

Course of

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SUPERVISOR

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CANDIDATE

Academic Year

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## **ABSTRACT – KEY WORDS**

### **Abstract :**

The purpose of this present thesis is to examine the current state of the smart city concept, both through a thorough literature review and an evaluation of four smart city initiatives, (Barcelona, Shenzhen, The Line, and Songdo) based on a series of previously defined characteristics. In this work, we will show that the term smart city is an umbrella term, serving different political discourses and initiatives, but also various urban needs, thus taking different forms between and within cities. It would make no sense to say that one strategy is more technology-driven than the others, because each of them is based on digitization. Nevertheless, Barcelona's smart city narrative is the most comprehensive, as it fits the latest and most complete definitions and characteristics of the term. The other three strategies have different focuses, namely, and respectively, security, sustainability, and innovation. Nevertheless, they all do push aside the human factor. This thesis shows that a smart city initiative and the projects carried out according to a specific vision, whatever it is, can only be promising for the future if it considers the citizens as proper innovators of their own city.

**Key words :** smart city; urban governance; technology; citizen; future; sustainability

### **Résumé :**

L'objectif de ce mémoire est d'examiner l'état actuel du concept de ville intelligente, à la fois par le biais d'une revue de la littérature approfondie et d'une évaluation de quatre initiatives de villes intelligentes, (Barcelone, Shenzhen, The Line et Songdo) sur la base d'une série de caractéristiques définies au préalable. Dans ce travail, nous montrerons que le terme de ville intelligente est un terme générique, qui sert différents discours, initiatives et besoins urbains, et qui prend donc différentes formes entre les villes et au sein de celles-ci. Il serait incorrect de dire qu'une stratégie est plus axée sur la technologie que les autres, car chacune d'entre elles est basée sur l'utilisation de cette dernière. Néanmoins, le concept de ville intelligente de Barcelone est le plus complet, car il correspond aux définitions et caractéristiques les plus récentes et les plus complètes du terme. Les trois autres stratégies ont des objectifs différents, à savoir, et dans l'ordre, la sécurité, la durabilité et l'innovation. Cependant, elles laissent toutes de côté le facteur humain. Ce mémoire montre qu'une initiative de ville intelligente et les projets réalisés selon une vision spécifique, quelle qu'elle soit, ne peuvent être prometteurs pour l'avenir que s'ils considèrent les citoyens comme les véritables innovateurs de leur propre ville.

**Mots clés :** smart city ; gouvernance urbaine ; technologie ; citoyen ; futur ; durabilité

## **INTRODUCTION**

*“Una città non è disegnata, semplicemente si fa da sola. Basta ascoltarla, perché la città è il riflesso di tante storie”.*

*"A city is not designed, it simply makes itself. Just listen to it, because the city is a reflection of many stories."*

This statement made by Italian architect Renzo Piano seems in complete contradiction with the way we currently are comprehending cities and the policies that accompany their much-needed transformations. Indeed, Piano here suggests that cities should evolve organically, thanks to their inhabitants' collective experiences and narratives. While it emphasizes the importance to consider the historical, cultural, and social layers that contribute to a city's identity, it also simultaneously implies that contemporary urban planning does not seem to be empowering citizens to make cities their own.

In the context of unprecedented demographic waves in urban areas, climate change, growing inequalities, social polarization, and new technological innovations, the *smart* concept has soared as the key solution for these urban issues. Because of its immediacy, it is consistently changing forms and definitions while remaining a source of debates in the political and social spheres. Particularly in the last three decades, there has been a growing - yet- unclear academic attention sparked on the 'smart' notion(s), which in turn led to a stack of uneven practical implementations globally. Both raised new questions on urban governance, one of them being: How can cities effectively integrate a data-driven approach into their -alleged-pursuit of sustainable and inclusive urban development? Conversely to the traditional vision Piano Renzo seems to be rooting for, the smart city notion proposes a more proactive and radical approach to urban planning. That is why smart cities are often framed as new hubs for advanced technology tools at the service of the optimization of their citizens' quality of life, mobility, safety, and health.

Many elements that highlight the benefits of implementing smart tools and narratives in cities at the same time raise further technological, economic, and political difficulties in changing the structure of a city, which ultimately changes the way inhabitants -want to- live, but also move, cooperate, and be included in the decision-making processes. Failures to find a middle-ground between economic growth, innovation, and environmental resilience risks the smart city projects to end up doing the opposite that they aim for: exacerbating

inequalities, marginalizing certain parts of the population, and polluting. With this in mind, the present thesis poses the question of how different technological, governance, and human-centered approaches can be evaluated. The main goal is to understand and analyze if the current discourse towards smart cities by different urban actors and the way smart projects are carried out highlight political, social, and environmental stakes evenly, and even more importantly, how they do so.

By drawing a global picture of the demographic and societal challenges we are currently facing, we will be able to introduce the smart notion and its meanders before focusing on analyzing four selected cities, their smart narratives, and what issues they raise for the future of urban governance. The four selected cities are both ‘traditional’ cities made smart, but also cities made ‘from scratch’. By depicting the projects they have carried out and/or the smart discourse they embody, the stories of Barcelona, Shenzhen, The Line and Songdo will enable us to assess what hides behind the well-oiled positive imagery resting behind the smart city concept.

First, we will study the different Industrial Revolution waves, and the role they had in concentrating people in urban agglomerations. Based on this analysis, we will see how this very event still has an impact on our societies today, especially in our need to tackle the impact(s) of global warming. Against this background, we will dive deeper into the ‘smart’ literature, and how certain debates surrounding its etymology developed, before looking over three main characteristics qualifying a city smart. After having explained which methodological tool we will use for the rest of this thesis, we will then lay out a proper comparative analysis of the four cities mentioned earlier, and in particular the specific narrative they share towards becoming smart. Finally, we will present our results and how they can be comprehended by decision makers. Our aim will be to provide interpretative frameworks on how future cities could concretely implement smart tools while being mindful of all the stakes its notion entails.



# **CHAPTER 1: CITY LIVING IN THE 21ST CENTURY, ARE WE LIVING IN STUPID CITIES?**

For the past three decades, government officials and tech companies have had one goal in mind: find smarter ways to live in cities. As we will constantly be talking about those smart city concepts, could one say we currently are living in dumb cities? The question remains open and up for debate. Nevertheless, if we agree stating that cities in our globalized world are stupid is provocative, it is still a particularly relevant way to highlight the negative impact of globalization on quality of life and equality. The problems that emerged due to urban concentration after the various Industrialization Revolutions still have an impact on how we live today. Global warming, social polarization, the need for innovations in critical mobility infrastructures, and health issues. All these challenges, which can be found in many -developed and developing- cities, are the reasons why new imageries in which cities are not only smart but smarter, -i.e., able to solve new urban matters-, developed.

## **Section 1 : From Homo Sapiens to Homo Urbanus**

In order to understand to what extent cities will be important hubs for future global economies and governments, it is first necessary to study the impact of the initial two Industrial Revolutions on urban concentration. This period is not only characterized by a general increase in urban population, but it is also the very cause of the rise of megacities. From there, we will consequently observe the supremacy of cities in our modernizing world and inspect how they expand unequally.

### **1. The Industrial Revolution(s): Catalyst(s) for Urban Densification**

As a matter of fact, the increasing smart city frenzy by many governments over the last two decades is due to the structural reasons that pushed them -and their citizens- to favor new urban strategies aimed at improving efficiency and resilience in their daily lives. Now, we will observe the way cities became *the* new players of the World's economic development.

### 1.1.1. The First Industrial Revolution: Great Britain

In *Hyper-lieux. Les nouvelles géographies de la mondialisation*, published in 2017, geographer Michel Lussault considers that another world has been established through urbanization<sup>1</sup>. This consideration is particularly relevant for our analysis, as we consider that the development of the smart city concept was born in response to the impact of mass urbanization, as we will see later. As a matter of fact, the origins of what we call the urban transition<sup>2</sup> lie in the industrialization process, which started in Western Europe almost three centuries ago. More precisely, Great Britain is considered the home country of the Industrial Revolution, which took place at the end of the eighteenth century. But what is the link between the Industrial Revolution and urbanization? The answer is rather short: *technique*, as the main feature of this revolution is innovation, both in the field of energy and mobility. Indeed, Peter P. Groumpos (2021) considers that “mankind has perfected its industry by not only relying on technical evolution but also by reinventing it as new resources have created new technical means”<sup>3</sup>.

This very quote perfectly echoes the case of the First Industrial Revolution. Manual labor gave way to mechanization and mass production, especially in the power industry, where the steam engine grew important. Steam power was already used before, but the major change is that it started to be used for industrial purposes. For instance, steam also transformed and improved other sources of power available at the time, as waterwheels and windmills. What needs to be said, however, is that most factories were situated in cities, which therefore became the place where the demand for labor was the highest. As around 80% of the population -and potential workers- lived in the countryside at the time<sup>4</sup>, most people had to move to the city to be able to work in those factories. That is why we can say that the Industrial Revolution initiated an unprecedented rural exodus, characterized by a spatial concentration of a growing portion of human population in the cities (Papillon, 2004), particularly in London, as the graph below underlines.

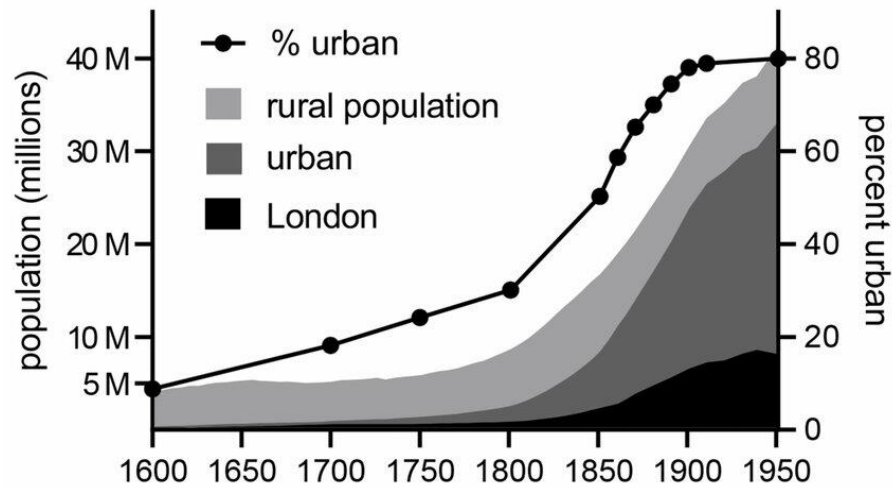
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<sup>1</sup> Original French passage: “Un autre Monde s’est installé via l’urbanisation”. In *Hyper-lieux. Les nouvelles géographies de la mondialisation : Les nouvelles géographies de la mondialisation*. (2017). Le Seuil.

<sup>2</sup> Scholars such as Evert Meijers also calls this phenomenon metropolization, defined as “the process through which institutionally, functionally, and spatially fragmented urbanized regions become integrated as coherent metropolitan systems”. See in: Cardoso, R. V., & Meijers, E. (2021). *Metropolisation : The winding road toward the citification of the region*. *Urban Geography*, 42(1), 4.

<sup>3</sup> Groumpos, P. P. (2021). A critical historical and scientific overview of all industrial revolutions. *IFAC-PapersOnLine*, 54(13), 464.

<sup>4</sup> Those numbers are based on Figure 1.



**Figure 1.** Urbanization and population growth in England, 1600 -1950. *International Journal of Paleopathology*<sup>5</sup>

### 1.1.2. The Second Industrial Revolution: Expansion to the 'West'

This process of urbanization expanded to the United States in the 19th century, when the end of the Civil War in 1865 called for a reconstruction of the country. This once again transformed a rural agrarian society into one dominated by thriving cities such as Boston, New York, or Philadelphia. The innovations associated with this Second -or American- Industrialization, soared through the discovery of electricity and assembly line production<sup>6</sup>. As a result, and according to Groumos (2021), this Revolution was not only the one that introduced people to the modern world, but also the one that led to the sharpest demographic growth in cities at that time. Naturally, America became a place for new opportunities for its own inhabitants, but also for immigrants. Joan Monras' analysis on the Federal Reserve Bank of San Francisco website corroborates this idea, as he considers immigration to intrinsically be an urban phenomenon (Monras, 2023). While the author talks about -rather- recent immigration movements, it can also be applied to the immigration waves that widely populated the United States from the 1880s. Indeed, as cities became new economic hubs

<sup>5</sup> Davenport, Romola. (2021). Mortality, Migration and Epidemiological Change in English Cities, 1600–1870. *International Journal of Paleopathology*. 34. 37-49.

<sup>6</sup> This era being linked to the concepts of Taylorism and Fordism is quite interesting. Indeed, Henry Ford carried out a new theory of industrial organization aimed at increasing productivity through product standardization and a strict labor organization. This led to a growth in salaries and life quality, expectancy, and an overall technological revolution.

and concentrated wealth<sup>7</sup>, it is no surprise those immigrants -mostly from Western and Southern Europe at first-flew away from famine and job shortages to settle where new opportunities rose<sup>8</sup>.

Hence, by 1900, 40% of the US population lived in cities, compared to just 6% in 1800<sup>9</sup>. All things considered, while industrialization has revolutionized innovation and increased workers' income, which both contributed to making most of the Western cities grow economically, it was not without any negative impact on their citizens' life expectancy. On the one hand, most cities were not ready to welcome this many workers, which inevitably ended up in terrible living conditions, health hazards, but also strong social polarization<sup>10</sup>. The latter is defined as a "growing contrast"<sup>11</sup> between the inhabitants and incoming labor workers who lived in specific neighborhoods and dangerous tenements, because hastily built to face the growing population. This, coupled with the lack of sanitary infrastructures, led to a sharp increase in infectious diseases and an actual decline in quality of life. On the other hand, the use of coal in mines and most factories inevitably caused environmental harm, which we are still trying to deal with today, as we will see in the next section. From then on, cities were not only associated with the creation of wealth, economic development, technical progress, and new opportunities, but also -and most importantly-, with the fulfillment of aspirations and innovative visions for the future at the expense of the environment and people's overall well-being.

