

Information Infrastructures: the Conduit Power of ICTs in Africa

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Abstract

In this article, I make a case for considering Information and Communications Technology (ICT) infrastructures outside the narrow prism of ICT for development (ICT4D), but rather as an alternate mechanism to exercise political power in Africa. I refer to ‘infrastructures’ rather than ‘infrastructure’ because the former has a broader definition. Infrastructures may be material, informational or structural. Infrastructure relates to the physical and organisational structure and facilities a society or an organisation needs to function, such as roads, electricity and communication systems. Owing to the inability to overcome weaknesses in state capacity, the expression of power in the global South often differs from the global North. ICT infrastructure is transnational with power oscillating between state and non-state actors but offers African countries a surrogate system of administration for individual territories. I draw on the concept of infrastructural power to describe how a state may harness ICT infrastructure, or information infrastructures, to increase its influence within its territory and extraterritorially.

1. Introduction

The challenge with traditional international political economy analysis is that it is based on a paradigm that is suitable for the global North but does not adequately examine the global South. The reasons for this are varied, although a significant reason for the differences relates to historical development paths, which, in developing countries, are also further affected by the history of colonialism. I pose the question of whether ICT infrastructure can be the backbone of Africa political power in the 21st century. Drawing on the concept of infrastructural power (IP), this article concludes that ICT infrastructures, particularly technological infra structures that allow for high-speed Internet, give the state the ability to govern its territory.

I argue that infrastructures are an integral part of society's development and the backbone of political power (Calhoun 1992; Furlong 2014). Larkin

(2013:328) best defines infrastructures as “built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space”. According to Mann (2008:355), there are two forms of state power: despotic or infrastructural. The former relates to the state’s ability to act “without consultation with civil society” while the latter relates to the “capacity of the state to penetrate civil society and implement its actions across territories”. In other words, infrastructural power relates to the state’s ability to administer its politics throughout the territory while despotic power relates to the state’s ability to enforce its will on its territory.

Much of the contemporary literature on African states and their engagement with ICT focuses on their lack of material infrastructure and the structural weaknesses in African governance systems. However, the focus of this article is not merely on material infrastructures but on normative infrastructure; specifically technological infrastructure related to communications, what I refer to as information infrastructures, as a pathway to ‘governmentality’. The study of infrastructures and infrastructural power distinctively underscores the intersection between bio-politics and techno-politics. It is about how transnational relationships shape the 21st century. Bio-politics sees the state’s power over society much like an organism that needs to be regulated through institutions. Rudolf Kjellén’s (Lemke et al. 2011, 9-11) view of bio politics is based in the biological sciences and perceives the functioning of the state as a pseudo-organism. Michael Foucault (2013) refined the concept. According to Foucault, states regulate society through the application of political power on all facets of human life. Techno politics refers to the nexus between politics and technologies. Hecht (2009,15) describes techno-politics as the “strategic practice of designing or using technology to constitute, embody or enact political goals”.

My argument is laid out in five parts: first, I explore ‘infrastructures’ and information infrastructures and infrastructural power; then I examine Africa and its relationship to technology, and finally, I illustrate how Africa could optimise its IP through information infrastructures.

2. The Function of Infrastructural Power: Information Infrastructures

Infrastructures, particularly information infrastructures, reside in the nexus of global-national power relations, which are constantly marked by the on-going battles between the ‘haves’ and ‘have-nots’. The centre of information infrastructures in the 21st century is the ability to connect to the Internet. The Internet is fundamentally a system of interconnected computers, and the backbone is the network that connects its various parts; that backbone is the

infrastructure. Currently, the main modes of Internet connectivity are satellite, which is the costliest, and linking to submarine fibre optic cables. The average price of broad band services on the African continent is prohibitive. The United Nations Economic Commission for Africa (UNECA) reports that “the average fixed price is approximately three times the world average of 22.1 per cent” of gross national income per capita, with only Gabon, Mauritius, Seychelles, and South Africa being able to offer services at below five per cent of gross national income (UNECA 2017:5). For most African states, the only prospect of improving broadband accessibility is linked to the ability to garner external funding and material support.

