Frontiers of Architectural Research xxx (xxxx) xxx

Higher Education Press

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.keaipublishing.com/foar

SOUTHEAST UNIVERSITY

RESEARCH ARTICLE

From smart to empathic cities

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Received 5 July 2020; received in revised form 14 September 2020; accepted 10 October 2020

KEYWORDS
Empathic city;
Smart city;
Wellbeing;
Neoliberalism;
Regenerative model

Abstract This paper acknowledges the contemporary neoliberal mode of operation of Smart Cities. The pitfalls of Smart Cities concerning its propensity towards techno-centric and efficiency-focused governance are identified, with diminutive emphasis on social equity and human-centric urban growth. Thus, the paper elaborates upon an alternative mode of person-environment-interaction based approach towards placemaking: Empathic Cities. This approach implies embracing a shift from efficiency to sufficiency and wellbeing embedded regenerative perspective for conceiving the built environment. First, the variable dimensions of urban growth and governance, which gave rise to the smart city, are contextualized. The embedded neoliberal operational agenda of smart cities are established. On this basis, the underpinnings of an empathic city are established by acknowledging the shift from techno-centric to human-centric and from product-based to context-based smart city and wellbeing perspectives. Strategies toward urban development are proposed, such as embracing a regenerative perspective wherein the city and its constituents need to be understood as interdependent systemic elements while embracing a human-centric and ethical approach. Additionally, a transition from efficiency to sufficiency-oriented practices and a shift towards inclusive modes of participatory governance are proposed as fundamental principles for an empathic future of the built environment.

1. Introduction

Cities today contain 55% of the population worldwide, and continually accommodate an estimated 1.5 million people each week through global migration and childbirth (UN, 2018). This figure is expected to reach the 68% mark by 2050 (UN, 2018), equating to almost 6.5 billion of the expected 10 billion people in the world. Megacities, with a population of over 10 million, have dramatically increased from two in the 1950s to the current 30, and is expected to rise to 43 by the year 2030 (The Economist, 2015). This soaring rate and desire for rampant urbanization, on the

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Peer review under responsibility of Southeast University.

https://doi.org/10.1016/j.foar.2020.10.001

Please cite this article as: Biloria, N., From smart to empathic cities, Frontiers of Architectural Research, https://doi.org/10.1016/j.foar.2020.10.001

one hand, contributes almost 75% of global Gross Domestic Product (McKinsey, 2016), but on the other hand accounts for the consumption of 64% of global energy production and the emission of almost 70% of greenhouse gases in 2013 alone (IEA, 2016). This lure towards city life, full of amenities and the dream of economic prosperity, also brings about devastating impacts on an already overburdened built environment in the form of multifaceted challenges such as transport congestion, lack of sufficient public spaces, environmental pollution, unethical socio-economic practices, and depletion of natural resources. These, in turn, directly impact the quality of life and wellbeing of residents of these so-called centers of opportunities and happiness. The two and half times increase in climate change-related disasters over the past 20 years (World Economic Forum, 2018), four billion tons of waste being dumped in our valuable oceans (National Geographic, 2015), 4.2 million deaths per annum due to ambient air pollution (World Health Organization, 2016) and almost 80% of urban residents being exposed to pollution levels above World Health Organization standards (World Health Organization, 2016), stand testimony to the impact of unfettered urbanization.

Alongside these developments within the built environment, the information and communication technology sector started its journey. The 1960s saw the rise of cybernetic thinking (Forrester, 1969) wherein experiments on ideas of optimizing city infrastructure and services via digital mediation were carried out with without much success. However, the widespread introduction of geo-information systems in the 1980s—1990s on personal computers, which were subsequently networked in the 1990s—2000s, opened up a new dimension in city administration, land-use regulation, and service management. The resultant transformation to e-government and e-governance (Castells, 1996) saw an increased infiltration of digital modes of service delivery and communication for the masses and the development of digital tools to manage citizen activities. Hardware and urban, social, political, and economic theory, and associated conceptual framing related developments came to the fore during the 1990s—2000s (Mitchell, 1995; Batty, 1997; Graham and Marvin, 1999; Ishida and Isbister, 2000; Komninos, 2002; Hanley, 2004; Shepard, 2011; Kitchin et al., 2015; Willis and Aurigi, 2017). In parallel, computational design evolved to give rise to bottom-up distributed systems (which further evolved to swarm and agent-based modeling) and Space Syntax with a focus on spatial analysis (John, 1995; Paul, 2010; Bonabeau et al., 1999; Hillier and Hanson, 1984). The steady progress in the integration of ubiquitous technologies, networked sensing systems, mobile information and communication technologies (ICT), and the Internet of Things (IoT) within our urban environment has slowly led toward rethinking the relationship between the digital and physical parts that form a city.

Interfacing this fast-paced development in the ICT and Urban Informatics space with the plethora of social, economic, spatial, environmental, and political issues that ensued from the growing trend of urbanization in turn resulted in the birth of smart cities. Urban big data and the opportunities that data science and IoT systems presented for managing and delivering effective solutions to complex urban problems propelled the smart city movement. In essence, smart cities deploy digital technologies to improve the lives of citizens by managing infrastructure and delivering services to enhance their efficiency and performance. Automating data capturing processes by deploying a range of sensors within the urban environment and using captured data as rational evidence for assessing existing urban policies thus became a quintessential agenda of the smart city movement (Kitchin, 2015). Based on these data-driven analytics, interventions were devised to manage and improve city problems. The city thus became prone to de-coding and realignment to function as an efficient machine. Many support the idea of measuring a city's performance in the form of key performance indicators (KPIs), thus quantifying and in a certain sense simplifying the inherent complexity of the city (see Giffinger et al., 2007; Caragliu, del Bo, and Nijkamp 2011). Defense of such KPI-based indexing of cities — "offering a sense of certainty and standardization" — along which the performance of multiple cities can be measured, reported, and compared with the sustainable development goals of the United Nations (United Nations, 2017) has prevailed.

Governments worldwide have taken these scenarios into cognizance. A techno-centric governance approach, most prominently propelled by the smart city and intelligent city movements, is embraced as a solution to addressing complex urban problems. This approach, apart from equating urban problems with technological ones, tends to grant overt control to high-tech industrial economies. Thus, privatization and vested interest-based investments increase, resulting in social inequality and unethical practices (Greenfield, 2013; Kitchin, 2014a). In addition, such inclinations invariably lead to embracing 'efficiency,' which is within reach of technology while excluding actual people and their problems, which are beyond the reach of technologies. This scenario further brings into question how human conditions are understood as a critical parameter for understanding and shaping the urban environment. Understanding wellbeing from a holistic perspective and truly embracing human-centric strategies that are inclusive and equitable thus become lost within a neoliberal mode of operating the city.