Still, if the Industrial Revolution had a key role in urban densification, most experts consider it far from comparable to the scale and ubiquity of urbanization in the 21st century. In its report tackling future urbanization trends and their consequences, published in 2015, the OECD talks about a "metropolitan century"<sup>12</sup>. Moreover, while Benjamin Barber's most successful work is entitled *If Mayors Ruled the World*, he highlights well into the very first pages of his first chapter that mayors already do (Barber, 2013). These quotes prove two points concerning how we must consider the growing role of cities in the political, social,

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<sup>7</sup> Minor anecdote, but still important to highlight, it goes without saying that the immigration waves were decided upon by the consecutive American governments. If the United States facilitated immigration in the beginning, it however quickly started to implement restrictions to specific types -or number- of people.

<sup>8</sup> More precisely, Monras considers specific types of cities were targeted by most European immigrants, as they tend to immigrate in a "small number of select cities, and those cities tend to be large". Very often, it is the capital cities that are chosen, which explains the role of immigration services in Ellis Island in New York city until 1954. Quote in: *Why immigration is an urban phenomenon—San Francisco fed.* (07/03/2023).

<sup>9</sup> Groumpos, P. P. (2021). A critical historical and scientific overview of all industrial revolutions. IFAC-PapersOnLine, 54(13), 466.

<sup>10</sup> This very social polarization echoes the notion of "global city" coined by economist and sociologist Saskia Sassen, which we will see later in more detail.

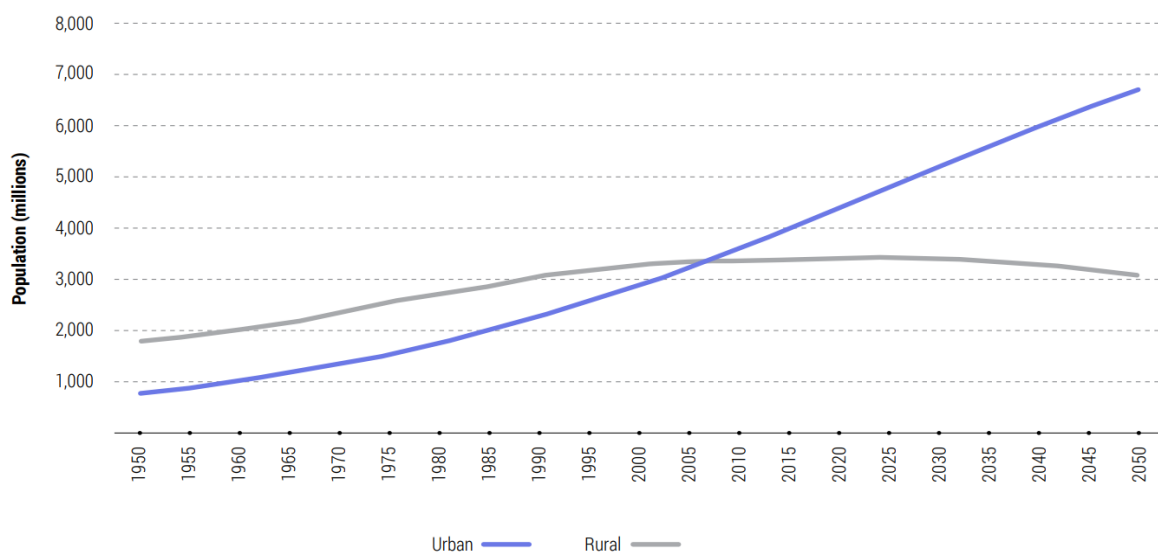
<sup>11</sup> Hollands, R. G. (2008). Will the real smart city please stand up? *City*, 3, 312.

<sup>12</sup> OCDE (2015), *The Metropolitan Century : Understanding Urbanisation and its Consequences*, Éditions OCDE, Paris.

and economic panorama today. First, it is unprecedented. Second, cities and their actors - either decision-makers or citizens-are to completely transform traditional urban governance.

## 2. Urban Concentration Today: New Urban Challenges

Today, cities are home to 56% of the world’s population, which represents approximately 4.4 billion people (World Bank, 2023). And it is not the end of metropolization, far from it. This percentage is expected to grow even more in the next three decades. As a matter of fact, experts expect it to go up to 60% by 2030, and up to 70% of the estimated 9.6 billion inhabitants by 2050<sup>13</sup>. Taking a glance at the graph below enables us to grasp this urban extension from the mid-20th century: the city, more than ever, will be the place for civilization to settle in. Indeed, figure 2 shows that the radical shift in rural and urban populations shows no sign of stopping.



**Figure 2.** Shift of urban and rural populations over the next 30 years according to UN DESA 2016. World Cities Report 2022<sup>14</sup>.

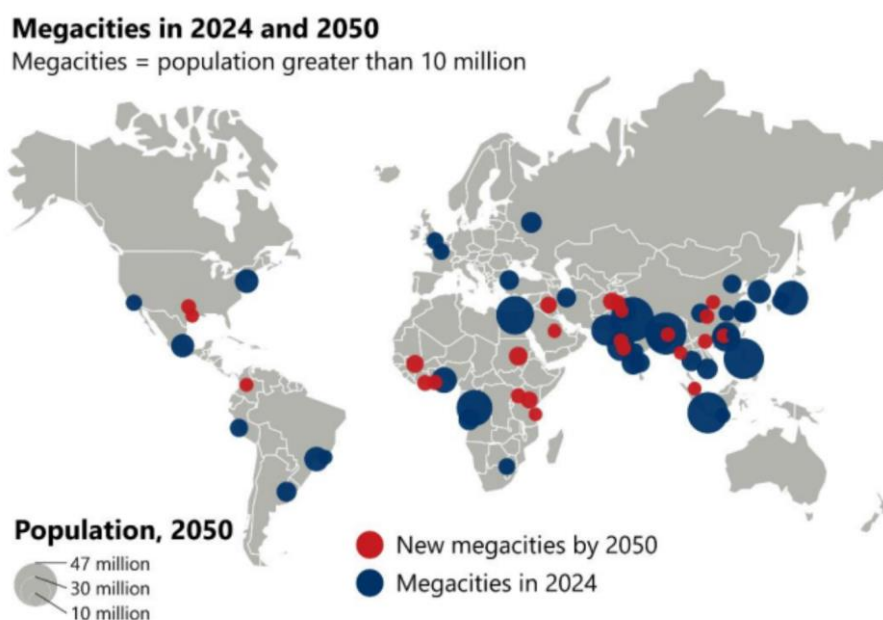
Nevertheless, urban growth is and will become more unequal at different scales, whether it be between continents, countries, or regions. First, the gap between the Global North and the Global South is narrowing, as “by 2050, 85% of the population in the countries of the North and 63% in the countries of the South will live in cities”<sup>15</sup>. Second, urbanization growth -or degrowth- in different cities within the same country is also relevant to tackle.

<sup>13</sup> Nations, U. “What is the city but the people”. United Nations.

<sup>14</sup> World cities report 2022. UN Habitat. 5.

<sup>15</sup> Original French passage: “A l’horizon 2050, 85 % de la population dans les pays du Nord et 63 % dans les pays du Sud vivront en villes”. In Ciattoni, A. (2018). Chapitre 7. Villes et métropolisation. In Les fondamentaux de la géographie: Vol. 4e éd. Armand Colin, 175

One of the first scholars who made a difference between cities depending on their size is sociologist and economist Saskia Sassen. In *Global City*, she hierarchizes cities at the global scale and identifies the first global cities to have been New York, London, and Tokyo. Those cities are characterized by a high degree of economic development and financial attractiveness. By contrast, Ann Markusen coined the “second city” concept, depicting cities participating as much in globalization as the global ones, without however having the same power to lead the globalized economy (Ghorra-Gobin, 2019). Those concepts help us understand that while all regions of the world are expected to become more urbanized, some such as Africa and Asia will concentrate most of the urban population (Ciattoni, 2018). Annette Ciattoni’s analysis fits today’s status quo, as the most populated (mega)city in 2024, ranked by the World Population Review is Tokyo, closely followed by Delhi in India, whose growth rate is positive, unlike Japan’s capital city<sup>16</sup>. The third city on the list is, without surprise, Shanghai, China. The first European city in the ranking is Paris, ranked the 30th most populous, with around 11 million inhabitants, which is 26 million less than Tokyo, and 22 million less than Delhi<sup>17</sup>. That said, the gap between the continents will continue to widen as by 2030, Asia will welcome 60% of the world’s urban population, namely 3.3 billion people. Africa’s urbanization growth is not comparable to Asia’s, but the number of 1.3 billion remains significant<sup>18</sup>. As we can see on the map provided by Oxford Economics’s Resource Hub below, Western megacities are not leading today, nor are they forecasted to lead in the future.



**Figure 3.** Megacities in 2024 and 2050. Oxford Economics<sup>19</sup>

<sup>16</sup> Largest Cities by Population, 2024. World Population Review.

<sup>17</sup> Ibid.

<sup>18</sup> Africa and Asia to lead urban population growth in next 40 years – UN report | UN News. (2012).

<sup>19</sup> Ghazi, S. (2024). Rise of new megacities will drive global urban growth. Oxford Economics.

Finally, the phenomenon of significant population decline -or stagnation-in Europe and North America also impacts the so-called shrinking cities. The latter are often cities that underwent deindustrialization and suffer gravely from it. Detroit, the fifth-largest city in the United States in the 1950s, lost 10.5% of its population just over the past decade<sup>20</sup>. Reading testimonies, most inhabitants prefer leaving Detroit and moving to larger cities for their economic opportunities, or their suburbs, for cheaper accommodation options. This last point underlines that while megacities and megalopolises<sup>21</sup> are key when analyzing urbanization in today's world and its impact on future policies and quality of life, mass urbanization is not exclusive to large metropolitan city centers. Rather, it is gradually impacting most citizens today, and action is needed.

## **Section 2 : The Impact of Urbanization**

The impact of urban concentration is what made citizens and decision-makers want to find more resilient ways to live in urban areas. Today, the goal for urban actors is no more about tackling them or not, but really to decide how future cities need to adapt or work to make compromises against climate change, swift technological developments, aging population, social tension and hyperpolarization, infrastructure security, and waste management. In other words, urban stakes need to be taken into account...And as past global efforts to improve urban living conditions worldwide have proved insufficient, the smart city concept, adapting to the local context and its own problematics, has become the new El Dorado for most urban actors.

### **1. Urban Challenges in the 21st Century...**

As we have just seen, both industrialization that spread globally at the end of the twentieth century, and the impressive resurgence of urban living in the 1990s until now have impacted city living, thus leading to unprecedented urban challenges. Recent urbanization is indeed considered to have worsened and created new long-standing weaknesses in the structure of cities -whether they be economic or social- (World Cities Report, 2022).

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<sup>20</sup> Neavling, S. (05/23/2022). *Duggan slams new census estimates that show Detroit's population continues to shrink*, Michigan Advance. Michigan Advance.

<sup>21</sup> A megalopolis is defined here following Eric S. Ross' definition "a polynuclear urban region consisting of a number of large metropolitan areas closely interrelated and interconnected, like the vital organs of a living organism, working in harmony to sustain the whole". In Ross, E. S. (2019). Megalopolis. In A. M. Orum, *The Wiley Blackwell Encyclopedia of Urban and Regional Studies* (1<sup>re</sup> éd., p. 1-4). Wiley.

In fact, because of the extraordinary urbanization growth we have analyzed, decision-makers in most cities face challenges directly related. In particular, the impacts of industrialization we addressed earlier still apply today, on a larger scale. For instance, the development of mobility networks from the Fordist era made most of the population rely on individual cars. Inherently linked to global warming, transportation is the second cause of CO<sub>2</sub> emissions after electricity and heat, as it accounts for about one-fifth of those global emissions alone<sup>22</sup>. Road transport contributes to most of the transport emissions today, particularly in developing countries, where regulation towards cars and other individual transportation is clearly lacking. Skimming through different sources, it becomes quickly apparent that India concentrates the most polluted cities in the world, as 42 of them on the IQAir website are situated in the country<sup>23</sup>. Still, according to this same source, India does not get the gold medal for hazardous air quality. In fact, Bangladesh has been the most polluted country for at least five years, as its air quality average worsened every year from 2018 to 2023<sup>24</sup>. Dhaka, its capital city, is known for its extreme congestion and the traffic jams associated, so much so that the US National Bureau of Economic Research found the city to be the “slowest city in the world”<sup>25</sup>. Unsurprisingly, Dhaka ranked the sixth most populous city in 2022. Thus, the more a city is inhabited, the more risk there is for congestion, and the more CO<sub>2</sub> emissions there are, causing pollution to skyrocket. We can notice the city’s concentration thanks to the photography below, which depicts Shahid Syed Nazrul Islam Sharani, one of the most famous Dhakaian thoroughfares, through which cars, trucks, handcarts, and pedestrians move at the same time.

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<sup>22</sup> Ritchie, H., & Roser, M. (2024). More people care about climate change than you think. Our World in Data.

<sup>23</sup> Number gotten after a swift calculation on *World’s most polluted cities in 2023—Pm2. 5 ranking* | *iqair*. (s. d.) website.

<sup>24</sup> *World’s most polluted countries in 2023—Pm2. 5 ranking* | *iqair*. (2023).

<sup>25</sup> Mustafa, K. (2023). Why exactly is Dhaka the slowest city in the world? The Daily Star.





