken internet shutdowns, in large part to block their citizens for accessing social media. For example, social media is widely used in Uganda, but the government blocked access to Facebook and WhatsApp on the day of presidential elections in 2016. President Yoweri Museveni justified the blockage by claiming that some people were misusing the platforms by telling lies (Kuo 2016; West 2016; Muhumuza 2017). Although Nigeria has a relatively independent press, there are continuing issues with access to information. That lack of access to information and social media contribute to a viral culture of rumors in Nigeria. In 2017, there were rumors about the health of President Buhari who had traveled to London on multiple occasions in 2017 and 2018, for undisclosed treatment for an unidentified condition. Little or no information was made available about his condition, and social media greatly facilitated rumors about his health (Campbell 2017; Dionne 2017).

Another challenge with social media and access to information is some governments' imposition of taxes on the use of social media. For example, the Ugandan Parliament enacted a law in 2018, which imposes a daily tax of about 5 cents for uses of social media and messaging platforms, like WhatsApp, Facebook, and Twitter (Matfess and Smith 2018; Nafuka 2018). The Ugandan government claimed that the law would help contribute revenue that would be used to finance government services and infrastructure. There are, however, valid concerns that the law is a restraint on citizens' access to the internet and a censorship of people's views. Internet shutdowns also have a significant negative economic impact, which is likely to severely impact the innovation and technology ecosystems (CIPIT 2018; Odunowo 2018). The law also does

not seem to have considered sufficiently the predictable move by many in Uganda to begin using virtual private networks (VPN) to avoid the new tax (Anena 2018).

## Conclusion

The adoption of new technologies in Africa offers potential opportunities to disrupt existing patterns, in which African countries adopt externally derived business frameworks, laws, and technologies, with insufficient attention to how to most effectively customize these externally derivations within local African contexts. Undertaking truly innovative approaches to legal reform could be a basis for disrupting past frameworks, which have contributed to the current state of affairs in many African countries. The new technologies, thus, represent an important opportunity for African countries to establish mechanisms to improve economic performance and political and social conditions. The knowledge economy also highlights the potential range of areas from which African countries might derive models for future policy initiatives, which address issues of continuing concern to African governments and their citizens. Reformulating existing legal and regulatory frameworks, in light of knowledge-era realities, will enable countries in Africa to alter prevailing tendencies to implement externally derived legal and regulatory frameworks without appropriate customization to local needs and contexts.

## Notes

- 1 Nigeria Independence Act 1960, 8 & 9 Eliz. 2 Ch. 55, §1(3), British National Archives CO 554/2189; see, also, Ch. 55, §1(3): “(3) Without prejudice to subsection (2) of this section, nothing in subsection (1) thereof shall affect the operation in Nigeria or any part thereof on and after the appointed day of any enactment, or any other instrument having the effect of law, passed or made with respect thereto before that day.” Article 4(10) of the Constitution of Nigeria (1960) essentially preserves the extension of colonial laws in the Nigeria Independence Act 1960: “(10) The provisions of this Constitution or (in so far as it forms part of the law of Nigeria) the Nigeria Independence Act, 1960, shall not be altered except in accordance with the provisions of this section.”
- 2 See, also, Nigerian Civil Aviation Authority (NCAA) Guidelines for the Operations of Remotely Piloted Aircraft Systems/Unmanned Aerial Vehicle (RPAS/UAV) in Nigeria, <https://ncaa.gov.ng/media-center/news/guidelines-for-the-operations-of-remotely-piloted-aircraft-systems-unmanned-aerial-vehicle-rpas-uav-in-nigeria/>.
- 3 According to World Bank statistics, 2017 Nigerian per capita GDP was \$1,968.60. World Bank, Per Capita GDP (Nigeria), <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=NG>.
- 4 The Civil Aviation Act (No. 21 of 2013), The Civil Aviation (Unmanned Aircraft Systems) Regulations, 2020, [www.kcaa.or.ke/sites/default/files/regulation/Civil%20Aviation%20%28Unmanned%20Aircraft%20Systems%29%20Regulations%202020.pdf](http://www.kcaa.or.ke/sites/default/files/regulation/Civil%20Aviation%20%28Unmanned%20Aircraft%20Systems%29%20Regulations%202020.pdf).
