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Title

Assessing smart city projects and their implications for public policy in the Global South

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Abstract

This article aims to assess critically different definitions and indicators of smart cities. Drawing on exemplary case studies, the author proposes a typology of four categories of smart cities: type A are the world leaders who pioneer ideas not predicated on smart city projects; type B are aspirational cities punching above their weight; type C are surprise transformers that use the smart city concept to propel real transformation; and type D are cases where smart city projects do not directly address the main urban problems. The discussion highlights the need to prevent 'smart-wash' by avoiding superficial technological solutions that chase symptoms but not causes of some of the complex urban challenges that they are intending to address. In conclusion, the author considers the public policy implications of applying these typologies to cities in general with particular reference to the Global South.

Key words: smart cities, definitions of smart sustainable cities (SSC), SSC indicators, typologies of smart cities

Introduction

Smart cities appear to be ubiquitous in many countries. However, our research suggests that many smart city ideas are weakly conceptualised, with limited attention paid to substantive and complex social issues that underlie the urban challenges. Some smart city proposals fail to recognise the exclusion of slum dwellers or the many other citizens who do not have access to internet or digital services. The concentration of decision-making powers made possible by big data and centralised 'control rooms', where digital CCTV live-feeds from various locations in the city are projected onto a wall of TV screens, raises serious concerns about the impending digital erosion of citizens' agency and the weakening of participatory governance institutions.

This paper adopts a public policy perspective to examine critically: how smart city ideas are being juxtaposed with citywide issues and priorities; how inequality and social issues are

addressed; how citizens' agency is conceived via channels of participation; and what the implications are for applying smart city ideas to the United Nations' Sustainable Development Goal 11 and the New Urban Agenda from the Quito HABITAT 3 conference in these contexts.

Research reported here is based on both primary and secondary data. Primary data were collected using mainly qualitative research methods, including workshops, focus group discussions and in-depth interviews with experts, academics and various stakeholders in selected cities in Ghana, India, Indonesia and United Arab Emirates. We begin by presenting a critical review of smart city definitions and indicators, followed by a brief overview of smart city initiatives focussing mainly on examples from the Global South, before proposing a typology of smart cities. The concluding section considers the implications of the issues raised by the analysis for public policy and further research.

Smart cities: definitions and indicators

The origin of the term 'smart city' can be traced to the 1990s. A search on the Web of Science for the term 'smart cities' produces 10,263 records. Of these, 8,955 describe the research domain as science technology, while 4,118 describe it as social science, and a smaller number (340) as arts and humanities. Further breakdown of the accumulated records by research areas suggests that nearly half are in the field of computer science (5,536), whereas only 1,360 records are in public administration and another 957 in business economics. These bibliometrics suggest that the field of smart cities is predominantly a computer science and engineering concept with some emerging use and adaptation in the social sciences and public policy sciences. The evidence of limited normative discussions is noticeable when we search 'smart city, ethics' as key words since only 24 records are returned.

In this section, we critically review three aspects of smart cities: how the smart city is defined; what kind of indicators are used to measure smart city performance; how smart city programmes are being developed.

Smart city definitions

Since the late 1990s, the appellation of smart cities has been applied to cities using digital technologies, smart devices, the internet of things (IoT) and big data approaches to improve

the functioning of their governance structures. Other labels include digital cities, tech cities, innovative cities, and future cities. Proposals by CISCO, Siemens and subsequently by IBM (2005 to 2009) focussed on generating granular and detailed data on the different infrastructure systems and services. The analytical and visual presentation tools ('video wall') for such data in real time further enabled a top down and centralised urban governance based on a command and control model. In a systematic review of the literature covering sustainable cities from 2005 to 2016 and smart cities from 2010 to 2016, Bibri & Krosgstie (2017) found that several important issues remained to be explored and that these concepts were theoretically underdeveloped.