**Figure 4.** Shahid Syed Nazrul Islam Sharani, Dhaka. *The New York Times Style Magazine*<sup>26</sup>.

Moreover, since Dhaka is one of the most crowded cities in the world, accommodation problems and the impact it has on the citizens' health have also risen. The city chosen for analysis is of course far from being the only one that saw its population double or even triple in the last few decades due to the influx of migrants, rural exodus, and population growth. Nevertheless, it is still considered to be one of the least prepared cities for it<sup>27</sup>. This unreadiness has strained urban infrastructures, causing more congestion than the traffic jams already created, which inevitably increased the prevalence of infectious diseases and sanitation problems. Those health hazards often impact vulnerable individuals more than others, and since accommodation is lacking, many slums were built, where those very individuals are often concentrated.

Finally, because urban centralization has been so important in the last few years, and not only in large cities, we also have to consider the negative impact of urban sprawl. The latter can be defined as some -or all- infrastructures typically situated in large and dense cities such as houses, office buildings, or even shopping centers<sup>28</sup> spreading to its periphery, i.e., to less developed cities. It can even spread to a completely undeveloped or a virgin land, where another city -or a place concentrating economic power like a city does-could be created

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<sup>26</sup> Rosen, J. (2016). The Bangladeshi traffic jam that never ends. *The New York Times*.

<sup>27</sup> Rahaman, M. A., Kalam, A., & Al-Mamun, Md. (2023). Unplanned urbanization and health risks of Dhaka City in Bangladesh: Uncovering the associations between urban environment and public health. *Frontiers in Public Health*, 11.

<sup>28</sup> These places are linked to the concept of "Hyper-Lieux", which I would translate as "Hyper-Places", coined by French geographer Michel Lussault. He described places like malls or airports to be the symbol of new urban systems in the modern world, but also a sign of standardization in the globalized era.

from scratch. Those are referred to as *edge cities*<sup>29</sup>, and their numbers continue to grow. Dhaka's outskirts have unprecedentedly expanded since 1991, but edge cities have also expanded in more developed cities. The Las Vegas strip, a 7km long stretch of the Las Vegas Boulevard in Clark County, Nevada, -which did not exist four decades ago-is indeed particularly relevant when talking about successful edge cities<sup>30</sup>. This suburbanization phenomenon (Sultana, 2011) indirectly causes more pollution, as only highways are constructed to connect these newly developed cities, leading to heightened car utilization. All in all, giving context of the adverse effect of city living in an ever-evolving world as well as our short case study on Dhaka enabled us to highlight the economic, environmental, and societal stakes of urbanization, and more precisely urban concentration in recent years.

## **2. ...Called for New "Smart" Initiatives to Be Adopted.**

As a result of the various issues urbanization caused, a new concept enabled all decision-makers to fit their narratives for the future of city living in the 2000s: that of the Smart City. We will analyze the debates regarding the definition of the notion and its meanders in chapter 3, but our aim here is to understand why Smart Cities and smart initiatives have become gradually key in most governments' policies over the last few years. For now, we can assess that Smart Cities are 1) already existing -or not-cities 2) where governments use technology and other urban tools aimed at favoring the citizens' quality of life (Anthopoulous & Fitsilis, 2014). That said, the most important point was brought up by geographer Margarita Angelidou: smart cities' governance solves the problems that the inhabitants and their governments identify (Angelidou, 2014).

As a matter of fact, according to scholars, the success of smart city development strategies is based on the governments' ability to adapt to the impact of an overcrowded, uncomfortable, and unhealthy city. In particular, the examples we have given in the previous subsection showed that metropolization led to an increase in inequalities, scarcity of certain resources, and the deterioration of urban infrastructures in many cities, especially in developing countries. Today, the protection of the environment is significant for most inhabitants<sup>31</sup>. The increasing frequency and intensity of ecological disasters as devastating

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<sup>29</sup> Ciattoni, A. (2018). Chapitre 7. Villes et métropolisation. In *Les fondamentaux de la géographie: Vol. 4e éd.*. Armand Colin.

<sup>30</sup> Sultana, Selima. (2011). Edge Cities in the Era of Megaprojects, 4.

<sup>31</sup> Malcolm Fairbrother's analyses showed that on a global scale, there is no relationship over time between economic development and people's concern towards environmental issues as global warming. He adds that "within countries, richer people are slightly more concerned about the environment, but only on some

floods in East Africa and Italy for example as well as the melting of glaciers in Antarctica has fueled much climate anxiety worldwide<sup>32</sup>.

To face those issues, governments have gradually attempted to implement new resilient policies. Not only were they aimed at increasing productivity and innovation, but also at catering to their citizens' demand for sustainability and an increase in quality of life. Many global decisions have been taken by government leaders to solve urban issues, especially with the aim to tackle the negative impacts of anthropization<sup>33</sup>. Global efforts against global warming started as early as 1972, during the first Conference on Human Environment in Stockholm, Sweden. The latter, which was composed of hundreds of experts and government officials from both developed and less developed countries, was aimed at identifying the hazards of human activities on the environment, which were also the 1992 Rio Conference's main objectives<sup>34</sup>. Besides, the 2015 United Nations Climate Change Conference organized in Paris, also known as COP21, was thought to be a pivotal moment in global efforts against climate change. The agreement, signed by not less than 194 countries, aimed to limit global warming to under 2 degrees Celsius above pre-industrial levels<sup>35</sup>, while developed countries were nudged to provide financial assistance to less affluent and more vulnerable nations in the face of climate change.

Nevertheless, even if countries such as India and Bangladesh signed the treaty, Annette Ciattoni (2020) considers that the Paris Conference represents a typically Western "environmental management"<sup>36</sup> of modern cities, whose goals do not fit every city's local objective. Indeed, environmental issues are not prioritized similarly depending on the city we are talking about. The author highlights that if the environmental stakes are particularly considered in developed countries, less developed countries do not place the environment at the top of their priorities, as health issues such as the Ebola pandemic in West Africa from

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dimensions and not others". Quote in Fairbrother, M. (2013). Rich people, poor people, and environmental concern: Evidence across nations and time.

<sup>32</sup> Google searches for the keyword climate anxiety soared by 565% in 2021 alone, according to Kate Yoder. YODER, Kate. "It's Not Just You: Everyone Is Googling Climate Anxiety". Grist, 4 October 2021.

<sup>33</sup> As a reminder, anthropization is defined as the transformation of spaces, landscapes, or natural environments by human action.

<sup>34</sup> Nations, U. (s. d.). United Nations conference on environment and development, Rio de Janeiro, Brazil, 3-14 June 1992. United Nations.

<sup>35</sup> Martin. (2016). List of parties that signed the Paris Agreement on 22 April. United Nations Sustainable Development. While their importance is not to be undermined, the Paris Conference -like the others mentioned in this thesis- is until today heavily criticized because of the confusion it created on its binding nature under International Law. While it is often described as legally binding, the reality is that not all its provisions are, which gives certain leeway to some decision-makers like Donald Trump to remove the United States' signature even though it was Barack Obama who signed it...or to not even have to actually achieve the goals set in the articles.

<sup>36</sup> Original French passage: "un management environnemental". In Ciattoni, A. (2018). Chapitre 7. Villes et métropolisation. In *Les fondamentaux de la géographie*: Vol. 4e éd. Armand Colin, 1994.

2014 to 2016, extreme poverty, or slums management in their large and overpopulated cities are what concerns them first. Thus, we need to qualify the stance that urban governance is naturally and always linked to sustainability and the fight against global warming, even though solving global warming can help other structural issues related. We will analyze in more detail in Chapter 3 how those diverging narratives for the urban future contribute to the development of a wide range of versions of the smart city concept.

Finally, many scholars, to solve or work on mitigating the impact of extensive urbanization, call for new sustainable urban planning, in which structured and organized policies could help improve any city's infrastructure while also reducing its social disparities and pollution levels. With more than 80% of global GDP generated in cities, urbanization can contribute to sustainable growth through increased productivity and innovation, but only if managed well<sup>37</sup>. Technology is thought to be the new means to do just that. Teo Lay Lim, when talking about Singapore, said that “necessity is the mother of invention”<sup>38</sup>. This quote is particularly relevant, as it underlines, also in our case, how the very concept of the Smart City was heavily based on the rapid advancement of digital technologies. They have been especially useful to answer the until then existing but limited initiatives to solve environmental and societal challenges in most cities today. As a matter of fact, the smart city discourse was based on the new technological revolution as an answer to increasing pollution and social inequalities. Since the 2000s, the Internet and overall new digital means of communication have widely spread around the world and emerged as one of the answers to more efficient, inclusive, and resilient city living. For instance, facing global warming and other urban concerns, smart city initiatives could be aimed at not only improving energy efficiency and spatial integration, but also, and maybe even more importantly, at reducing urban congestion in targeted cities. This would 1) help to reduce pollution and 2) offer a critical transition to renewable energies, 3) thanks to the use of new technologies. Now, we will analyze in more detail the new opportunities the smart city concept is set to grant, while its definition remains fuzzy.

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<sup>37</sup> Overview. (2023). Urban Development. World Bank.

<sup>38</sup> Teo Lay Lim, in Living on a platform. (2010). The Economist.

## **CHAPTER 2: THE SMART CITY - REVOLUTIONARY TOOL FOR AN EFFICIENT, RESILIENT, AND SUSTAINABLE FUTURE?**

The 2016 urban agenda adopted at the UN-Habitat III in Quito is thought to have underlined the significant popularization of the notion since the beginning of the 21st century. The conference was introduced as the “highlight of the display by city stakeholders of their interests in understanding and positioning themselves on what could be Smart Cities”<sup>39</sup>. Indeed, whether in North America, Asia, or Africa, many events and programs soared in the past few years to make most cities smarter, stressing how credible smart urban planning narratives and initiatives have become in building a more equitable urban future. Nevertheless, this recent race towards urban governance optimization raises further the question of defining those smart cities. If cities do not suffer from the same urban issues -or at least - at the same scale, it seems tough to find a universal definition of the ideal smart city. This is why the ‘smart’ literature tells us that while much confusion remains concerning the recent concept of smart cities, comprehensive characteristics can be found.

### **Section 1 : Defining Smart Cities, Debates and Core Characteristics**

As we have seen, making cities smarter has become the main goal for many city leaders. In *Will The Real Smart City Please Stand Up*, published in the *City Journal* in 2008, Robert Hollands asks a question of the utmost relevance for this thesis: “Which city, by definition, does not want to be smart, creative, and cultural?”<sup>40</sup>. Yet, while everyone wants to be smart, another fundamental question remains to fully grasp the stakes at hand: what defines a smart city, and what specific attributes contribute to its intelligence?

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<sup>39</sup> Original French passage: “Un temps fort de l’affichage par les acteurs de la ville de leurs intérêts à comprendre et se situer par rapport à ce que pouvaient être ces « Villes intelligentes »”. In Eveno, E. (2018). *La Ville intelligente : Objet au cœur de nombreuses controverses. Quaderni*, 96(2), 30.

<sup>40</sup> Hollands, R. G. (2008). Will the real smart city please stand up? : Intelligent, progressive or entrepreneurial? *City*, 12(3), 305.

# 1. Multidimensional Approaches to Defining Smart Cities in the Literature

When reviewing the literature referring to the smart city concept and the smart urban initiatives associated, it quickly becomes evident that finding a unique and comprehensive definition that all experts can agree on is a complex task. While we will see in the following subsections that the scientific community has been able to find potential characteristics that could enable a common understanding of the key elements of a smart city, it is still necessary to tackle the debate between scholars on the evolution of the term, and most importantly on its instrumentalization by governmental actors. This will help us to better assess the notion of the smart city and not to dash into prejudices and flawed assumptions. Our starting point for explaining what is at stake here is that because the new urban issues caused by fast metropolization are relatively recent, the concept of smart city also is. The graph below shows the exponential growth of smart city literature since the 2010s.

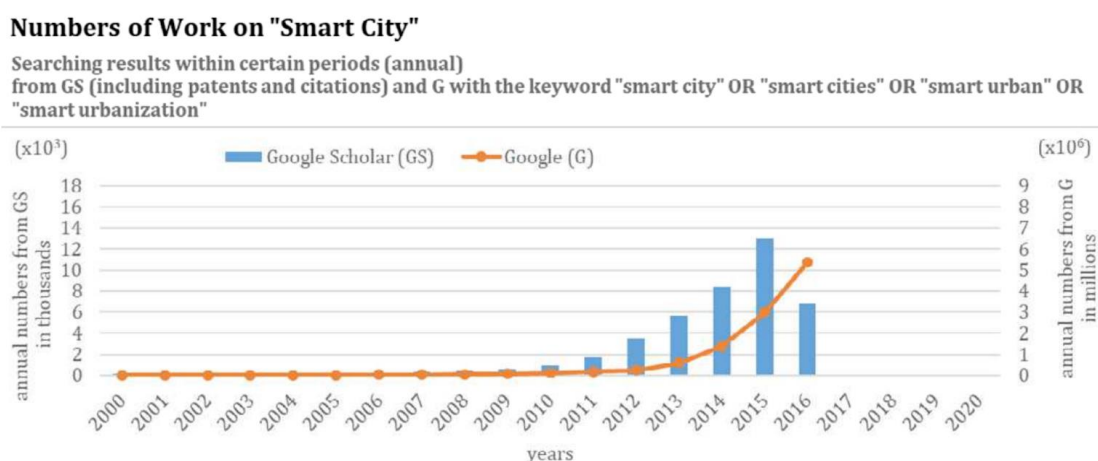


Figure 5. The rise of the numbers of work about Smart Cities. IGLUS Quarterly<sup>41</sup>

We have seen in the previous chapter that governments are not equally vulnerable to the impacts of urbanization, which pushes each city’s decision-makers to adopt local solutions. This à la carte framing of the smart concept by government actors, coupled with its confusion with other related city concepts, contributes to its “elusive”, “fuzzy” (Caragliu, 2009), or “ambiguous” (Vanolo, 2014) nature.

<sup>41</sup> IGLUS Quarterly. (Volume 4, Issue 1, 2018). IGLUS. 5.