Nevertheless, although the very creation and diffusion of information technology are transnational, it is bound to the rigid boundaries of state. Miller and Rose (1990), building on Foucault’s concept of ‘governmentality’, developed the concept of ‘technologies of government’ to describe how technology and political realities of authority are interwoven. Governmentality refers to in what way the state governs or administers society. Foucault explains this way:

“[t]his word [government] must be allowed the very broad meaning it had in the sixteenth century. ‘Government’ did not refer only to political structures or to the management of states; rather, it designated the way in which the conduct of individuals or groups might be directed – the government of children, of souls, of communities, of the sick” (Foucault, 2000, 326).

Simply put, states have the authority to develop regulatory mechanisms to govern the use and proliferation of technology within their territory. Yet, although information infrastructures are a feature of modernity, its availability is not universal (Calhoun 1992; Edwards 2003; Furlong 2014). In Africa, much of the lopsided infrastructures development relates to its colonial history and the failure to restructure colonial-era infrastructure deployment patterns effectively.

2.1 What are information infrastructures?

The word ‘infrastructure’ is loaded with meanings and lacks a set definition as different scholars, and disciplines, have different views of what infrastructures and their dimensions are. Mann’s conceptualisation of infrastructure echoes Marx’s (2010) idea of a superstructure, which envisions it as the norms, ideology and social institutions that are reflective of the ‘base’ that controls it. Weber’s (2013) understanding of the structure of society appears to be the one towards which Mann leans. He views the base and superstructure as more reciprocal. The result is that there is a difference between infrastructures, which includes workers and the means

of productions, as well as symbolic superstructures (cultures and norms).

The distinction is unnecessary, and exploring material infrastructure, or infrastructures, does not take away from Mann's original concept of infrastructural power. As Foucault (2010:70) reminds us, infrastructures are crucial because they are the 'apparatus of governmentality'.

One of the most comprehensive definitions is the one put forward by Edwards (2003:186) who contends that "infrastructures simultaneously shape and are shaped by - in other words, co-construct - the condition of modernity". He recognises that "this notion of infrastructure as invisible, smooth-functioning background "works" only in the developed world". In the global South, norms for infrastructure may not exist (Edwards 2003:188).

Edwards, similar to Calhoun (1992: 208), links modernity to infrastructural technologies. Furlong (2014), on the other hand, recognises that the theory of infrastructures lacks transferability because it was created with the assumption that infrastructure provision is universal, and not as precocious as it is in the global South. Von Schnitzler (2013) illustrates the mechanics of the politics of infrastructure by tracing the movements of the prepaid electricity meter. Her work calls attention to the role of technical artefacts in society, they are neither apolitical nor can ethical considerations be ignored in their deployment.

2.2 The continuing importance of the state

The critical component of Mann's concept of political power, both despotic and infrastructural, is territory; the primary concern is how the territory is administered. As Soifer and Vom Hau (2008: 222) claim, IP underscores the "ability of states to carry out their projects is territorially organized and crucially shaped by the organizational networks that they coordinate, control, and construct". This gives room to comprehend the variations of "the ability of the state to regulate society", which is inclusive of the interplay between the state and non-state actors (Ibid). The authors correctly describe Mann's concept as being "relational" (Ibid). Nowhere is the concomitant relationship between state infrastructural power and infrastructures as evident as it is in sub-Saharan Africa.

However, much of the discourse around Africa and technology, particularly information infrastructures, focuses on dearth and how Africa is lagging. At the core of the discussion are issues of state capacity and the ability of the state to exercise its power over an extended period. However, in order to fully understand the functioning of infrastructural power, it is important to identify the base unit of analysis: the state. It is important to appreciate that the state and government are not interchangeable terms.