- 5 The Civil Aviation Act (No. 21 of 2013), The Civil Aviation (Unmanned Aircraft Systems) Regulations, 2020, [www.kcaa.or.ke/sites/default/files/regulation/Civil%20Aviation%20%28Unmanned%20Aircraft%20Systems%29%20Regulations%202020.pdf](http://www.kcaa.or.ke/sites/default/files/regulation/Civil%20Aviation%20%28Unmanned%20Aircraft%20Systems%29%20Regulations%202020.pdf).

## References

- Ackerman, Evan, and Eliza Strickland. 2018. “Medical Delivery Drones Take Flight in East Africa.” *IEEE Spectrum* 55 (1): 34–5. doi:10.1109/mspec.2018.8241731
- Adegbesan, Elizabeth. 2018. “Union Bank Introduces Robotics to Ease Banking Operations.” *Vanguard*, May 28. [www.vanguardngr.com/2018/05/union-bank-introduces-robotics-ease-banking-operations/](http://www.vanguardngr.com/2018/05/union-bank-introduces-robotics-ease-banking-operations/).
- Adepetun, Adeyemi. 2017. “How Nigeria Wastes Billions on Data Capturing.” *The Guardian*, September 18. <https://guardian.ng/technology/how-nigeria-wastes-billions-on-data-capturing/>.
- African Business Magazine. 2017. “Biometrics On the March across Africa.” September 4. <https://africanbusinessmagazine.com/african-banker/biometrics-march-across-africa/>.

- Air Force Technology. 2018. "Nigerian Air Force Inducts First Indigenous UAV to Support ISR." News, February 20. [www.airforce-technology.com/news/nigerian-air-force-inducts-first-indigenous-uav-support-isr/](http://www.airforce-technology.com/news/nigerian-air-force-inducts-first-indigenous-uav-support-isr/).
- Alzouma, Gado. 2005. "Myths of Digital Technology in Africa: Leapfrogging Development?" *Global Media and Communication* 1 (3): 339–56.
- Anena, Harriet. 2018. "Social Media Shutdown in Uganda Will Become a Norm—Analysts." African Centre for Media Excellence (ACME), May 19. <https://acme-ug.org/2016/05/19/social-media-shutdown-in-uganda-will-become-a-norm-analysts/>.
- APA News (Agence de Presse Africaine). 2018. "U.S. Organises Drone Tech Workshop for Nigerian Students." June 7. <http://apanews.net/en/pays/nigeria/news/us-organises-drone-tech-workshop-for-nigerian-students>.
- Arewa, Olufunmilayo B. Forthcoming, 2021. *Disrupting Africa: Technology, Law and Development*. Cambridge: Cambridge University Press.
- Avila, Renata, Hazel Feigenblatt, Rebekah Heacock, and Nathaniel Heller. 2010. "Global Mapping of Technology for Transparency and Accountability: New Technologies." Transparency & Accountability Initiative, Open Society Foundation, London. [www.transparency-initiative.org/wp-content/uploads/2017/03/global\\_mapping\\_of\\_technology\\_final1.pdf](http://www.transparency-initiative.org/wp-content/uploads/2017/03/global_mapping_of_technology_final1.pdf).
- Baker, Aryn. 2015. "Twitter Courtesy Has Been a Factor in Reducing Post-Election Violence in Nigeria." *Time*, April 1. <https://time.com/3767351/nigeria-elections-twitter/>.
- BBC News. 2018. "Chibok Girls: Many Abductees Dead, Says Journalist." April 15. [www.bbc.com/news/world-africa-43767490](http://www.bbc.com/news/world-africa-43767490).
- Bello, Olushola. 2018. "Stanbic IBTC Bank Deploys Robots to Drive Operations." *Leadership.ng*, October 8, <https://leadership.ng/2018/10/08/stanbic-ibtc-bank-deploys-robots-to-drive-operations/>.
- Biometrics Research Group. 2009. "What is Biometrics?" Department of Computer Science and Engineering, Michigan State University. <http://biometrics.cse.msu.edu/info/index.html>.