### 1.1.1. The Large Amount of Smart-Related City Concepts Creates Confusion

Indeed, smart used as an adjective is broad, which means it can be used and interpreted in different ways (Sedlacek, 2021). Concepts like ‘cyber cities’, ‘wired cities’, ‘knowledge cities’, and even ‘learning cities’ are, on the one hand, often used interchangeably, and on the other hand, mistaken with the term ‘smart’. Indeed, those words all carry different meanings and need to be nuanced. Robert G. Hollands (2008) makes the difference between wired cities, which are cities working literally thanks to cable and connectivity, and knowledge-based cities, which establish their added value on the concentration of universities and research centers. This concentration is aimed in the long-term at increasing attractiveness and economic development<sup>42</sup>. Others agree that the smart city concept is a victim of definition vagueness, as they introduce new terms that can be mixed up with the adjective ‘smart’ such as digital, virtual, ubiquitous, and the most interesting one to analyze; intelligent. As a matter of fact, if Hollands (2008) swiftly mentions digital cities to be virtual reconstructions of cities<sup>43</sup>, Breux and Diaz (2017) consider that they are rather meant for information sharing, collaboration, and the creation of positive experiences within the city itself. Moreover, they highlight that the term smart would inherently include that of intelligence, because smartness could only be if an intelligent system is used to improve one’s efficiency, or even quality of life, which rather fits the smart city narrative. This differentiation between smartness and intelligence is especially interesting as it also applies to other languages. For instance, French scholars primarily use the term ‘smart city’ in their works, instead of the French translation. We will see later that one of the reasons for the mainstream spreading of the term has been its branding by specific tech actors. All in all, while those terminological nuances can be particularly a matter of confusion, they do help to understand the differences between a traditional city and a smart -because technologically intelligent- city.

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<sup>42</sup> This echoes Richard Florida’s “creative class”, depicting the tendency of cities to implement gentrification policies to attract -often wealthy- creative talents for economic gains. According to Caragliu, “The basic idea in this case is that creative occupations are growing and firms now orient themselves to attract the creative. Employers now prod their hires onto greater bursts of inspiration”. In Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology*, 18(2), 48.

<sup>43</sup> Hollands, R. G. (2008). Will the real smart city please stand up? : Intelligent, progressive or entrepreneurial? *City*, 12(3), 306.

### 1.1.2. The Difference Between 'Traditional' and 'Smart' Cities

Many of the 'traditional' cities and their management systems are described by Lom and Pribyl (2017) as unitary and unable to communicate with their immediate environments. Conversely, smart cities would be able to integrate a “dominant system of interdependent elements, formal and informal-traditions, shared beliefs, conventions, norms, and rules, based upon which actors base their decisions”<sup>44</sup> (Nee, 2005, as cited in Pinson et al., 2023). Nevertheless, they are not thought to be inherently intelligent, but they become so because their governance mechanisms, and complex subsystems (Getzner, 2021) rely on technology and technological goods to efficiently react to concrete challenges. Indeed, as these technological systems give answers and actively communicate with the 'physical' city, they can bring intelligent responses to urban issues. Lom and Pribyl (2017) give the example of transport subsystems communicating and exchanging data with an energy provider to reduce energy consumption, but we can also imagine a system directly made for the citizens' experience. As simple as it may seem in today's societies, applications that display real-time bus locations directly onto users' smartphones serve as a relevant example of how technology systems diverge from traditional urban models.

Moreover, the difference made between those two types of cities echoes W. Brian Arthur's analysis of the digital economy and how its systems communicate with the physical one. Indeed, in an article entitled *The Second Economy*, published on the MC Kinsey & Company website in 2011, Arthur states that digitization is creating a proper second economy. The latter neither replaces the physical economy nor is constricted in its communication with it. Instead, he compares the digital economy system to aspen trees, being a huge interconnecting root system always communicating with the exterior. But it is not only about aspen trees. Arthur in fact adds to his tree imageries the notion of the neural system. This idea implies that the digital -or second- economy acts like an intelligent organism: it senses something, changes its internal state, and reacts appropriately. This is exactly what is happening in our case: 'traditional' cities are not magically removed because of the advent of smart city initiatives. However, it is the smart systems that are built in a 'traditional' city that enable strong communication between the two, and end up improving the governments' policies, but also the citizens' quality of life, ultimately optimizing urban governance.

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<sup>44</sup> Laugaa, M., Pinson, G., & Smith, A. (2023). Les strates de la smart city : L'institutionnalisation disjointe des politiques urbaines du numérique à Bristol. *Réseaux*, N° 243(1), 103-142.



To conclude this first section, it is necessary to underline that many scholars consider that the effect of this imprecision of the concept of smartness can lead to the instrumentalization of the label. Hollands (2008) said that “the problematic mapping of the smart label onto a series of other seemingly progressive debates and concepts concerning the technological and creative city, creates not only definitional problems but also hints at some of the more normative and ideological dimensions of the concept”<sup>45</sup>. Without diving into the debates on the potential neoliberal aberration of smart city narratives by certain governments, it is still relevant to keep in mind that the term can be used for self-congratulatory means, or simply for a decision-maker to make himself look better by branding his city smart when it is not necessarily. This checks out to the ever need to not only be smart, but smarter, if not the smartest city (Ciattoni, 2018; Batty et al., 2012). However, the smart city, as we have seen in the previous chapter, is not a mere concept or a political means to compete with other decision-makers. Rather, smart cities have the potential, thanks to the practices associated with them and the services they provide, to change how cities have been governed since the beginning of the 21<sup>st</sup> century.

## **2. The Means of Smartness: From Top-Down to Bottom-up Governance**

Because of the confusion surrounding the concept of smartness, the characteristics of what makes a city smart are also debated. Diving into the literature, three main approaches to smart cities were found: a) the approach centered around technologies, or hardware, b) the approach centered around ‘soft’ governance, and finally, c) the approach centered around the role of the citizen. While those three characteristics are important to consider together, many papers often focus only on one of these three characteristics when defining smart cities.

### **1.2.1. The ‘Wired’ City: Hard Infrastructure and ICT**

As we have seen with the notion of intelligence in the previous subsection, technology is often the core means that is considered when wanting to define smart cities. More precisely, it is the Information and Communications Technology (ICT) tools, such as the Internet and mobile communications, that enable the decision-makers to make the city and its infrastructures more efficient and resilient, according to the literature<sup>46</sup>. In short, ICT makes the merging of different

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<sup>45</sup> Hollands, R. G. (2008). Will the real smart city please stand up? : Intelligent, progressive or entrepreneurial? *City*, 12(3), 304.

<sup>46</sup> More precisely, most experts consider three waves to have mattered in ICT History: the first one before the 2000s, with the radio or the telegraph, the second from the 2010s, with broadband internet and mobile communication, and finally a wave we are currently in with 5G and Generative AI.

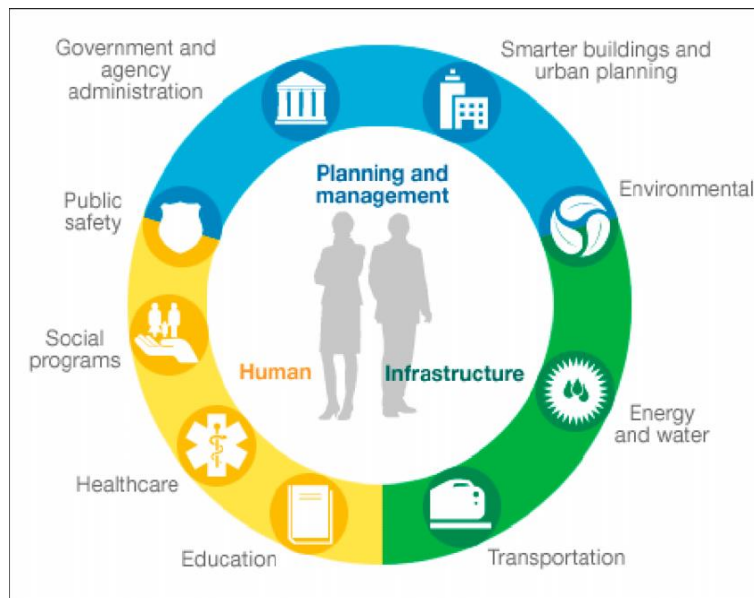
systems by using cabling or signal distribution possible, which allows utilities to become automated and more flexible thanks to data processing.

While projects using these tools to tackle the long-standing challenges posed by urbanization existed before the 2000s, IBM, the American Tech Company, was one of the first stakeholders contributing to the smart cities discourse. For many, the popularity of the term is thus the product of “an advertising campaign by a private firm in the context of the quest for profits”<sup>47</sup>. Jean Haëntjens (2021) is particularly cynical towards the notion, as he believes that the smart city, while responding to consumer expectations in real-time, is governed by algorithms. In contrast, he states that the ‘traditional’ city is governed by a mayor, elected by citizens, and has collective long-term ambitions. This vision of the smart city is flawed and extreme. As we have seen in the previous chapter, the concept was born to solve problems in cities. Undeniably, because of what it sells, the smart city concept is, for IBM, purely technology-driven. As a matter of fact, it considers the city as a “system of systems”<sup>48</sup>, composed of three main pillars. According to Susanne Dirks, Manager of the IBM Institute for Business Values Global Center for Economic Development in Ireland, the planning and management of services such as regulation and policy environment, the infrastructure services such as telecommunications and transportation systems, and the human services are what to consider in city governance (IBM Services Interview, 2009). We will see in Chapter 3 that relationships between public and private actors like Cisco have raised questions when wanting to create smart cities ‘from scratch’. However, even with this in mind, smart initiatives are either decided upon or accepted by democratically elected mayors, actors who have long-term ambitions for cities of the future. Again, a city is not smart merely because it concentrates on smart technologies, but because its actors can use them to improve efficiency, sustainability, and quality of life (Batty, 2012). This stance is stressed on IBM’s website when looking at its ‘Smart Cities’ tab, as it says that it is the city leaders who provide the fundamental infrastructure that will make the city attractive and safe. Tech companies and the technologies associated would thus provide these tools to fit the decision-makers’ projects. Below, the company’s main fields of interest that can be improved by technology.

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<sup>47</sup> Original French passage: “En d’autres termes, la popularité du terme « smart city » est le produit d’une campagne publicitaire d’une firme privée dans un contexte de quête de profits ». In Breux, S., & Diaz, J. (2017). *La ville intelligente : Origine, définitions, forces et limites d’une expression polysémique*. Institut national de la recherche scientifique - Centre Urbanisation Culture Société, 4.

<sup>48</sup> Cavalcante, E., Cacho, N., Lopes, F., Batista, T., & Oquendo, F. (2016). Thinking smart cities as systems-of-systems : A perspective study. *Proceedings of the 2nd International Workshop on Smart*, 3.



**Figure 6.** The Smart City, According to IBM<sup>49</sup>.

There are hundreds, if not thousands of examples where improvements in city governance were allowed thanks to innovation and technology. New tools and smart infrastructures keep being created, which makes the city not only smart but ‘brained’ (Weber, 2023). Smart oceans, mountains, and grids are all inroads -in practice - into providing interactive and resilient infrastructures. We will focus on an initiative taken by Stockholm’s mayor Anika Billstrom in 2003 to solve the city’s long-standing issue of congestion thanks to Artificial Intelligence. Indeed, very often, the first decision taken by governments to change their cities’ governance systems to a smarter one is to invest in transport and mobility solutions, backed with technology tools (EU Parliament, 2014). For instance, cycling plans and intelligent traffic routing have a notably beneficial effect on the citizens’ urban experience, but also on the city’s sustainability goal.

Stockholm, Sweden’s capital city, like many others, widely expanded in the 2000s. Its population grew by 20,000 annually, representing more than half a million cars in and out of the city<sup>50</sup>. To solve the congestion issue that was gaining more and more importance, the city’s government officials gathered in 2016 and decided on a congestion pricing initiative. The idea was simple: to prevent as many people as possible from using their cars inside the city. The latter already had a group of experts dedicated to solving congestion, especially in the city center, but it still needed an actor able to supply and implement the potential technological tools needed for the project to be a success. That is why IBM was chosen to build, design, and operate the technical operations. The main idea to reduce congestion in the city was that “each Swedish-registered

<sup>49</sup> Makarova, I., Buyvol, P., Fatikhova, L., & Parsin, G. (2021). Influence of smart education on characteristics of urban lands’ transport systems. MATEC Web of Conferences, 334, 01001. 2.

<sup>50</sup> Jablonska, J. (2019). How Stockholm broke its gridlock with congestion pricing. IBM Blog.

vehicle entering and leaving the city center between 6:30 a.m. and 6:30 p.m. on weekdays would pay a fee—the equivalent, then, of \$3<sup>51</sup>. The company implemented an algorithm-based recognition system able to read the license plates of the cars passing through the control points situated in different parts of the city. But this is not all. Data was also shared regarding the positive impact the initiative had on the city’s air quality, for instance. Most citizens boycotted the project at first, but as the traffic jams decreased and the funds gathered were invested back in Stockholm’s green infrastructure, it became rather supported. Most importantly, it is when the project’s leaders communicated the reduction of CO2 levels that the project began to gain legitimacy. Even when the price continued to rise years after the implementation of the system, little opposition was raised against it. Today, the congestion tax is still imposed, and the project has surpassed its original targets in reducing traffic levels<sup>52</sup>.

All in all, this example of congestion charges in Stockholm underlines three main points. First, it perfectly corroborates what the smart city discourse focused on the ICT-driven approach advocates for: technology as a service. Second, it shows that urban governance is often not unitary, as the project requires multi-stakeholder investments and negotiations as well as drastic changes in the city’s infrastructure, which impacts the citizens’ urban experience. Finally, it enables us to once again refute Jean Haëntjens’s (2021) stance of a utopian traditional city against a malevolent smart city. Rather, in Chalendar’s (2021) words, with this project, Stockholm became a physical city, covered with a digital layer.

