Handbook of African Economic Development
Pádraig R. Carmody and James T. Murphy (Eds.)
Cheltenham, UK: Edward Elgar Publishing

Part VII: Urban Development and Livelihoods

CHAPTER 34

Infrastructure Challenges: Thinking infrastructure differently for more hopeful African futures[1]

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Abstract

This chapter provides a multidimensional take on how infrastructures matter to African economic development. It starts with an overview of how infrastructure is seen in economic development circles and then offers insights into the social, political, and environmental dimensions of infrastructure. Finally, it reviews the tension between the provision of formal, networked infrastructure services and situated, heterogeneous solutions in urban Africa. Overall, the chapter seeks to explore what infrastructure does for (and to) people and what the socio-spatial effects of infrastructure are, with a view to fostering more hopeful futures for infrastructure development in urban Africa.

Keywords

Africa, Infrastructure, Economic Development, Urbanisation, Urban services

Introduction

In development circles there is a longstanding consensus that infrastructure matters for African economic development (Ayogu 2007; Ndulu 2006; The World Bank 1994, 2000). The poor state of Africa's infrastructure is seen by many analysts as a major obstacle to human development, a drag on business enterprise, and an impediment to a productive integration of the continent in the global economy (Estache and Wodon 2014; Ncube and Leyeka Lufumpa 2017; AfDB 2018). Indeed, for many economists, infrastructure has the potential to

[1] The author wishes to acknowledge the support of the UKRI-GCRF project "Community energy and sustainable energy transitions in Ethiopia, Malawi, Mozambique" (CESET).

boost productivity, economic output, aggregate demand, and human welfare (Gramlich 1994). These assumptions have placed infrastructure development at the heart of theories of modernization, structural change, and economic growth (Hirschman 1958; Rostow 1960). However, infrastructures matter beyond this economic dimension – they also have social, political, and poetic effects on society (Larkin 2013). Put differently, infrastructures play many roles in the contemporary lives of Africans, not just an economic one. Therefore, for Africans to overcome the infrastructure challenges they face in everyday life it is necessary to recover a multidimensional understanding of infrastructure.

This chapter looks at *how* infrastructure matters: what infrastructure does for (and to) people and what its socio-spatial effects are. It focuses on the urban scale, although many of the insights are drawn from, and will be relevant to, thinking about infrastructure at other scales (regional, national, or transnational) or outside urban settlements (e.g., peri-urban or rural areas). The urban scale raises specific challenges and opportunities in the study of how infrastructure matters in the African continent (Hyman and Pieterse 2017). Especially in sub-Saharan Africa, where an urban revolution is underway (Parnell and Pieterse 2014), there are key dynamics that affect the prospects of delivering on a sustainable and just infrastructure agenda.[2] These include rapid urbanization, natural population growth, circular migration, fiscal and governance deficits, and the twin realities of growing poverty and an emerging middle class (Parnell and Pieterse 2014). Understood in context of colonial and postcolonial political economies, these dynamics underpin the many challenges of rolling out universal networked infrastructures in African urban areas along the lines of 20th-century global north modern infrastructural ideal (Graham and Marvin 2001). Attention to the urban scale also foregrounds how ordinary Africans have addressed their infrastructure needs through a combination of different solutions and the infrastructure possibilities that emerge from their experimentation under conditions of precarity, uncertainty, and hope (Jaglin 2014).

The chapter is organized in four further sections. The next section provides an overview of how infrastructure has been conceptualised in mainstream economic development circles. It suggests that there has been a tendency in these circles to disconnect infrastructure from its social, spatial, and temporal dimensions, which limits the effectiveness of infrastructure-led development interventions. The following section takes stock of various socio-spatial and temporal dimensions of infrastructure, thus exposing what infrastructure does for (and to) people. Then the chapter turns the focus to the urban scale to discuss the tensions between desires for formal networked services with the realities of fragmented and heterogenous configurations through which most Africans satisfy their infrastructural needs. The last section, the Conclusion, questions how economic development policy and scholarship can more seriously engage with the difficult trade-offs, moral challenges, and ambivalent decisions facing actors involved in delivering and using infrastructures in urban Africa.