2. Methodology

This paper, apart from serving as a critique of the smart city momentum, elaborates upon an alternative mode of person—environment—interaction based approach towards placemaking to conceive Empathic Cities. This mode of thinking to understand and develop a city implies embracing a paradigm shift from 'efficiency' to a 'well-being and livability' perspective, wherein human outcome-driven methodologies are the fundamental focus.

The overall methodological approach of this study is thus threefold. First, this study critiques the contemporary operational mechanisms and ethical erosion perpetuated under the Smart Cities banner, categorizing such techno-centric modus operandi as a Neoliberal agenda.

Second, given this reflection, parallels are drawn between the generations of smart cities and of wellbeing. Simultaneously, this study refers to a conceptual smart city

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framework and traces the evolution in smart cities as a quintessential criterion for conceiving contemporary cities. Selected smart city developments globally are also evaluated based on the technology, community, and policy drivers of the smart city framework, thereby categorizing them within the aforementioned evolutionary track.

Lastly, this study presents a case for three fundamental principles for developing Empathic Cities. These principles are connected with four smart city assets (economy, society, environment, and governance) extracted from the same smart city conceptual framework. These assets directly interface with the aforementioned smart city drivers, thus influencing the manner in which urban development can become holistic and equitable. Therefore, re-conceptualizing these assets is of prime importance in enabling an empathic approach for redesigning cities. Concluding remarks and discussion pertaining to this reconceptualization are indicative of a shift toward the adoption of empathic design practices.

3. Neoliberal smart city

Neoliberalism is commonly used to define an economic system wherein the state transforms its role from a public welfare provider to a market promoter, with competition becoming the mantra for its justification. This competition fueled free market to extend into and affect our public and personal lives. Impacts include selling off public assets to private corporations, cutting trade tariffs, rising rents, smashing of trade unions, deregulation, and glorifying competition rather than equitable social and economic access to all as the prime purpose of human relationships. In this process, citizens become pure consumers, with buying and selling of goods and services becoming an expression of democratic freedom. The all-powerful 'market' thus becomes a defining entity that can deliver any and every benefit for citizens to experience. Any revolt or questioning of the agenda and implications of this 'market' by societal factions or by organized public bodies is thus considered market distortions. Equity and accessibility have slowly and naturally declined with the slow but inevitable privatization of essential urban services such as energy, water, transportation, health, education, and infrastructure. Examples of such privatization abound. For instance, Brazil saw 65% increase in electricity costs for residential consumers owing to the privatization of electricity in the late 1990s (Ofu, 2004). Similarly, water commercialization in Ghana in the mid-1980s and early 1990s further contributed to the poverty context of citizens (Ofu, 2004). Privatization of education that comes with increased prices resulted in class segregation and propelled inequality rather than the original purpose of public education, that is, social equity and high living standards. Costa Rica (Espinosa and Santos, 2008), Chile (Torche, 2005), Nepal (Subedi et al., 2014), India and Pakistan (Aslam and Atherton, 2014) are a few of the many countries that have witnessed such social concerns related with the privatization of education. Such privatization of the specific assets of our fundamental rights as tax-paying citizens are now treated as investments, which, rather than aid us in being productive and healthy, transform us into rent payers to receive these very services.

As significant playing fields for attracting capital by encouraging commodification of our resources, cities are an integral target of this neoliberal mode of operation. Thus, citizens naturally end up filling the coffers of a select few who favor economic profits over improving the human condition (Brenner et al., 2012). In turn, this attitude results in self-inflicted social inequality and acceptance of social stature with a focus on survival rather than on enhancing wellbeing. Smart Cities, within this context of neoliberal modes of governance, extend a techno-centric vision as an all-encompassing solution to social, political, economic, and spatial problems. However, of notable importance is that technology providers and corporations that head such propositions are in fact intrinsically embedded within the same neoliberal agendas, which ultimately tend to impact the lives of citizens. The urban data that such organizations thrive on, however, is also subject to dispute with significant research concerns that need acknowledgment.

Researchers disagree that the collected city data are neutral and always reflect the real truth about our cities (Gray et al., 2016). Data, irrespective of its method of collection, are always embedded within political systems within which information is generated, processed, and analyzed. The nature, interpretation, and presentation of data are thus almost always conditioned by collection, processing, and analysis instruments, which may or may not be engulfed within the neoliberal agenda, such as Raw vs. Cooked data (Bowker et al. (2013)). This conditioning is often the case given that governmental bodies (local, state, or federal), owing to their lack of technical competence/know-how, often fall prey to developing policies and roadmaps for smart cities that are influenced by the industry competence and embedded business models. Technocratic modes of governance, which in essence are influenced by such deep-rooted networks of industry and government, thus tend to be projected as the next wave of advancement and innovation aimed at solving all urban problems. Kitchin therefore argues (Kitchin, 2016) that the central challenge for urban practitioners is to research and explore city-data mechanisms and how they can be grounded on principles rather than politics or economic motives (created by sectors that stand to benefit from their adoption). Similarly increasingly apparent is that this new trend of glorifying and holding collected city data to the highest value is propelled by global corporations (such as IBM, Cisco, Siemens, and of late, Google). This tendency can be to promote the adoption of their propriety ICT frameworks, standards, enterprise solutions, and valuable digital data storage space (Wilson 2015). Associated vendors have an active role in the promotion and creation of such systems, thus contributing to this techno-political system of city data supply. Thus, the state slowly but steadily loses power and service of their fundamental duty to provide appropriate services to enhance the wellbeing and livability standards of citizens. In itself as a techno-political market, the city is being slowly subdivided (initially with the idea of running test beds and smart urban living labs within city districts) through the rising wave of privatization of essential infrastructure, land, and services.