- Boulton, Clinton. 2018. "What is RPA? A Revolution in Business Process Automation." *CIO.com*, September 3. [www.cio.com/article/3236451/business-process-management/what-is-rpa-robotic-process-automation-explained.html](http://www.cio.com/article/3236451/business-process-management/what-is-rpa-robotic-process-automation-explained.html).
- Bright, Jake, and Samantha Stein. 2018. "African Experiments with Drone Technologies Could Leapfrog Decades of Infrastructure Neglect." *techcrunch.com*, September 16. <https://techcrunch.com/2018/09/16/african-experiments-with-drone-technologies-could-leapfrog-decades-of-infrastructure-neglect/>.
- Brussevich, Mariya, Era Dabla-Norris, Christine Kamunge, Pooja Karnane, Salma Khalid, and Kalpana Kochhar. 2018. "Gender Technology, and the Future of Work." IMF Staff Discussion Note SDN/18/07, October, International Monetary Fund, Washington, DC. [www.imf.org/~media/Files/Publications/SDN/2018/SDN1807.ashx](http://www.imf.org/~media/Files/Publications/SDN/2018/SDN1807.ashx).
- Campbell, John. 2017. "Rumors of President Buhari's Death Abound." Council on Foreign Relations, Africa in Transition blog, May 18. [www.cfr.org/blog/rumors-president-buharis-death-abound](http://www.cfr.org/blog/rumors-president-buharis-death-abound).
- Christensen, Clayton. 1997. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston: Harvard Business Review Press.
- Chui, Michael, James Manyika, Jacques Bughin, Richard Dobbs, Charles Roxburgh, Hugo Sarrazin, Geoffrey Sands, and Magdalena Westergren. 2012. "The Social Economy: Unlocking Value and Productivity through Social Technologies." McKinsey Global Institute, McKinsey & Co., Technology, Media & Telecommunications, July 2012 Report. [www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-social-economy](http://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-social-economy).
- CIPIT (Centre for Intellectual Property and Information Technology Law). 2018. "Intentional International Internet Disruptions in Africa." CIPIT, Strathmore University, Nairobi. <https://cipit.org/images/downloads/FB%20Executive%20Summary.pdf>.
- Clement, J. 2019. "Number of Social Media Users Worldwide from 2010 to 2021 (in billions)." *statista.com*, August 14. [www.statista.com/statistics/278414/number-of-worldwide-social-network-users/](http://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/).
- Cohen, Julie E. 2007. "Cyberspace As/And Space." *Columbia Law Review* 107 (1): 210–56.
- Comms Week. 2017. "Overview of Biometric Identification System in Nigeria." *Nigeria Communications Week, E-Business*, March 27. <https://findbiometrics.com/nigerian-officials-registering-foreigners-biometrics-506261/>.
- Cooper, Barry, and Matthew Ferreira. 2018. "Invisible without Identity: Biometrics and Financial Inclusion in Africa." July 18, *emerge85*, <https://emerge85.io/Insights/invisible-without-identity-biometrics-and-financial-inclusion-in-africa/>.



- Cousins, Sophie. 2016. "Condoms by Drone: A New Way to Get Birth Control in Remote Areas, May 19, NPR.com [www.npr.org/sections/goatsandsoda/2016/05/19/478411186/condoms-by-drone-a-new-way-to-get-birth-control-to-remote-areas](http://www.npr.org/sections/goatsandsoda/2016/05/19/478411186/condoms-by-drone-a-new-way-to-get-birth-control-to-remote-areas).
- Dahir, Abdi Latif. 2018. "Africa Isn't Ready to Protect Its Citizens' Personal Data Even as EU Champions Digital Privacy." Quartz Africa, May 7. <https://qz.com/africa/1271756/africa-isnt-ready-to-protect-its-citizens-personal-data-even-as-eu-champions-digital-privacy/>.
- Daily Post. 2018. "The Future of Work Now a Reality at Diamond Bank." September 28. <https://dailypost.ng/2018/09/28/future-work-now-reality-diamond-bank-sponsored/>.
- Davies, Marc. 2017. "Biometrics, Surveillance Technologies and the Rise of the 'Security State' in South Africa." LSE Centre for Africa blog, London School of Economics. <https://blogs.lse.ac.uk/africaatlse/2017/03/22/biometrics-surveillance-technologies-and-the-rise-of-the-security-state-in-south-africa/>.