[2] Various authors have cautioned against sweeping statements about the nature of urban areas across Africa, the pace and form of urbanisation, or the types of dynamics that motivate population growth in and around existing settlements (Potts 2012; Satterthwaite 2017). Therefore, I use 'urban Africa' under caution and against a one-size-fits-all approach to the infrastructural challenges experienced in different places.

The Meaning of Infrastructure to Economic Development

A first step towards understanding how infrastructure matters to Africa's economic development is to take stock of its meaning to ideas of development, progress, and modernisation in general. In doing so, this section illustrates how the meaning of infrastructure has changed over time from a multidimensional to a narrowly defined idea.

"Infrastructure," Petroski (2016, 12) claims, "is a relatively new word for an absolutely ancient concept" – i.e., "the underlying foundation or basic framework of any system or organisation." Petroski traces the etymology of the word to Latin and its believed origins in late 19th-century French army vernacular, making its way into the English language during World War I. The word seems to have picked up pace in the French-speaking world after World War II, at the same time the use of another concept – *travaux publics*, or public works – began to decline. In the global north, works such as roads, bridges, and water systems had long been a staple of sovereign power to access, trade, and communicate with a wide range of subjects and territories. This effort increased in magnitude in the early 19th-century with the continued development and consolidation of the modern nation-state in Europe and the perceived need to weld together the population from every corner of its territory (Mann 1984). For this reason, there was a widespread consensus for state involvement in the roll-out of infrastructure networks for broad public use, whether through their direct implementation or the regulation of concessions to private initiative, usually through natural monopolies (Jacobson and Tarr 1996). In urban areas, public works provided improvements needed to counter pollution and the unhealthy living conditions of the working classes under the expansion of industrial capitalism (Graham and Marvin 2001). Infrastructure networks were seen to represent the power of science and rationality and, as such, were often celebrated as symbolic markers of Western ingenuity (Kaika and Swyngedouw 2000). The effects of infrastructure networks were then much more than just the provision of services. Embedded in them were also the hopes of delivering a cohesive society and the ordering and rationalisation of space towards progress and modernity (see next section).

Therefore, when examining the roll-out of large-scale infrastructure networks in colonial Africa during the 19th-century, we must also question what infrastructure was meant to achieve. Existing research points to colonisers (in Africa and elsewhere) using infrastructures as modes of ordering colonial territories, but less motivated by the benign purpose of cohesion and more by that of extraction and oppression (Arnold 2005; Headrick 2010). Late 19th-century investments in public works were part and parcel of the occupation that followed the 'scramble for Africa' and crucial instruments in the extractive racial capitalism in operation (Phiri 2020). The bulk of public works was concentrated around sites of extraction and trade – e.g., mines, plantations, and port towns – and on the very material structures needed for organising those endeavours: railways, roads and ports, alongside concentrated developments of services such as waterworks, electricity, and health facilities in urban settlements. More often than not, colonial public works were implemented, not specifically through the public purse, but under public concession contracts by private consortia for private gain, as indeed had been the case in many European metropoles (Hausman, Hertner, and Wilkins 2008). Moreover, there is much evidence that the provision of basic urban services was largely restricted to the settler quarters and often only affordable to colonial administrative and business elites (Chikowero 2007; Olukoju 2003; Phillip 2005). As such,

infrastructures served as pernicious modes of asserting moral and racial superiority over African populations (Arnold 2005).

In this context, it is not uncommon to find celebratory accounts of how infrastructure arrived in Africa through the ingenuity and entrepreneurship of European colonisers. Infamous images like Cecil Rhodes straddling the continent connecting Cape-to-Cairo via railway are but one example of this. This Eurocentric view of the continent's history of infrastructure fails to acknowledge how several colonial infrastructures were largely laid over pre-colonial trade and communication networks. For example, Wilks (1989) notes that roads radiating today out of the Ghanaian city of Kumasi can be easily mapped onto the roads built in pre-colonial times by the Ashanti Empire. Indeed, much like their European sovereign counterparts, the Ashanti King and local chiefs had roadbuilding under their purview (Charney 2016). They relied on *akwan-tempɔn*, the 'straight great-roads', to sustain the empire's political organisation alongside establishing trade routes between the hinterland and different coastal areas across the continent (Charney 2016). Infrastructures like the Ashanti great-roads, as similar networks elsewhere, put a finer point on Petroski's assertion that the concept of infrastructure is a new word for a very old practice.