A narrow definition of 'smart cities' focussing on digital technologies and the creation of a digital layer over infrastructure systems and flows makes it possible to deliver specific and measurable outcomes. A broader definition refers to blended approaches, new management paradigms and governance arrangements. Smart city initiatives generally occur in a crowded policy space where other initiatives and projects already exist at different stages of completion as governments respond to a perceived 'urban crisis', exacerbated by their inability to access and analyse information quickly to inform management and strategic oversight. Moreover, emerging urbanism and the call for city system-wide thinking require governments to connect different interventions from sustainable cities or other overarching macro frameworks. In the aftermath of the 2008 financial crisis, the launch of IBM's Smarter Planet in 2009 signalled the idea of cities as nodes of worldwide neural networks where trillions of devices are connected and communicate with each other in complex systems. The International Telecommunications Union (ITU) set up a focus group on smart sustainable cities (SSC) in 2013 and published a report (ITU-T, 2014) on the definitions of SSC. The study group considered attributes (quality of life, urban aspects, intelligence or smartness), themes (society, economy, environment and governance) and infrastructures (physical, service and digital layers) in defining smart sustainable cities. After analysing over 120 definitions and identifying important keywords the group proposed the following definition:

> A smart sustainable city (SSC) is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects.(ITU-T, 2014)

This definition comprises all the ideals associated with an SSC, but it also makes clear that, if this is the standard or ideal to be measured against, no city in the world can presently match up to this definition. The ITU definition can be considered as a step change from a technologically centred 'smart city' to repurpose it as a city that focusses on sustainability, suggesting that smartness must have an ultimate purpose of delivering sustainability. In a systematic literature review, Yigitcanlar et al (2019), for example, concluded that cities ought first to become sustainable if they are to be considered smart.

The role of information and communication technologies within this definition of SSCs has two operative parts: on the one hand meeting the demands of improving the quality of life, efficiency of urban operations and services, and competitiveness; and on the other meeting the needs of the present generation and of future generations.

The debate over ethical considerations, competitiveness and urban paradigms (see for example Clark, 2016; Parnell & Robinson, 2013; Pinson & Journel, 2016) lies well beyond the scope of this paper. Suffice it to note that potential trade-offs can be shown to exist between the goals of efficiency and equity (Okun, 1975), highlighted, for example, by the privatisation of urban water supply services in many cities (Roa-Garcia, 2014). Smart cities have only recently begun to focus on equity. Equity can have many different dimensions: between present and future generations, between rich and poor citizens, between core city and peri-urban communities, between long-term residents and newly arrived migrants, among others, raising important ethical considerations and dilemmas which are difficult to address within a smart city approach.

The idea of competitiveness may at first appear to be a universal value, or principle, but it does not exist without normative or moral consequences. A very competitive city may produce efficient allocation of resources, including human resources, but such cities may not always be inclusive. The quest to attract the most productive members of society is also a race to reject anyone who is less than perfect. Arguably, while such cities may generate enormous profits for private enterprise and high salaries for those who are productive, they also make many people feel undervalued or rejected. The burden of caring for those who are elderly, or disabled or sick, is transferred to the public and social sectors (possibly elsewhere in the hinterland), while the most profitable activities are captured by the private sector within the city.

The International Organisation for Standardisation (ISO) has developed a standard for smart cities. The ISO/IEC:30182:2017 concept model for organisations aiming to deliver smart city services defines a smart city as: 'effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its citizens'. Many common elements can be found between this definition and the ITU definition mentioned above. The first part of the ISO definition maps on to the innovative city using the ICT technologies part of the ITU definition; the prosperous and inclusive part focusses on the quality of life aspect, while the word 'sustainable' in the ISO definition maps onto meeting the needs of the present generation without compromising the ability of future generations in the other part of the ITU definition. Like the ITU definition, the ISO definition is also an ideal in that no city can claim that it has achieved effective integration of physical, digital and human systems. However, both definitions lack the following normative concerns:

1. They do not elaborate the governance aspect of smart cites. The ISO definition refers to 'citizens' and the ITU to present and future generations, but they do not explain how the city is governed and how accountability to citizens is embedded. They exclude information governance and ethical issues in the framing of a market-based approaches to smart cities, thereby systematically excluding some groups (Anand & Navio, 2018). Meijer & Bolivar (2016) noted from a review of 51 studies that smart city governance could benefit from references to previous studies of the successes and failures of e-government, and they identified the need to 'build upon sophisticated theories of social change'.
2. The issues of equity and equality are not highlighted or inequality issues are raised with somewhat superficial understanding of the underlying causes. Barcelona, for example, one of the world's leading smart cities, appears to have higher income inequality than many Spanish cities (Hortas-Rico, Onrubia & Pacifico, 2014). Given that urbanisation generates winners and losers, addressing inequality should be an important concern for smart cities.
3. Gender inequality is not a particular concern. Though the ISO definition incorporates the word 'inclusive', this needs further elaboration. For example, a study on women in the ICT sector for the European Union found that four times more men than women study ICT related subjects (Quiros et al, 2016).
4. How the concept of responsibility is defined and whether sustainability should relate to it are important issues that are not sufficiently highlighted.

5. With the emphasis on ‘prosperity’ in ISO’s definition and ‘efficiency’ and ‘competitiveness’ in the ITU definition, both definitions appear to take a benign view of markets, whereas markets in smart cities can lead to the development of trafficking of persons and drugs or to cultural appropriation on a global scale.
6. While the ITU definition speaks of present and future generations and the ISO definition refers to ‘citizens’, the present business model of smart cities has tended to be imposed top down with limited voice and agency for citizens (see also Marrone & Hammerle, 2018).

This list is by no means exhausts normative concerns; other issues could be raised related to power (Dutta & Odendaal, 2019), the political economy (Gandy & Nemorin, 2018), climate emergency (Ellsmoor, 2019) and the ethics of dataveillance and privacy (Kitchin, 2016)

Integration of digital and physical systems is predicated on the assumption that such integration is desirable. Better information about the physical networks of infrastructure can certainly help in improving the services to the citizens and in anticipating and preventing problems. However, in many cities in the Global South, physical infrastructure systems are inadequate. If the roads are going to be congested throughout the day because the travel demand is far greater than the capacity of the roads or rail systems, a tool for making information available on the new digital platforms (Apps) can be of limited use and may merely confirm what is already known. Though these definitions suggest an end state, in reality the commitment to become a smart sustainable city is long term and open ended. Arguably, it is about continuously striving to do better on social, economic and environmental dimensions rather than reaching a threshold level.

Smart city indicators

A city seeking to become a smart and sustainable city needs to know how it is performing on the different dimensions. Hence, the production of appropriate indicators makes an important contribution to the creation of smart sustainable cities. A search for ‘smart city indicators’ returned over 445,000 results on Google scholar. In this section, we review some of the smart city indicators currently being used by various organisations to benchmark and rank cities.

Giffinger, Kramar, Haindlmaier, & Strohmayer (2014) have developed a widely used set of indicators for smart cities in Europe. Although their work predated the more recent digital and ICT-enabled smart city interventions, it has been influential in providing a framework on

which many current smart city projects in Europe continue to be based. They considered six characteristics: smart economy, smart people, smart governance, smart mobility, smart environment and smart living. For these six characteristics, they further developed 31 factors and 74 indicators. Smart economy (or competitiveness) factors include innovative spirit, entrepreneurship, economic image, productivity and international embeddedness. Their smart people dimension includes factors of social and human capital such as the level of qualifications, the extent of lifelong learning, plurality and participation in public life. Smart governance includes factors such as participation in decision-making, transparent governance, and the magnitude and quality of public services. Smart mobility focusses on transport and communications, including factors such as accessibility and availability of ICT infrastructure. Smart environment covers factors such as pollution, environmental protection and sustainable resource management. Finally, their smart living dimension incorporates factors affecting the quality of life focussing on cultural facilities, health status, housing quality, education facilities and social cohesion.