Apart from these economic and political dimensions, a growing concern revolves around the ability of civic

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authorities to truthfully protect the individual rights of citizens while maintaining ethical city data practices. Exponential ICT developments and associated computer and information ethics research simultaneously raise concerns over the ethical use of hardware and communication technologies. Issues concerning privacy, geo-surveillance, social profiling, nudging, control-based governance, and gentrification are all interlinked ethical violations that come as a by-product of this so-called 'smartification' of cities. Floridi and Taddeo argue that hardware per se is not the root cause of these ethical problems, but rather the hardware combined with software that primarily produce data-carrying human footprints are responsible (Floridi and Taddeo 2016). Unpacking the ethics of city data (generation, recording, curation, processing, dissemination, sharing, and use), algorithms (artificial intelligence and machine learning), and of practices exercised by city governments and commercial entities are critical issues that need investigation. In addition, city authorities need to understand and unravel the classic trap of insurgence set up by corporates to slowly infiltrate city districts — from setting up proprietary technologies within smart city test beds to slow infringement of buying and owning property to apply their tested technologies and ultimately acquire control over districts, including owning relevant data sets. As Kitchin points out, these tendencies can already be witnessed from the non-transparent and closed nature of collected urban data (concerning analytical methods, algorithms, shortfalls), which remain behind closed doors of organizations that undertake the data collection, analysis, and predictions (Kitchin, 2015). Another critical factor for citizens to note is that, with the diminishing power of elected city government bodies, votes and democratic rights also begin to diminish in value. We must also become aware that, now more than ever, people occupy space within a surveillance society. A society where fitness apps, CCTV cameras, traffic cameras, smart bins, and smart lights with embedded WIFI sniffers, and smart mobility cards continually capture and route our data to various organizations. These organizations may also financially profit by selling our digital footprints. This loss of privacy is of growing ethical concern, and the adoption of best practices that recognize associated digital, social, and economic risks in acquiring ethical city data therefore need urgent investigation.

4. Toward an empathic city

Given this context of the neoliberal existence of smart cities, this paper now frames the foundations for conceiving an Empathic City — a city with Person—Environment Interaction at its core and the 'wellbeing' of its citizens as a critical component of its responsibility. This can be achieved by understanding three evolutionary phases of thinking within the Smart City and Wellbeing domains. This paper presents a 'system of systems' conceptual framework for smart cities to evaluate and situate smart city case studies in the evolutionary phases of smart city development. The evaluation is presented in tabular form (Table 2) and is based on three core drivers of the selected framework: technology, community and policy.

4.1. Evolution in smart city thinking

After reflecting on the implications of the neoliberal mode of operation on smart cities, understanding if smart city projects generate desired outcomes at the economic, societal, environmental, and governance front in a sustainable and balanced manner becomes of considerable value. Yagticanlar proposes the following four factors, modes, and resultant benefits that should underlay successful smart city propositions (Yigitcanlar, 2016, 2018) (Table 1).

Yagticanlar argues that multidimensional frameworks are critical for developing a holistic smart city. Multidimensional frameworks have been developed (Angelidou, 2015; Caragliu and Del Bo, 2012; Errichiello and Marasco, 2014; Fernandez-Anez et al., 2018; Joshi et al., 2016; Kummitha and Crutzen, 2017; Lee et al., 2014; Manville et al., 2014), but tend to either lack the underlining relationships between smart city domains or end up becoming too abstract for the quick adoption of local planning authorities. In general, these frameworks lack a system of systems view (McLoughlin, 1969). After consideration of the multidimensional models of the aforementioned research, the present study selects a recent multidimensional conceptual framework of Yigitcanlar (2018). This framework not only incorporates a system of systems view but also interfaces smart city frameworks and sustainable urban development (Fig. 1). Details about each framework

Table 1 Development factors, modes and benefits for smart city development.

DEVELOPMENT FACTORS	MODE	PROPOSED BENEFIT
Economic development in smart cities	Provide opportunities to develop custom solutions for developing technologies which address a cities unique developmental problem and needs	Establishing a local innovation economy and associated prosperity
Sociocultural development in smart cities	Develop technologies to be inclusive in nature and thus able to serve the elite as well as the less fortunate	Enhancing socioeconomic equality
Spatial (urban and environmental) development in smart cities	Use sustainable urban development principles	Generating ecological sustainability
Institutional development in smart cities	Equip cities with dynamic mechanisms to manage growth as well as everyday challenges	Appropriate planning, development and management practices

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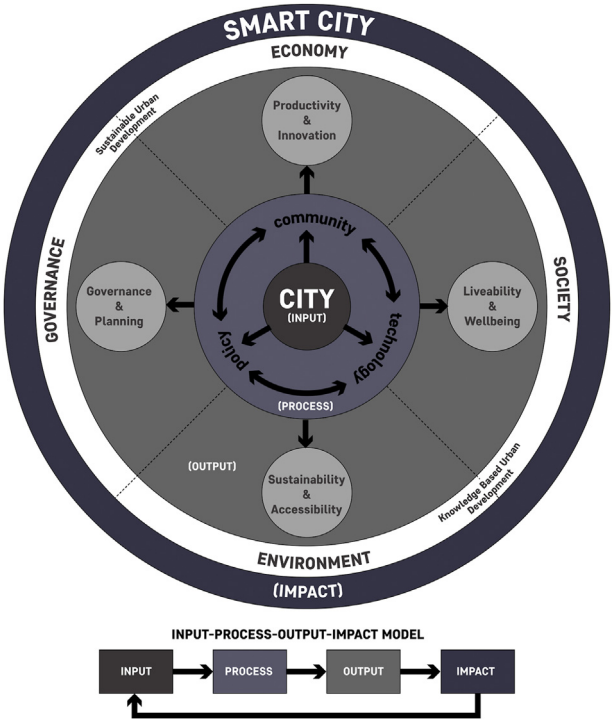

Fig. 1 Smart city conceptual framework derived from Yagitcanlar (Yigitcanlar et al., 2019a).

component and the workings can be found in literature (Yigitcanlar, 2018; Yigitcanlar et al., 2019b).

The framework presents a clear input-process-output-impact logic establishing clear multi-scalar interdependencies between framework components. Critical drivers of technology, policy, and community are established and interconnected with strategic outputs. These factors are further informed by key assets of the city, namely, economy, society, environment, and governance (also outlined in Table 1). Interestingly, within this framework, 'technology' is perceived as an enabler to achieve desired outcomes rather than becoming an end goal in itself, thus supporting the argumentation in Section 3. The 'community' driver also supports this argumentation and opposes corporate takeovers and data ownership, proposing the wider community to become active users and developers of the smart city. The 'policy' driver is also seen as crucial and comprises a bottom-up approach towards appropriately developing planning, development, and management practices. These three drivers (technology, policy, and community) become critical parameters for evaluating case studies of smart cities worldwide. The results of this evaluation are used to classify smart cities in distinctive categories, each influenced by specific modes of thinking (Table 2). Three distinct categorizations demarcating different genres of thinking and operation of Smart Cities can be mapped as follows: Smart City 1.0: Technology-driven city; Smart City 2.0: Technology-enabled city-led city; and Smart City 3.0: Citizen co-creation driven city.