Nettl (1968) notes the difficulty in appropriately defining the state, particularly

with the introduction of developing nations in the international society. Half a century later, the concept of state, and statehood, is further complicated by the immense power wielded by some non-state actors. Three points from Nettl's conceptualisation of state that may prove useful in our overall analysis: first, the state is "a collectivity that summates a set of functions and structures in order to generalize their applicability" (Nettl 1968: 562). This infers that the state is a member and at the same time independent, which of course has implications for legitimacy and sovereignty; second, a state is a "unit in the field of international relations" (Ibid: 563); and third, "the state is the gatekeeper between intrasocietal and extrasocietal flows of action" (Ibid: 564). He speaks to the autonomous character of the state and the various shifts between the private and public. This is seen in education, healthcare and commerce, for instance.

Mann's (1993:55) definition of state power, by his own admission, is more 'institutional' than 'functional'. In other words, his definition focuses more on the conventions and organisation of the state rather than what the state executes. The last two points in his four-point definition recognise that the state is a "territorially" established area in which it has authority and can enforce its authority using physical force. I take the view that this is not the most appropriate method of assessing the levels of the state's infrastructural power. Although Michael Mann's 1976 conceptualisation of social power, and infrastructural power specifically, is focused on the global North, Hawkins (2014) extends the concept by applying it to developing nations. She observes that through "the application of primary or secondary data, the trajectory of a country's development can be teased out providing a much needed historical dimension to the study of developing states" (Hawkins 2014:306).

However, the challenge for states facing stark infrastructure deficits, what Schoeten (2014) defines as 'infrastructures of rule' and what Larkin (2008) calls 'representation of rule', is that they underscore the weaknesses in the state apparatus and trigger the descent towards the use of despotic power (Mann 1984; Mann 1993; Schoeten 2014).

The tilt towards despotism is at times reinforced extraterritorially. Reno (2001) underscores the complicity of external actors in shoring up the state in the face of feeble bureaucratic systems. Reno (Ibid: 201) refers to Martin's (1995) discovery that between 1963 and 1994, France had deployed troops in thirty separate cases in only six states. The purpose was to shore up failing regimes. However, there are cases where external support for despotic regimes is not even necessary. For instance, during Nigeria's military dictatorship between 1985 and 1993, weakening institutions led to the state further leaning towards more pugnacious means to control its territory (Lucas 1998).

3. Transnationalism and Infrastructural Power

The function of, and access to, infrastructural power is affected by transnationalism. Infrastructures are often built, particularly in the face of deficits that are unable to be met by the state, by a variety of state and non-state actors. Transnationalism is not only a human migration concern but also has economic and cultural dimensions. The concept of transnationalism is important as it details the nature of technological infrastructure in the world economy and provides an alternate explanation to Africa's integration in the world economy.

The concept of transnationalism relates to interactions across state boundaries. These interactions are not limited to economic activity but may include political and cultural relations. At times, transnational and non-state are incorrectly used as interchangeable terms. Russo and Chiriatti (2013:4) distinguish between 'transnational' and 'non-state', positing that the former "identifies a mode of interaction" whilst the latter characterises "the agent of interaction". Their distinction is important because it pinpoints subsequent analysis to more than just considering the actions of particular agents in the international system. Moreover, focussing merely on cross boundary movement ignores key questions about the nature of the relationship between the state and infrastructures, as well as why understanding transnationalism is so vital to infrastructural power.

The politics underlying transnationalism is in no way simple - particularly for African states that are still developing. For instance, there are issues related to the potential reduction in state autonomy and danger of the internationalisation of local assets or key points. Most importantly, transnationalism in a globalised environment questions the very existence of the state itself. Does having a legitimised monopoly of violence or the provision of public goods enough to be recognised as a state? I explore these questions further explored within this article but what is clear is that transnationalism complicates traditional views of the state that a plethora of actors are involved. Yet, these actors cannot be disregarded by states as the cost of not adequately engaging with transnational organisations, such as multinational businesses, particularly for developing countries, can be too steep. Nye and Keohane (1971b: 725) best explain that transnational relations "affect interstate politics by altering the choices open to statesmen and the costs that must be borne for adopting various courses of action".