The idea we hold today of infrastructure in economic development circles has become largely disembodied of these social, spatial, and temporal dimensions. This has in part to do with the neoclassical economic thinking taking root among global north policymakers and governments from the mid 20th-century onwards. As Mazzucato (2019) explains, the 'marginal utility revolution' decoupled the economy from societal relations and narrowed the accounting of value to a simplified notion of price (see also Polanyi 1944). In this context, policy analysts came to treat infrastructure either as a service consumed by individuals or as a social overhead capital (Rosenstein-Rodan 1943), i.e., an input for production, alongside land, labour, and other forms of capital. In this restricted definition, infrastructures matter as capital inputs or factors of production that allow firms and individuals to maximise their utility in the competitive marketplace. At the hands of the marginal utility revolution, infrastructures are seen through the lens of their economic dimension only, while losing their multidimensional complexity.

This simplistic take on infrastructures has shaped policymaking in development circles since the 1950s. Earlier efforts by the World Bank to promote development in post-colonial Africa were largely focused on providing capital to fund investment in large-scale infrastructures – usually in transport and energy (Adelman 2000). By the 1960s, there was a widespread agreement that a concerted investment in infrastructures was key to self-sustained economic growth (see Mkandawire 2014). These policies were welcomed by the leaders of newly independent African nations. The prospects of swift structural transformations aligned well with their nationalist and developmentalist agendas. Due to a confluence of factors, this policy of investment in physical infrastructures resulted in significant levels of indebtedness for African governments, ushering in the structural adjustments programmes of the 1980s and 1990s (Mold 2012). Subsequent development policies sought to rebalance investment in other economic sectors, including education, health, and rural development (Mold 2012; Adelman 2000), which ultimately led to a chronic disinvestment in infrastructures, especially in urban areas.

Infrastructure-led development has since regained favour in African development circles, albeit under a different rationale. In the 1990s, donor agencies and international financial institutions made a significant push towards the liberalisation and privatisation of various infrastructure sectors under the perception that African governments were inefficient and ineffective (The World Bank 1994). This was the decade when public-private partnerships (PPPs) came of age as the one-size-fits-all solution to infrastructure roll-out and service delivery, even if their results have been mixed (Leigland 2020; Klein 2015). In the 2000s, those institutions turned their focus on government reform towards 'good governance' and 'getting the institutions right'. This meant to facilitate the smooth operation of markets (and PPPs) and to reduce perceptions of risk by private finance whose investment was arguably needed for infrastructure development (Adelman 2000; Mold 2012). These principles have since shaped interventions in the infrastructure sector, especially under programmes aimed at meeting the UN's Millennium Development Goals (2000-2015) and now the Sustainable Development Goals (2016-2030) (Mkandawire 2014). Nowadays, infrastructures are cast as an opportunity to address the joint challenges of poverty and sustainability.