First genre: Smart City 1.0, can be directly associated with a technology-centric agenda propagated by large scale multinationals such as IBM, Siemens, and Cisco, to promote their ICT solutions to governmental bodies. A corporate—commercial model that is usually packed with the allure of job creation boosts the technology innovation sector and provides opportunities for start-ups to emerge. This model is promoted as an overarching package to city governments. IBM, the primary promoter of this ideology, through its 'Smarter Planet—Smarter Cities' initiative (Palmisano, 2008), are progressively attracting multiple commissions with various cities worldwide to set up their 'smart' vision. Technology thus gains prime importance and is positioned as a solution provider for all urban problems. However, developments propelled by this (neoliberal) model face various opposition from the research community. This opposition is based on the fact that such private investment fuel technology-centric initiatives failure to understand the city dynamics and its interaction with citizens (Aurigi, 2006; Graham, 2000; Söderström et al., 2014; Townsend, 2013). In addition, multiple examples of such initiatives give rise to the so-called 'Empty Cities' such as PlanIT in Portugal, Songdo in Korea, and Masdar in UAE, to name a few. However, despite these opposing views and apparent failures, Smart City 1.0 initiatives prevail and continue to feed the neoliberal agenda.

Second wave: Smart City 2.0 sees a technology-provider led to a city-led evolution. This approach implies the city administrators be responsible of decision-making pertaining to the deployment of technological solutions intertwined with the direction that city officials decide to take. Damieri, Cocchia, and Kitchin, to name a few, have written and critiqued this approach from the standpoint of 'Top-Down' urban planning perspective (Dameri, 2013; Kitchin, 2014b). The problem with this wave of development is the lack of public participation and, once again, the increased reliance/influence of technology providers, which then portray city administrators as all-knowing decision-makers who govern the meaning of citizen wellbeing. A prime example of this category is IBM and its engagement with the Mayor of Rio for deploying IBM's proprietary smart city solutions within the city to monitor landslides and crime detection at its Center of Operation facility. The fundamental issue behind this mode of operation is the lack of participatory and co-creation mode of city development, which impacts critical consideration of ethical implications on the very citizens for whom such expensive technological investments are made.

Third genre: Smart City 3.0 tries to comprehend the shortfalls of the earlier waves (not to say that these are not operational in the current context) and aims to embrace a citizen co-creation ethic. In this newly induced thinking, both governmental bodies and citizens co-create solutions for issues concerning city growth and socio-cultural associations. Cities such as Amsterdam (https://amsterdamsmartcity.com/), Vienna (Vogl), Vancouver (City of Vancouver), Medellin, Columbia (Freedman, 2019), San Francisco, and Barcelona (Barcelona city council) have set examples of ingenious urban regeneration. These strategies engage citizens from even the most vulnerable neighborhoods to produce socially responsive urban inserts and innovation districts. Thus, such is the first time that a transition in city governance, which willingly embraces the community and an anthropocentric vision of smart cities rather than a hyper-modernist technology-centric city,

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begins to surface. A trend that slowly moves toward collectively understanding and addressing 'wellbeing' is gradually emerging.

To strengthen this categorization of smart cities genres, this study further refers to previous findings (Yigitcanlar et al., 2019a) for evaluating prominent case studies mentioned per genre using the aforementioned smart city conceptual framework. Technology, policy, and community drivers are specifically used for the evaluation. Table 2 presents the categorization of the chosen cities into the aforementioned genres based on the abovementioned three drivers.

4.2. Wellbeing as a key criterion to attain urban sociability

To truly embrace the novel shift in thinking (from Smart Cities 1.0 to 3.0), understanding the concept of 'wellbeing' and in parallel comprehending a similar shift that wellbeing has witnessed: from product to context-based wellbeing is important. At a broad level, wellbeing refers to citizen capacity to live healthy, creative, and fulfilling lives. Terms such as 'quality of life,' 'happiness,' and 'life satisfaction' are often connected with wellbeing (Ballas, 2013; Dodge et al., 2012). Mental health and wellbeing are also intricately linked in research concerning the urban context; health and comfort or health, comfort, and happiness are also combined as determinants of wellbeing (Bluyssen, 2010; Bond et al., 2012; Evans, 2003; Koohsari et al., 2013). However, within the urban context, this definition has also undergone transitions, expanding 'beyond life satisfaction' to meaningful interaction between individuals and their social and physical environment. This definition implies considering cognitive, physical, and mental health alongside meeting basic everyday needs.

To date, two conceptual approaches of understanding wellbeing persist: the Objective approach defines wellbeing in terms of quality of life indicators such as material resources, income, and housing, alongside social attributes such as education, health, and social networks (Sen, 1973, 1992, 1999); and the Subjective approach that focuses on individual subjective evaluation of life and that can also be categorized via behavioral and social science into 'Hedonic' and 'Eudaimonic' wellbeing (Deci and Ryan, 2008; Ryff and Singer, 2008). Herein, Hedonic wellbeing relates to happiness and perceived quality of life, measured using subjective overall life evaluations. By contrast, Eudaimonic wellbeing relates to a fuller psychological concept of one's life purpose and individuals having the capabilities to function adequately to this end — known as self-determination (Ryan and Deci, 2011) or flourishing (Marks and Shah, 2004). Notably, until the end of the 20th century, the GDP index was considered as the objective measure to evaluate the wellbeing of a country. Only in 2011 did the commissions of measurement of economic performance and social progress initiate an 'OECD Better life index' (Ballas, 2013). The index is primarily built on the argument that life is more than GDP figures. Thus, this index evaluates other aspects of wellbeing such as health, safety, happiness, and life satisfaction (Evans, 2003), and thereby combines both objective and subjective modes of understanding wellbeing.

As a comprehensive body of tangible and intangible amenities, services, socio-cultural, and socio-economic opportunities provider, the city certainly plays a vital role in shaping both objective and subjective wellbeing. However, transitioning towards an environmentally, socially, and economically sustainable lifestyle, to be achieved via the concept of wellbeing, can be seen as a parallel development to the aforementioned evolution in smart city thinking. Thus, for the sake of this paper, wellbeing is categorized into three categories: Product-based, Access-based, and Context-based.