3.1 Africa's infrastructure push

Ougaard (2018) argues that "the infrastructure push is an effort by the transnational state to remedy the infrastructure gap, a major impediment to economic growth, by inducing massive surge in infrastructure investments". Infrastructure is

undoubtedly Africa's Achilles heel with dire consequences for state-society relations, as well as the perceived authority of the state (Foster and Briceño-Garmendia 2010; Estache and Garsous 2012; African Development Bank 2018). This insufficiency has grave implications for the amount of infrastructural power, which the state can access. For instance, a 2018 report by the World Bank and Afrobarometer highlights the relationship between the provisions of social infrastructure (such as water and electricity) and the improved taxation rates (Blimpo *et al* 2018).

Infrastructures are often acquired in a top-down fashion. Essentially, the state decides what infrastructures are to be deployed and where? An extreme example of this is *Apartheid*-era South Africa and its racial spatial development planning policies (Berrisford 2011). The deployment of material and normative infrastructures was driven by race-based policies rather than just a focus on economic growth. A key example was the practice of only deploying telephone lines in primarily white areas during *Apartheid*. Does that mean that the role of the modern state is merely an incubator for economic growth in the global capital economy? Answering in the affirmative ignores the fact that investing in infrastructures, particularly information infrastructures, includes many other concerns that go beyond the mere will of the state.

States and their stakeholders, such as labour movements have to contend with socio-technical developments elsewhere, forcing the government to decide between efficacy and political stability. A salient example is the improved capability of sewbots (textile manufacturing robots). On the one hand, the capacity of sewbots means that 800 thousand of T-shirts can be produced daily at the cost of only 33 US cents per T-shirt (Zhou and Yuan 2017). On the other hand, the potential labour unrest, as human jobs are replaced, means that developing states that do not slow down technology-driven growth within its borders have to be prepared to deal with the fallout due to job losses. Still, the inability to produce goods efficiently would cause job losses.

Nevertheless, there would always be some form of recompense. Strange (1976: 342) describes this as a "triple trade off" between efficiency, equity and order influenced by "the input of political direction or authority of the system" (Strange 1976: 342). This trade-off in African countries is often out of balance due to external political influence.

In the aftermath of the Washington Consensus capital allocation to infrastructures declined drastically from the 1990s till the early 2000s when this approach to development had lost favour in Western monetary and financial circles. However, in Africa, this reduction in infrastructure spending led to an infrastructure deficit that has been difficult to overcome (African Development Bank 2018: 64-64).

The ability to address the infrastructure gap was dealt a further blow during the global financial crisis between 2012 and 2016. The result was that external commitment to Africa's infrastructure was drastic; commitments of an average of US\$75 billion declined to US\$62,5 billion (Ibid). With regard to ICT, and the need to grow the digital economy, Africa is seriously challenged. On the one hand, basic public goods such as roads and electricity need to be built. But on the other hand, bridging the digital divide is needed so as to drive economic growth. Both demands are vital, but the resource pool is limited.

The result of limited ICT infrastructure is that the costs of infrastructure, the cost of Internet and telephone charges is exorbitant. The 2018 African Economic Outlook reports that the Internet and call charges are one of the highest in the world. Moreover, the cost of data in Africa costs "an average citizen nearly 18 per cent of average income", in Asia this figure is only 3 per cent (Ibid: 73). What this means is that any hope of closing the gap would mean that African countries would have to look towards transnational networks that consist of varied actors. Understandably, this would lead to an inevitable tension between capital poor countries and wealthy industrialised countries over the governance of knowledge infrastructures and specifically specific control of the digital value chain.