Some of these factors overlap across different dimensions, for example participation, and some factors may lead to double weighting of performance in the same aspect; for example educational outcomes can affect both smart people and smart living dimension. Based on data availability, Giffinger et al. (2014) constructed indexes for 70 medium-sized cities (population between 100,000 and 500,000) in Europe for the year 2007, covering 71 cities in 2013 and 77 cities in 2014. Subsequently, in 2015 they constructed a similar index for 90 larger cities (population from 300,000 to 1 million). The index was used to rank cities. Although data are available for many cities for three years, and they do allow within-year comparison between different cities, they cannot be compared for the same city over a period of time to see how the city has progressed.

The ISO37120 comprises 17 aspects (or dimensions) namely to determine whether a city has achieved ISO standards: economy, education, energy, environment, finance, fire and emergency response, governance, health, recreation, safety, shelter, solid waste, telecommunications, transportation, urban planning, wastewater, and sanitation. These 17 dimensions cover 100 indicators. Cities registered for ISO37120 are listed in the Global Cities Registry by the World Council on City Data (2017). The number of cities certified worldwide was 45 in 2017 and had grown to 100 by 2018 (WCCD, 2018). ISO37120 is independent of whether a city uses a smart city approach to achieve the standard. However, smart city platforms can be mindful of these indicators, and a smart city project, while not

essential, can be a pathway to achieving ISO37120. Thus, cities newly embarking on a smart city journey may be well advised to look at these indicators when framing the terms of reference for smart city projects.

On the one hand, the proliferation of smart city, as well as city competitiveness (see Clark, 2016, for example), is a sign of creativity and innovation in measuring different dimensions of the performance of smart cities. On the other hand, it is also a cause for concern. Indicators are only as good as the quality of the data on which they are based. Cities in the Global North have better quality data than their counterparts in the Global South. The measurement approach seems to be biased in favour of a logical positivist and reductionist approach often leading to fitting complex reality into a single or a small set of indicators. Further, if the smartness of a city is defined by how well it is integrated in the global economy, automatically the measurement will be biased in favour of more connected cities in the Global North.

Inherently indicators seem to be oriented towards bigger cities, whereas the concept of smart cities should be applicable for all settlements irrespective of size. The construction of indicators is mainly determined by what data are available rather than being based on an a priori theoretical construct. An alternative approach would be to develop a theoretical frame and then look for appropriate indicators that best reflect the variable of interest.

Ranking smart cities

Among the smart city indexes that have emerged in recent years, Juniper Research (2018) provides a ranking of the top 20 smart cities in the world using data on four dimensions: mobility, health, safety and productivity. According to this ranking, Singapore pipped London and New York at the top spot. A novel aspect of this study was the estimate of the potential number of hours that can be saved and given back to the citizen by smart technologies: investments in smart mobility could give back up to 59 hours per citizen per year (time that is presently wasted in congestion and longer travel times); investments in public safety up to 34.7 hours; smart government and contactless and cashless payments a further 21.2 hours; and improved health systems another 9 hours, totalling 15 days per citizen per year, which can be used for leisure and healthy lifestyle, potentially leading to a reduction in depression and improve productivity.

The University of Navarra has been producing the 'cities in motion index' (CIMI) since 2013. The original index used ten dimensions namely: 'human capital, social cohesion, the economy, public management, governance, the environment, mobility and transportation, urban planning, international outreach and technology' (IESE Business School, 2018). The 2018 edition used the ISO37120 set of 100 city indicators for delivering public services in cities, but merged public management and governance into a single dimension to achieve 83 indicators and ranks for 165 cities worldwide: New York, London, Paris, Tokyo, Reykjavik, Singapore, Seoul, Toronto and Hong Kong took the top 10 spots; cities in the Global South − Karachi, Lagos, Kolkata, Caracas, Nairobi, Douala, New Delhi, Mumbai, Cairo and Johannesburg − took the bottom 10 positions.