Product-based wellbeing primarily focuses on the virtue of 'products' as a materialization of otherwise complex service/task (e.g., from laundry service to a home-owned washing machine). This move towards a product-oriented provision of wellbeing, embedded within an 'individual processing' phenomenon, has been prevalent since the beginning of the industrial era and has been fueled by a capitalist mode of operation with a vested interest in understanding citizens as consumers. This phenomenon, in turn, not only results in social inequity (the ones who can afford high-quality personalized products vs. the ones who cannot or settle for lower quality goods) but also in equating life choices and standard of wellbeing with the freedom of choice, which in this case is directly related to the ability/freedom of buying. However, this mode of wellbeing is both environmentally and socially unsustainable, despite the attempt of technical production processes and eco-friendly materials to the environmental footprint and exhaustion of natural resources considering our insatiable desire to surround ourselves with products. The concept of consumption and acquisition, which equates the standard of living with one's ability to possess more products to enhance personal wellbeing, begs the question if our planet can sustain the aspirations of 6—8 billion people worldwide.

The subsequent rise of the knowledge economy and the information era over the last two decades further reconceptualized wellbeing. This era of an economy based on services, experience, and knowledge has slogans such as 'from consumption to experience' (Pine and Gilmore, 1999) and 'from possession to access' (Rifkin, 2001) as the mantra. Access-based wellbeing thus became the norm, with its core ideology of provision of access to services, experiences, and intangible products rather than the acquisition of material products. In this genre, quality of life is linked with the quantity and quality of services and associated experiences that one can access and the level of freedom associated with such access. However, Manzini (Manzini, 2001; 2003) states that this mode of wellbeing, apart from enhancing our desire to satisfy intangible needs, can simply be seen as an add-on layer to the perpetual desire for the material rather than substituting the acquisition of the material/product. In addition, the resultant flexibility and pace of life brought about by this information era demand a corresponding speed and agility of access to services, which in turn imply a more intensive material process to deliver services. If seen from the perspective of sustainable wellbeing, the entire process behind access-based wellbeing can thus be argued to have an inconsequential impact, a reflection that can also be termed as the rebound effect.

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Table 2 Literature review based smart city analysis using the technology, community and policy drivers to determine categorization per smart city genre.

Smart City Drivers			Smart City Genres
Technology	Community	Policy	
Songdo, Korea			
• Collaboration between real-estate developers, technology corporates, and local government (Yigitcanlar et al., 2019a,2019b). • State of the art technology for security, connectivity, energy, and waste used in all high-rise towers (Lobo, 2013) • Ubiquitous broadband connections throughout the city (Strickland, 2011). • City conceived for the promotion of high-tech industries (Bio, Nano, Information, Ubiquitous technologies and RFID) (Townsend, 2013).	• Top down development model (Yigitcanlar and Lee 2014). • Local Socio-cultural context neglected in favor of attracting international businesses (Millar and Ju-Choi, 2010). • Smart city planning devoid of community participation (Lee et al., 2008). • Inequitable city with a focus on attracting the affluent class (Benedikt, 2016).	• Top-Down policy making practices with a focus on technocratic solutions (Yigitcanlar et al., 2019a,2019b). • City developed on sea reclaimed land with repercussions on natural ecology (wetland and rare species) (James, 2016). • Increase of urban footprint via reclamation instead of retrofitting of existing cities (Yigitcanlar et al., 2019a,2019b). • Marketed as a sustainable city with a combination of sustainable design principles and cutting-edge urban technologies (Shwayri, 2013).	1 2 3
Masdar, UAE			
• City administration led initiative with technology and innovation sector conceived as primary economic generators (Yigitcanlar et al., 2019a,2019b). • High-tech mobility solutions developed for catering to transportation needs (Kamel, 2013). • Extensive use of solar panels (dedicated solar farm + rooftops) - 40% less productive owing to dust storms (Crot, 2013). • Planned to deploy autonomous vehicles to reduce car reliance - discarded since it could not meet the city's demands (Cugurullo, 2018). • Sensors systems for saving water and electricity (Hopwood, 2010).	• Initial conception of the city purely focused on economy driven challenges. • Local Socio-cultural context neglected in favor of attracting international businesses (Millar and Ju-Choi, 2010). • Smart city planning devoid of community participation (Lee et al., 2008). • Inequitable city with a focus on attracting the affluent class (Cugurullo, 2013). • The city is now diversifying to cater to other environmental and resource efficiency challenges (Cugurullo, 2016).	• Top-down planning policy and design approach (Yigitcanlar et al., 2019a,2019b). • Use of traditional urban form and architectonics for reaching a sustainable design goal (Hassan et al., 2016). • Strong link between environmentalism and consumerism (Cugurullo 2016). • Economically unfeasible development which capitalizes on environmental concerns to generate profit (Cugurullo 2016). • City not able to attract innovative industries as expected (Mezher et al., 2011)	1 2 3
Amsterdam, The Netherlands			
• Technology not central to the development of the city (Van Winden et al., 2016). • Proliferation of bottom-up Living labs to encourage participation of local communities (Van Winden et al., 2016). • Companies allowed to test Beta versions of their products via Living labs and pilot projects (Van Winden et al., 2016). • High number of sensors, actuators, digital networks, and infrastructure could become a cause of concern with the data quality, fidelity, security, management, and validity of urban analytics (Kitchin et al., 2015).	• The platform works with over 80 partners from multiple disciplines (Yigitcanlar et al., 2019a,2019b). • Projects cover a wide area ranging from living, working, mobility, public space, and open data initiatives (Dameri, 2014). • Initially top-down in nature which quickly transformed into community involvement as an integral aspect of all projects (Mora and Bolici, 2015). • Bottom-up technical solution development via pilot-testing and analyzing acceptance levels in the community (Van Winden et al., 2016).	• Focus on boosting local economy and environment using high-tech infrastructure to reduce emissions by 40% by 2025 (Dameri, 2014). • Cross EU collaborations in order to distribute and receive knowledge in an open and transparent manner (Manville et al., 2014). • Open data policy allows data to be shared democratically. • Encourages active mobility and has gained the status of the most walkable and cyclable city in the world (Lehmann, 2016). • Policies are geared towards enhancing urban green and livability.	1 2 3

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Table 2 (*continued*)