### 1.2.2. To ‘Nudge and Attract’: Soft Infrastructure

Literature often makes the difference between a “soft”, hyper-sustainable city and a “hard” city, which relies on hyper-technological solutions. We have debunked the idea that either of these strict versions existed autonomously. While it is undeniable that tech companies have become key stakeholders of cities, as, we previously saw through the partnership between the city of Stockholm and IBM, they significantly participate in creating new models of an ideal sustainable, resilient, and efficient city, wanted by the citizens and city governmental officials. The technology-centered approach is also complemented by other “softer” approaches. While they do not contradict the fact that hard infrastructure was at the core of the smart city idea at the beginning of the 21st century, they consider other

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<sup>51</sup> Ibid.

<sup>52</sup> Ibid.

characteristics to make a city smart (Serfaty, 2011). And to improve one's efficiency, simple but more inclusive and resilient regulations can help to do just that.

Indeed, many scholars notice renewed attention to the role of 'soft' communication infrastructure in urban governance initiatives and policies. Those infrastructures are, for example, not only sustainability-related infrastructures but also, according to Caragliu (2011), both "knowledge networks"<sup>53</sup> and "crime-free environments"<sup>54</sup>. Applied to our thesis and the goals of cities in the modern world, municipalities can nudge the citizens to sort waste and dissuade them from using individual transportation, for instance. If we consider the potential side effects of the Stockholm project just analyzed, we can consider that it nudged the citizens to use public transportation instead of using their cars for simple short trips. Nevertheless, other examples exist where technology was not used directly to get the same results. In 2015, the city of San Francisco launched its \$603.7 million Better Market Street project, aimed at improving circulation and security on the city's principal thoroughfare. To achieve these goals, one of the main initiatives was to ban cars from entering the street, known to be extremely congested. The idea became reality in 2020, when for the first time in around 125 years, the city finally banned private vehicles all along the street. Below, two pictures before the Better Market Street project and what the city imagined it to become.



**Figure 7.** Better Market Street before January 2020 (on the left)<sup>55</sup>, and a 2019 rendering of the Better Market Street project taken from the San Francisco Public Works' YouTube Channel (on the right)<sup>56</sup>.

<sup>53</sup> Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in europe. *Journal of Urban Technology*, 18(2), 47.

<sup>54</sup> Ibid.

<sup>55</sup> Brekke, D. (2020, janvier 23). San Francisco's market street is going 'car free'—7 things you need to know (And a map) | kqed.

<sup>56</sup> Reid, C. (2020). San Francisco bans cars from Market Street 124 years after bicyclists called for primacy. Forbes.

### 1.2.3. The 'Smart' Citizen: Innovator of His Own City

In *Coriolanus*, William Shakespeare wrote, “What is the city but the people?”<sup>57</sup>. This quote perfectly introduces the last characteristics of what makes a city smart according to the available literature. The previous examples highlighted that smart cities are to answer the demands of the citizens to improve, for example, efficiency, through both technology tools and ‘soft’ regulations. One last vision of the smart city concept is however yet to be depicted: the human-centered approach.

Similarly to the two other ones, city leaders here do consider the citizen’s requests and needs in their policies, but what differs is their very importance in the governance decision-making process. More than a mere beneficiary of the decisions taken, the inhabitants of smart cities become collaborators<sup>58</sup>, able to positively contribute to a project, its design, and its long-term impacts (Ghidouche & N’Goala, 2020). Public participation, which is undeniably not a recent phenomenon, has thus been revolutionized thanks to digitization. Communication between citizens, their representatives, and other agencies that represent them has never been easier to implement. This approach introduces a bottom-up governance process, rather than a top-bottom process, quite inevitable in the technology-centered approach. It does however not mean that ICT, for instance, is not used, on the contrary. Rather, it is used to make the citizens participate. Often, what is implemented are open services platforms where sensors, data processing, and critical feedback monitors evaluate the citizens’ experience on a specific project or infrastructure. Based on these feedback loops, the decision-makers will thus be able to implement governance policies that fit best the citizens’ expectations, always to improve quality of life. This inclusive notion would lead to the ultimate version of what scholars call e-governance, defined by Manuel Bolivar and Albert Mejeir as “the question of designing – developing, facilitating, nurturing – synergies between social structure and new technology”<sup>59</sup>. Moreover, the synergetic and collaborative nature of the human-centered characteristic of the smart city can also contribute to strengthening democracy<sup>60</sup> (Metais-Wiersch, 2019).

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<sup>57</sup> This is also the quote that initiates Anthony Townsend’s book “Smart Cities Big Data Civic Hackers And The Quest For A New Utopia”. (2013).

<sup>58</sup> Halbert (2010) also considers them to be innovators, because, if the government officials let them, they can initiate and drive urban projects by themselves.

<sup>59</sup> Meijer, A., & Bolívar, M. P. R. (2016). Governing the smart city : A review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82(2), 394.

<sup>60</sup> Strengthening democracy is the primary goal of the Civic Tech concept, short for civic technology. It is pretty much common-sense, but the latter is aimed at improving the inclusion of the citizen in the urban decision-making process. See more in: Metais-Wiersch, E. (2019). Chapitre 2. La révolution des Civic Tech. In *Démocratie participative digitale* (p. 56-87).

As we have noticed, many terms are used to define the tools used by the citizens during what we call the intermediation process of urban governance, i.e., their direct participation in it. (Orillard, et al., 2020). Historically, many initiatives have been carried out to put theory into practice. Living Labs, for example, can today be defined as group meetings organized between the government representatives and the citizens where the latter will be asked what they think should change, or be executed concerning a specific -or not - matter in the city, a district, an infrastructure, or even a street. The very first time the notion of Urban Laboratory was used was to evoke the in-field experiment made by students from the University of Drexel in Philadelphia to improve mobility and circulation efficiency in South Street, the city's commercial and residential area (Bajgier et al., 1991). The concept was then appropriated by scholars such as William J. Mitchell, who wanted to consider the role of technologies in this participatory 'living' experimentation. That is why they are today called Living Labs (LLs) or Urban Living Labs (ULLs). Following this global appropriation of the concept in the United States in the 1990s and from 2006 in Europe, many of them were launched in different cities, and at different scales (Béjean et al., 2021). Amsterdam often stands out in the literature as an example for its constant implementation of LL projects<sup>61</sup>. For instance, the I-CHANGE project is a discussion program where different actors in the city thought of new infrastructure ideas, notably smart buildings, to overcome the impacts of heat waves, a phenomenon that is gradually taking importance due to global warming. What makes it a Living Lab is its multi-stakeholder nature: not only did local communities, associations, and businesses take part in the project, but a network of 100 'citizen scientists' also did.

On a smaller scale, the congestion of Nantes' tramway, a city in the Northwest of France, forced government officials to find a more comfortable and efficient way of traveling in the city. As a result, transportation designer Régine Charvet Pello interviewed 70 inhabitants to get their opinion on potential solutions to address this issue before its launch in spring 2024. In the end, the citizens opted for a sensor directly situated on the door of the tramway so that anyone who wants to open the door, even if they are constrained by many people next to them, can do so. Previously, the button was placed only in specific places, far from each other, which made it hard to leave the tramway.

Besides, I will give another personal example that I encountered during the writing of this thesis that could be linked to the LLs discourse, or at least to the direct intermediation

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<sup>61</sup> Barcelona also does, as we will see in our next chapter.

of the citizens in urban governance and policies. Bordeaux is a French city whose current government is dedicated to becoming more sustainable and resilient, especially in its mobility practices. Simultaneously, bicycles have become a rather popular means of transportation in most -developed- cities<sup>62</sup>. It is therefore understandable that Bordeaux would want to implement new strategies and initiatives to enhance cycling infrastructure in the city. On Wednesday, March 27, 2024, I, probably like many other residents of Bordeaux, received an email in which was attached a survey invitation and an opportunity to participate in the city's upcoming bicycle project. Essentially, the latter proposes residents to share their data on their bicycle usage -such as the amount of time they spend cycling or the distances they travel- to enable government officials to understand citizens' mobility behaviors and adjust the city's organization accordingly. Below, the poster attached to the email shared by TBM, the city's public transportation system, with the project's procedure explained.



Figure 8. TBM's Bicycle Campaign.

Translation:

**At the very top:** “Participate in our campaign to improve the modeling of our bicycles.”

**On the left, second paragraph of the frame at the top:** “We want to improve our predictions abilities [for next major mobility projects].”

<sup>62</sup> In 2023, Bordeaux was the third French city where most people used the bicycle to go to work. See: Savary, D. (2023). Quelles sont les cinq villes en France où l'on utilise le plus le vélo ?



Finally, the implementation of LLs and the importance put on the citizen's own voice in urban governance inevitably also implies that it understands the technology used. Thus, the citizen in the smart city becomes a smart citizen<sup>63</sup>, able to make sense of the tools he is using and the impact they can have on his experience in the city (Coletta et.al, 2019). Thus, according to the human-centered approach of the smart city, a city will be smart “because their citizens have found new ways to craft, interlink and make sense of their own data and information, changing the behaviour of people and organisations”<sup>64</sup>.

## **Section 2 : Defining Smart Cities - Methodological Foundations and Criteria for Analysis**

In scholarly work, the definition of the smart city is often focused on a specific approach instead of being comprehensive. As a result, the interaction between the technological, ‘soft’, and social characteristics of smart cities have often been unstudied, contributing to the fuzziness of the definition assessed in the previous section. In contrast, we now argue, following Caragliu’s acclaimed definition, that it is the combination of involved citizens, smart technologies, and problem-solving initiatives that make a city smart. Moreover, having in mind what was said in Chapter 1 about the inequality between cities, it is relevant to wonder if, in practice, smart city initiatives implement the three characteristics equally, or if, as in most of the available literature, personal narratives or interests from the governments, citizens, and other actors impact the ‘ideal’ definition of smart cities.

### **1. Operational Definition of the Smart City Concept Used in This Thesis**

#### **2.1.1. Bridging the Fundamental Components of Smart City - Nam and Pardo, Caragliu, Giffinger**

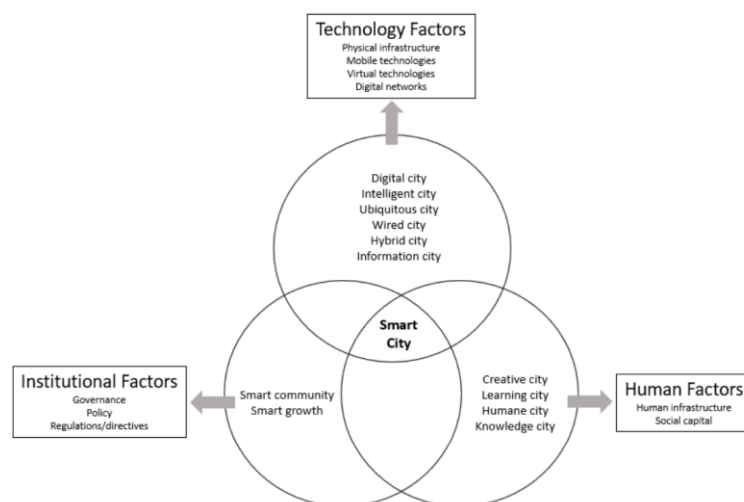
Nam and Pardo’s (2011) definition of the smart city concept is based on their desire to combine the three -technology, institutional, and human- factors that, according to them,

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<sup>63</sup> In Kitchin, R., Coletta, C., Evans, L., & Heaphy, L. (2018). Creating smart cities. In C. Coletta, L. Evans, L. Heaphy, & R. Kitchin (Éds.), *Creating Smart Cities* (1<sup>st</sup> éd., 144-154), Ayona Datta also talks about a netizen, i.e. a citizen who has the potential to -or already do know how to- use digital tools and willing to collaborate with its representatives to carry out new urban digital initiatives.

<sup>64</sup> Directorate-General for Internal Policies of the Union (European Parliament), Millard, J., Thaarup, R. K., Pederson, J. K., Manville, C., Wissner, M., Kotterink, B., Cochrane, G., Cave, J., Liebe, A., & Massink, R. (2014). *Mapping smart cities in the EU*. Publications Office of the European Union, 24.

enable the government to implement the best policies for the city’s economic growth, and their citizens’ well-being. Indeed, they consider, as said previously, that technological progress is not enough to implement smart urban governance. Technological infrastructures are thus described as a means, rather than an end, for a city to become more innovative, and ultimately serve the urban actors’ goals. Thus, sustainable, and resilient urban policies -that can be proposed by the citizens-have to be implemented by decision-makers and accepted by them to fulfill their aims, i.e., increasing the efficiency of the public transport system, waste and water management, while reducing CO2 emissions and/or social polarization. The figure below, drafted by Birthe Getzner in *Critical Review of Smart City Concepts, Strategies, and Indicators*, shows the “model components”<sup>65</sup> of the smart city concept, according to Nam and Pardo. For the sake of brevity, and because we have already analyzed each of the characteristics in Section 1, we will not be doing so here. Nevertheless, some critics can be raised, which we will dive into while comparing this definition with Caragliu et al.’s (2009).



**Figure 9.** Fundamental Components of a Smart City, according to Nam and Pardo (2011). In Birthe Getzner (2021)<sup>66</sup>.

In *Smart Cities in Europe*, Andrea Caragliu and his colleagues’ (2009) stance rather goes along Nam and Pardo’s, as they consider that a bias can intervene in the leader’s decision-making process, favoring a business-led model of urban governance, instead of one based on inclusion. To address this issue, the authors give their own definition of a smart city, able to ensure an environment where values like sustainability and freedom are guaranteed. Once again, they do so by combining the three characteristics described earlier [Cf. Appendix 1], as they believe “a city to be smart when

<sup>65</sup> Birthe Getzner, *Critical Review of Smart City Concepts, Strategies and Indicators*. Master Thesis. 2021. 10.