The indicators adopted in these rankings are biased towards Northern cities since they use technology indicators such as the number of Apple stores per city, the number of Twitter, Linkedin and Facebook users in the city, broadband subscriptions, and percentages of households with access to internet; number of McDonald's restaurants per city, hotels per capita, and conferences and meetings taking place in a city are indicators of international outreach. The ranking is also biased towards capital cities. Another limitation is that some of the indicators − data on the ease of starting up a business or the corruption perception for example − collect data mainly at national rather than city level. Arguably, these variables are endogenous (derived from some other underlying phenomenon) and correlated.

Though a smart city is not itself a specific element of an SDG, sustainable cities are part of SDG11. Under that goal, ten targets have been identified by the UN (2018): adequate, safe and affordable housing and upgrading of slums; safe, accessible, affordable and sustainable transport; inclusive and sustainable urbanisation and planning; safeguarding cultural and natural heritage; reducing vulnerability to disasters; reducing the adverse environmental impact of cities, especially air quality and municipal waste; providing universal access to safe and inclusive green and public spaces; promoting positive links between urban, peri-urban and rural areas; and supporting the least developed countries in constructing resilient and sustainable buildings. SDG6 (clean water and sanitation), SDG7 (affordable and clean energy), SDG9 (industry, innovation and infrastructure, especially regarding mass transport and access to ICT technologies), all contain elements that are relevant to smart cities. The danger is that cities can start making exaggerated claims regarding their contribution to SDGs when in effect such SDG impacts may be unintended consequences rather than the result of deliberate actions. Cities need to avoid 'SDG-washing' just as they should be wary of 'smart-

washing', by adopting superficial re-arrangements that do not go to the substance of smartness or SDGs.

Identifying smart cities in the Global South

It is impossible to know precisely how many cities in the Global South are seeking to become smart cities. A search with a set of randomly chosen country names – Angola, Argentina, Djibouti, Fuji, Jordan, Mauritius, Namibia, Peru, Qatar, South Africa, Tunisia, and Vietnam – and the words 'smart cities' in Google produced results in every case, suggesting considerable activity on smart cities in the Global South. Based on the definitions and indicators identified in the previous section, the expression 'smart city' can be loosely applied to four different kinds of interventions: imposition of new urban investment in digital infrastructure usually due to national level initiatives; transformation of specific urban services such as transport, water, energy or waste management but in an inter-connected manner, as in Bogota and Bhubaneswar; citywide command centres to improve responsiveness of public services to citizens, as in Rio de Janeiro; and small-scale real estate developments as a suburb of a large city as in Lekki in Lagos.

More than two decades before it hosted the FIFA World Cup or the Olympics, Rio de Janeiro hosted the world leaders at the historic Earth Summit in 1992 which produced the Framework Convention on Climate Change and the Convention on Biological Diversity. In April 2010 heavy rains paralysed the city and prevented its agencies from being able to respond quickly and in a co-ordinated manner. However, it did provide them with the impetus to build the capacity for municipal systems to receive and analyse information on climatic events 24/7. In December 2010, Rio de Janeiro created the Rio Operations Centre (called COR) with 10 agencies, 92 video surveillance cameras and real time weather stations and mapping capability. By 2015, more than 30 agencies, 1,000 video surveillance cameras, 15,000 sensors had been established to support enhanced geo-information systems (Schreiner, 2016). Today, Brazil has a connected-cities programme in which several cities are participating. Medellin in Colombia has been pursuing a smart city programme since 2014 (Florez, 2016).

Previously, smart city projects were seen as 'toys for the rich', essentially digital and ICT applications in cities in high-income countries. Although the Republic of Korea launched many smart city projects, exemplified by Songdo with its strategic plan in 2008 (Lee, Kwon, Cho, Kim, & Lee, 2016), only with Rio's operations centre did smart cities truly arrive in the Global South.

