

Imagining urban transformation in Kenya

Article (Published Version)

Cairns, Rose, Onyango, Joel, Stirling, Andy and Johnstone, Phil (2022) Imagining urban transformation in Kenya. *Environmental Science & Policy*, 135. pp. 86-95. ISSN 1462-9011

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/105888/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.



Imagining urban transformation in Kenya

Rose Cairns^{a,*}, Joel Onyango^b, Andy Stirling^a, Phil Johnstone^a

^a Science Policy Research Unit, University of Sussex, Falmer, Brighton BN1 9SL, UK

^b Africa Centre for Technology Studies, ICIPE Duvulile Campus, Kasarani, Nairobi, Kenya

ARTICLE INFO

Key words:

Sustainability transformations
Sociotechnical imaginaries
Smart cities
Kenya
Q method

ABSTRACT

This paper examines the diverse ways in which science and technology are implicated in collective imaginations of urban futures in Kenya. Despite calls for a ‘deep reimagining’ of African urbanisation (UN Habitat 2014), globalised narratives of urban ‘smartness’ are intersecting with pan-African tendencies toward top-down Master Planning to constrain spaces for collective imagining of urban futures. Using the conceptual lens of sociotechnical imaginaries and the methodological approach of Q method, we hope to open up and navigate the space of tension between the violence of narratives of failure and crisis in African cities, and the sometimes ‘blinding power’ of certain hyper-modernist visions of urban futures. We argue that powerful global hegemonic forces around urban transformation can sometimes be most effectively balanced, not by reproducing the same assertive idiom of stylised monothetic categories and set-piece contrasts but by illuminating diversity in the implicated imaginations. Our research describes three distinguishable overlapping imaginaries of Kenya urban futures, which we call: ‘Working towards equitable, culturally-vibrant urban habitats for all’; ‘Transforming our cities and ourselves to become ‘smarter’ and thrive sustainability in a digital future’, and ‘Pragmatically harnessing technology for more inclusive, equitable, liveable cities’. Our findings highlight salient dimensions of difference between the imaginaries including: diverse understandings of technology and culture in urban areas; diverse imaginaries of the urban dwellers of the future; and diverse imagined processes of change. Through detailed analysis of the distinctiveness and similarities/overlap between these imaginaries, we draw out implications for urban governance in Kenya.

1. Introduction

In debates around urban sustainability, diverse voices draw attention to collective imagination as an important site of urban ‘future-making’. ‘Conjuring’ (Bhan, 2014) and circulation (Valaskivi and Sumiala, 2014) of associated visions and imaginations influence urban politics, shaping aspirations for the future as well as thinking about the present. In an African context, calls for ‘a deep re-imagining of African urbanisation’ (UN-Habitat, 2014) require navigation of plural and contradictory discourses around urban futures.

On one hand, narratives of failure, decay and daunting arrays of urban governance problems facing cities across the continent, echo a long history in which African cities feature as objects of external, colonial and post-colonial / developmental concern: dystopian, apocalyptic imaginings of unfettered urbanisation leading to a ‘coming anarchy’ (Kaplan, 1994) in African cities – or in Africa itself as ‘the hopeless continent’ (The Economist, 2000). On the other hand an emergent ‘Africa Rising’ narrative invokes an ‘African Renaissance’ (UNESCO, 2015)

associated with the increasing prominence of hyper-modernist visions of African cities remade or built from scratch in processes of utopian ‘speculative urbanism’ (Goldman, 2011; Watson, 2014), often as part of infrastructure ‘development corridors’ (Enns, 2018).

These ‘globally competitive’ ‘smart’ or ‘techno’ cities are variously imagined to lever the transformative potential of Information and Communication Technologies (ICTs) to facilitate influx of foreign investment, and catalyse a transition to a digital / knowledge economy, that is imagined ultimately to benefit all. Tensions are rife between these narratives, in particular in disjunctures between more utopian / modernist aspects of these visions and lived realities for many urban Africans (Pieterse, 2011). Observers thus describe the present moment as an ‘ambivalent era for urban visions blossoming across urban Africa’ (Myers, 2015). Questions about how Africanist scholarship might effectively traverse, or circumvent these ‘seemingly contradictory forecasts’ (Goldstone and Obarrio, 2016) spurs a burgeoning academic literature on African futures.

This paper contributes to these debates by exploring ways in which

* Corresponding author.

E-mail address: r.cairns@sussex.ac.uk (R. Cairns).

<https://doi.org/10.1016/j.envsci.2022.04.016>

Received 6 January 2022; Received in revised form 22 April 2022; Accepted 25 April 2022

Available online 11 May 2022

1462-9011/© 2022 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

science and technology are implicated in diverse collective imaginations of urban futures in Kenya. We use sociotechnical imaginaries (STIs) as a lens on how diverse imaginations ‘pre-exist and channel the spread of science and technology’ (Jasanoff and Kim, 2015b). Rather than simply assuming that relevant categories of imaginary are a given, or differ from each other by some simple set of necessary or sufficient attributes, we seek to interrogate this kind of ‘monothetic’ conceptualisation. We apply Q methodology to explore plural dimensionalities of imaginaries of Kenyan urban transformation more systematically, allowing what count as different instances of imaginary to emerge more inductively than deductively. The following section sketches the contested discursive terrain of urban futures in Kenya and situates this in broader African and wider trends concerning urban development.

1.1. Kenyan urban futures

In 2007 the Kenyan government published its long term national ‘development blueprint’ called Kenya Vision 2030 (Government of the Republic of Kenya, 2007). This shapes a range of urban development policies, including the 2008 Nairobi Metro 2030 Strategy and later Nairobi Integrated Urban Development Master Plan (NIUPLAN) (Nairobi City Council, 2014); as well as a raft of ICT policies and Master Plans.¹ Common threads linking these policies include strong belief in top-down holistic urban master-planning, and in the transformative power of ICT for development (reflecting a so-called ‘digital turn’ in development discourse more widely (Al Dahdah and Quet, 2020)). The explicit imperative outlined in these policies is that Kenya become an ‘industrialised information society and knowledge economy’ in the coming decade. ICT is framed as key in helping Kenya benefit from the ‘fourth industrial revolution’ in order to ‘leapfrog into a transformed society where every citizen will have better access to opportunities to improve their livelihoods and harness the benefits of a digital economy’ (ICT Authority, 2019).

Publication of Kenya Vision 2030 follows a development trend witnessed right across sub-Saharan Africa, from donor-driven development policies framed around reducing poverty, toward state-led ‘visions’ and Master Plans. Re-emergence of the Master Plan as a dominant mode for planning in Kenya, and the professional practice of urban planning in Sub-Saharan Africa more broadly, has deep roots in European colonialism (c.f. Otiso, 2005). Priorities of colonial-era urban planning primarily centred around facilitating the extractive and accumulative practices of the colonial state, ‘crafting a racially segmented spatial order, fixing control over who could be in (and who was left out of) the city, and creating a terrain of surveillance and observation’ (Myers, 2015).

Often prioritising large scale infrastructure projects, Master Plans frequently include infrastructure projects financed by Chinese investment and loans (Mosley and Watson, 2016). Influence from models of ‘Chinese urbanism’ (Zhuang, 2014) and expertise in mega-projects (Hu, 2019), mean that China has become the ‘epicentre of the neo-urbanization process that is being strongly promoted in Africa’ (Cain, 2014).

With much Master Planning for Africa’s cities fixating on attracting external investment in order to create the right kinds of infrastructure for business, many African countries have sought to replicate East Asian success in implementing special economic zones (SEZs). But these aspirations to planning (particularly ‘Master Planning’) contrast starkly with many realities of African city topographies, in which ‘largely spontaneous landscapes’ have evolved over time, rather than being planned, comprising an ‘uncoordinated and incremental assemblage of

structures [which] has gradually spread across all available space’ (Gandy, 2006).

Despite suggestions that new configurations of South-South cooperation represent a fundamental rupture from colonial-era relations and dynamics, others criticise this notion. Kimari and Ernston, for instance, acknowledge the novelty that African urban development increasingly emulates countries like Malaysia, Singapore, South Korea, China and India rather than Europe or the US. However, they argue that despite the language of ‘partnership’ and ‘friendship’ that accompanies such development, the new model replicates colonial and racist relations, practices and structures (relations that have been labelled forms of ‘debt-trap diplomacy’ (Hursh, 2019)). They suggest contemporary large scale infrastructure projects across Africa ‘have to be understood in relation to inherited material and discursive scaffoldings that remain from the colonial period’ and argue that ‘recent mega infrastructures inhere, in their planning, financing and implementation, to a colonial racialism, despite rhetorical claims to the opposite’ (Kimari and Ernston, 2020).