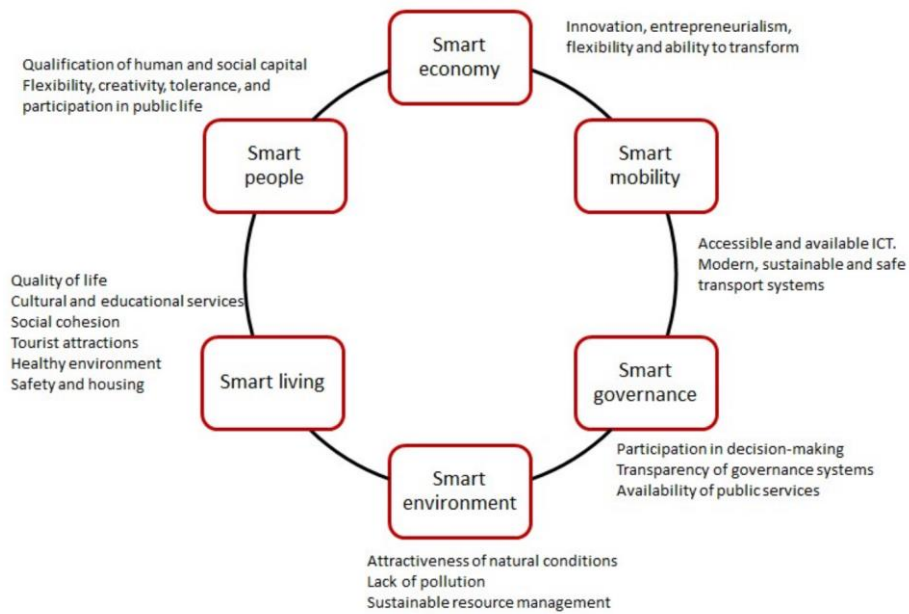
<sup>66</sup> Ibid.

investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance”<sup>67</sup>. Nevertheless, the missing notion of environmental protection is particularly relevant to point out, as Nam and Pardo’s figure does not include the importance of sustainability and environmental resilience. Moreover, both definitions should further be regarded with hindsight, as the notion of the urban structure also seems to be lacking. Indeed, while they do implicitly highlight the multi-stakeholder vision of the ideal smart city concept, one could argue that the consideration of the city as a system, itself composed of subsystems, is absent of any consideration.

It will be Giffinger et al. (2007) who will elaborate on the mainstream definitions of the smart city concept, as their approach serves as the basis for their European smart city ranking. As we have seen, considering a city’s local context influencing the citizens’, the government leaders’, and other third parties’ decisions and behaviors are necessary when approaching an analysis of its smart initiatives. This is what the authors attribute the greatest importance to, as they laid out six characteristics of the smart city. This does not mean that the three main characteristics we have depicted become irrelevant. In fact, they are included while the new analysis provides complementary considerations and dimensions that were ignored or underestimated in previous works, as the environment, this time, is directly mentioned. Moreover, because the fields of smart urban development laid out by the authors are extensive, they enable us to understand that a city is the result of complex interactions between different systems. Of course, it fits the concept of urban smartness as well, as the six new layers of the smart city are: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, and Smart Living. This work has inspired a large number of scholars interested in the smart city concepts, as Cohen’s Smart City Wheel (2014) includes Giffinger et al.’s dimensions [Cf. Appendix 2]. It is also the case for both Sharifi’s (2019) [Cf. Appendix 3] and Ibrahim et al.’s Smart City Indicators (2019) [Cf. Appendix 4]. The figure below introduces Giffinger’s six dimensions, which we will use as the basis for our comparative analysis.

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<sup>67</sup> Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in europe. *Journal of Urban Technology*, 18(2), 5



**Figure 10.** The Six Characteristics of a Smart City, according to Giffinger et al. (2007). In Kunttu (2019)<sup>68</sup>.

### 2.1.2. Criteria of Selection for the Cities Assessed and Research Instrument

Smart cities have undeniably been a growing phenomenon for the last two decades, and hundreds of those projects have soared on all continents. For those same reasons, many are led to believe that several smart narratives exist and that no smart city can be standardized, or unique. One of the main goals of this thesis, as described in the introduction, is to compare four selected smart cities' narratives. Our aim is not to provide an arbitrary index or ranking based on the cities' smartness of any kind. Indeed, a conceptual comparison can increase the risks of biases and lack empiricism. Instead, we will thoroughly analyze to what extent different smart city projects, in practice, fit Giffinger's dimension of the smart city model depicted in the literature. More precisely, we will wonder if they are equally implemented in the governments' urban policies, or if one characteristic, more than another, is favored.

#### *Data and Methods*

##### *Selection of Methodology, Smart Criteria —*

As previously said, we will use multidimensional and multicriteria approaches to see our analysis through, based on Giffinger et al.'s (2007) six characteristics of the smart city. With those dimensions in mind, and after having defined them according to the EU Parliament's

<sup>68</sup> Kunttu, Iivari. (2019). Developing smart city services by mobile application.

interpretative framework (2014), we will thus provide a detailed comparative table considering different criteria: the narrative at the birth of the projects, the goal to achieve through these projects and/or the city's future smart projects.

*Selection of Methodology, Criteria for Selection of the Cities—*

The three main criteria for the cities selection were the following:

1. The cities chosen needed to have a well-defined smart city strategy, whether it be through already-established projects or specific narratives.
2. Particularly different city projects were chosen in order to assess a wide range of narratives that could be created out of the smart city concept. To this end, different city sizes and regions have been purposely chosen.
3. Two of the smart initiatives were implemented in an already-existing city, while two others are being created from scratch. This choice was made to understand if the 'smart' choices were similar depending on those two types of projects.
  1. If this is the case, we will also make hypotheses on the causes of the valorization of certain sustainable, or business-led initiatives instead of others. After having gotten the results based on our analyses, we will complete a comparative table, as discussed earlier.

*Selection of Methodology, Cities Chosen —*

Our comparative analysis will thus be based on four cities, which are:

- Barcelona, Spain
- Shenzhen, China
- Songdo, South Korea
- The Line, Saudi Arabia

The table used for analysis and its defined characteristics are displayed on the next page.

**Table 1 (1)***Research Instrument for this Thesis' Comparative Analysis*

City	Country	Population	Smart Governance	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living
BARCELONA	SPAIN	1,700,000 (2023)						
SHENZHEN	CHINA	13,073,000 (2024)						
SONGDO	SOUTH KOREA	167,346 (2023)						
THE LINE	SAUDI ARABIA	450,00 (Expected by 2026)						

Note. The cases will be checked -or not- depending on our results. A cross (x) means the characteristics are fully satisfied; a dash (-) means the characteristics are only partially satisfied; and an oval (o) means the characteristics are not at all satisfied.

### Table Notes<sup>69</sup>

- **SMART GOVERNANCE:** By Smart Governance we mean joined up within-city and across-city governance, including services and interactions which link and, where relevant, integrate public, private, civil, and other organizations, so the city can function efficiently and effectively as one organism. The main enabling tool to achieve this is ICT.
- **SMART ECONOMY:** By Smart Economy we mean e-business and e-commerce, increased productivity, ICT-enabled and advanced manufacturing and delivery of services, ICT-enabled innovation, as well as new products, new services, and business models.

<sup>69</sup> Again, the definition of each of the criteria was taken from the Mapping smart cities' EU report published on the European Union website in 2014. Because some definitions considered the European Union's potential role in the decision-making process or in the initiatives taken by the city, which is not relevant for our analysis, we removed any mention of the organization. In: Directorate-General for Internal Policies of the Union (European Parliament), Millard, J., Thaarup, R. K., Pederson, J. K., Manville, C., Wissner, M., Kotterink, B., Cochrane, G., Cave, J., Liebe, A., & Massink, R. (2014a). Mapping smart cities in the EU. Publications Office of the European Union, Table 4, page 28.

- SMART MOBILITY: By Smart Mobility we mean ICT-supported and integrated transport and logistics systems. For example, sustainable, safe, and interconnected transportation systems can encompass trams, buses, trains, metros, cars, cycles and pedestrians in situations using one or more modes of transport<sup>70</sup>.
- SMART ENVIRONMENT: A Smart Environment includes smart energy like renewables, ICT enabled energy grids, metering, pollution control and monitoring, renovation of buildings and amenities, green buildings, green urban planning, as well as resource use efficiency.
- SMART PEOPLE: Smart People means e-skilled individuals in ICT-enabled environments, having access to education and training, human resources, and capacity management, within an inclusive society that improves creativity and fosters innovation. It also means that the citizens can use and manipulate data themselves.
- SMART LIVING: By Smart Living we mean ICT-enabled lifestyles, behavior, and consumption. Smart Living is also healthy and safe living in a culturally vibrant city with diverse cultural facilities that incorporates good quality housing and accommodation. Smart Living is also linked to high levels of social cohesion and social capital.

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<sup>70</sup> Real-time information can also be accessed by the public in order to save time and improve commuting efficiency, save costs and reduce CO2 emissions, as well as to network transport managers to improve services and provide feedback to citizens.

## **CHAPTER 3: SMART CITIES, SAME INSTRUMENTS FOR COMPETING URBAN NARRATIVES**

The examples of Barcelona, Shenzhen, The Line, and Songdo embody Isabelle Baraud Serfaty's (2011) concept of "urbanization strategies"<sup>71</sup>. What she means by that is that while the instruments to create and sustain smart cities are the same, or at least extremely similar, each city -and its governments and actors- has its own vision of what they can be used for. Barcelona fits the European Union's vision of the Smart City concept and sets itself as one of its ideal archetypes, according to the definitions given earlier. The Line and Songdo rather fit the US' Technology City narrative, which puts forward innovation and growth. Lastly, Shenzhen embodies China's Smart-Safe city strategy, whose goal is to use technology as a surveillance means, while however branding it as a tool for security and environmental sustainability.

### **Section 1 : From a Traditional City to a Smart City**

#### **1. Barcelona, the Ideal Smart City**

##### **1.1.1. From a Near Collapsing Economy to a Smart Revolution**

What really is of interest with Barcelona as a smart city is its "success story". Indeed, the city went from being one of the most impacted European cities by unemployment and economic stagnation in the 1980s, to one of the most advanced smart cities in the world from the 2010s (Gasco-Hernandez, 2018). As a matter of fact, it is no exception to its reliance on manufacturing and traditional commerce due to the Industrial Revolution and the latter's impact on urbanization growth. It saw its population surge from a little below 250,000 people in 1890 to 1.6 million in 1960<sup>72</sup>. At the time, the city lacked obvious strategic planning, notably regarding housing, water management, mobility, and environmental issues, notably due to Francisco Franco's dictatorship. It is in preparation for the 1992 Olympic Games that

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<sup>71</sup> Original French passage: "Une urbanisation des stratégies". In "La nouvelle privatisation des villes": Esprit, Mars/avril(3), 158.

<sup>72</sup> The evolving urban form : Barcelona | NewGeography. Com. (2012).



the city experienced a deep political and structural transformation. The main goal was not only to become an important global city, but also to become smarter, i.e. becoming a competitive model with other cities in the domain of inclusive high-tech urban governance. According to Francesca Bria, the city's Chief Technology and Digital Innovation Officer from 2015 to 2019, "Barcelona is leading the way in the description of ontologies because we were very early in thinking about urban services which have technology built into them."<sup>73</sup>. As early as 1988 was launched the 'Barcelona Strategic Plan 2000' which carried out three waves of innovation. In 1990 was implemented the first permanent cycling lane in the city and new tunnels, closely followed by the building of the New Rambla del Rival in 1994, and, from 1999, the gradual implementation of high-speed trains, public Wi-Fi Network, and trams. That said, although technology has always been at the core of its urban planning, it is in 2011, the year when the 'Smart City Expo World Congress' was held for the first time in Barcelona, that the city's smart policies soared. The idea behind the smart projects that we will explain in more detail in the next subsection was to build a truly self-sufficient city, reassembling productive information, infrastructures, organizations, and citizens for achieving a zero emissions policy.

### 1.1.2. Description of Barcelona's Smart Initiatives

As a matter of fact, one of the main components of Barcelona's Smart City strategy is to build a technology-led, knowledge-based city, whose goal is to provide sustainable, efficient, and inclusive urban infrastructures. While fourteen tech hubs were created in Catalonia in 2023, and 76% of them are in Barcelona<sup>74</sup>, we will focus on describing the projects that embody the city's multidimensional aims the best.

The 22@District, also called 22@Urban Lab, was one of Barcelona's main projects in redesigning and transforming wholly a major district of the city to make it more modern and community-based. Introduced in 2000, the district was meant to foster interactions between local firms, institutions, and citizens (Gasco-Hernandez, 2018). It is characterized by the concentration of modern networks of energy such as centralized heating and air-conditioning, telecommunication, smart traffic management systems and smart garbage-collection systems, for instance. More precisely, the district welcomes around 114,000 m<sup>2</sup> of new green space, 7,000 -mostly Tech-companies and businesses<sup>75</sup>, but also social housing,

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<sup>73</sup> News, I. T. U. (2020). How Barcelona's smart city strategy is giving 'power to the people' ? ITU Hub.

<sup>74</sup> Record figures in the sector for international tech hubs | Info Barcelona | Barcelona City Council. (2023).

<sup>75</sup> Case study : 22@ Barcelona Innovation District | Smart Cities Dive. (2011).

playgrounds, and restaurants. Thus, not only the district enables economic innovation by connecting technologically advanced companies and “talented”<sup>76</sup> citizens, but it is also aimed at encouraging sustainability, social interaction, and knowledge. For instance, the district has organized an ‘Urban Cluster Day’ every year since 2009 where the representatives of the innovation companies in the district are brought together and discuss the progress they can make regarding environmental issues or social inclusion within it. This constant interaction between the different actors within the district highlights is one of the pillars of what makes Barcelona one of the most looked upon smart cities.