Unfortunately, these trends have affected the effectiveness of infrastructure-led development interventions. On the one hand, the drive to attract private capital to support infrastructure development has pushed infrastructure into an asset class of its own (BlackRock 2015; Arezki et al. 2017) and distracted from much-needed state fiscal reforms. This can have pernicious effects on what infrastructure gets built, when and where, as investment decisions are based on the risk-return profile of the asset, not on the infrastructure project's value-added to society, nor on its contribution to a low-carbon transition (Weber, Staub-Bisang, and Alfen 2016). Moreover, African governments have shown little appetite for the fiscal reforms that can facilitate a sustained allocation of state funding for the delivery of basic infrastructure services at the local level (Cirolia 2020). On the other hand, infrastructure-led development in a deeply financialised landscape tends to further commodify nature and obscure the environmental damage and human displacement caused by infrastructure development (Mawdsley 2018; Loftus, March, and Purcell 2019). For example, the transition from fossil fuels to renewables, while highly desirable, is not without its complex trade-offs. Mining for lithium, cobalt, and copper – three key ingredients of the renewable electricity revolution – comes at great human, social, and environmental cost (Wanger 2011; Nkulu et al. 2018; Valenta et al. 2019). In practice, it will be hard to overcome the many challenges of infrastructure-led development without thoroughly engaging with the complex, and at times intractable, realities of African political economy – from extractive economies, political gate-keeping, or neo-patrimonialism to an adequate level of skills in a range of areas, from project procurement to engineering (Carmody 2016; Ncube and Leyeka Lufumpa 2017).

These shifts in how infrastructure is understood to matter to economic development have important consequences for the future of the African continent. If the shift from 'public works' to 'social overhead capital' turned infrastructure into an economic good disembedded from social-technical relations, the move from 'social overhead capital' to 'asset' conjures a further hollowing out of the sociality of infrastructures. If those investing in infrastructures see it mainly as an asset, then they will determine its value according to the profile of risk and return on investment, not for its developmental, social, political, or environmental functions.

What Infrastructure Does: Dimensions Beyond the Economy

This section explores how infrastructure matters beyond the economy. Drawing on a range of disciplines in the social sciences and humanities,[3] the section engages with the various effects infrastructures have on people, and society more broadly, and how these are particularly visible in African urban contexts.

Much of this literature builds on studies of technology and technical systems in global north contexts, which have questioned deterministic and technicist views of infrastructure and proposed, instead, we see infrastructures as socio-technical systems with historical, political, environmental, and symbolic dimensions (e.g., Bijker, Hughes, and Pinch 2012; Heynen, Kaika, and Swyngedouw 2006; Larkin 2013). From this point of view, infrastructures are a complex, interdependent assemblage of technical artifacts (e.g., cables, pipes, or engines), multiple actors (from engineers to politicians, financiers, and users) and other intangible objects (e.g., regulations, plans, discourses), which operate at different scales across space and time. In this sense, there is a certain ephemeral quality to the assemblage of infrastructure, not just because of the wearing down or breakdown of its material parts, but because of the multiple social, political, economic, and environmental relations embedded in it.

This approach exposes the simplicity of mainstream narratives of infrastructure-led development in Africa. By foregrounding the multidimensional and relational nature of infrastructures, this approach reveals the difficulty of establishing causal relationships between infrastructures and development. It cautions against dominant views that infrastructure can be delivered successfully through policy interventions narrowly focused on the economic calculations alone (e.g., creating markets or the right institutions for mobilising private investment) (Rubin et al. 2020). It reveals the ways infrastructures are entangled with environmental degradation and social injustice not just where they are rolled out but in places near and far (Myers 2016; Samarakoon et al. 2022). It highlights the political and symbolic dimensions embedded in narratives that connect infrastructure to progress, modernisation, or economic growth, all of which persist over time with broad collective reach (Hecht 2009; Bloom, Miescher, and Manuh 2014).

The multidimensional approach to infrastructures also provides a basis to examine critically the ambivalence of infrastructure-led development strategies. For instance, governments often present infrastructures as benevolent, while obscuring the ways infrastructures can exert control, oppress, or simply differentiate between political friends and foes (Tischler 2014; Verhoeven 2015). On the one hand, infrastructures can facilitate the circulation of people, goods and services, resources and even ideas across a nation. For instance, a network of roads across a city, a region, or a nation can provide access to resources and marketplaces, while also engendering a sense of belonging to an imagined community coterminous with that territory (Debrie 2010). In this sense, infrastructures are key to territorial organisation and control, and to facilitate a sense of national security and sovereignty, whether on a national or transnational scale (Mohan and Tan-Mullins 2019). On the other hand, the same network of roads also provides access for police forces or the military to discipline or even

[3] Virtually every discipline has taken infrastructures as an object of study in some form or another – from history to anthropology, geography, sociology, political science, and even international relations.

subdue populations deemed 'unruly', real or imagined. Government officials can use infrastructures to differentiate between segments of the populations, by promising new infrastructures, affordable service tariffs, or improved service provision for those constituents that are most likely to support their policies and maintain them in power (Bawa 2011). Citizens tend to perceive such well-functioning infrastructures as signs of capable and caring governments. By the same token, dysfunctional infrastructures are often seen as signs of political incompetence and neglect, with strong potential to foster popular disconnect and discontent.