Technology, and the infrastructures that support it, have always leaned towards transnationalism and as such has been impacted by some form of collective political authority. However, that relationship has been malleable. An early example is radiotelegraphy in the early 20th century. Behemoths such as the Marconi Company and Siemens Brothers led the charge in the provision of the infrastructure that enabled the use of radio technology but could not do so without the acquiesce of some form of state authority. Yet, the peculiarity of radio, as with Broadband and Wi-Fi in the 21st century, is that it is amorphous, meaning that once the basic infrastructure is in place, its actual movement cannot be fully controlled by the state. Moreover, it is inherently transnational due to the diverse actors that have to be involved in its development and operation. Soroos (1982) describes this phenomenon as the 'commons in the sky', whereas Rikitianskaia, Balbi and Lobinger (2018) coined the term 'mediatization of the air'.

There has been an extensive push with regard to information infrastructures across the African continent. But with the involvement of external actors it is uncertain as to how this would play out politically in the long term. A situation to watch is the recent landing of cables linking Africa to the Americas. African and Latin American countries' external communication has historically been via the US or Europe. The development of the South Atlantic Cable System, also known as the Angola-Brazil cable, is set to bring down communication costs for African and Latin American countries (African Research Bulletin 2018: 22012-

22013). A further boon is that cables are 100 per cent owned by Angola Cables, a private Angolan telecommunications operator. With a reduction in revenue from data and international voice calls, how would the traditional powers respond - particularly to Angola, a regional actor with a desire to regain its prominence.

4. Africa and information infrastructures

The ability for states to harness their potential IP is low and potential improvement is hampered by the lack of information infrastructure. The concept of a 'digital divide' or a separation between the information rich and the information poor is mired in controversy as many scholars find the common understandings of the phrase lack nuance (Warschauer 2004: 297-301). One of the most comprehensive definitions is that provided by the Organisation for Economic Cooperation and Development (OECD):

“[t]he term “digital divide” refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities” (OECD, 2001: 5).

It is this information gap, which is really an infrastructures gap, is one that Africa is still struggling to close.

In 1987, McPhail and McPhail observed a widening disparity between the global North and South concerning the importance placed on information and by extension, telecommunications. They underscore the fact that information has become an increasingly important commodity across the globe and the portal in which to transmit it, telecommunications, had also become important. However, governments in the global North did not see the value in increasing the telecommunications capacity, or communications infrastructure available in the global South. As one of their examples, they refer to a 1980 report by the Canadian Parliamentary Task Force North-South Relations, which ignores information and communications infrastructure as being important to the growth of developing countries.

The discourse around developing nations, particularly African nations, and access to information infrastructures, has changed in subsequent years. The social and economic mobility of developing nations is linked to their ability to close the 'digital divide'.

4.1 Why does the information infrastructures gap exist?

The lack of information infrastructures in Africa, much like other physical infrastructure, is a consequence of both their colonial history as well as missed opportunities by African leaders. Noll (2000: 184-185) notes that in the developing world, telecommunications companies were primarily foreign-owned, with service concentrating on societies' elites such as government officials, wealthy individuals, as well as large corporations. As a result, the infrastructure that was built to support this arrangement was concentrated in the capital city, or other large commercially important cities. This arrangement was a vestige of colonial infrastructure development. For instance, Schwenkel (2015: 526) reminds us that urban infrastructure in colonial Vietnam, was "marked by the accessibility of resources, in accordance with the racialised practices of infrastructure exclusion". This form of infra structural exclusion was common all across the colonised world and continued in the diffusion of telecommunications technology. One of the first telecommunications technological artefacts developed was the telegraph, and colonial powers saw it as a way to deepen their engagement with their remote territories (Carey 2008:9).

Ultimately, the effect of colonialism went far beyond inequity in the diffusion of infrastructure dependent technology, but it affected the lens in which African leaders viewed these technologies. This is evident in the manner in which African nations engaged the burgeoning communications technologies, particularly as they became independent nations. Arguably, this is a function of previous socialisation. Larkin (2008: 21) illustrates that British colonialism and its use of technological infrastructure went beyond mere "representation of rule", it was about creating "a particular sort of colonial subject". Larkin's description of the type of subject that British colonialists expected, is one that is more cosmopolitan, by European standards.