As well as defining the parameters for Kenyan urban policy, Vision 2030 outlines plans for two ‘flagship’ new cities to be built from scratch: Konza and Tatu. Alongside attracting foreign investment, a stated aim of building new cities is to ‘relieve the pressure’ from existing urban centres. However, the proliferation of plans for new cities across Africa, has been critiqued (Watson, 2014) as a form of ‘speculative urbanism’, ‘linked to the highly remunerative challenge of transforming rural economies into urban real estate’ (Goldman, 2011). Often marketed with reference to globally circulating imaginaries of ‘smartness’ (IBM, 2012; Sadowski and Bendor, 2018; Joss et al., 2019; Shuilenburg and Pali, 2021), these cities are often associated with inflated land costs (Mung’ahu, 2017). In varying states of emergence, they exist primarily as glossy architects renderings on billboards and online, in what Smith refers to as the ‘spectacle of official planning’ (Smith, 2017).

Despite the optimism they exude, many new city plans perpetuate unequal configurations of power and colonial ideals of modernity (Côté-Roy and Moser, 2019), catering for a relatively wealthy minority, in urban contexts in which the majority populations often face extreme hardships and lack of basic services (Watson, 2014). Van Noorloos, and Kloosterboer compare these new cities to gated communities for middle and higher classes, highlighting their tendency to implement ‘post-democratic private-sector-driven governance’. Meaning that, they argue, these cities are at best ‘unsuitable for solving Africa’s urban problems, and at worst they will increase expulsions and enclosures of the poor, public funding injustice and socio-spatial segregation and fragmentation’ (van Noorloos and Kloosterboer, 2018).

Kenya Vision 2030 was produced in collaboration with South African international consultants, McKinsey and Co. (who also worked on similar ‘national’ visions for Malaysia and other countries). This process of ‘business consultancy urbanism’ (Amin, 2013), in which a seductive but standardised set of visions, policies and templates aim at – or succeed in – duplicating similar spectacular skylines, neoliberal structuring and corporate management systems, is described as a trend of ‘urban replication’ (Bunnell and Das, 2010). The focus of these visions on the ‘symbolic power’ of the city and the achieving of ‘world class’ status can be understood a form of urban entrepreneurialism in which cities are framed as actors competing for investment on the global stage. For example: ‘competition among cities is intense, and a strong city brand is a potent weapon to maximise the visibility of a city’s qualities and allow it to differentiate itself from its competitors’ (Pricewaterhouse Coopers, 2005). Such aims to achieve ‘world class’ status are critiqued as implying a primary ‘concern with the importance of a city in relation to other cities rather than the extent to which it functions for its citizens’ (Watson, 2014).

Imaginaries of a hyper-modern ‘smart city’ are critiqued as ‘telescopic’ by Amin, who highlights the partial nature of visions in which ‘the prosaic, jobbing, informal, making do, surviving, unkempt, hybrid spaces occupied by the majority population—blurs out of focus, barely acknowledged as linked to the urban growth machine’ (Amin, 2013). In

¹ Including the ‘Digital Economy Blueprint’, the National ICT Master Plan 2019 the National ICT infrastructure Master Plan (Ministry of Information Communications and Technology, 2019) and the ICT authority’s strategic plan (ICT Authority, 2019)

these visions, if informality features at all, it tends to be a problem (e.g. the ‘hawker menace’ (Linehan, 2007)) to be solved through surveillance, containment and removal (often through violent policing (Dragsted, 2019)). Without glossing over intense hardships of daily life for many inhabitants of informal settlements, framing informality solely in terms of a problem can miss many ways in which informality actually shapes highly complex social-spatial structures to address settlement, business and cultural/human needs (Charman and Govender, 2016). Countering the top-down planning trend, Charman and Govender argue that paying greater attention to social-spatial dynamics at the micro level (of individual streets, buildings and businesses), can lead to a richer understanding of the relational economy of informality, and perhaps prompt reconsideration of some long held assumptions around urban public planning.

The micro-scale focus is similarly apparent in a number of ‘bottom up’ initiatives applying technological innovation to development problems (a trend sometimes referred to as the ‘datafication of development’ (Heeks and Shekhar, 2019)). Initiatives include, for example, the use of remote sensing technologies to map particular hazards; to gather environmental and other data via ground-based sensors; or to map housing developments in order to secure tenure or lobby for improved services (SDI, 2018). Many of these initiatives are lauded for their potential to offer powerful advocacy tools to help marginalised communities get their voices heard in processes of urban development (Borie et al., 2019). Aligned with calls for universal ‘rights to the city’ (Kitchin, Cardullo and Feliciano, 2019), these may represent more grounded imaginaries for urban ICT, transcending dichotomies between excited optimism of whole-city transformation and critical dystopian views of surveillance, inequality and privatisation in urban futures.

In the face of the diversity of views documented here, simplistic dichotomies can be restrictive and standardising in their effects, suppressing real-world complexities, especially as experienced by the most marginalised interests. Powerful global hegemonic forces around urban transformation can sometimes be most effectively balanced, not by reproducing the same assertive idiom of stylised monothetic categories and set-piece contrasts but by illuminating diversity in the implicated imaginations. The next section will discuss a methodology towards these ends.

2. Conceptual and methodological approach

Sociotechnical Imaginaries (STI) have been defined as ‘collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology’ (Jananoff and Kim, 2015b). This potentially very useful concept is therefore necessarily complex (Beck et al., 2021) and multidimensional (Cairns et al., 2021) – variously overlapping, encompassing or distinguishable (Jananoff and Kim, 2009) from parallel notions like ‘frames’ (Fischer and Forester, 1993), ‘discourse’ (Foucault, 1971), ‘narratives’ (Holstein and Gubrium, 2008) and ‘storylines’ (Hajer, 1995).

In any field, what might count as instances of ‘an STI’ may also be expected to be ambiguous, fluid and contestable (Cairns et al., 2021) (Appadurai, 1990). There are open questions around how STIs relate to other socio-political phenomena, like sectors, interests, policy arenas or national politics (Sismondo, 2020). It would be rash to assume that STIs are individually distinct, internally homogenous and equally mutually separable from each other (and other discursive formations) in relatively simple ‘monothetic’ ways (Needham, 1975). In other words, instances of STIs should not be viewed under a ‘monothetic glance’ (Ritzer, 2000), as if constituted by a fixed set of necessary or sufficient characteristics (Cohen and Lefebvre, 2005) on standardised dimensions (Bourdieu, 1990).

Likewise, it would be unwise to assert in advance that STIs will necessarily display settled one-to-one mappings with other relevant foci

for attention, like discourses, jurisdictions or constituencies (Cairns et al., 2021). Like other social formations, STIs may instead coexist in any given setting in complex ‘ecological’ relationships (Powell and Depelteau, 2013), be ambiguous and varied in their mutual distinctions (Bowker and Star, 1999) and stabilised in dynamic rather than static patterns (Nabavi, 2017). Which possibilities hold in any given case (and to what degree), are more rigorously treated as matters for empirical investigation, than tacit presumption or assertion.

These complexities are readily visible around urban futures in Kenya, in that many different kinds, scales and nestings of discursive formation are variously described as ‘sociotechnical imaginaries’ – including for example, notions of ‘smart cities’; ‘digital economy’ and ‘ICT for development’ (Bowman, 2015). Even where an STI terminology is not explicitly adopted, a host of other elements in the above discussion of African cities may also be addressed broadly as ‘imaginaries’. Somewhat distinctively, the present analysis will therefore be as neutral as possible on whether instances of the phenomena under scrutiny are best discerned in monothetic ways, or are better seen as polythetic – not distinguishable by any necessary or sufficient characteristics or dimensions (Needham, 1975). This is important because, rather than assuming settled boundaries or one-to-one relations with other categories or settings chosen by the researcher, STIs should arguably be analysed in ways that are able to recognise more complex, dynamic and relational configurations (Cairns et al., 2021).