In fact, infrastructure can be (and usually is) set up in ways that differentiates users based on individual characteristics, such as income, disability, age, gender, or race and ethnicity (Guma 2019; von Schnitzler 2016; Lemanski 2019). Low-income populations may not be able to pay for water or electricity services; disabled persons may find it difficult to take public transport; women may feel unsafe to ride a bus at night; and racial restrictions or distinctions, all too common in Africa during the colonial period, can create cleavages that differentiate access to infrastructures along racial (or ethnic) lines. Therefore, just because an infrastructure exists in a specific place, it does not mean that everyone can access it equally or all the time. Infrastructures can create winners and losers depending on who can and cannot access them, where, and when (Rubin et al. 2020).

In sum, the roll-out of infrastructures is thus not simply a matter of drawing on the latest technological innovation, setting up the right economic incentives, or the appropriate governance structures. There are key political economy, environmental, and social considerations to how infrastructures are planned, delivered, by whom and to whom, and where. By accounting for the various dimensions of infrastructure and what it does, it is possible to foreground how infrastructure matters, which is of essence to address ongoing infrastructural challenges across the African continent.

The insights afforded by a multidimensional approach to infrastructure are rather evident in urban areas across the African continent. Infrastructures are co-constitutive of the urban experience and of contemporary life, for they structure the way our cities work as much as they are shaped by the histories and specificities of urban life (Blundo and Le Meur 2009). Indeed, infrastructures are key to shaping the uneven development of urban areas through processes taking place at various scales and involving a multitude of flows – not just of natural resources, but also of capital, people, or knowledge (Goodfellow 2020; Murphy and Carmody 2019). Scholarship has shown how infrastructural deficits in African cities are deeply intertwined with the historically situated political economy of their urbanisation processes and the structural inequalities embedded in infrastructure provision since colonial times (Njoh 2012; Kimari and Ernstson 2020). Colonial ideas of 'the good city' or the 'modern infrastructural ideal' have persisted over time and remain at the heart of ambitions and desires of both politicians and urban dwellers alike (Watson 2014; Graham, Andersen, and Mann 2015).

Because imaginaries of infrastructure-led urbanisation are in such stark contrast with the lived realities of many urban Africans, many scholars have questioned the desirability and inevitability of the modern infrastructural ideal of formal, uniform, and integrated networks to guide infrastructure development in African cities (Lawhon et al. 2018; Swilling 2011).

Instead, they scrutinise the importance of hybrid, heterogeneous, or makeshift infrastructure arrangements which citizens use to satisfy their needs in contexts of poverty, precarity and uncertainty and in the absence of reliable and affordable formal networked services (Jaglin 2014, 2016; Monstadt and Schramm 2017; Lawhon, Nakyagaba, and Karpouzoglou 2022; Munro 2020). In their view, there is value in considering the complementarity between modern infrastructures and more localised modes of infrastructural delivery to satisfy existing demand (Hyman and Pieterse 2017).