Smart City Drivers			Smart City Genres
Technology	Community	Policy	
	• Evolved into a facilitator for smart city community in Amsterdam (Van Winden et al., 2016).	• Policies adopt a retrofitting approach for developing the Amsterdam Metropolitan Area. • Integration of economic, societal, environmental, and technological goals (Yigitcanlar et al., 2019a,2019b).	
San Francisco, USA • Global trendsetter for urban technology initiatives. • Multiple smart-energy applications that share knowledge on energy harvesting potential, energy spending, energy saving (SF Energy Map, Energy use Challenge, Honest Building platforms) (Dahlquist and Fell, 2015). • Smart mobility initiatives, including ride-share and shared autonomous vehicles, to enhance sustainable mobility practices (Davis, 2018). • Multiple electric charging infrastructure as well as online platforms to encourage electric vehicle usage and communicate charging station locations respectively (ChargePoint app). • Smart parking made readily available to all citizens in order to reduce traffic congestion and pollution (SF Park app) (Yigitcanlar et al., 2019a,2019b).	• Urban ecosystem for accelerating smart and sustainable urban development. • Highly accessible and free technology applications for improving mobility behavior (Brown et al., 2011). • Affordable housing remains a challenge owing to the influx of technology companies in the city. Equitable access to resources is thus a challenge which still needs to be addressed (Palm and Niemeier, 2017).	• Policy geared towards enhancing smart and sustainable urban development (Lee et al., 2014) • Waste reduction projects through local level participatory initiatives has resulted in 80% waste diversion rate (Kaufman et al., 2010). • Open data policy allows for democratic and equitable access of non-confidential data to citizens via e-government portals. • Living innovation zone initiatives allow for companies to test and trial new technology ventures in the city (Canellakis et al., 2017). • Social policies and housing affordability are issues which need attention (San Francisco Planning, 2020).	**1** **2** **3**
Rio de Janeiro, Brazil • City promoted technologically intensive development approach (Gaffney and Robertson, 2018) • Top-down decision-making processes in direct coordination with technology companies. • Two smart city operations centers (Enbysk, 2013): CICC-RJ (jointly financed by the Ministry of Justice of the State of Rio de Janeiro and the federal level Extraordinary Secretary for Mega-Event Security) and COR, contributed to Rio winning the title of 2013 smart city of the year. • The operations centers are purely state level institutions with no extensions beyond Rio de Janeiro city (Gaffney and Robertson, 2018). • Extensive installation of CCTV cameras, GPS, and video monitoring in police cars (Gaffney and Robertson, 2018).	• Lack of integration with the urban context (Gaffney and Robertson, 2018) • Fortified set up of the operations centers portrays a controlling image of Rio's security forces over the underprivileged population (Gaffney and Robertson, 2018) • Brazilian IT companies were favored in order to boost local economy • Data strictly for city officials with no public access/transparency available (Gaffney and Robertson, 2018). • Non-participatory nature resulting in inequity and mistrust with citizens (Nunes, 2014).	• Governance policies and strategies adhere to entrepreneurial management, city marketing, privatization, and technologizing of urban systems (Brownill et al., 2013) • Primarily city led initiative with technological accumulation concentrated in the hands of city managers (Gaffney and Robertson, 2018). • Owing to the state level focus only, the center had negative effects on security in peripheral regions (Rio's suburbs and interior cities) (Da Silva, 2013).	**1** **2** **3**

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However, in both these wellbeing genres, the direct or indirect focus is still on the 'product,' with their rebound effect showcasing its impact on maintaining an environmentally, socially, and economically sustainable lifestyle. In this mad rush to surround oneself with products and access to services, the fundamental 'local common goods' (goods that belong to all citizens alike) have been forgotten (Manzini, 2001). These goods range from essential physical resources such as clean air and water, social resources such as a neighborhood with embedded civic behavior, to complex resources such as sociable urban open spaces and equitable security for all. The neoliberal agenda continues to entice us to lead a highly tangible lifestyle wherein individual gains tend to trump the increasingly urgent need to focus on enriching local common goods that are fundamental to wellbeing.

Context-based wellbeing is born from this realization of the degradation of local common goods as a result of our choices and the increasing marketization/privatization of common local goods (as discussed in Neoliberal smart city section). Smart cities and their technocentric focus further lead to an increased reliance on so-called 'remedial goods'. This reliance tends to proliferate monitoring and data storage, processing, and communication rather than remedying the urban problem and the root cause of the deterioration of local common goods. In this scenario, evaluating and reconsidering what constitutes the context of wellbeing and, more importantly, giving priority to the enhancement of local common goods in an equitable fashion while sustainably addressing access and product-based ecosystems become critical.

5. Fundamental pillars of an empathic city: a critical discussion

This paper thus far presents a concise outline of the impacts of neoliberal agenda on how cities and their intricate operations/services are structured, sold/privatized, and governed/outsourced. Simultaneously, the discourse on the transition from a techno-centric Smart City perspective towards an Empathic City can also be implicitly perceived from the attitudinal change toward acquiring a human and context-centric focus within the domains of city planning and wellbeing. A human-environment-interaction based context thus emerges as a strong underpinning for the Empathic City. However, this context also implies rethinking the conceptual smart city framework (Fig. 1). Specifically, the assets (outer ring of the conceptual framework in Fig. 1) of a city in the framework comprising an economy, society, environment, and governance, are worth rethinking. These assets directly interface with the aforementioned drivers and are thus critical to be re-conceptualized to conceive a holistic approach towards developing our urban environment. The following sections attempt to re-conceptualize how these assets can be framed to create ethically inclined input conditions for the three primary drivers of technology, policy, and community. A regenerative perspective towards economy, environment and governance is proposed in 5.1. This is further strengthened by the argumentation for a shift from efficiency to sufficiency, with a focus on environment and society. Finally, a shift from being exclusionary to becoming inclusive is proposed to strengthen society and associated governance practices.

5.1. From neoliberalism to a regenerative economics proposition

Neoliberal capitalism can be concluded as an extractive economy from our earlier discourse on the Neoliberal Smart City and the techno-centric mode of governance and operation, which it propagates. In other words, this extractive mode of economics considers local, regional, and national economies as sources of wealth (resources, money, labor) to build strength and power by concentrating resources. This scenario further results in unequal distribution and accumulation of wealth and power (as seen with the increasing privatization of basic resources) while temporarily creating a bubble of prosperity (in this case via technological prowess). However, in reality, this leads to an even more fragile economy that is inherently inequitable in the long term. More importantly, this phenomenon can be further linked with 'Uneconomic Growth,' which, per human development theory, welfare, and ecological economics, can be termed as economic growth that reduces the quality of life (Daly, 2007; Elgar and Daly, 1999).