Rather than pre-supposing a single particular canonically ‘Kenyan’ sociotechnical imaginary of urban transformation, then, we set out to investigate possible diversities of STIs in this setting, each coming to the fore in different contexts or from different angles. If a singular ‘dominant’ picture emerges, this may command greater confidence through having been interrogated rather than simply assumed. Likewise in interests of robustness, our initial focus will be on more fine-grain framings and storylines than on encompassing notional STIs – allowing such more aggregated formations to emerge more inductively than by prior assumption (Glaser and Strauss, 1967). Crucially, we will ask what this more complex and nuanced picture might reveal about discursive and material struggles over urban futures in Kenya.

To achieve these research aims, we selected Q method as a means to explore how ostensibly discrete imaginaries can overlap, entangle, co-exist and co-constitute in an empirical setting. For example, the ‘factors’ emerging in a Q study are not definitive in the way they separate clusters of associated statements, statements strongly associated with one cluster may also associate with others. Rather than starting with assumed constructs, fragmenting and ‘reconstructing’ (Dryzek and Berejikian, 1993) of imaginaries in this way allows empirical probing of those dimensions of the argumentative space around urban change in Kenya, that are held most salient by diverse social actors. Resulting analytic categories are thus able to emerge more inductively from the empirical evidence (and are more transparent in their derivation), than can sometimes be the case (Charmaz, 2006).

Incorporation of quantitative, statistical elements in Q methodology, and the fact that the method requires the researcher to work through a standard protocol in a fairly prescribed way (See Box 1.), arguably puts this approach into productive tension with much STI research (Jananoff and Kim, 2015a). Here, as in much qualitative discourse analyses more broadly (Atkinson and Delamont, 2011), research methods are typically more interpretive, with stark contrasts (and sometimes strong antagonisms) in relation to a quantitative idiom (Wodak and Krzyzanowski, 2008). Yet these divides can sometimes be overdrawn. Not all quantitative methods are aggregative or pretend at the kind of ‘objective’ stance that is rightly decried in much interpretive research (Saltelli et al., 2004). Likewise, some qualitative work can itself be prone to quite rigid deductive procedures and yield quite reductively simplistic pictures (Law, 2004).

Where processes of reasoning are treated as axiomatic or intuitive, it can be difficult to achieve qualities of academic transparency or accountability to stakeholders (Mahoney, 2006). Previously applied

Box 1**Q process summary.**

- **Concourse:** 198 statements related to ‘urban transformation in Kenya’ were selected from diverse sources (including academic papers, NGO reports, governmental and multilateral institution documents and reports; corporate material; traditional print media, blogs and social media). In addition to statements specifically about transformation of Kenyan cities, a number of more generic statements contextualising science and technology in the Kenyan context, and linking science and technology to urban issues were also included. Statements were all written in English.
- **Selection of the Q set and pilot:** Statements in the concourse were coded thematically according to content, and a subset of 36 statements (the Q set) were selected that aimed to capture the diversity of content categories. These statements were piloted with 3 team members and 2 invited participants from Kenya, resulting in the rewording and changing of several statements for clarity and balance. The final 36 statements in the Q set are listed in [Table 1](#).
- **Participant selection:** Participants were purposively selected on the basis of their involvement in debates and discussions on urban transformation in Kenya. Participant selection aimed to capture as diverse a range of views as possible (acknowledging that knowing a priori what traits or affiliations might result in this diversity is not possible).
- **Online Q sorts:** Twenty-one people carried out a Q sort online (between December 2020 and June 2021) using the freely available online programme Qsortware. Participants were asked to sort the statements onto a forced pyramidal distribution from – 4 (‘least like my view’) to + 4 (‘most like my view’). Participants were interviewed during or after the sort via Zoom or Skype. The sorting patterns and qualitative interview data were recorded, and interview transcripts were coded and analysed using Nvivo software.
- **Factor analysis:** 21 sorts were intercorrelated and factor analysed using the dedicated free software PQMethod ([Schmolck, 2002](#)). Five factors were extracted using centroid factor analysis, and then rotated using a varimax rotation that aimed to maximise the variance explained by the factors. Three of the rotated factors met our criteria for interpretation, these include the following principles: i) The patterns made sense to us in light of our knowledge of the participants’ interviews and wider discourses of urban change in Kenya. ii) Factors had at least two participants whose sorts correlated with that factor alone and eigenvalues greater than 1 (meaning each factor accounted for at least as much variance as a single participant’s sort). iii) The patterns of participants and statement groupings appeared to be stable from one analytic procedure to another (comparing PCA, centroid, and various extractions and rotations).
- **Interpretation:** The patterns of statements associated with each factor were interpreted into narratives about urban transformation in Kenya with the aid of the qualitative interview data.

only rarely to the study of STIs (e.g. [Wilde and Hermans, 2021](#)), what is crucial about Q method in these regards, is that it is fundamentally an interpretive disaggregating method ([Eden, Donaldson and Walker, 2005](#)), using quantitative tools to provide greater transparency in the resolving of contrasting subjectivities ([Stirling, Simmons and Spash, 2003](#)). The core task in Q method is to apply knowledge and experience to ‘give meaning to factors and develop narratives out of them that describe complex subject-positions’ ([Nost, Robertson and Lave, 2019](#)).

Despite the aid of factor analytic procedures to help uncover patterns and relations, however, the factors or narratives that emerge from a Q study are not ‘scientifically determined’ ([Sneegas, 2020](#)). Instead, the number of factors in any given research context depends on research interest. Clearly, as in all research, researcher subjectivity and interpretive abilities infuse all stages of Q analysis: from the framing of the study question; the selection of statements; the number and rotation of factors, and ultimately the interpretation of the results. The aspiration is, that the open nature of these procedures can confer a useful degree of transparency, accountability and therefore distributed reflexivity ([Stirling, 2006](#)). To this end, [Box 1](#) Gives details of the methodological process undertaken in this study.

3. Results and interpretation

[Table 1](#) illustrates the scores assigned to the 36 statements for each of the three factors described. These are weighted averages of scores for all individual Q sorts that loaded significantly on that factor (i.e. exhibiting similar sorting patterns). [Table 2](#) lists the participants and their correlations with the three factors. In line with common practice in the reporting of Q analysis results (and in interests of readability), the three factors have been named in ways that attempt to capture key distinguishing features. Factor 1 and 2 were quite distinct from one another, being correlated at only ~10%. However, factor 3 to a certain extent confounds a clean distinction between factors 1 and 2, as it was correlated to a high degree with both (52% and 56% respectively), illustrating the fuzzily indeterminate and overlapping boundaries of

factor constructs themselves. In addition to correlations between factors, two participants’ sorts were significantly correlated with two factors (‘confounders’ in Q parlance) further illustrating the porous, overlapping boundaries between constructs.

3.1. Factor 1. Working towards equitable, culturally-vibrant urban habitats for all

Associated with 11 participants: four participants from research/academia; five participants from civil society; one from government; one from the private sector (see [Table 2](#)).

Human rights and equality should be at the forefront of the collective imagining of urban futures (14, +4). A crucial component of supporting positive urban futures is in working to support organised communities (2, +4) to collaborate with local authorities and others in planning processes to respond to the pressing needs of the majority urban poor (19, –4). While different forms of technology may be an important component of responses to urban problems and issues, technologies should respond to human need, not vice-versa (29, +4). Kenyan cities should not aim for ‘smartness’ (7, –2) or try to achieve ‘world-class status’ (6, –4) competing on the global stage, but should focus on creating more equitable, inclusive and sustainable habitats for all (34, +3). Building new cities is unlikely to be beneficial (20, –3), but simply siphons limited resources away from existing cities. Kenyan cities, including their informal settlements (1, +3) are culturally vibrant places, and understanding, supporting and harnessing diverse manifestations of urban culture will be crucial to achieving desirable urban futures in Kenya (10, –4; 15, +2).

3.2. Factor 2. Transforming our cities and ourselves to become ‘smarter’ and thrive sustainability in a digital future

Associated with five participants from local government, private sector and civil society organisations.

Table 1
Q statements and scores for each factor.