As a result, scholars have taken a strong interest in the local scale instead of focusing on grand narratives of policymakers and political leaders alone. They have focused much attention on the needs, desires and practices of infrastructure users and the motivations and practices of service providers. They have explored the kinds of things people can do with infrastructure, what services they derive from it, as well as the processes of subjectivity formation that emerge from the everyday use of infrastructure (e.g., thrift, responsibility, independence, calculative, sustainability) (Doherty 2020; Baptista 2015; Fredericks 2018). Conversely, this literature has also foregrounded the many ways in which people use infrastructures politically, for instance, to claim citizenship rights, fashion alternative subjectivities of their own, or protest, resist, and subvert power dynamics associated with infrastructure (McFarlane and Silver 2017; Nakyagaba et al. 2021; Samson et al. 2022). Finally, this literature has also sought to fill the gap of how a range of actors – from public or private utilities to co-production, mafias, or piracy – provide infrastructure in practice and the challenges they face to maintain and repair them (Baptista 2019; Cirolia et al. 2021; Guma 2020; Silver 2014; Simone 2006; Sseviiri et al. 2020).

From the point of view of Africa's economic development, the multidimensional approach to infrastructure offers a way of engaging the continent's infrastructure deficits through the specificities of its urban areas (Hyman and Pieterse 2017; Swilling 2011). This approach is a helpful corrective to policy-oriented literature which tends to draw on one-size-fits-all best practices for the delivery of basic infrastructures at the urban level. I turn to these challenges in the next section.

Infrastructures for Urban Africa: Tensions between Formal Networked Systems and Situated Heterogenous Solutions

Africa's infrastructure deficits are well known, even if there are significant differences across the continent, with North Africa substantially more well-endowed than sub-Saharan Africa (The World Bank 2000, 2004; Estache and Wodon 2014). Even in urban areas, where provision is usually greater than in rural areas, access to quality infrastructure services is concerningly low (Table 1). A volume edited by Ncube and Leyeka Lufumpa (2017), based on available information to the African Development Bank, offers a detailed analysis by region of various sectors – water and sanitation, energy, transport, and ICT, but not waste management. The exclusion of waste from this volume, a significant environmental and social problem across the continent (UNEP 2018), betrays the authors' understanding of infrastructure as largely an economic input to production. Indeed, their analyses focus on a supply-side approach to improving finance and governance conditions for the rehabilitation of existing large-scale networked systems and the roll out of new major infrastructure projects.

Table 1. Access at home to selected infrastructure services (% of population, year provided)

Infrastructure service	Sub-Saharan Africa	Urban	Rural
Drinking Water (safely managed, 2020)[1]	30	54	13
Sanitation (safely managed, 2020)[1]	21	23	19
Hygiene facilities (basic, 2020)[1]	26	37	18
Electricity connection (2019)[2]	47	78	28
Clean fuel and technology for cooking (2016)[2]	14	--	--
Mobile phone subscriptions (2020)[3]	46	--	--
Mobile internet users (2020)[3]	28	--	--

Sources: [1] WHO and UNICEF (2021); [2] The World Bank (2019); [3] GSMA (2021).

However, the pathway to rolling out major infrastructure projects, while desirable, is uncertain. Annual investment needs are sizable: available estimates for 2009 set the mark at c. USD$93 billion, a figure well above the c. USD$45 billion committed on average to infrastructure development, operations, and maintenance at the time (Foster and Briceño-Garmendia 2010). On the governance front, many global north donors call for substantive improvements: governance reforms to improve transparency and accountability; other regulatory reforms to facilitate market-led infrastructure development (e.g., for in-sector market competition, finance, contracting, or corporate activity); fiscal reforms to decentralise government resources to local level for everyday operations and maintenance; and improvements to technical capacity to manage the entire lifecycle of an infrastructure system (Foster and Briceño-Garmendia 2010). Faced with the constraints imposed by donors, many African governments are now engaging with finance partners, such as China, for whom strengthening institutions is not a main priority (Gil, Stafford, and Musonda 2019). Whether African governments are getting the projects their populations needs or what is of relevance to their financing partners is a matter up for empirical scrutiny.