Moreover, coexistence is also facilitated thanks to the ubiquity of ICT and Open Data-based infrastructure in public space. For instance, the ‘Smart Street’ project in Barcelona’s suburb Saint Cugat achieves efficiency and avoids traffic jams in a particularly congested street<sup>77</sup>. To solve this issue, sensors network monitoring systems are used, which helps to reduce the traffic and give more rapid feedback to the drivers. Nevertheless, technology is not only used in specific districts, but also everywhere in public spaces. For instance, the City OS project provides “better data governance, quality controls, more effective privacy and security and, above all, it gives the City Council an overview of this area<sup>78</sup>” in different parts of the city. Besides, the issue of public street lightning harming the environment is a subject of discussion in many cities. In this regard, Barcelona has been one of the pioneer cities to implement LED technology equipped with sensors to light its streets. The benefit of this technology is twofold: the LED consumes way less energy than normal lightbulbs and their sensors process data on the environment like humidity or the presence of people at the same time.

Finally, one of the points of these technologies is of course to make the city more livable and efficient, but also, and most importantly for Barcelona, for its citizens to fully partake in the decision-making process and urban strategies. The ‘Citizen to Citizen’ services enable citizens, through Open Data, to create or propose services to the government officials and ameliorate their urban experience within the city. According to Barcelona’s City Council’s website, “the initiative recognises people's ability to become active players in matters that affect the community as a whole, favouring the general public's role in defining priorities or needs in the city's political agenda”<sup>79</sup>. And results have been observed thanks to these sharing

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<sup>76</sup> Idem.

<sup>77</sup> The programs also includes Smart grids, Smart meters, Smart energy and solar, wind and water management systems.

<sup>78</sup> CityOs | Barcelona Digital City | Barcelona City Council.

<sup>79</sup> Ajuntament de Barcelona, Citizens initiatives. (2017). Citizen Participation.

platforms and the city's bottom-up governance initiatives. Indeed, the citizen-led 'Commitment to Climate Change' project<sup>80</sup> was organized in 2015 upon citizens' request to reduce the city's CO2 emissions. As a result, the plans included for example a bike-sharing program and energy-reducing training. Hence, in 2023, AMBici, a bicycle sharing service, was launched in 15 municipalities within the Barcelona metropolitan area<sup>81</sup>.

To conclude, what makes Barcelona the model of the transition from a near-collapsing traditional city to one of the most innovative cities in the world? From the projects we have just analyzed, it is because technology was used as a tool and facilitator for 1) more flexible, available, efficient urban infrastructures aimed at 2) making the city more inclusive, self-sufficient, and community oriented. What is key in Barcelona's example and that echoes the definitions we gave of the smart city earlier is that technology was not seen as a mere goal, and that the visions for the future were on the long-term.

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<sup>80</sup> Cities100 : Barcelona - citizen initiatives drive climate action. (2016). C40 Cities.

<sup>81</sup> Ambici, The Bike Sharing Service in Barcelona Metropolitan Municipalities. (2024). SCEWC 5-7 NOV 2024.

## 2. China's 'Safe Cities' Paradox: The Case of Shenzhen

In 2020, Deloitte estimated that half of the 1000 smart city projects at the global scale were Chinese<sup>82</sup>. Indeed, similarly to South Korea -as we will see-, China is proving it is becoming an important actor in both technology and innovation, but also in urban governance. This fits a claim shared by the EU Parliament, stating that some countries are branding their whole country as a “Smart Country”<sup>83</sup>. China is even, thanks to its powerful companies, promoting and implementing smart cities technologies abroad, in 106 countries (Atha et al., 2020).

### 1.2.1. The Development into a Technological Metropolis at the Service of Security...

Much like Barcelona, Shenzhen was not to become one of China's most important smart cities. Indeed, from a fishing village in the 1990s, it became the “Chinese Silicon Valley”<sup>84</sup>, an “Instant City”<sup>85</sup>, or a “Benchmark”<sup>86</sup> for cities all around the world. Economic reforms in the 1980s are the reason for Shenzhen's economic growth and potential to become a leader of smartness today. By focusing on both the ‘2018 New-Style Smart City Development Plan’, and Shenzhen's government officials' relationship with Huawei, we will understand the city's main narrative. As we have just said, Shenzhen's strength has been, from the moment it started to grow, its capacity to lead the electronics industry. China's national strategy from the 2010s to develop smart cities based on data processing and the digitization of urban planning thus perfectly fit Shenzhen's advantage. The 2018 Plan was put forward to improve the city's public services and economic development, mostly in order to go against congestion, pollution, inequalities, which characterize, as we know, most cities today. It is even more relevant to point out when we know that China is one of the most polluted countries in the world. Basing itself on ICT-based technologies such as cloud-computing and big data, the city aims at increasing the city's management efficiency, particularly in the domain of mobility, waste management, and public security.

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<sup>82</sup> Hu, R. (2019). The state of smart cities in china : The case of shenzhen. *Energies*, 6 (22), 4375.

<sup>83</sup> Directorate-General for Internal Policies of the Union (European Parliament), Millard, J., Thaarup, R. K., Pederson, J. K., Manville, C., Wissner, M., Kotterink, B., Cochrane, G., Cave, J., Liebe, A., & Massink, R. (2014a). Mapping smart cities in the EU. Publications Office of the European Union.

<sup>84</sup> Lai, O. (2023, janvier 19). *Top 10 smart cities in china*. Earth.Org.

<sup>85</sup> Hu, R. (2020). The shenzhen phenomenon : From fishing village to global knowledge city. Routledge. 3.

<sup>86</sup> Smart shenzhen: A benchmark for smart cities. Huawei Enterprise's Website

Indeed, the transportation system is set to be low carbon, implemented with digital display screens, using real-time data for parking lot information for the reduction of congestion and testing projects for AI self-driving cars. The water-management system was also planned to use data processed 24/7 for improving pipe networks. Moreover, an emphasis was put on increasing the city’s economic opportunities, especially through the promotion of new technologies at the service of economy. Finally, the most important focus for China in the Plan was the public safety pillar, characterized by technology improving surveillance, emergency response, and security. Concretely, according to Atha et al. (2020), the safety systems were to cover two main threats: crime and terrorism. To solve these issues, are set to be implemented “public surveillance systems and a third-generation public security command center with full-area surveillance coverage, full network sharing, fully controllable processes, and 24/7 usability, [...] systems including intelligent infrared sensing equipment, [...] and robotic inspection equipment”<sup>87</sup>. Huawei, arguably the most important tech company in the country, is the main service provider for these smart initiatives. Below, we can see what concrete uses the city claimed to do with the data collected after the Plan was developed.

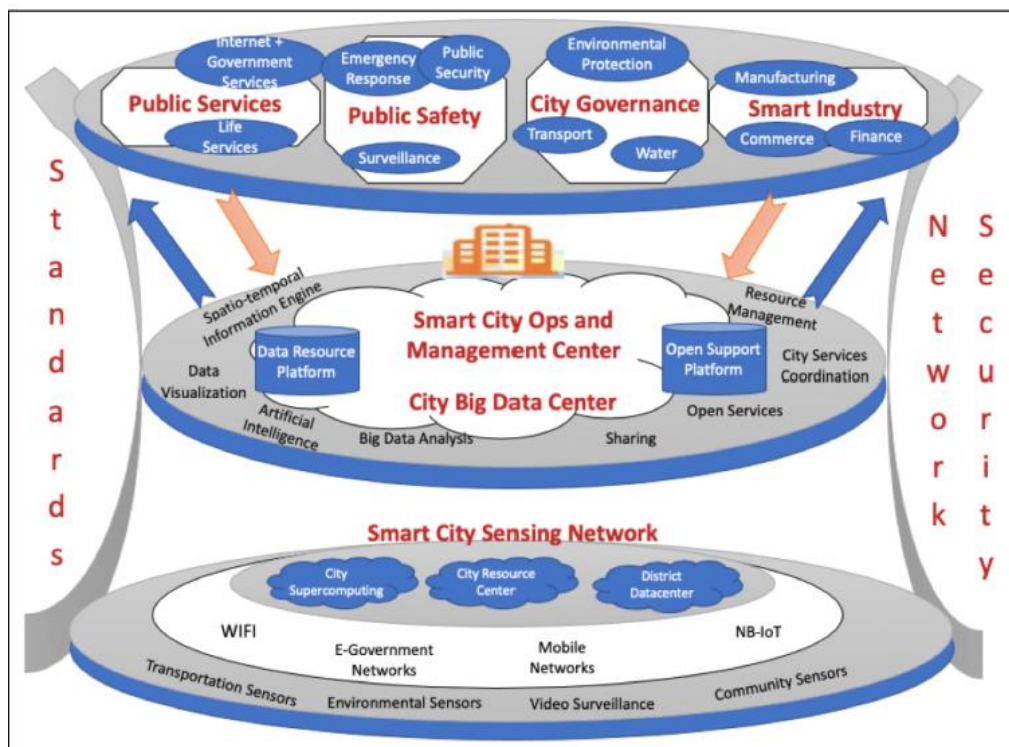


Figure 11. Shenzhen’s Smart City Development Plans<sup>88</sup>.

<sup>87</sup> China Smart Cities Development Report—Uscc.gov. (2022). PDF4PRO. 31.

<sup>88</sup> Ibid.

## 1.2.2. ...Serves the Authorities' Surveillance Purposes

If there are discussions on the implied aim of Songdo's smart city towards securitization and surveillance, it is far from being comparable with Shenzhen's. As Richard Hu (2019) believes, smart cities are reflections of an urban regime. It is true that Shenzhen's smart initiatives according to the 2018 Plan do not seem to have established direct dialogue between its stakeholders, i.e., the citizens, Huawei, and potential other organizations. This is a characteristic of China's techno-centrist urban planning policies, but it also reflects its closed regime. A similar instrument will not be accepted in the same way depending on the country. Indeed, the fact that most Chinese citizens seem to have approved the Plan, still according to the author, highlights that the undermining of the human factor and the participation of the citizen in the city does not have the same importance everywhere.

## Section 2 : Cities 'From Scratch'

### 1. The Business City: Songdo, South Korea

In 2010, Parag Khanna wrote on his eponym website an article entitled *When Cities Rule The World*, where he said that "Technology-crazed Koreans are now leading the pack in demonstrating that in the future, digital and physical infrastructure will be equally important"<sup>89</sup>. Similarly to the other examples we have given, South Korea is historically a country that had to face economic and social challenges, especially after the Second World War. Today, the country is known to be one of the most successful technology-wise, as its tech companies are acclaimed worldwide and its average internet connection, for instance, is considered the fastest in the world. However, urbanization issues, as we have seen in all our case studies, still impact cities such as Seoul, and call for new governance responses.

### 2.1.1. The Management of the City as a Factory...

This is what is at the very core of Songdo's initiative: a new smart city which is being built from scratch since 2009, and connected to Incheon International Airport, in the Northwest of South Korea. The approximate \$40 billion necessary to build the city were part

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<sup>89</sup> Khanna, A. (2011). *When cities rule the world*. Parag Khanna.

of President Lee Myung-Bak's 2008 national agenda entitled 'Low-Carbon Green Growth' (Seong, 2011). However, one of the perks of Songdo is that it is the result of a public-private partnership (PPP), which means private companies also invested in the project. Indeed, several digital communications businesses as Cisco and LG as well as the two realty developers Gale International and Morgan Stanley Real State are involved in Songdo Smart City. Two main points are key to bear in mind in order to understand what type of services Songdo was set to provide. Indeed, on its website, two names are given to the project, as it is both described as an "international city"<sup>90</sup>, and an "international business district"<sup>91</sup>. The first concept considers the city an attractive hub that responds to current demands from citizens and investors, such as sustainable urban living. This hypothesis checks out with reality, as the developers claim on the same website to have wanted to create a new place where green spaces could be enjoyed. Thus, the new city, whose works are still not finished, was inspired by emblematic green spaces as New York City's Central Park, with 40% of its available space dedicated to bicycle lanes and waterways<sup>92</sup>. The second idea was to build a business-led city, allowing innovation to soar: "As a global business base including International Business complex, [...] Knowledge and information industrial complex and High-tech Industrial Complex, Songdo [...] is leading the global business and economic growth of South Korea"<sup>93</sup>.

In order to make those two main goals reality, Songdo bases all of its services on ICT-based infrastructure, whether it be AI, data processing networks or sensor monitoring systems. In short, every service we know and use today is to be optimized or reinvented to make it more efficient, sustainable, and comfortable. For instance, Songdo's new waste management system marks the end of garbage trucks, which might threaten the inhabitants' tranquility due to their smell or the noise they make. Indeed, according to Songdo's urban planners, waste management is facilitated by underground tubes directly connected to waste treatment centers. The latter's aim is to sort, treat, and reuse the collected waste and transform it into energy. Water also allegedly goes through a thorough recycling system, as rain and water used for cooking, showers and toilets is treated and reused to make it an infinite resource, in a world where doubts keep on rising as to its presence in the future.

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<sup>90</sup> Songdo IBD. Website. Homepage.

<sup>91</sup> Ibid.

<sup>92</sup> Could Songdo be the world's smartest city? World Finance. The Voice of the Market. Rita Lobo.

<sup>93</sup> Songdo IBD. Website." SONGDO INTERNATIONAL CITY" Tab.

Moreover, and almost naturally, all living places as houses, buildings, malls, schools, and workplaces will be not just equipped with smart infrastructure but inherently smart<sup>94</sup>. As a matter of fact, the operation center manages and provides data regarding all services and infrastructures of the city, such as transportation, crime prevention, or any other information service in “real-time for the citizens”<sup>95</sup>. Data is thus used for traffic, air-quality, and weather information services, but not only. Both a real-time 24/7 monitoring and data processing system as well as a vehicle tracking system are implemented for “security of the city”<sup>96</sup>, still according to Songdo’s website.