		Factor scores		
		Factor 1	Factor 2	Factor 3
1	'Informal' development is intrinsic to Kenyan cities.	3	0	2
2	The collaboration of organized communities and local authorities is the cornerstone of planning for inclusive and resilient cities in Kenya.	4	1	4
3	The booming young population of Kenya is more likely to adopt technology, including smart city technologies, and to produce innovation.	2	1	4
4	Kenya's delay in urbanization could be an advantage, as new cities or city districts can be designed with smart city solutions in mind from the start	-2	-3	-4
5	In the future there is a risk that digital infrastructure in Kenyan cities will be used for surveillance and to police behaviour of those who are deemed to be deviant.	0	2	2
6	Kenya needs to build the next world class smart city in order to be competitive and attract investment	-4	1	-1
7	E-governance in smart cities will radically reform governance of urban Kenya, through removing human intermediation and embedding a culture of monitoring and evidence-based planning and decision-making.	-2	4	3
8	Unlike the historical haphazard growth of Kenyan cities, in a smart city every building, dam, site or road, will be well-thought out and installed with a view to accomplishing sustainability	-2	4	-2
9	The smart Kenyan cities of the future will offer citizens a seamless urban experience: from connected homes, to the use of Wi-Fi-enabled transport, to hyper-connected workplaces	-1	0	0
10	Culture is a luxury that is secondary to other urban priorities in Kenya, like fresh water, decent jobs, adequate housing and education	-4	-3	-4
11	The risks of pandemics like COVID 19 remind us that tackling basic sanitation is the first step in building a healthier city: that means providing appropriate water and sanitation systems and good quality houses for all must be a priority for urban transformation	2	-1	1
12	Kenya needs the optimism and inspiration of visionary ideas like Konza city	-2	3	-2
13	Smart urban technologies can be most transformative when they act as an enabler for people to feel part of the city: that they have a right to the city and the services the city offers	3	2	4
14	Until the rights of whole of the urban population are respected, inequality will prevent a sustainable urban transformation in Kenyan cities	4	-2	2
15	Without culture there is no future for Kenyan cities: cities need vitality, meaning and identity	2	-2	0
16	City planners need to cater to the needs of Kenya's rapidly growing middle class and address Nairobi's shortage of urban middle class housing	0	2	1
17	Urban problems in Kenya are rooted in corruption, unresponsive governance, and lack of proactive urban planning	2	4	3
18	In the future, technology will provide solutions to some of Kenya's cities biggest challenges	0	3	3
19	The conditions of the urban poor in Kenyan cities can be improved without a need for their Involvement in planning processes.	-4	-4	-4
20	Building new cities in Kenya could provide a solution to ease the pressure off the old cities and could, if done right provide a sustainable solution to rapid urbanisation	-3	2	1
21	Industrialisation is at the core of Kenya's structural transformation, and infrastructure is its catalyst	-1	1	1
22	ICT is one of the primary enablers or foundations for the socio economic transformation of Kenyan cities.	0	0	1
23	It is vital that Kenya develops a vibrant digital economy lest it be swamped by fast moving global brands and companies	-1	0	-2
24	ICT-enhanced urban services in Kenyan cities will ultimately benefit all urban residents	-1	-3	-2
25	The current virus pandemic could provide a once-in-a-lifetime opportunity for speeding up the introduction of digital technologies aimed at improving the lives of city dwellers in Kenya	0	0	-1
26	One of the great advantages for the digital revolution in Kenya, is that there's far less legacy to get in the way than in other regions, creating a clean sheet on which companies can develop their own distinctive business models	-3	-1	-3
27	COVID 19 has proven how important it is that policy makers focus on developing digital urban infrastructures in Kenyan cities	1	1	-1
28	As digital technologies become the cornerstone of daily activities in Kenya, Governments, businesses and individuals must adapt to this new reality	1	3	2
29	Contemporary urban crises in Kenya require a 're-humanizing' of the urban environment	4	-2	0
30	Colonial exclusionary measures in Kenyan cities (which were largely retained at independence) are at the core of widespread urban apathy in Kenya today.	1	-1	-1
31	Kenya is engaged in a race with other countries to establish information supremacy: those who are able attract the high value and knowledge-intensive manufacturing, research, software, IT, and services jobs will be the ones that will prosper	-1	-2	0
32	We need to see urbanisation in Kenya as a tool for development not just an accumulation of problems	1	-1	-1
33	Kenya, and Africa more broadly, is neither 'rising', nor undergoing any meaningful structural transformation	-3	-4	-3
34	An important question to ask is whether Kenyan cities should aspire to become 'smart' or to create more equitable, inclusive and sustainable habitats for all.	3	-1	-3
35	To seize opportunities and build sustainable prosperity, Kenyan cities need to become smarter and take a holistic approach to managing the system of systems on which they depend	0	0	0
36	The most likely outcome of new master-planned cities such as Konza is a steady worsening of marginalization and inequality	1	-4	0

Transforming Kenya's cities requires more holistic, ambitious, urban planning and increasing use of digital technologies to make more effective, transparent decisions (8:+3) (7: +4), and to deal with endemic corruption in the planning system (17, +4). The world is being transformed by digital technologies, and Kenya must adapt in order to keep up with, and take advantage of the opportunities presented by this new reality (28,+3), and to achieve sustainable urban development (8, +4). Meeting the challenge posed by rapid urbanisation in Kenya could be achieved by the building of new cities (20: +2), and the vision of master-planned, 'techno' cities such as Konza are a positive example of this trend (36: -4). Transformative ideas such as Konza city (12, +3) are important for Kenya: showcasing Kenya on the global stage, attracting investment, and providing decent housing and job opportunities for the growing

middle class population (16, +2). The smart Kenyan cities of the future will require citizens to be sufficiently educated in order to access and benefit from the technological advancements, and some forms of (tribal) culture can hinder these forms of development: individuals and cultures (15,-2) must adapt to the inevitability of technological progress.

3.3. Factor 3. Pragmatically harnessing technology for more inclusive, equitable, liveable cities

Associated with three participants, two from academia/research and one from civil society.

Table 2
Participants and their correlations with the three factors (* indicates a defining sort).

Role	Sector	Factor 1	Factor 2	Factor 3
Trainer	Research/academia	0.7122 *	0.0545	0.2334
Climate Change Practitioner	Civil society	0.5411 *	0.1510	0.3899
Sustainability Engineer	Private sector	0.5130 *	0.1520	0.4059
Programme planner	Civil society	0.4709 *	0.1971	0.4884 *
Urban Planner/ PhD Candidate	Research/academia	0.5512 *	0.1256	0.2130
Project officer	Civil society	0.6699 *	0.1132	0.2813
Professor	Research/academia	0.7920 *	-0.1077	0.0717
Research Fellow	Research/academia	0.8104 *	0.0606	0.1012
Senior Lecturer	Research/academia	0.4528 *	0.2824	0.0908
Research coordinator	Civil society	0.6373 *	-0.0312	0.1103
Consultant urban planner/ PhD candidate	Research/academia/ Civil society	0.6745 *	-0.1315	0.0875
Development Consultant	Private sector	-0.0383	0.6418 *	0.0148
Natural Resources Officer	Local government	-0.1139	0.7442 *	0.0744
Waste management consultant	Private sector	0.0968	0.4270 *	0.3484
Smart technologies entrepreneur	Private sector	0.1809	0.5815 *	0.4278 *
Urban Systems Educator	Civil society	-0.0474	0.5287 *	0.2839
Information & Technology expert	Research/academia	0.1736	0.4115	0.6540 *
Professor	Research/academia	0.3029	0.1510	0.6845 *
Student	Research/academia	0.4184	0.4195	0.1962
Community Mobiliser	Civil society	0.1693	0.1291	-0.0926
Urban Disaster Management Practitioner	Research/academia	0.2704	0.0745	0.2473
	% Variance explained	23	11	10

Different forms of technology have the potential to improve the lives of Kenya's urban residents in tangible ways, particularly around issues like transport and security (18:+3) (24:+1). Technology can be most transformative if adopted with a view to improving inclusivity, fostering a sense of belonging, and of enabling all residents to exercise their rights to the city (13:+4). However, technologies reflect the social and political conditions in which they emerge – they are unlikely to be transformative in and of themselves, and the push toward the promoting the 'digital economy' (23:-3) or the development 'ICT enhanced services' (24: -2) will not necessarily benefit the majority of the urban population. New cities might play a role in addressing rapid urbanisation (20:+1) (36: 0), but as Kenyan cities continue to be shaped and constrained by the structures and architectures of colonialism - it is not a 'clean slate' for development (4: +4) (26:-3) - patterns of urban development such as the building of new 'techno cities', risks replicating these patterns of inequality. Positive urban futures in Kenya are unlikely to be brought about by the wholesale transformations envisaged in 'grand plans' and 'visions', but may emerge over time in more incremental ways through the cumulative result of many collaborative efforts between community groups, civil society and local government (2:+4), particularly those actively involving the majority poor population (19,-4).