Over the course of the 1950s and 1960s, many African countries gained independence and began to take control of their infrastructure including their communications infrastructure. The result, however, was lopsided investment in maintaining and improving the available infrastructure. For instance, countries such as Côte d'Ivoire merely mimicked the colonial setup and did not actually control its infrastructure, but rather it was controlled from the *Afrique Occidentale Française* (AOF) in Dakar.

The Côte d'Ivoire model is one that many Franco-African countries adopted as a result of their socialisation. In the heat of the anti-colonisation movement, Franco-African leaders moved towards increased autonomy, as well as increased rights as French citizens (Cooper 2014:68) that stood in stark contrast to the anti-colonial visions of Anglo-Africans. These contrasts are seen in how

infrastructures, both material and social infrastructures, were engaged with. Under the AOF, states were not even allowed to build additional infrastructure (Kone 1999:145). The post-colonial relationship to infrastructure, particularly communications infrastructure was different in Anglophone countries. Perhaps as a function of the British policy of indirect rule, there was more ownership of the foundations that were developed previously. At least, Nigeria realised the importance of its telecommunications infrastructure in each of its National Development Plans since the 1960s. However, the civil war, mismanagement and lack of funds, upended the effective implementation of just over 40 per cent of its original targeted telephone line installations (Ajayi, Salawu and Raji 1999: 164).

Telecommunications prior to World War II was primarily a private enterprise, although it enjoyed state support. In the aftermath of WWII, the desire to rebuild lost communications infrastructure led to the nationalisation of telecom; Cable and Wireless Plc, a British company, became a state-owned enterprise in 1947. Over the same period, there was not a similar drive to accelerate infrastructure development in developing nations.

4.2 Has a transnational outlook paid off?

As previously discussed, Africa has had to take a transnational approach to its information infrastructures. Weiss describes this approach as “governed inter dependence”. She defines it as:

“The state’s ability to link up with civil society groups, to negotiate support for its projects, and to coordinate public-private resources to that end make up the broad tapestry of IP” (Weiss 2006:168).

Her argument is in line with Soifer and Vom Hau (2008: 222) who argue that state capacity, which is at the heart of IP, is “relational”. The ability of the state to exercise its power is dependent on its ability to maximise its relationships with other actors, including institutions. Vom Hau (2008: 351) explains that “state infrastructural power is constrained or facilitated by the relationships between state elites and non-state groups, and relationships between executive authorities and social control institutions”. Although Vom Hau and Soifer are writing from the perspective of local institutions and local government, their perspectives can be applied on a much wider scale. Africa's state capacity is bolstered by external involvement. For instance, in 2011, the World Bank approved funding worth US\$71, 5 million dollars, for the improvement of ICT infrastructure in Liberia, Sierra Leone, São Tomé and Príncipe (Balancing Act-Africa 2011). This is part of a larger US\$300 million earmarked for the West

Africa Regional Communications Infrastructure Program (WARCIP) (Ibid). Despite the high level of political and governance risk inherent in WARCIP, the project has progressed with the landing stations for the Guinea Bissau leg, set to be constructed in the first half of 2019 (Foch 2019). It is unlikely that any of these countries would have been able to garner this level of support outside of a regional arrangement.

The capitalist undercurrents of globalisation, in the 20th and 21st century, have made regional economic and political integration and the development of regional infrastructural networks an imperative for developing nations. Khalili (2017) makes the important argument that liberal capitalism renders the commonly accepted distinctions between public and private, foreign and domestic, ineffective. She takes the view that “we have to take account of how physical and virtual infrastructures were crucial to the capitalisation of the economies of the Global South” (Khalili 2017:3).

I do not take a normative position on whether or not capitalism is good or bad for the Global South, particularly Africa, but I do agree that the language and mechanism of capitalism can have either an amplifying or a diminishing effect on states' IP. This can be seen in the top-down-bottom-up approach to infrastructures with the intention of integrating into the global economy (Fromhold-Eisebith and Eisebith 2005; Zawdie and Langford 2000). This approach refers to projects being state-led or conceptualised, but being executed by the bottom, or civil society. The structural and political weakness still present in a number of states in African means that they have been unable to benefit from globalisation (Bøås, Marchand and Shaw 1999:1062).