In China, it is estimated that more than 500 smart city projects are in progress (Deloitte, 2017). India and Indonesia have '100 Smart Cities' programmes. In both countries, strong-centralising prime ministers and national governments appear to have used smart city projects as disruptive strategies for solving old urban problems: smart city programmes are conceived as national government programmes. Nigeria is developing a smart city and digital innovation hub as a public–private partnership based on real estate development (an IT city) in Lekki in Lagos (see Smartcityplc.com). The Government of Rwanda, for its part, presented the Smart Sustainable Cities Blueprint at the Transform Africa summit in Kigali in 2017 (Republic of Rwanda, 2017). The document notes the rapid urban growth that is due to take place in Africa and proposes that African cities should leapfrog '…to the forefront of global digital transformation'. Smartness is depicted as essential for cities to become sustainable. Two major classes of systems are identified within cities: 'flows that run through a city's infrastructure and services delivered to people and businesses'. These different examples suggest that, while most countries have smart city projects, some governments are adopting a more pro-active approach.

Developing a typology of smart city projects in the policy context

Smart cities are not the only innovative idea to arise among the challenges in urban management. As noted in the Habitit-3 Urban Agenda policy papers, digital era governance has been making inroads into urban and metropolitan management for some time, and smart city projects seem to have latched on to this policy landscape. While smart cities are part of the information and communication revolution and of big data from mobile phones or smart transit cards, these innovations need to be situated within the complex context of urban governance. Technology is no doubt an important tool for solving complex challenges but, as Moyer & Bohl (2019, p. 204) noted in their assessment of possibilities for achieving the human development related SDGs by 2030, the '…pathways characterized by more rapid technology diffusion as well as effective governance solving local problems are two development trajectories that improve both environmental outcomes and human development'.

Can we apply a smart city approach to any city irrespective of population size, the nature of existing urban growth patterns, and urban land and housing market dynamics, or is there a particular stage in the evolution of a city where becoming a smart city has much greater

impact? A one-size-fits-all approach can make smart city projects akin to a silver bullet or a magic potion that can cure all urban ills by the power of data analytics. In responding to the question and to avoid falling into the trap of 'silver bullet', four different typologies are proposed to assess the smartness of cities.

Type A: Pioneer cities

The successes of cities such as New York, London, Barcelona, and Amsterdam seem to suggest that cities with well-developed strong and robust governance institutions to plan, coordinate and implement metropolitan strategies gives them an enormous advantage in introducing innovative ideas and policies. Type A cities are pioneer or World Cities (Knox & Taylor, 2010) or Global Cities (Clark, 2016; Oxford Economics, 2018). They have been thought leaders and innovators where technology is catching up. Thus, their success is not predicated upon being digitally smart cities.

Type B: Aspirational cities

Aspirational cities are able to use mobile innovation and transformation within a short period of time due to unified institutions of governance and the ability to deliver on large projects. Dubai and Singapore are examples of this category. In Clark's (2016) classification these are 'emerging global cities' and aspirational because, unlike the global pioneers they are achieving a transformative vision and governance within a short period of time. As they are not in the Global South, their characteristics are not developed further here.

Both these examples are great showcases of what can be a sustainable urban community and many similar 'gated' developments are making claims to be sustainable cities in Asia and Africa. However, the main problems with these examples are that they are of small scale and cannot be scaled up to the entire city let alone a mega-city. They are themselves utopian products of hyper-globalisation of capital and are thus appropriating the idea of sustainable cities to commercialise another 'cool' luxury product, not intended for millions of ordinary urban residents who will never be able to benefit from these kinds of developments. Moreover, they seem to suggest that sustainable cities are something that only a developmental state can deliver, as in Masdar, or where no government is needed, as in Dubai's sustainable development real estate project.

Other relevant candidates in this group could include innovation hubs such as Bengaluru, Hangzhou, Hong Kong, Tel Aviv and Kigali. The distinguishing features of such cities

include a concentration of knowledge industries, adequate size to capture agglomeration economies, global connectivity and a position that puts them within touching distance of becoming a global city.