4. Analysis and discussion: dimensionalities of imaginaries of urban futures

Much policy discussion around urban futures in Kenya takes place within the framework of Kenya Vision 2030 (including influential discourse around new cities such as Konza and Tatu city). Related wider high-level government strategies and policies encourage ICT as an engine of development. Given this, it is perhaps unsurprising that the present study should encounter in factor 2, an imaginary of Kenyan urban futures shaped by technological progress, and achieved through transformative large-scale Master planning processes. Framed in contrast to 'haphazard' (8: +4) and 'informal' (1: 0) uncontrolled growth of contemporary Kenyan cities, the imagined future city emerges as a bounded site of harmonious, sustainable, holistic planning (8:+4) aided by 'smart' technologies (13: +2).

From the perspective of factor 2, efforts to materialise this future via construction of new master-planned cities like Konza city (20: +2) are important for Kenya (12: +3). This is partly because of the need for provision of quality housing and employment for the 'growing Kenyan

middle class' (16: +2), but also as a mobilising and optimistic (12: +3) national project, resonating with broader 'Africa Rising' narratives (33: -4). However, even those participants who were broadly positive about the potential or importance of new city developments expressed a somewhat sceptical view, given the lack of material progress on these mega-projects to date. Hence the relatively low scores awarded to statement 6 ('Kenyan needs to build the next world class smart city...') by all factors, including the more apparently sanguine factor 2. As one participant put it:

"Konza cities, Tatu city all these cities of the future, these visionary ideas, when they came they were very exciting, but they have lost that edge of excitement, so the optimism is no longer there, the inspiration... not very many people are very optimistic that these are ideas that are going to work." (Participant 5)

Another participant framed the lack of progress thus:

"The problem always comes in when you want to do those kinds of things you will get some part of the population are against it, because not everyone needs to change, but Kenya can if we put everything in. We need it, Kenya needs it a lot." (Participant 6)

In contrast to this first person plural 'we' narrative of a united Kenya, both factors 1 and 3 foreground the stark inequality of Kenyan society, arguing that drives to develop new 'techno' cities – while possibly making Kenya 'look good in some magazines' (Participant 16) – are actually:

'an absconding from the real responsibilities we have in the city. I don't care if I can open a door with my phone or have WIFI in a car, but if we have not been able to make sure people don't die from drinking water...' (Participant 17)

Another participant highlighted links between inequality and insecurity in urban Kenya, and saw new city projects as "siphoning resources, away from the old cities". As he put it:

"Rather than dealing with the problem of distribution of resources, therefore creating an environment where everybody feels secure, we have concentrated income so much that the only way to feel secure is to hide behind nine foot walls, barbed wire on top, electric security cameras, CCTV, you know?" (Participant 16)

Despite criticising the exclusionary nature of many proposed new urban developments, previous research has found widespread support

(at least for representations of these developments on billboards and other promotional materials), even among poorer residents, who would most likely be excluded from the imagined developments, were these ever to materialise (Smith, 2017). Similarly, a factor 1 participant explained the seductive power of these imagined futures and a widespread desire to ‘connect to’ these visions:

“Even the poor in the slums, connect to those aspirations. But many people also have little knowledge of how aspirations and visions can be translated to actual realities. Then they just remain as they are... and they like to connect to them: they would like to see a city with a good transportation system, jobs, you know, slums gone and all this, everybody, living a decent life.” (Participant 18)

The future conveyed by official representations of projects such as Konza city, involves apparent rupture from the intractable problems of the present day city. The implied novelty and distinctness of this future shifts focus away from ideas of continuity, repetition or the structuring influence of the (colonial) past. In contrast, a participant who loaded on factor 3, described a different relationship between past and future. As he put it:

“Whatever you want add the new is always inside the old in a sense.” (Participant 16)

Partly as a consequence of this structuring role of Kenya’s colonial past, the future city imagined to result from Master-planning processes is understood in much less optimistic terms by factors 1 and 3. Here, echoes of colonial planning regimes are present both in the idea of a ‘segregated city’, and even in the idea of ‘starting afresh’. As one factor 1 participant put it:

“I understand the motivations that planners may have, and elites may have to say, Nairobi such a mess let’s start over, and we’ll build a whole new thing. But that ignores the history of urbanization in Africa, that colonial regimes did exactly the same thing. Nairobi itself is an example of that, having been created as capital because Mombasa was ‘too much of a mess’ and wasn’t convenient to colonial ambitions” (Participant 14)

The idea of Kenya being engaged in ‘a race’ with other countries (6:–4; 31: –1) or of needing to strive for ‘world class status’ implies a linear view of time, that was rejected by participants loading on factor 1. As one participant put it:

“This vernacular like ‘delay in urbanization’ or ‘race’ is very Darwinian for me, it’s part of putting cities, especially African cities in a hierarchy that I think it’s not productive. And it’s actually very racist...”. (Participant 17)

4.1. Technology, culture and urban change

The role of technology in shaping or driving processes of social change emerges as another potential axis of difference between factors. For example, in a factor 2 perspective, technological progress is framed as inevitable with seemingly little scope for individual or collective agency in shaping this (global) process: digital technologies are ‘the new reality’, becoming ‘the cornerstone of daily activities’ (28: +3). It is individuals that need to adapt to the technology not vice-versa. Factor 2 and 3 shared a belief in possibly transformative roles of technologies with the potential to provide specific ‘solutions’ to some of Kenya’s most intractable urban problems (statement 18; and statement 7 +3).

“If we talk of e-governance and if we talk of transportation, and also the rise in insecurity, I think technology has to really be, it will be integral for creating solutions around these issues.” (Participant 11)

For factor 2, the particular problem of corruption (understood as a primary barrier to attaining the desired urban change (17: +4)), is framed as amenable to technological resolution via increased

transparency and ‘removal of human intermediation’ offered through innovations such as e-governance platforms (7, +4). Factor 3 shared this belief in the transformative potential of technology to reform governance (7: +3), but interview comments revealed somewhat more ambivalence:

“It has helped because now, you can get a lot of services online, but do you still see corruption scandals in the press, all the time. I mean, it may just end up being efficient in collecting resources, to be misappropriated at the highest levels of government”. (Participant 16)

Factor 1 participants in particular rejected any suggestion that these technologies could provide a simple fix for the problem of corruption. As one participant put it:

“All of this money is just actually going into the pockets of the same old people and that digitizing things is actually not necessarily making them more transparent it’s creating another filter” (Participant 15).

The potential of smart technologies and holistic planning to achieve ‘sustainability’ was an important component in factor 2, with technology facilitating a vision of a ‘well thought out’, sustainable city (8:+4). The idea that the ‘smart city’ is a route to ‘sustainability’ is questioned by factor 3, and a more expansive understanding of relevant dimensions of sustainability emerges from the interviews, as one participant put it:

“The whole idea of creating sustainability should not only look at the end product but should also focus on the process of bringing about this sustainability because if you are going to bring professionals from abroad to come and design a city for Kenya then how is that sustainable? ”. (Participant 11)

In general, factor 1 participants were more circumspect about the potential of ‘technology as solution’ apparent in the broader ‘smart city’ discourse, highlighting the way in which the ‘smart city’ is promoted.

“as though this is a solution to something; but we’re not quite sure what that something is, as it’s never that clearly articulated.” (Participant 15)

This resonates with the critique that the discourse of the ‘smart city’ acts to embed a ‘culture of crisis’ (Shuilenburg and Pali, 2021) in urban governance, whereby whatever the anticipated crisis (whether this is rapid urbanisation; climate change; fiscal austerity; terrorism or pandemic), the smart city is always waiting in the wings with a fix that is ‘at once immediate and innovative’. Citing the example of citizen participation in governance, the same participant went on:

“Just rolling out some kind of app that says ‘now people can participate in the local government’, I don’t think that in itself does anything. I think you have to have a complete mind-set shift in terms of: what do you think a city is? Whom you think a city should be for? and what kind of place you’re building. So if you just want to maintain a kind of very exclusive, non-participatory space, you could do that with technology, as well as you could without technology”. (Participant 15)

The idea that individuals and collectives should adapt to technological development was further apparent in discussions about culture, education and the kinds of citizens that will be able to flourish in the future city. Responding to statement 15, one factor 2 participant argued that:

“Smart cities require everyone to attain basic education, so if someone is not with basic education then that kind of person is not going to benefit from smart cities, because a lot of things will be hard for them to understand.” (Participant 6)

This participant described a perceived tension between culture (understood in primarily tribal terms) and education (understood as the key to unlocking the potential of ‘smart cities’) and ‘technological

advancement’ (Participant 6).