In the African context, the deepening of regional ties, much like the building of infrastructures, are often top-down in nature. However, regional integration must not be seen as a challenge to the state's power *per se* but rather offering it a form of “international legitimacy” (Gibb 2009: 717). African nations, through the regional economic communities; the New Partnership for Africa's Development (NEPAD); and the African Union (AU) overall has pinpointed ICT infrastructure as being imperative, not only for regional economic integration, but also for socio-economic development goals. Both the AU and NEPAD acknowledge the emergence of an information society of which ICT was a cornerstone. Paragraph 107 of the NEPAD document sets out teledensity objectives and is focused on Africa's e-readiness. More specifically, paragraph 104 points to the belief that ICTs would provide the impetus needed to contribute to economic growth and development as well as accelerate African integration and intra-regional trade. To breathe life into these beliefs, NEPAD adopted the *Protocol on Policy and Regulatory Framework for NEPAD ICT Broadband Infrastructure for Eastern and Southern Africa*, commonly called the *Kigali Protocol*, in 2008⁶.

The staggering number of private and state-led consortiums has accelerated the development of backbone infrastructure, particularly submarine cables. Yet, these relationships are not optimised, and great opportunities are missed. The 2003 Eastern African Submarine Cable System (EASSy) developed in 2006 is one such regional project. EASSy was originally envisioned as part of the NEPAD vision for the development of the continent's backbone infrastructure (NEPAD e-Africa Commission 2005), and to that end, NEPAD pursued funding for the project (Muller 2007). However, Kenya became a stumbling block, as it was not in agreement with having to increase its government's regulation of the sector, and it did not agree with the primacy South Africa enjoys, not only within NEPAD but that of the South African companies within the EASSy Consortium (Gedeye 2007). Eventually, owing to the contentious relationship, NEPAD withdrew from EASSy and put forward its own project - Uhurunet.

In Africa, Farivar (2011: 74) reminds us that Internet diffusion across the African continent is "subject to many political, economic, and educational obstacles that need to be overcome". Infrastructures cannot be considered in isolation; they are a sum total of technical artefacts, regulatory regimes as well as cultural norms (Obertreis et al. 2016:172). Broadband connectivity is critical to Africa's political and socio-economic growth. The challenge faced by developing countries, particularly in Africa, is that not only is the current broadband technology prohibitively expensive but material infrastructure such as fibre networks lag behind the rest of the world. In fact, approximately 36,3 per cent of Africa's population lives out of reach of an active fibre network (OECD 2017:155). This gives us the impression that African states are unable to muster civil society, and harness international support to improve access to the Internet. But that is not exactly correct, part of the problem identified by UNECA lies with individual countries. National backbone is arguably 'the weak link' in the African broadband infrastructure value chain (UNECA 2017:6).

The proliferation of mobile network technology has also changed the game with regard to broadband penetration. Mobile telephony is the primary mode in which African countries have access to the Internet. The International Telecommunications Union reminds us that mobile network innovations "have made connectivity, including to high-speed broadband communication network potentially ubiquitous" (OECD 2017: 148). Mobile global penetration and least developed country penetration rates have reached 99,7 per cent and 72,6 per cent respectively (Ibid: 143).

But the narrative of improved Internet and consequently improved developmental outcomes, thanks to improved mobile penetration, is an imperfect narrative. Other than the fact that the Internet may reinforce current inequalities that exist between the haves and have-nots, owing to

the cost of infrastructures and other structural issues (Ibid). Carmody and Murphy (2015: 17) warn that mobile products, such as Safaricom's mobile money platform, M-PESA, that is often flaunted as evidence of mobiles' ability to catapult African development, may in fact "replicate patterns of economic extraversion". Similarly, authors such as Ya'u (2004, 2005) and Cline-Cole and Powell (2004) warn that the Internet and the Internet for development (ICT4D) is not a *panacea* for all Africa's problems.