- Deloitte. 2010. "Connected Health: How Digital Technology is Transforming Health and Social Care." Deloitte UK Centre for Health Solutions, London. [www2.deloitte.com/content/dam/Deloitte/uk/Documents/life-sciences-health-care/deloitte-uk-connected-health.pdf](http://www2.deloitte.com/content/dam/Deloitte/uk/Documents/life-sciences-health-care/deloitte-uk-connected-health.pdf).
- Dermalog. 2020. "Bank Verification Number Nigeria." Biometrics Bank Project. [www.dermalog.com/success-stories/nigeria/](http://www.dermalog.com/success-stories/nigeria/).
- Dionne, Kim Yi. 2017. "Buhari Has Been Gone for Months. The Last Nigerian President Absent This Long Died In Office." *Washington Post*, July 31. [www.washingtonpost.com/news/monkey-cage/wp/2017/07/31/buhari-has-been-gone-for-months-the-last-nigerian-president-absent-this-long-died-in-office/](http://www.washingtonpost.com/news/monkey-cage/wp/2017/07/31/buhari-has-been-gone-for-months-the-last-nigerian-president-absent-this-long-died-in-office/).
- Diuto, Tony. 2018. "SEC Nigeria Talking about Start-Ups in Nigeria." Diutocoinnews.com, Bitcoin and Cryptocurrency News in Nigeria, May 20. <https://diutocoinnews.com.ng/sec-nigeria-on-start-ups-in-nigeria/>.
- Dottie, Toju. 2018. "Guidelines and Requirements for Drone Use in Nigeria." January 2. [www.linkedin.com/pulse/guidelines-requirement-drone-use-nigeria-toju-dottie/](http://www.linkedin.com/pulse/guidelines-requirement-drone-use-nigeria-toju-dottie/).
- Ekwealor, Victor. 2017. "Drones in Nigeria; Will The Birds Ever Fly Again?" May 19. [Techpoint.africa. https://techpoint.africa/2017/05/19/drones-in-nigeria/](https://techpoint.africa/2017/05/19/drones-in-nigeria/).
- Fandrich, Dennis, and Mark Iden. 2018. "Nigeria Employing Sophisticated Drones to Prevent Ongoing Sabotage to National Pipeline Infrastructure." *Pipeline Technology Journal*, February 16. [www.pipeline-journal.net/news/nigeria-employing-sophisticated-drones-prevent-ongoing-sabotage-national-pipeline](http://www.pipeline-journal.net/news/nigeria-employing-sophisticated-drones-prevent-ongoing-sabotage-national-pipeline).
- Goldbaum, Christina. 2018. "A Trumpian War on Terror That Just Keeps Getting Bigger." *The Atlantic*, September 11. [www.theatlantic.com/international/archive/2018/09/drone-somalia-al-shabaab-al-qaeda-terrorist-africa-trump/569680/](http://www.theatlantic.com/international/archive/2018/09/drone-somalia-al-shabaab-al-qaeda-terrorist-africa-trump/569680/).
- Government of Nigeria. 2011. "Evidence Act, 2011." June 3. [www.refworld.org/docid/54f86b844.html](http://www.refworld.org/docid/54f86b844.html).
- Government of Nigeria. 2012. "High Court of Lagos State (Civil Procedure) Rules 2012." [http://www.nigeria-law.org/The%20Judicature/State%20Courts/High%20Court%20of%20Lagos%20State/High%20Court%20of%20Lagos%20State%20\(Civil%20Procedure\)%20Rules%202012.pdf](http://www.nigeria-law.org/The%20Judicature/State%20Courts/High%20Court%20of%20Lagos%20State/High%20Court%20of%20Lagos%20State%20(Civil%20Procedure)%20Rules%202012.pdf).
- Haq, Nakhath Nasreen Azizul, and Gamal Ahmed Ahmed Abdullah. 2012. "Impact of Information Technology on Quality of Life and Well-Being of Secondary School Children." *International Journal of Psychology and Behavioral Sciences* 2 (4): 94–102.
- Hudson, John, and Siobhán O'Grady. 2016. "As New Threats Emerge, U.S. Closes Drone Base in Ethiopia." *Foreign Policy*, January 4. <https://foreignpolicy.com/2016/01/04/as-new-threats-emerge-u-s-closes-drone-base-in-ethiopia>.