In contrast to Neoliberalism, Regenerative economics works towards regenerating capital assets that provide goods and services required to or contribute toward wellbeing (Goerner, 2015). The focus is on principal or original capital assets (similar to the notion of minimum common goods discussed in 3.2), such as the Earth, Air, Water, and Sun, to counter the impacts of Uneconomic Growth. This economic mode also aids in developing internal capacities and capital, particularly pertaining to humankind, to maintain long-term vitality and wellbeing. With a risk-mitigating and solution-seeking nature at its core, institutions that embrace this economic mode tend to eliminate risks before their occurrence. The human-centric nature of this economics propels nurturing human networks and finds value in harnessing individual capacity to identify risks, develop solutions, and gather resources for implementing the solutions. This focus on developing human networks and capabilities can subsequently prove fruitful for transforming resources into social, environmental, and economic value-added offerings (Jacobs, 2016; Sen, 2001). Attempts to reorganize known economic factors into the role of regenerative economics within an Empathic city can be three-fold:

a. From siloed to systemic thinking: rather than the Neoliberal conception of economies constituting independent agents with siloed self-interests (as seen from the privatization of our resources), the Regenerative economy view proposes understanding economies as a network of interdependent agents bound in a common cause of social, environmental, and economic wellbeing. This change in thinking implies embracing circular value-chains, which primarily focus on lasting constructive practice rather than on short-term monitory gains. From 'how much money' to 'where the money goes' to create lasting holistically, beneficial impacts can thus become

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the new mantra (Goerner, 2015). Thus, this study proposes a systems-thinking approach with a purposeful integration of constituting agents necessitates a focus on the whole rather than parts of the economic system. This focus implies that the various economic sectors have to rethink how to work collectively rather than being interested in self-glorifying data profiles of their own operations and impacts. More importantly, focusing on cross-scale alignment and integration is critical to counter the critique of scalability associated with the regenerative economy. This mode of operation ensures the equitable integration of voices/demands and concerns from the local to the global scale, thus aiding in devising holistic solutions rather than creating band-aid solutions that do not understand the complexities underlying urban problems.

b. From technology-centric to human-centric: The discourse on the Neoliberal Smart Cities and Wellbeing highlight the increasing influence of technology-centric thinking, which is further intertwined with the attainment of economic gains, often creating inequitable societies. However, within this newfound affection for techno-centricity, the real value source that brings about economic vitality within urban environments - 'the Human'- is often forgotten. As opposed to this capitalist mode, Regenerative economics adheres to a human-centric vision that, rather than purely focusing on technological capacity, believes in addressing and enhancing human, social, cultural, intellectual, financial, material, and living capacities (Goerner, 2015). This focus on humans is critical in the contemporary context to produce citizen-centric urban growth, which is sustainable and genuinely responsive to our needs. Technology within this context can start acquiring the role of technological sovereignty that serves residents and can be owned as a local common good rather than a proprietary commodity that profits individuals. Understanding the importance of citizens, communities, co-creation, participation, and social innovation as quintessential components that contribute to vibrant urban development is thus crucial for developing human-centric Empathic Cities. Developing collaborative organizations, reducing the price of associated basic common goods, and the slow but sure decline for the privatization of natural resources, while providing citizen engagement-based decision-making power to local governments/councils, are examples of the possible impacts of harnessing such an empathic future.

c. From self-centered to ethical: The Empathic City framework is incomplete without ethical grounds pertaining to social justice, equity, fairness, efficient and circular use of resources, freedom, and democratic participation. This attitude implies reconsidering selfish economic gains and proprietary rights-based approaches usually propagated via the techno-centric mode of governance and operations in contemporary smart city projects. As opposed to the siloed thinking suggested above, the systemic approach also implies ethical behavior to prevail at the individual organization level and at the interdependencies established between each organization that is a part of the regenerative model. Holistic wellbeing via healthy collaboration within ethical grounds is thus critical for outlining a common cause, culture, and value systems that constitute an empathic city.

5.2. From efficiency to sufficiency

The insatiable urge to improve the efficiency of services under the smart city paradigm increasingly leads to a siloed mentality, wherein objective operational parameters acquire priority over human-centric participatory modes of dissecting urban problems. A change in thinking that embraces the idea of 'Sufficiency' as opposed to 'Efficiency' can become a turning point for embracing an empathic approach towards city development. Sufficiency can be described as the quality or conditions of being sufficient while Efficiency can be defined as the extent to which time is well used to perform an intended task. Kris De Decker (Decker, 2018), while investigating one of the primary industry sectors of energy, concludes that even after the development of efficient products and energy-efficient homes, the amount of energy consumption increases more than ever. This fact is the rebound effect of energy efficiency, which states that improvements in energy efficiency often encourage greater use of the services that energy helps to provide (Sorrell, 2007). De Decker links this effect to the measurements of energy savings and efficiency, and terms this phenomenon as 'Avoided Energy' — the energy resources not used because of advances in energy efficiency. However, "energy savings" is not defined as a reduction in actual energy consumption compared with current or historical figures, but rather as reductions compared with the projected energy use. Ironically, instead of measuring the success of efficiency by factually recording lower natural resource consumption, projecting future energy usage higher than current usage implies that current policies already agree that despite claims on energy efficiency, total energy consumption rate continues to increase.

By contrast, Sufficiency focuses on absolutes (for instance, reduction of carbon and fossil fuels) (Harris et al., 2008) or rather 'creation of conditions' that reduce natural resource consumption, thus maximizing opportunities for directly and indirectly impacting personal wellbeing. These conditions can involve service reduction and substitution strategies in the form of participatory urban planning for developing optimal service infrastructures, bottom-up citizen-centric urban regeneration initiatives that encourage active mobility, community-owned resource maintenance and sharing opportunities, population of the correct mix of economic opportunities and health and wellbeing resources (that can operate in a circular manner), inculcating respect for environmental conservation, and ethical and inclusive policy-making initiatives. Defining contextually appropriate sufficiency policies and measuring their impact through observing and evaluating human thinking and actions can undoubtedly aid in shifting from the purely economic efficiency-enhancing attitude of alleviating otherwise unsustainable services. Possibly of greater significant impact is the creation of a hybrid approach that combines efficiency and sufficiency. This combination implies first

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attempts to create urban conditions that mitigate resource consumption (as mentioned above). In cases where this conditioning cannot be fully met, efficiency measures for improving existing services and products can aid in minimizing negative impacts. Rebound effects of both efficiency and sufficiency measures thus need to be considered while evaluating the reaction of other market participants rather than being assessed in isolation (Figge et al., 2014).