In contrast the cultural dimension of cities was crucial for factor 3, who stressed the need for planners to understand the cultural dimensions of “*how people interact and relate, and even interact with the physical environment*” (Participant 11) (15:+2; 10:-4). The importance of culture was emphasized even further by factor 1 (10:-4; 15:+2). As one participant put it:

“Culture for us is not a luxury. For instance, speaking in Sheng is not a luxury, it is a survival... It’s not secondary; it needs to be considered even in our planning.” (Participant 2)

Factor 1 one is distinct in emphasizing the idea of a need for a ‘re-humanising’ of the urban environment, foregrounding the need to keep human need at the centre of urban governance (29:+4) rather than developing technology for technology’s sake.

4.2. Urban dwellers of the future

In line with diverse understandings of the role or otherwise of culture in urban transformation, ideas about who is imagined to be the ‘ordinary citizen’ of the future city, reveal another dimension that differentiates factors. For example, the idea of a growing ‘middle class’ features prominently in factor 2 imaginaries of a desirable future. As one participant put it: ‘*if we are planning for a prosperous future and economic development then we must put into consideration a growing middle class*’ (Participant 5). The idea that Kenya’s population will soon be predominantly ‘middle class’ is typified reports by consultant such as Deloitte: “Kenya’s middle class (44.9% of population) is expected to continue expanding by an average annual growth rate of 5%, giving rise to a thriving shopping-mall lifestyle...” (Deloitte, 2016, p. 7). That the term ‘middle class’ is vague and amorphous is widely recognised (Němečková, Harmáček and Schlossarek, 2020), and statement 16 prompted various reflections about its meaning and the implications of its prominence in discourses of urban change in Kenya. Some pointed out that, although increasing numbers of people seem to self-identify as middle class, “*nobody seems to identify as working class*” (Participant 15). Drawing attention to the aspirational character of the term, often associated with young professionals who pin their identity on a desired future rather than on ethnicity. This suggests that identifications with this term are a way to emphasize not “*where you came from, but... where you’re going*” (Participant 15). Others argued that the term ‘middle class’ has become so expansive as to become meaningless when it includes (by some definitions) those living close to poverty conditions (e.g. spending above \$2 a day (Ravallion, 2010)). As one factor 1 participant put it:

“If you are telling me I’m middle class, then you are shocking me. I’m still living in a shack, I’m still paying for a toilet, you know?” (Participant 18)

Related to debates around the amorphous Kenyan ‘middle-class’, are discussions around roles for the so-called ‘informal sector’: whether the informal development and economies are in some sense ‘intrinsic’ to Kenyan cities (factors 1 and 3), or something that can or should be ‘developed away’ (factor 2). For example, with regard to informality, one factor 1 participant responded:

“I would say it forms the very foundation for Kenyan cities” (Participant 17)

This participant argued for greater “*recognition of the work that the poor urban majority does to make the city move, to keep it working and functioning*” (Participant 17).

Other participants agreed, but were a little less celebratory, focusing on inequalities that produce informality. As one factor 3 participant put it, informality is.

“just part of the city that is trying also to make ends meet. So as long as those inequalities exist we can say that the development of our

urban areas will always be punctuated by such informal occurrences.” (Participant 11)

4.3. Imagined processes of change

The process by which desirable futures are imagined to come into being is another dimension of difference between the three emergent imaginaries described here. From the point of view of factor 2, achieving a desired urban future involves ‘leveraging’ the potential of technological change, through controlled, ‘top-down master planning’ and visioning. In contrast, factors 1 and 3 emphasize the importance of inclusive collaborative planning processes (particularly involving the urban poor), and roles for organized communities and others in bringing about desired change. This change is understood less as ‘transformation’ than as emergence over time through sustained collaborations in more incremental ways. As one participant put it, over time and through multiple initiatives:

“*The cumulative result of such collaborations are what may result into a resilient city...*” (Participant 11).

While the idea of an ‘organised community’ was felt to play a key role in change processes by both factor 1 and factor 3, participants were careful not to romanticize or over-simplify the ideal of self-organised communities effecting change. One participant drew attention to the highly differentiated nature of the umbrella term ‘organised communities’, and their fragmented nature, particularly in low income areas compared to comparatively high levels of organisation of ‘residents associations’ of home owners in the wealthier urban areas. One factor 1 participant questioned the basic ‘assumption that we have organised communities’. Referring to the work of Slum Dwellers International, he questioned the extent to which communities are actually represented by these organisations, asking: “*Who organises these communities? Basically, NGOs. And the question is, on their own, would they have organised? ... Whose agenda is really being pushed?*” (Participant 18).

This participant went on to reframe a lack of ‘community organisation’ as a lack of a sense of urban identity or belonging, arguing that working toward inclusive urban transformation requires an understanding of how people relate to Kenyan cities, particularly Nairobi, in which many people feel transient: they “*come to the city with an exit plan*” (Participant 18):

Factor 3 has been labelled ‘pragmatic’ to capture the nuance of the view, that expresses cynicism about many of the prevalent discourses around urban transformation, but nonetheless is trying to work to deal with the immense challenges facing urban Kenya. As one participant put it (responding to Q statement 17):

“Being an urban planner I would say we have tried to be proactive, there are just very many impediments. On one hand, we can argue we’ve not been given space to influence the urban development of the country and of urban areas, but on the other hand, others argue that we need to create these spaces. But we are just trying our best at the end of the day.” (Participant 11)

5. Conclusion

Many people share the hopes for future prosperity expressed in burgeoning Afro-optimistic narratives of economic growth and modernisation, and may welcome the proliferation of smart-city and techno-city narratives across Africa. However, although these narratives can be interpreted as a helpful counterpoint to the immense ‘symbolic violence’ that narratives of failure have inflicted on the ‘collective African imaginary’ (Sarr, 2019), nonetheless these modernist visions have been critiqued as ‘dreams produced by others’ (Sarr, 2019, p. x). In our exploration of the imaginative space of urban futures in Kenya, we encounter in Factor 2 an imaginary that shares many elements of the modernist vision. However, our analysis has revealed two other distinct

imaginaries influential in the Kenyan discursive landscape, enabling us to bring to the fore questions around inequality, technology and urban change in Kenya. Salient dimensions of difference between these three overlapping, intertwined imaginaries include understandings of the transformative power of technology; the nature of urban transformation; the structuring role of history, and implicit assumptions about the desired future and its imagined ideal citizens.

Our findings suggest that distinctive features of the imaginative landscape of Kenyan urban futures may lie more in particular combinations of relations between imaginaries, than in the prevalence of any single form. This may hold implications for research into imaginaries of urban change in other global settings, and research on sociotechnical imaginaries more generally. For example, the overlaps and interconnections observed here between imaginaries might be taken to confirm empirically, some key theoretical questions raised at the outset. It seems on this basis unwise, simply to assume that any imaginary in view can reasonably be treated as a settled ‘monothetic’ construct – definable by a fixed set of attributes. They may (as here) relate to each other in more complex ‘polythetic’ ways. Likewise, the revealed complexity of relations between these urban imaginaries, might be taken to suggest the value of further work to investigate the extent to which the diagnostic ‘stabilising’ of sociotechnical imaginaries in a given setting, depends (respectively) on their individual constitutions, or the relational patterns between them over time.

From a methodological point of view, we have argued that the manners in which imaginaries relate to the wider discursive background – and the detailed features that variously constitute them – are not solely a matter for intuitive interpretation on the part of the researcher. Rather these should be transparently accountable in relation to the concourse of fine-grain narrative fragments with which the analysis began and the patterns of association elicited across multiple participants. Such practice can provide, for instance, a means to test hypothesised one-to-one correspondences between particular imaginaries and specific settings. Since these kinds of generalisation can play significant roles both in academic analysis and policy prescriptions, this seems quite a significant practical finding. On the basis of the present analysis, we suggest that Q method is well suited to this task.

Finally, not all collective imaginations will come to shape the urban future to an equal extent. As Müller Mahn puts it: ‘[m]aking the future an object of collective imagination and community building ...needs more than just vision and aspiration. It requires performative action that creates greater visibility for some future imaginations while silencing others’ (Müller-Mahn, 2020, p. 157). African scholars have been at the forefront in drawing critical attention to colonial dimensions in these processes of silencing, in particular lamenting the ‘destabilisation of African imaginations of the future’ (Ndlovu-Gatsheni, 2014). We hope that by subjecting imaginaries – and the relations between them – to scrutiny as we have done in this paper, might help to open up and navigate this space of tension between the violence of narratives of failure, and the sometimes ‘blinding power’ of certain representations of urban futures.