- Idaeho, Richmond Ekhosuehi. 2018. "Digitalisation of the Supreme Court: Way Forward for the Nigerian Legal Profession." *This Day*, February 27. [www.pressreader.com/nigeria/thisday/20180227/282046212589817](http://www.pressreader.com/nigeria/thisday/20180227/282046212589817).
- Johnson, Deborah G. 2006. "Introduction." In *Women, Gender and Technology*, edited by Mary Frank Fox, Deborah G. Johnson, and Sue V. Rosser, 1–11. Urbana and Chicago: University of Illinois.
- Kazeem, Yomi. 2016a. "It Is Now Illegal to Fly Drones in Nigeria without Government Approval." *Quartz Africa*, May 9. <https://qz.com/africa/678985/it-is-now-illegal-to-fly-drones-in-nigeria-without-government-approval/>.
- Kazeem, Yomi. 2016b. "In Nigeria It Will Cost You \$4,000 to Register to Fly a Drone—In the US It Costs \$5." *Quartz Africa*, May 27. <https://qz.com/africa/692856/in-nigeria-it-will-cost-you-4000-to-register-a-drone-in-the-us-it-costs-5/>.
- Knegoyon. 2012. "When Will Nigerian Lawyers Stop Wearing Wigs, Looking Like Fools to the World?" *Nairaland.com* blog post, May 11. [www.nairaland.com/935634/when-nigerian-lawyers-stop-wearing#10801800](http://www.nairaland.com/935634/when-nigerian-lawyers-stop-wearing#10801800).



- Kolsky, Elizabeth. 2010. "'The Body Evidencing the Crime': Rape on Trial in Colonial India, 1860–1947." *Gender & History* 22 (1): 109–30.
- Kuo, Lily. 2016. "Uganda Has Launched a Total Social Media Blackout for the Second Time in Three Months." *Quartz Africa*, May 12. <https://qz.com/africa/682630/uganda-has-launched-a-total-social-media-blackout-for-the-second-time-in-three-months/>.
- Lee, Isabella. 2018. "Drones Offer Breakthrough Potential in Africa's Agricultural and Medical Industries." *uavcoach.com*, June 28. <https://uavcoach.com/cta-africa-drones/>.
- Leggon, Cheryl B. 2006. "Gender, Race/Ethnicity, and the Digital Divide." In *Women, Gender and Technology*, edited by Mary Frank Fox, Deborah G. Johnson, and Sue V. Rosser, 98–109. Urbana and Chicago: University of Illinois.
- Leonard, Eileen B. 2003. *Women, Technology, and the Myth of Progress*. Upper Saddle River, NJ: Prentice Hall.
- Lessig, Lawrence. 2006. *Code: And Other Laws of Cyberspace, Version 2.0*. New York: Basic Books.
- M2SYS Technology. 2020. "20 Million Records For Nigerian Biometric Voter Registration Project." Biometric Technology Case Studies of Vertical Markets, M2SYS Technology, Dunwoody, GA. [www.m2sys.com/biometric-fingerprint-software-case-studies-nigerian-voter-registration/](http://www.m2sys.com/biometric-fingerprint-software-case-studies-nigerian-voter-registration/).
- Matfess, Hilary, and Jeffrey Smith. 2018. "Africa's Attack on Internet Freedom." *Foreign Policy*, July 13. <https://foreignpolicy.com/2018/07/13/africas-attack-on-internet-freedom-uganda-tanzania-ethiopia-museveni-protests/>.
- McQueen, Rob. 1999. "Of Wigs and Gowns: A Short History of Legal and Judicial Dress in Australia." In *Misplaced Traditions: British Lawyers, Colonial Peoples*, edited by Rob McQueen and W. Wesley Pue, 31–58. Annandale, NSW, Australia: Federation Press.
- Mellersh, Natasha. 2016. "In the Land of a Thousand Hills." *African Law & Business*, September 2. [www.africanlawbusiness.com/news/6147-in-the-land-of-a-thousand-hills](http://www.africanlawbusiness.com/news/6147-in-the-land-of-a-thousand-hills).