Type C: Meteoric cities

Cities such as Bogota and Bhubaneswar have had a meteoric rise in their ability to use urban strategy to be disruptive, think outside the box and bring innovative solutions to vexatious problems. While type B cities exist in contexts where a national strategy that closely aligns with the city strategy exists (in terms of the city's development being a national priority) type C cities tend to be exceptions (as islands of excellence).

Though Bogota's success precedes the smart city projects, it can be considered an example of a meteoric city. Bogota was previously notorious for many decades for its favelas and poor-quality housing. Two successive mayors restored the legitimacy of city government, and Mayor Enrique Penalosa (2014) used the smart city project in a completely different way to create what is called 'democracy of the road space'. Here, the principle of equity is applied to the question of buses (with 100 passengers) competing for road spaces with cars (each with just one person). Bogota invested in a bus rapid transit (BRT) system TransMilenio with dedicated bus-only lanes and articulated buses and feeder roads. An ex-post evaluation by Hidalgo, Pereira, Estupinan & Jimenez (2013) concluded that the demand for bus travel increased from a few thousand persons per day in 2000 to 1.7 million in 2011. It found that the overall benefits, including travel time and cost savings, reduction in the number of road accidents and fatalities, health impacts due to reduced air pollution and reduction in crime, exceeded the costs by nearly 2 billion USD. Bogota's success suggests that smart connectivity can be an instrument to deliver equity and pro-poor public transport. From a review of BRT systems in the Global South, Venter, Jennings, Hidalgo & Pineda (2017) suggest, however, that, while in general BRT systems are pro-poor, the benefits tend to be skewed towards medium income earners.

Our research found that Bhubaneswar, one of India's few planned cities designed by German architect Otto Konigsberger, has been a surprise winner by being the first city to be announced in India's 100 smart cities programme (Government of India, 2016). Our research identified some plausible reasons. As a relatively small city with fewer than 840,000 people, it could be argued that the per capita impact of smart city project investment is much greater. As a planned city, it already started on a slightly better level of urban services than is the

norm for many organically growing cities in India. Finally, the sense of pride and ownership from both the state government and the city municipal government brought these two different layers of government together. They shared a unified focus on using a smart city project as an opportunity to prioritise urban development projects with a significant potential impact on a wider cross section of the city's population. Due to its quality of life and better infrastructure than neighbouring larger cities, Bhubaneshwar has been attracting inward investment in ICT industry; an increasing proportion of social media users helped in the early stages of the campaign to engage different sections of the population, especially schools, in the smart city proposals. Of the eight cities contacted for our study, Bhubaneshwar proved to be the city that is most open to researchers. The city has embraced the open knowledge philosophy to a much greater extent than the other Indian smart cities that we contacted.

Indicators developed for some 20 different dimensions of urban services have enabled us to compare the initial performance of the top 20 smart cities in India on these 20 dimensions (Anand et al, 2019). Our analysis showed that Bhubaneshwar is not the top-performing city in many of the dimensions, but that its overall index rank was around 5 out of 20. At the time of writing, some of the cities had not completed full e-government before embarking on smart city projects. Smart initiatives are generally focussing on free wifi and promoting internet. Although our evidence suggests that e-government initiatives can help improve accountability and reduce corruption, no discernible relationship has been found between internet adoption and reduction in corruption (Elbahnasawy, 2013).

Type D: Smart-washed cities

Type D cities use smart city language, but the smart city project is seen as just an addition (maybe a trophy) to various current projects; some going on for decades, some recently started, and some talked about but hardly started.