CRedit authorship contribution statement

Rose Cairns: Conceptualisation, Investigation, Formal analysis, Writing – original draft. **Joel Onyango:** Conceptualisation, Investigation, Writing – review & editing. **Andy Stirling:** Conceptualisation, Supervision, Validation, Writing – review & editing. **Phil Johnstone:** Conceptualisation, Validation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We would like to thank all the participants who generously shared their time and views on Kenyan urban futures with us. We are grateful to Tom Randa at the Africa Centre for Technology Studies. (ACTS) for his research assistance during the project, to Dr Joanes Atela (ACTS), for valuable comments and insights on an earlier draft, and to Prof Adrian Smith (SPRU) for his input and feedback during the piloting phase. The work presented here benefited from discussion with participants at the GOST Policy Pathways to Transformation workshop organised by ACTS, which took place in Mombasa, Kenya on 29th November 2021. This work was carried out as part of the Governance of Sociotechnical Transformations project (GOST), under the auspices of the NORFACE/Belmont Forum’s Transformations to Sustainability research programme, and was funded by European Union’s Horizon 2020 research and innovation programme under grant agreement No 730211.

References

- Al Dahdah, M., Quet, M., 2020. Between Tech and Trade, the Digital Turn in Development Policies. Development. Palgrave Macmillan, UK. <https://doi.org/10.1057/s41301-020-00272-y>.
- Amin, A., 2013. Telescopic urbanism and the poor. *City* 17 (4), 476–492. <https://doi.org/10.1080/13604813.2013.812350>.
- Appadurai, A., 1990. Disjuncture and difference in the global cultural economy. *Public Cult.* 2, 2.
- Atkinson, P., Delamont, S., 2011. *Sage Qualitative Research Methods, Vol. I*. Sage, London.
- Beck, S., et al., 2021. The governance of sociotechnical transformations to sustainability. In: *Current Opinion in Environmental Sustainability*, 49. Elsevier B.V, pp. 143–152. <https://doi.org/10.1016/j.cosust.2021.04.010>.
- Bhan, G., 2014. The real lives of urban fantasies. *Environ. Urban.* 26 (1), 232–235. <https://doi.org/10.1177/0956247813514305>.
- Borie, M., et al., 2019. Mapping (for) resilience across city scales: An opportunity to open-up conversations for more inclusive resilience policy?. In: *Environmental Science and Policy*, 99 Elsevier, pp. 1–9. <https://doi.org/10.1016/j.envsci.2019.05.014> (May).
- Bourdieu, P. (1990) *The Logic of Practice*. Redwood City: Stanford Univ Press.
- Bowker, G.C., Star, S.L., 1999. *Sorting Things Out: classification and its consequences*. Cambridge MA. MIT Press.
- Bowman, W., 2015. Imagining a Modern Rwanda: Sociotechnical imaginaries, information technology, and the postgenocide state. In: Jasanoff, S., Kim, S.H. (Eds.), *Dreamscapes of Modernity: Sociotechnical imaginaries and the fabrication of power*. The University of Chicago Press, London, pp. 79–102.
- Bunnell, T., Das, D., 2010. Urban pulse- A geography of serial seduction: Urban policy transfer from Kuala Lumpur to Hyderabad. *Urban Geogr.* 31 (3), 277–284. <https://doi.org/10.2747/0272-3638.31.3.277>.
- Cain, A., 2014. African urban fantasies: Past lessons and emerging realities. *Environ. Urban.* 26 (2), 561–567. <https://doi.org/10.1177/0956247814526544>.
- Cairns, R. et al. (2021) *Transforming imaginations? Multiple dimensionalities and temporalities in transformations to sustainability*. Brighton.
- Charman, A., Govender, T., 2016. The relational economy of informality: spatial dimensions of street trading in Ivory Park, South Africa. *Urban Forum Urban Forum* 27 (3), 311–328. <https://doi.org/10.1007/s12132-016-9290-z>.
- Charmaz, K., 2006. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. Sage Publications, London.
- Cohen, H., Lefebvre, C., 2005. *Handbook of Categorization in Cognitive Science*. Elsevier, Amsterdam.
- Côté-Roy, L., Moser, S., 2019. Does Africa not deserve shiny new cities? The power of seductive rhetoric around new cities in Africa. *Urban Stud.* 56 (12), 2391–2407. <https://doi.org/10.1177/0042098018793032>.
- Deloitte (2016) *Kenya Grounding Africa’s Economic Growth*. (https://www2.deloitte.com/content/dam/Deloitte/za/Documents/afrika/za_Kenya_Report_Formatted.pdf).
- Dragsted, B., 2019. Crackdown economics: policing of hawkers in Nairobi as violent inclusion. *Geoforum* 69–75. <https://doi.org/10.1016/j.geoforum.2019.03.016>.
- Dryzek, J.S., Berejikian, J., 1993. Reconstructive democratic theory. *Am. Political Sci. Rev. Am. Political Sci. Assoc.* 87 (1), 48–60 (Available at). (<http://www.jstor.org/stable/2938955>).
- Eden, S., Donaldson, A., Walker, G., 2005. Structuring subjectivities? Using Q methodology in human geography. *Area Wiley Online Libr.* 37 (4), 413–422.
- Enns, C., 2018. Mobilizing research on Africa’s development corridors. In: *Geoforum*, 88. Elsevier, pp. 105–108. <https://doi.org/10.1016/j.geoforum.2017.11.017>.
- Fischer, F., Forester, J., 1993. *The Argumentative Turn in Policy Analysis and Planning*. Routledge.
- Foucault, M., 1971. *The Archaeology of Knowledge and the Discourse On Language*. Pantheon, New York.
- Gandy, M., 2006. *Planning, anti-planning and the infrastructure crisis facing Metropolitan Lagos*. *Urban Studies* 43 (2 SPEC. ISS.), 371–396.
- Glaser, B.G., Strauss, A.L., 1967. *The Discovery of Grounded Theory: strategies for qualitative research*. Aldine, New Brunswick.