5.3. From exclusion to inclusion

Rather than genuinely being introspective, ethical and equitably addressing the interests of the citizens, the neoliberal smart city and its technocentric propositions, leans towards serving the interests of the state and allied private enterprises. Apart from not being citizen-centric per se, this tendency excludes or becomes rather selective about receiving and integrating critical inputs from citizens to shape urban growth and address social, spatial, and economic issues. Citizens, rather than becoming mere consumers, end up becoming a statistic within the economic framework of a neoliberal city. A move towards an Empathic City implies being more inclusive, democratic, and trusting of the very citizens for whom the reforms are initiated. This move also aids in changing the role of the citizen from a consumer to a creator, active participant, decision-maker, and, most importantly, a vital co-participant in the processes of urban decision-making alongside multiple stakeholders. Rather than leaving citizens exposed to technological surveillance and personal data theft, such a participatory mode of governance can help advocate their digital, political, social, and spatial rights, and thus aid in transparent governance and enhance personal and community wellbeing. The preservation and enhancement of local-common goods (in the form of equitable distribution of resource such as urban green, quintessential infrastructure, public services, clean air, and water) can be further assessed by the transparency, inclusiveness, and equitability of the strategies supporting such initiatives, and how they serve a larger common-cause. Mc Laren and Agyeman outline 'Social Urbanism' as one such inclusive strategy that promotes the idea of social inclusion in a shared public realm (McLaren and Agyeman, 2015). As a way to empower citizen initiatives such as education opportunities, access to ICT, cultural activities, economic development, infrastructure provision, participatory budgeting, and community planning can be beneficial in the creation of urban commons of public services and spaces.

As discussed in section 4.1, technological sovereignty is another form of inclusion where technology serves local residents. Morozov and Bria suggest interfacing this concept with political actions to further enhance inclusive participation and, simultaneously, promote ethical practices of governance (Morozov and Bria, 2018). From the technical sovereignty and digital policy perspective, Morozov and Bria suggest promoting alternative data ownership regimes. These include creating open data commons (including migrating information services to open source and open standards) and regulations (including building alternative open and decentralized digital infrastructures that support net neutrality) to limit aggressive data harvesting by the state and private enterprises. Alongside this technological democratization, the digital literacy of citizens is also an equally crucial element that needs consideration while devising technologically intensive strategies for understanding public needs and demands. A mix of quantitative and qualitative approaches for understanding the architectural and urban conditions is thus of paramount importance. A combination of on-ground surveys, community meetings, and demographically equitable participation drives for conceptualizing architectural and urban interventions with a variety of social, spatial, environmental, and temporal datasets should become the basis for understanding the urban condition. Thus, inclusive growth can become a genuinely democratic principle for ensuring an empathic built environment.

6. Conclusion

This paper attempts to understand and expose the contemporary neoliberal context within which the Smart City agenda operates. Apart from serving as a critique of social, political, economic, and environmental impacts of the Smart City momentum, this paper attempts to outline an alternative mode of conceiving, framing, and making our urban environment: Empathic Cities. Underpinning this proposition is a generic shift in ideology within both 'smart city' and 'wellbeing' thinking. These shifts have been categorized into genres, and attempts to interface the gradual shift from techno-centric to human-centric and from product-based to context-based smart city and wellbeing trends have been made. This observation underpins a paradigm from a neoliberal perspective to a regenerative perspective, wherein the city and its constituents need to be understood in a systemic/circular manner rather than a siloed manner while embracing a human-centric and ethical approach towards urban development. Thus, this study proposes a move of governance emphasis from enabling efficiency and the privatization of natural resources to sufficiency and human wellbeing, wherein human outcomes-driven methodologies acquire fundamental focus. The primary criterion of becoming inclusive rather than knowingly or unknowingly excluding the citizen voice, needs, demands, and collective intelligence is ultimately argued to be one of the fundamental pillars for conceding an Empathic City. The human dimension of urban life is thus proposed to be of vital importance. Attempts akin to technological sovereignty, social urbanism, and political negotiations to empower the quintessential rights of the everyday citizen are positive and welcome steps and should be actively encouraged to transition to an empathic future.

Pondering upon the advantages of empathy and the associated shift in thinking proposed in this paper is of vital importance. Empathy and understanding the human-dimension are interlinked given that empathy is the ability to put one's self in the place of the other while at the same time continuing to be 'yourself' (Berthoz, 2014). This definition implies understanding the psychological perspective of others and experiencing emotional reactions through observation. Spatial empathy is a direct result of the sensorial experiences of individuals as they interface the ambiance of a place. Within today's rampant urban

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growth context, remembering the social and cultural aspects of sustainable development bound to sensorial factors such as our sense of place, identity, affinity, and usage of space is critical. These human aspects are deeply engrained within us and influence our sensorial experiences. The Empathic City proposition is thus intrinsically promoting the human-centered design, which can encourage urban practitioners, policymakers, governmental organizations, and private enterprises to move towards the users. This move is advantageous for understanding on-ground needs, requirements, sentiments, and associations of citizens and their city, or in other words, emphasize on sensitivity (Mattelmäki et al., 2014) rather than pure monitory and efficiency-oriented gains. Apart from embedding flexibility, realism and enabling alterations to prevailing urban conditions, this empathic design can aid a holistic understanding of people in different spatial, social, and cultural contexts. The paper attempts to highlight ideological foundations for transitioning from a smart to an empathic future of the built environment and aims to inspire the research community to rethink and reshape our urban futures.

Acknowledgments

The research is not a part of any funded research grant or financially supported by any external organization and was conducted as fundamental research at the University of Technology Sydney, Australia, by the author.

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Please cite this article as: Biloria, N., From smart to empathic cities, Frontiers of Architectural Research, https://doi.org/10.1016/j.foar.2020.10.001

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Please cite this article as: Biloria, N., From smart to empathic cities, Frontiers of Architectural Research, https://doi.org/10.1016/j.foar.2020.10.001