African leaders appear to have forgotten that although technical infrastructures do hold the potential to change the trajectory of the continent positively, they are still beholden to those who control, not only the technical artefacts/infrastructures but also those who control the regime that controls the artefacts. As Marx argues: the regime, which he describes as superstructures, reflects the norms and values of who controls it. In the case of Internet infrastructure, it appears that the interests of private industry are more important than the needs of developing nations over all. As can be seen with WSIS, and its subsequent review summits, the private sector is beginning to play a more significant role.

Already the excitement of submarine and terrestrial fibre optic cable has many private sector players, who often participate in multi-stakeholder platforms at an international level, rushing to provide to Africa in particular with physical infrastructure. However, some analysts have already begun to sound the alarm that there are too many cables being laid and the broadband capacity far outstrips the projected requirements for the continent. However, there is not as much excitement in providing electricity infrastructure, with only 43 per cent of people in sub-Saharan Africa having access to electricity (International Energy Agency 2017) to make use of the high-speed broadband that these cables provide, or even the education to utilise these infrastructures adequately. The private sector cannot be blamed solely for these challenges, as African governments have not optimised the public-private partnerships. The fact is that as much as many states do not have the financial muscle to institute these projects themselves they do have the leverage because they have the legitimacy to regulate the territory.

5. Conclusion

The world is only just coming to grips with the societal implications of technology. The speed of socio-political changes, exacerbated by rapid technological advances, means that the silhouette of the international systems in the 21st century is dissimilar to the previous century. I call for the development of other ways to assess infrastructures and IP. Technological infrastructures are changing the dimensions of the world, as we have traditionally understood it.

Mann's concept of IP works well in underscoring the relational nature of that state power (Soifer and Vom Hau, 2008) even at a global or local level. The challenge, however, with Mann's definition is his characterisation of a state. Many entities can claim, either wholly or in part, to be a state according to his definition. For instance, Nigeria's own Islamic State in West Africa, otherwise known as Boko Haram, views itself as a state even though the wider society views it as a terrorist organisation. Boko Haram has control of a demarcated territory and attempts to enforce their authority through the use of force. The group models itself after the Islamic State (IS) in the Middle East who has not only implemented a taxation scheme and other forms of revenue collection, but also provides essential services. Unlike IS, there is not yet evidence that Boko Haram provides essential services, but it appears to have started a taxation scheme (Campbell 2018; Ogunidipe 2018).

Vom Hau (2008: 339) explains that the principal method for assessing IP is by looking at the ability to extract taxation. The challenge with this form of assessment is that, as shown by research economists such as Thandika Mkandawire (2010), the capacity to extract tax in Africa is uneven owing to its post-colonial development patterns. Thus, bringing forward a question to be explored in future studies: if an entity, private or external state power, can extract tax in a demarcated area, does that make it a state with its own IP?

To allow political discourse about the African continent to be defined by woolly concepts such as information society and digital divide without defining what the concepts mean and creating a solid plan on how to marshal ICT development for the benefit of the continent in the way it is done in East Asia is a great mistake. Without a doubt, Africa has significant challenges that developing nations in other regions do not have, the least of which is insufficient state capital to finance infrastructure deficits. Critical mass with regard to innovation has to include the private sector, but the terms of engagement must be set by the Africans themselves.

This article took an integrated interdisciplinary approach, as the conceptual tools to analyse the nexus between international relations and technology are still in flux. Sociology, however, provides excellent tools to understand technology, particularly infrastructures and infrastructural power. The major difficulty with these instruments is that they are not developed for analysis at a global level and therefore necessitates the use of international relations analytical devices *in tandem*. Africa remains on the periphery of the technological age. Moreover, promises of ICT4D and the potential developmental leapfrogging brought on next-generation ICTs that have failed to materialise. Within technological institutions, particularly telecommunications, African leaders have failed to properly make use of their opportunities to leverage the attention that is currently on them.

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