- Miglani, Sanjeev. 2014. "India Wields the Axe on Her Majesty's 'laughable' Laws." Reuters, October 7. [www.reuters.com/article/us-india-lawmaking/india-wields-the-axe-on-her-majestys-laughable-laws-idUSKCN0HW0JA20141007](http://www.reuters.com/article/us-india-lawmaking/india-wields-the-axe-on-her-majestys-laughable-laws-idUSKCN0HW0JA20141007).
- Mingst, Karen A. 1988. "Judicial Systems of Sub-Saharan Africa: An Analysis of Neglect." *African Studies Review* 31 (1): 135–47.
- Moore, Claudine. 2015. "Inside Nigeria's Twitter Election." *PR Week*, April 3. [www.prweek.com/article/1341562/inside-nigerias-twitter-election](http://www.prweek.com/article/1341562/inside-nigerias-twitter-election).
- Mount, Harry. 2011. "Good Riddance to Barristers' Wigs—They're Pompous, Pointless, and Itchy." *The Telegraph*, November 22.
- Muhumuza, Rodney. 2017. "African Governments Learn to Block the Internet, but at Cost." *Phys.org*, March 14. <https://phys.org/news/2017-03-african-block-internet.html>.
- Murphy, James T., and Pádraig Carmody. 2015. *Africa's Information Revolution: Technical Regimes and Production Networks in South Africa and Tanzania*. Chichester, UK: Wiley-Blackwell.
- Muthuri, Robert, Francis Monyango, and Wanjiku Karanja. 2018. "Biometric Technology, Elections, and Privacy: Investigating Privacy Implications of Biometric Voter Registration in Kenya's 2017 Election Process." Centre for Intellectual Property and Information Technology Law, Strathmore University, Nairobi. <https://blog.cipit.org/wp-content/uploads/2018/05/Biometrics-Privacy-Report-by-CIPIT.pdf>.
- Nafuka, Juliet. 2018. "Uganda Blocks Access to Social Media, VPNs and Dating Sites as New Tax Takes Effect." Collaboration on International ICT Policy for East and Southern Africa (CIPESA), July 1. <https://cipesa.org/2018/07/uganda-blocks-access-to-social-media-vpns-and-dating-sites-as-new-tax-takes-effect/>.
- The Nation*. 2017. "NCAA Issues First Drones Operator Certificate to Oando." News Update, June 29. <https://thenationonline.net/ncaa-issues-first-drones-operator-certificate-oando/>.
- National Archives. 1960. "Nigeria Independence Act 1960." UK Public General Acts, 1960, British National Archives CO 554/2189. [www.legislation.gov.uk/ukpga/Eliz2/8-9/55](http://www.legislation.gov.uk/ukpga/Eliz2/8-9/55).
- Naylor, Karlina Treurnicht, Paul Kudlow, Felix Li, and Kevin Yuen. 2011. "Improving Healthcare with Information Technology." *University of Western Ontario Medical Journal* 80 (1). [www.uwomj.com/wp-content/uploads/2011/08/Naylor.pdf](http://www.uwomj.com/wp-content/uploads/2011/08/Naylor.pdf).
- O'Neill, James. 2012. "The Wearing of Wigs: Past Time for a Fresh Look." *Hearsay: The Journal of the Bar Association of Queensland* 55, April. [www.hearsay.org.au/index.php?option=com\\_content&task=view&id=1332&Itemid=48](http://www.hearsay.org.au/index.php?option=com_content&task=view&id=1332&Itemid=48).
- Ogunowo, Olanrewaju. 2018. "The Economic Impact of Recent Internet Shutdowns in Africa." *TechCabal*, August 14. <https://techcabal.com/2018/08/14/the-economic-impact-of-recent-internet-shutdowns-in-africa/>.

- Ohwovoriole, Onome. 2017. "Multiple ID Registration May Be Over Soon." Nairametrics.com, September 25. <https://nairametrics.com/2017/09/25/nimc-to-harmonize-all-identification-databases-in-the-country/>.
- Okeowo, Yinka. 2018. "Robotics: Why Nigeria Should Be More Serious With Software Business." *Techeconomy.ng*, November 17. <https://techeconomy.ng/2018/11/17/robotics-why-nigeria-should-be-more-serious-with-software-business/>.