There is a huge risk that many of the smart city projects in the Global South fall into type D because they do not address the inadequacies of governance arrangements. The already limited financial base of the municipal governments are stretched to provide many social and public goods not available from the market. Then why do they embark on a smart city project? Several plausible explanations can be suggested. Firstly, some cities may be making a genuine effort to leapfrog and use a smart city project as an opportunity and game-changer in tackling 'wicked' urban problems. As yet, there is limited evidence to support this contention. Secondly, a smart city project may be used as an opportunity to grab and

appropriate land or property as a means of consolidating the political and economic exercise of power to benefit from speculation. Thirdly, a smart city project may be used as 'smart washing' to create a smokescreen as part of electoral advantage seeking for local, state or national elections, thereby diverting attention from the failures and mismanagement of urban public services. Here, the concept of isomorphic mimicry discussed by Andrews, Pritchett & Woolcock (2016) is highly relevant. Instead of addressing the real urban challenges, it is easy for cities merely to appear to be smart by creating hubris over smart city projects and investing significant public money to suggest that a smart city is the panacea for all problems. By the time the citizens realise that the core problems have not been addressed, the smart city merchants will have moved on to other things.

These four typologies have been found to be useful for policy analysts and stakeholders seeking to challenge smart city proposals and evidence of accountability from the city governments when new smart city projects are being proposed, or the performance of existing ones is being assessed.

Conclusions

To develop a properly calibrated classification of smart cities that could be used to inform public policy, an ideal scientific approach would be to use a randomised control trial for a group of cities, some of which implement a smart city project while others do not. The researcher could then track whether smart city projects make a difference to the quality of life, environmental performance, efficiency, competitiveness and other important dimensions of smart sustainable cities. Because smart city projects are a fairly recent development, such an evaluative approach would be difficult to operationalise.

This article argues that smart cities are currently driven mainly by utilitarian arguments (efficiency, saving resources). However, the technological focus of smart cities should not dilute the need for a coherent and meaningful conceptual understanding of the social world in which the problems exist that the smart city is trying to solve. Several candidate theoretical frameworks already exist (Anand, 2018): a sustainable city as a continuously improving city, in terms of social, economic and environmental dimensions; a just city where all resources are allocated or used on the principles of justice, equity and human rights claims; the city of capability approach, whereby a city strives to increase substantive freedoms for each and every citizen to be and to do what they value and have reason to value; an inclusive city, where all stakeholders, including future generations, have the agency to participate in and

shape the decisions of the city; and the social–ecological systems approach where members develop and implement rules for the management of a common pool of resources (Ostrom, 1992). Labelling a city can be the easiest and least costly way to stake a claim for changing the history of a city. Genuine interventions that alter the course of history take time, and usually arise in response to a crisis or to provide an innovative solution to a particular challenge.

When governments are developing smart city projects, their citizens and stakeholders can use the typologies here to avoid smart-washing and thus ask critical questions to ensure the projects are appropriately positioned. When seeking to emulate smart initiatives from pioneer cities, policymakers should be aware that such cities have undergone several iterations of institutional development and thus acquired enormous analytical capabilities. The success of aspirational cities can be attributed to the significant scale of activities in one or more skills and in their degree of industrial development. For most global cities, these examples are relevant but governments need to avoid what Clark (2016) refers to as being 'one trick ponies', meaning relying too heavily on one particular sector or activities. The meteoric cities provide an inspiration for smart city projects elsewhere because they suggest that, against all odds, it is possible to create successful city-based and city-focused smart city interventions that can be truly transformational. Choosing the right priorities, investing in appropriate technologies that address the local challenges or priorities, building local capacity, and creating a community of stakeholders are all essential to achieve success.

Eleven years after the publication of Hollands (2008), it is still appropriate to ask: 'would the real smart city please stand up'. Really smart cities would be those where healthy lifestyles are the default option; where clever design (informed by behavioural insights and nudging perhaps) promotes multiple uses of space by different types of stakeholders; where compassion, universalism and sustainability are embedded and promoted as the norms; or where integrity rather than corruption is 'the normal' (Anand, 2019). However, in a globalised economy where laundered and tainted money cannot be distinguished from other resources, it is not easy to ensure these conditions. Policymakers are required to provide a different kind of thought-leadership and to create multi-layered and citizen-based models of responsible, social and solidarity economies as the basis for citizen–business–government relationships.

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