Where successfully meeting African interests, this focus on supply-side provision of large-scale infrastructure networks runs the risk of creating quality but unaffordable and exclusionary infrastructures accessible only to African elites (Hyman and Pieterse 2017). In sub-Saharan Africa, where c. 73% of the population has only vulnerable employment (The World Bank 2019), everyday consumption of modern, safely managed, infrastructures – if available – is simply unaffordable to most households (Banerjee et al. 2008). Indeed, service availability does not imply that households can connect to them or consume them liberally on an everyday basis (Chitonge 2014). This is in part why ordinary Africans satisfy their needs through a patchwork of supply systems: old colonial networks, which have outlived their life expectancy; home-based, individual systems provided by formal private operators (e.g., M-KOPA); formal community-based systems, managed by local authorities, NGOs, or community groups; makeshift supply arrangements provided by informal private micro-operators – ranging from the trustworthy to the exploitative; individual, self-sufficient systems (e.g., own borehole or diesel generator); to illegal connections (including stealing, pilfering, or tampering).

It is common in development circles to see this plurality of delivery configurations as either a public governance failure, an outcome of underinvestment in formal networked services, or simply as a temporary step on the development pathway towards universal infrastructure

services (Jaglin 2014). However, as Jaglin (2014) has argued, it may be more productive to see this diversity as intrinsically linked with the very nature of urban lives, livelihoods, and lifestyles in urban Africa. As she notes, "Whereas conventional [networked] services reflect a supply-side calculation based on standardization norms and principles, alternative services answer to commercial imperatives of adaptation to demand, based on finely segmented customer groupings" (Jaglin 2014, 441). The segmentation of demand is not simply a matter of income and affordability. It is also a response to the complex dynamics of rapid urbanisation and sprawl into peri-urban and rural areas, which make the timely roll-out of networked infrastructures very challenging. In this context, some authors advocate support for heterogeneous solutions of infrastructure supply as a more efficient and inclusive way of addressing unfulfilled demand (Hyman and Pieterse 2017).

The pathway to affordable, reliable, quality infrastructure services in urban Africa may have to rely on a combination of both formal, networked infrastructure services and situated, heterogeneous solutions. However, it is important to avoid romanticising either approach to infrastructure delivery or to associate them simply to economically productive uses. After all, ordinary Africans also have their own agency, hopes, and desires about infrastructure and what they want to do with it. For instance, in the case of electricity supply, there is evidence that rural households prefer networked, on-grid services to off-grid solutions, due to the number of appliances the former can support over the latter (Peters and Sievert 2015). Evidence from water supply studies suggest that poor households value a reliable supply of quality water, irrespective of its mode of provision (Adams and Vásquez 2019). When it comes to deciding on how to use electricity, some urban households may opt for entertainment (e.g. TV set) over other, more 'productive', uses (e.g. refrigerators) (Baptista 2015). What these examples suggest is that having access to a connection is not good enough. After all, infrastructures matter to people in a multitude of ways. A more hopeful African infrastructure future needs to take them all into account.

Conclusion: Ambivalence, Trade-offs, and Difficult Decisions in African Infrastructure Development

This chapter examined how infrastructure matters beyond its economic dimension. It started with an overview of how infrastructure is seen in economic development circles and then offered insights into the social, political, and environmental dimensions of infrastructure. Finally, it reviewed the tension between the provision of formal, networked infrastructure services and situated, heterogeneous solutions in urban Africa. Throughout, the chapter sought to explore what infrastructure does for (and to) people and what are the socio-spatial effects of infrastructure, beyond the narrow calculations of economic productivity.

Taking a multidimensional approach to infrastructure development is not an easy task. Infrastructure is a complex, interdependent socio-technical system, deeply embedded in the workings of global economic and financial systems, intertwined with global flows of resources, environmental degradation, and social injustice, and often used for political purposes. Decisions on which infrastructures to build, where, with what resources, and by whom involve very difficult technical and political trade-offs and, even, moral challenges (Baptista and Cirolia Forthcoming). User decisions on which service solutions to draw from

are not clear cut, but ambivalent with regards to the level of comfort and convenience possible in contexts of uncertainty. Moreover, past infrastructural choices continue to reverberate in the very fabric of urban Africa and structuring the possibilities of Africans on an everyday basis. Thinking about infrastructure's role in Africa's economic development cannot continue without a more rounded account of how infrastructure matters to people in a multidimensional way. A hopeful future for urban Africa requires we think of infrastructure differently, more than as an economic asset.

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