- The Paypers. 2018. "Union Bank Introduces Robotics to Fix Cash Dispense Errors in ATMs." *ThePaypers.com*, May 28. [www.thepappers.com/payments-general/union-bank-introduces-robotics-to-fix-cash-dispense-errors-in-atms/773327-27](http://www.thepappers.com/payments-general/union-bank-introduces-robotics-to-fix-cash-dispense-errors-in-atms/773327-27).
- Penna, David R. 1990. "Apartheid, The Law and Reform in South Africa." *Africa Today* 37 (2): 5–21.
- Penney, Joe, Eric Schmitt, Rukmini Callimachi, and Christoph Koettl. 2018. "C.I.A. Drone Mission, Curtailed by Obama, Is Expanded in Africa Under Trump." *New York Times*, September 9. [www.nytimes.com/2018/09/09/world/africa/cia-drones-africa-military.html](http://www.nytimes.com/2018/09/09/world/africa/cia-drones-africa-military.html).
- Perala, Alex. 2018. "Nigerian Officials Registering Foreigners' Biometrics." *FindBiometrics.com*, June 26. <https://findbiometrics.com/nigerian-officials-registering-foreigners-biometrics-506261/>.
- Plaut, Martin. 2018. "Cambridge Analytica and the Digital War in Africa." *New Statesman America*, March 20. [www.newstatesman.com/world/2018/03/cambridge-analytica-facebook-elections-africa-kenya](http://www.newstatesman.com/world/2018/03/cambridge-analytica-facebook-elections-africa-kenya).
- Portland. 2016. "Africa Outstrips US and UK in Using Twitter for Political Conversation." <https://portland-communications.com/digital/africa-outstrips-us-and-uk-in-using-twitter-for-political-conversation/>.
- Portland. 2018. "How Africa Tweets 2018." <https://portland-communications.com/pdf/How-Africa-Tweets-2018.pdf>.
- Premium Times*. 2016. "Nigeria Bans Unauthorised Use of Drones." May 8. [www.premiumtimesng.com/news/more-news/203080-nigeria-bans-unauthorised-use-drones.html](http://www.premiumtimesng.com/news/more-news/203080-nigeria-bans-unauthorised-use-drones.html).
- Rise Africa Rise. 2017. "Drones Will Change Africa. Here Is How." September 14. <https://riseafricarise.com/drones-will-change-africa-here-is-how/>.
- Rugege, Sam. 2007. "Judicial Independence in Rwanda." *Pacific McGeorge Global Business & Development Law Journal* 19 (2): 411–25.
- Runsewe, Oreoluwa. 2016. "Nigeria Adopts the 'Drone War' Approach in the Fight against Boko Haram: Here Are Other Modern Warfare Options They Can Take On." *Ventures Africa*. <http://venturesafrica.com/nigeria-joins-the-drone-wars-in-its-fight-against-boko-haram-here-are-other-weapons-they-could-use/>.
- Schmitt, Eric. 2018. "A Shadowy War's Newest Front: A Drone Base Rising from Saharan Dust." *New York Times*, April 22. [www.nytimes.com/2018/04/22/us/politics/drone-base-niger.html](http://www.nytimes.com/2018/04/22/us/politics/drone-base-niger.html).
- Schumpeter, Joseph A. 1942. *Capitalism, Socialism, and Democracy*. New York: Harper.
- Shearlaw, Maeve. 2015. "Did the #bringbackourgirls Campaign Make a Difference in Nigeria?" *The Guardian*, April 14. [www.theguardian.com/world/2015/apr/14/nigeria-bringbackourgirls-campaign-one-year-on](http://www.theguardian.com/world/2015/apr/14/nigeria-bringbackourgirls-campaign-one-year-on).
- sUAS News. 2016. "Nigeria: NCAA Issues Safety Guidelines for Drone Operators." May 9. [www.suasnews.com/2016/05/43512/](http://www.suasnews.com/2016/05/43512/).
- Subramanya, Rupa. 2013. "The Colonial Hangover of India's Rape Law." *India Real Time blog, Wall Street Journal*, January 4. <https://blogs.wsj.com/indiarealtime/2013/01/04/the-colonial-hangover-of-indias-rape-law/>.