- Goldman, M., 2011. Speculative Urbanism and the Making of the Next World City. *Int. J. Urban Reg. Res.* 35 (3), 555–581. <https://doi.org/10.1111/j.1468-2427.2010.01001.x>.
- Goldstone, B., Obarrio, J., 2016. African Futures: essays on crisis, emergence and possibility. African Futures. The University of Chicago Press, Chicago and London. <https://doi.org/10.7208/chicago/9780226402413.001.0001>.
- Government of the Republic of Kenya (2007) The Kenya Vision 2030. The Popular Version. Available at: (http://www.vision2030.go.ke/cms/vds/Popular_Version.pdf).
- Hajer, M., 1995. The Politics of Environmental Discourse: Ecological Modernization and the Policy Process. Clarendon Press, Oxford. <https://doi.org/10.1017/CBO9781107415324.004>.
- Heeks, R., Shekhar, S., 2019. Datafication, development and marginalised urban communities: an applied data justice framework. In: *Information Communication and Society*, 22. Taylor & Francis, pp. 992–1011. <https://doi.org/10.1080/1369118X.2019.1599039>.
- Holstein, J.A., Gubrium, J.F., 2008. *Handbook of constructionist research*. Guilford Press, New York.
- Hu, R., 2019. 'The state of smart cities in China: The case of Shenzhen'. *Energies* 12 (22). <https://doi.org/10.3390/en12224375>.
- Hursh, B.J. (2019) 'A bump in the belt and road: Tanzania pushes back against Chinese port project', Centre for International Maritime Security, 2 December.
- IBM (2012) 'A vision of a smarter city: How Nairobi can lead the way into a prosperous and sustainable future', pp. 1–16. (http://www-05.ibm.com/za/office/pdf/IBM_-_A_Vision_of_a_Smarter_City_-_Nairobi.pdf%5Cpapers2://publication/uuid/AC98353B-5950-400D-AB16-7D5E1FE2302F).
- ICT Authority (2019) Draft ICT Authority Strategic Plan FY 2019–2023, Kenya. Nairobi.
- Jasanoff, S., Kim, S.-H., 2009. Containing the atom: sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva* 47 (2), 119–146. <https://doi.org/10.1007/s11024-009-9124-4>.
- Jasanoff, S., Kim, S.-H., 2015a. *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago and London. The University of Chicago Press.
- Jasanoff, S., Kim, S.-H., 2015b. *Future imperfect: Science, Technology, and the Imaginations of Modernity. Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. University of Chicago Press, Chicago and London, pp. 1–47.
- Joss, S., et al., 2019. The smart city as global discourse: storylines and critical junctures across 27 cities. *J. Urban Technol.* Taylor Fr. 26 (1), 3–34. <https://doi.org/10.1080/10630732.2018.1558387>.
- Zhuang, Justin, 2014. How Chinese urbanism is transforming African cities. *Metropolis*. <https://doi.org/10.1017/CBO9781107415324.004>.
- Kaplan, R.D., 1994. *The Coming Anarchy*. *Atl. Mon.* 273 (2), 44–76.
- Kimari, W., Ernstson, H., 2020. Imperial remains and imperial invitations: centering Race within the contemporary large-scale infrastructures of East Africa. *Antipode* 52 (3), 825–846. <https://doi.org/10.1111/anti.12623>.
- Kitchin, R., Cardullo, P., Feliciantonio, C., Di, 2019. Citizenship, justice, and the right to the smart city. In: Kitchin, R., Cardullo, P., Feliciantonio, C., Di (Eds.), *The Right to the Smart City*. Emerald Publishing Limited, pp. 1–24.
- Law, J., 2004. *After Method: Mess in Social Science Research*. Routledge, Abingdon.
- Linehan, D., 2007. 'Re-ordering the Urban Archipelago: Kenya Vision 2030, Street Trade and the Battle for Nairobi City Centre'. *Aurora Geogr. J.* 21–37.
- Mahoney, J., 2006. A tale of two cultures: contrasting quantitative and qualitative research. *Political Anal.* 14 (3), 227–249. <https://doi.org/10.1093/pan/mpj017>.
- Ministry of Information Communications and Technology (2019) National ICT Infrastructure Master Plan 2019 - 2029. Nairobi.
- Mosley, J., Watson, E.E., 2016. Frontier transformations: development visions, spaces and processes in Northern Kenya and Southern Ethiopia. *J. East. Afr. Stud.* 10 (3), 452–475. <https://doi.org/10.1080/17531055.2016.1266199>.
- Mung'ahu, A. (2017) 'Tobiko gets two weeks to act on Sh179m Konza Techno City case [online]', The Star (online). Available at: https://www.the-star.co.ke/news/2017/03/14/tobiko-gets-two-weeks-to-act-on-sh179m-konza-techno-city-case_c1523860.
- Müller-Mahn, D., 2020. Envisioning African futures: development corridors as dreamscapes of modernity. In: *Geoforum*, 115. Elsevier, pp. 156–159. <https://doi.org/10.1016/j.geoforum.2019.05.027>.
- Myers, G., 2015. A world-class city-region? Envisioning the Nairobi of 2030. *Am. Behav. Sci.* 59 (3), 328–346. <https://doi.org/10.1177/0002764214550308>.
- Nabavi, E. (2017) *More-than-water, more-than-human: a transdisciplinary sociology of water conflict in central Iran*. Australian National University.
- Nairobi City Council (2014) *The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya Final Report*. Nairobi.
- Ndlovu-Gatsheni, S., 2014. *Global Coloniality and the Challenges of Creating African Futures*. *Strategic Review for Southern Africa* 36 (2).
- Needham, R., 1975. Polythetic classification: convergence and consequences. *Man* 10 (3), 349–369.
- Němečková, T., Harmáček, J., Schlossarek, M., 2020. Measuring the middle class in Africa – income versus assets approach. *Afr. Spectr.* 55 (1), 3–32. <https://doi.org/10.1177/0002039720916087>.
- Nost, E., Robertson, M., Lave, R., 2019. Q-method and the performance of subjectivity: reflections from a survey of US stream restoration practitioners. *Geoforum* 23–31. <https://doi.org/10.1016/j.geoforum.2019.06.004>.
- Otiso, K.M., 2005. Colonial Urbanization and Urban Management in Kenya. In: Salm, S. J., Falola, T. (Eds.), *African Urban Spaces in Historical Perspective*. University of Rochester Press, Rochester, NY, pp. 73–97. <https://doi.org/10.5860/choice.43-1099>.
- Pieterse, E., 2011. Grasping the unknowable: coming to grips with African urbanisms. *Soc. Dyn.* 37 (1), 5–23. <https://doi.org/10.1080/02533952.2011.569994>.
- Powell, C., Depelteau, F., 2013. *Conceptualizing Relational. Sociology: Ontological and Theoretical Issues*. Palgrave MacMillan, London.
- Pricewaterhouse Coopers (2005) *Cities of the Future: global competition, local leadership*. doi: 10.1177/0002764214550300.
- Ravallion, M., 2010. The developing world's bulging (but vulnerable) middle class. *World Dev.* 38 (4), 445–454. <https://doi.org/10.1016/j.worlddev.2009.11.007>.
- Ritzer, G., 2000. *Encyclopedia of Social Theory - Volume I & II*. Thousand Oaks, CA. Sage Publications, London, UK; New Delhi, India.
- Sadowski, J., Bendor, R., 2018. Selling Smartness. *Sci. Technol. Hum. Values*. <https://doi.org/10.1177/0162243918806061>.
- Saltelli, A., et al., 2004. *Sensitivity Analysis in Practice: a guide to assessing scientific models*. John Wiley & Sons Ltd, Chichester.
- Sarr, F., 2019. *Afrotopia*. University of Minnesota Press, London.
- Schmolck, P. (2002) 'PQMethod 2.11', Downloaded from <http://www.lrz-muenchen.de/~schmolck/qmethod/downpqx.htm>.
- SDI (2018) *Know Your City: Slum Dwellers Count*. Cape Town.
- Shuilenburg, M., Pali, B., 2021. Smart city imaginaries: looking beyond the technoutopian vision. In: Shuilenburg, M., Peeters, R. (Eds.), *The Algorithmic Society: Power, Knowledge, Technology*. Routledge, UK.
- Simondo, S. (2020) 'Sociotechnical imaginaries: An accidental themed issue'. doi: 10.1177/0306312720944753.
- Smith, C., 2017. Our changes? Visions of the future in Nairobi. *Urban Plan.* 2 (1), 31–40. <https://doi.org/10.17645/up.v2i1.834>.
- Sneegas, G., 2020. Making the case for critical q methodology. In: *Professional Geographer*, 72. Routledge, pp. 78–87. <https://doi.org/10.1080/00330124.2019.1598271>.
- Stirling, A., 2006. Precaution, foresight and sustainability: Reflection and reflexivity in the governance of science and technology. *Reflex. Gov. Sustain. Dev.*
- Stirling, A., Simmons, P., Spash, C. (2003) APPROACHES TO THE MAPPING OF VALUES: a review of Q Methodology, Multi-Criteria Mapping and Attitudinal Scales. *The Economist* (2000) 'The hopeless continent', 13 May. Available at: (<https://www.economist.com/weeklyedition/2000-05-13>).
- UNESCO (2015) *African Futures: towards a sustainable emergence*. Paris. doi: 10.2307/219376.
- UN-Habitat (2014) *State of African cities 2014; re-imagining sustainable urban transitions, United Nations Human Settlements Programme*, Nairobi. Available at: (<http://www.eurekaselect.com/52219/volume/1>).
- Valaskivi, K., Sumiala, J., 2014. Circulating social imaginaries: theoretical and methodological reflections. *Eur. J. Cult. Stud.* 17 (3), 229–243. <https://doi.org/10.1177/1367549413508741>.
- van Noorloos, F., Kloosterboer, M., 2018. Africa's new cities: The contested future of urbanisation. *Urban Stud.* 55 (6), 1223–1241. <https://doi.org/10.1177/0042098017700574>.
- Watson, V., 2014. African urban fantasies: dreams or nightmares? *Environ. Urban.* 26 (1), 215–231. <https://doi.org/10.1177/0956247813513705>.
- Wilde, K., Hermans, F., 2021. Deconstructing the attractiveness of biocluster imaginaries. *J. Environ. Policy Plan.* 1–16. <https://doi.org/10.1080/1523908X.2021.1891872>.
- Wodak, R., Krzyzanowski, M., 2008. *Qualitative discourse. Analysis in the Social Sciences*. Palgrave MacMillan, Basingstoke.