- Summers, Nick. 2016. "Drones Deliver Sterile Insects to Tackle Disease in Ethiopia." *Engadget.com*, March 30. [www.engadget.com/2016/03/30/drones-tsetse-flies-combat-ethiopia/](http://www.engadget.com/2016/03/30/drones-tsetse-flies-combat-ethiopia/).
- Swanwick, Ron. 2012. "Keep the Faith, Look the Part and Wear the Wig: A Response to James O'Neill's Article Advocating the Abandonment of Wigs." *Hearsay: The Journal of the Bar Association of Queensland* 56, June. [www.hearsay.org.au/index.php?option=com\\_content&task=view&id=1383&Itemid=48](http://www.hearsay.org.au/index.php?option=com_content&task=view&id=1383&Itemid=48).
- Taiwo, Shakirudeen. 2017. "Africa Is Teaching the World How to Use Drones for Commercial and Delivery Purposes." *Business Insider Sub Saharan Africa*, August 30. [www.businessinsider.com/africa-is-teaching-the-world-how-to-use-drones-2017-8](http://www.businessinsider.com/africa-is-teaching-the-world-how-to-use-drones-2017-8).
- Taylor, Mildred Europa. 2018. "Meet the Nigerian Engineer Who Makes Drones for One of the World's Most Powerful Armies." *Face 2 Face Africa*, October 21. <https://face2faceafrica.com/article/meet-the-nigerian-engineer-who-makes-drones-for-one-of-the-worlds-most-powerful-armies>.
- Techloy*. 2018. "Union Bank Introduces Robots into Banking Processes in Nigeria." May 22. <https://medium.com/techloy/union-bank-introduces-robots-into-its-banking-processes-in-nigeria-6936d2e90107>.

- Toesland, Finbarr. 2021. "African Countries Embracing Biometrics, Digital IDs." *African Renewal*, February 5. [www.un.org/africarenewal/magazine/february-2021/african-countries-embracing-biometrics-digital-ids](http://www.un.org/africarenewal/magazine/february-2021/african-countries-embracing-biometrics-digital-ids).
- Uchechukwu, Ogbuowelu Anthony. 2020. "Nigeria Calls for an Extension of the Time Set or the Eco Currency Launch for West Africa." *Cryptotvplus.com*, February 13. <https://cryptotvplus.com/nigeria-calls-for-an-extension-of-the-time-set-for-the-eco-currency-launch-for-west-africa/>.
- UNICEF (United Nations Children's Fund). 2017. "Humanitarian Drone Corridor Launched in Malawi." August 23. [www.unicef.org/stories/humanitarian-drone-corridor-launched-malawi](http://www.unicef.org/stories/humanitarian-drone-corridor-launched-malawi).
- Union Bank. 2018. "Union Bank Takes the Lead: Introduces Robotics to Banking in Nigeria." Union Bank of Nigeria. [www.unionbankng.com/blog/union-bank-takes-the-lead-introduces-robotics-to-banking-in-nigeria/](http://www.unionbankng.com/blog/union-bank-takes-the-lead-introduces-robotics-to-banking-in-nigeria/).
- Visvanathan, Vishnu Kumar. 2015. "Observations on Wig Use in Australia by a Malaysian Lawyer." *Hearsay: The Journal of the Bar Association of Queensland* 72, March. [www.hearsay.org.au/index.php?option=com\\_content&task=view&id=1463&Itemid=4](http://www.hearsay.org.au/index.php?option=com_content&task=view&id=1463&Itemid=4).
- West, Darrell M. 2016. "Internet Shutdowns Cost Countries \$2.4 Billion Last Year." Center for Technology Innovation at Brookings, October. [www.brookings.edu/wp-content/uploads/2016/10/internet-shutdowns-v-3.pdf](http://www.brookings.edu/wp-content/uploads/2016/10/internet-shutdowns-v-3.pdf).
- Willhelm, Anthony G. 2004. *Digital Nation: Toward An Inclusive Information Society*. Cambridge, MA: MIT Press.
- Wyatt, Sally, Flis Henwood, Nod Miller, and Peter Senker. 2000. *Technology and In/equality: Questioning the Information Society*. London: Routledge.