Finally, high mobility is a key part of the city’s projects: as an international city, Songdo is connected to the rest of the country through both Gimpo and Incheon airports, and the multiple train and metro lines to Incheon and Seoul. As we have seen, within the city itself, compared to The Line as we will see later, cars remain a potential means of transportation. However, they are thought not to be needed in the future, as the city was designated to gradually eliminate the need for the traditional thermal car-owning model. Still, SK Telecom, the principal Korean telecommunication company, is set to establish self-driving cars connected by 5G networks in Songdo, but we still do not know when -or if- the project will actually be implemented.

### 2.1.1. ...Gives Little Relevance to the ‘Human Factor’.

The Songdo project is a revolutionary one in the smart city scenarios available, notably considering innovation and the use of ICT-Technology for efficiency and resilience. In its peculiar attempt to create the city of the future, however, Songdo is labelled as a cold or a ghosted city<sup>97</sup> by many of its inhabitants (Lab Gov City, 2020; White, 2018). Moreover, bearing in mind that the project has still not met the promises it gave to potential citizens and investors is relevant for our future discussions. Not more than 100 thousand people currently live in Songdo, which is extremely low for a Korean megacity<sup>98</sup>. The reason is that, while it does rely on technology, the city is still “half-built”<sup>99</sup>. It thus seems to be telling a story nobody wants to hear anymore: high prices of accommodation and the lack of cultural

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<sup>94</sup> Most buildings are LEED- (Leadership in Energy and Environmental Design) certified, meaning that they are made to consume less energy and thus be sustainably accountable.

<sup>95</sup> Songdo IBD. Website.” SONGDO INTERNATIONAL CITY” Tab.

<sup>96</sup> Ibid.

<sup>97</sup> This echoes Masdar Smart City, in Abu Dhabi, initiated by sultan Ahmed el Jaber. The narrative of the project is close to The Line’s, as it counts on its sustainable functionment, but its ending is rather like Songdo’s: the city, that lacked understanding of what made a smart city work, is near to be deserted.

<sup>98</sup> Eremeev, E. (s. d.). A ghost town from South Korea that is worth more than \$40 billion. Smapse.Com.

<sup>99</sup> Ibid.



and social attractions up until today do not appeal to many Koreans. Now, the next step for the developers is to attract new visitors, and potentially gain new residents, such as Europeans or Americans. For instance, an ‘American district’ is currently under construction. Nevertheless, the root of the issue is still the same: citizens are not truly taken into account, and rather considered at best as ICT users. As addressed earlier, at first, Songdo was set to be a PPP, but many consider that the private companies are the only actors currently leading -or at least deciding on the future of- the city. As a matter of fact, as Rita Lobo said: “Songdo is the city of the future; all that is missing are the residents”<sup>100</sup>.

## 2. The Eco-City: The Line

The idea of a linear city is far from being new. In the past, many architects and engineers have undertaken projects to make cities more equal, as the vertical city, according to them, prevent the citizens to be. This is exactly what Arturo Soria, Spanish engineer, thought of doing when he proposed his plans for his 53km long “Ciudad Lineal”<sup>101</sup> to Madrid’s government officials in 1894. Introduced as a “radical revolution in the architecture of the cities in Spain”<sup>102</sup>, the main goal was to connect rural and urban areas by providing infrastructures which, in the end, would provide social inclusion, and ultimately, equality. The project started to be carried out but was abandoned after only a few months. Le Corbusier, French architect, also introduced in 1931 his idea of an industrial linear city for Algiers, which was never carried out either.

Thus, what differentiates The Line, linear city part of the Neom project put forward by Saudi Arabia in 2016 from the ones we have just seen is that it actually might become reality. What makes it possibly smart, and the smart narratives used in the project, will now be analyzed.

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<sup>100</sup> Could Songdo be the world’s smartest city? World Finance. The Voice of the Market. Rita Lobo.

<sup>101</sup> Linear City.

<sup>102</sup> Original Spanish passage: “En España una revolución radical en la arquitectura de las ciudades”. In the report of the 1894 Conference presented by Soria to present his project, Soria y Mata, A. (1894). Conferencia dada en el Ateneo Científico y Literario de Madrid por D. Arturo Soria y Mata el día 14 de mayo de 1894 acerca de la nueva arquitectura de las ciudades, 6.

## 2.2.1. A Sustainable Alternative...

The Neom project alone highlights the fact that creating smart cities from scratch is now the thing to do to improve city living. At least, this is how Mohamed ben Zayed's government described the future of the ideal sustainable megacity. Branding the future city as a "new miracle for the world"<sup>103</sup>, the project is undeniably unprecedented. It is indeed Saudi Arabia's prince that chose the Neom region, situated in the Northwest of the country, to launch The Line, the -expected- \$1 trillion flagship project of the country's national transformation and urbanization project, Saudi Vision 2030. The city is set to be stretched along the Red Sea and Aqaba Gulf, occupying an area of 26,500 km<sup>2</sup><sup>104</sup>. The Line website alone is extremely relevant to understanding the narrative of the city, especially mobility-wise. Basically, the promoters have two main claims. On the one hand, The Line's architects and planners have witnessed, like most of us, the impact of traffic jams, social inequalities due to urbanization, and aim at solving these issues. On the other hand, they have learned from all the other smart city initiatives towards the preservation of the environment and decided to combine them to create a true natural city able to sustain economic growth. To be precise, different videos and reports from NEOM itself take the example of Manhattan or Central London to show how unpractical and unsustainable cities are today. Just like The Line, the same rigid urban idea remains: making it vertical. Below, a screenshot of the project's website, showing how Central London could also become a 'Line':



**Figure 12.** What would Kensington look like with The Line's vertical idea? "Central London reimaged as a city of the future". Screenshot of the video on NEOM's YouTube Channel<sup>105</sup>

<sup>103</sup> Quote found on NEOM's website. See: THE LINE : A revolution in urban living.

<sup>104</sup> This means that it will be 33 times larger than New York. In Arnault, J. (2022). *La ville linéaire, de l'utopie sociale à la mort des opposants*. Chroniques d'Architecture.

<sup>105</sup> Central London reimaged as a city of the future. (2022). Neom. YouTube.

Thus, the bottom line is to create the perfect eco-friendly city: entirely free of cars, the underground train system enables the trip from one end to the other -which represents a good 170 kilometers- to be completed in twenty minutes. Moreover, any of the residents' or visitors' basic needs are to be accessible in five minutes on foot. This perfectly embraces the '15-minute' concept, which is a model of compact, comfortable, and interconnected neighborhoods enabling, through the integration of green infrastructure, a perfected quality of life and a reduction of spatial inequalities. All these mobility policies are to achieve a sense of community, which, for the creators, is impossible to build in current cities. In a video shared on NEOM's YouTube channel, Tarek Qaddumi, executive director of the urban planning at the same company, said: "I think that the principle of the module is about community. And you don't enjoy or become part of a community by driving past in a car"<sup>106</sup>. The verticality that the literal form of the city represents is what, according to them, enables community, and with that, equality. Equal healthcare and equal education are thus naturally two points particularly emphasized by the plan.

Another point is truly important in The Line's narrative: using technology, namely Artificial Intelligence, to enjoy infinite resources. We have understood it, the promoters stand against global warming and the use of finite resources like gas. The city is thus set to run on 100% renewable energy thanks to solar, wind, and hydrogen, as 95% of the land is preserved for nature, still according to the website. In the same vein, a canal is to be built from the Red Sea to the city, allowing desalination factories to treat the water and offering 100% sustainable water. Finally, a totally unprecedented legal system will be based on AI only.

All in all, we addressed that while The Line's main ideological pillar is based on sustainability and nature, technology, community, and livability are three of the others pillars its creators base the project on. The point in the following section is not to argue if the project is doable or not, which most experts -unrelated to the project, naturally-think not anyway<sup>107</sup>. However, we are to understand if the narratives behind what NEOM provides fit the smart city definition and main characteristics, according to the theoretical foundations laid out earlier.

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<sup>106</sup> *The line | The city of the future* (2023). 5'.

<sup>107</sup> "Everything has to change for nothing to change". Original French passage: "Il faut que tout change pour que rien ne change". In Musset, A. (2023). Neom et The Line (Arabie saoudite) utopie futuriste ou cauchemar urbain ?. *L'Information géographique*, 87, 159.

## 2.2.2. ...Which May Favor Neoliberalist Urban Policies

The ambitious project in Saudi Arabia just assessed is often compared to Zucktown, Mark Zuckerberg's "community"<sup>108</sup> initiative in Menlo Park, California, or Alphabet City, a Google-led initiative to make a district in Manhattan, New York, more modern and attractive. The reason for these comparisons seems obvious: sustainable urban governance is used for certain actors' profits. More precisely, the main critics of The Line project are that the implied goal might rather be towards 1) astonishing -but not-so-sustainable-nor-inclusive-technological performances and 2) making a great impression on investors all over the world to be able to carry out their expensive promises (Eveno, 2018). When seeing the project for the first time, the main incoherence that can be highlighted is that the city, aimed first and foremost at the preservation of nature, might have catastrophic impacts on the environment. Many criticize the walls of the future city, that will be made of mirrors. The latter might reflect the sun rays, and if not destroy, strongly damage the flora surrounding the city, while the fauna might be forced to flee from the desert.

Another question that challenges the social-centered narrative of NEOM's project is: Who is going to live in it? In other already-existing cities, this question often does not need to be answered. If it does, it is for who will live in it in the future, and how to include them in the current governance agenda. According to architecture experts and scholars, rethinking the traditional horizontal socio-spatial urban structure and making it vertical does not necessarily solve the social polarization issue (Musset, 2023). On the one hand, since the project mainly targets investors, the future residents thought to be living in The Line might be from the so-called 'talented citizens' we have addressed in previous chapters. While it promised social integration, the city might thus end up concentrating a specific group of people in the same area. Others consider that even if it does not only attract wealthy investors, the design could still favorize social polarization: a vertical one. Even now, as the city is not functional yet, the impacts on certain social groups are already visible: around 20.000 members of the Howeitat tribe have been chased from the land where the project was set to be constructed.

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<sup>108</sup> Streitfeld, D. (2018). Welcome to zucktown. Where everything is just zucky. The New York Times.

## **CHAPTER 4: DISCUSSION OF RESULTS & FINAL CONSIDERATIONS**

This final part will be dedicated to the results of our analyses made in Chapter 3. We will take each city in the same order we analyzed it and proceed to assess to which characteristics from Giffinger et al.'s their narratives best fit.

### **1. Barcelona**

- **SMART GOVERNANCE:** Based on our analysis of the 22@District, CityOS, and Citizen to Citizen projects, it is safe to say that Barcelona has and still initiates within-city and across-city governance initiatives. Different services as well as public, private, and civil actors at various scales were integrated in each of these projects, so the city could function more efficiently and offer more inclusive and resilient infrastructures, through ICT.
- **SMART ECONOMY:** The 22@ project is a particularly relevant example to underline how one of Barcelona's main goals is to be economically attractive. It is done through the promotion of e-business and ICT-enabled innovation, products, new services, and business models, all aimed at increasing the city's livability and productivity.
- **SMART MOBILITY:** Through its ICT-supported and integrated (real-time data) control of lightning zone, smart parking, and attention to the pedestrians and bicycles, Barcelona is one of the examples of a smart city which promotes sustainable, safe, and interconnected transportation systems.
- **SMART ENVIRONMENT:** Barcelona's Smart City initiative resolves around finding a sustainable solution to global warming and it implemented tools to do so: Smart Energy management through energy grids, metering, pollution control and monitoring but also investments in green buildings (eg. Media-tic buildings), urban planning, and an increased waste management overall.
- **SMART PEOPLE:** Barcelona is an example of a smart city including its citizens in the decision-making process. Thus, not only they are surrounded by initiatives to foster creativity and innovation, but they also have the possibility to use and manipulate data themselves to share their ideas on what the city could become.
- **SMART LIVING:** The projects analyzed underlined that Barcelona is aiming to be a particularly safe living and culturally vibrant city, with diverse cultural facilities, that

incorporates good quality housing and accommodation which in turn increases social cohesion and social capital.

Based on these results, Barcelona’s smart city narrative seems to be checking all six of Giffinger’s characteristics satisfyingly:

**Table 1 (2)**

*Research Instrument for This Thesis’ Comparative Analysis*

City	Country	Population	Smart Governance	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living
BARCELONA	SPAIN	1,700,000 (2023)	X	X	X	X	X	X
SHENZHEN	CHINA	13,073,000 (2024)						
SONGDO	SOUTH KOREA	167,346 (2023)						
THE LINE	SAUDI ARABIA	450,00 (Expected by 2026)						

Note. The cases will be checked -or not- depending on our results. A cross (x) means the characteristics are fully satisfied; a dash (-) means the characteristics are only partially satisfied; and an oval (o) means the characteristics are not at all satisfied.

## 2. Shenzhen

- **SMART GOVERNANCE:** Shenzhen's 2018 Development Plan did not include various services as well as public and civil actors at various scales in its projects. Indeed, although most of its functioning is ICT-based, the government officials and big tech companies seem to make the ultimate decisions for urban planning without much cooperation.
- **SMART ECONOMY:** The Shenzhen Plan does promote e-business and ICT-enabled innovations, products, new services, and business models, as well as advanced manufacturing and delivery of services, all aimed at increasing the city's livability and productivity.
- **SMART MOBILITY:** Shenzhen's buses and metros are modern, have real-time CCTV cameras data processing systems, enabling interconnected means of transportation to cover the whole city. Nevertheless, not much emphasis was put on bicycles or pedestrian mobility, but it is a more secondary matter.
- **SMART ENVIRONMENT:** The 100% emission-free public transportation network is one of the examples highlighting that the city aims at finding sustainable solutions to global warming, as well as improving its efficiency and reliability. The city also integrates Smart Energy management through energy grids, metering, pollution control and monitoring but also green buildings, and an improved water management initiative thanks to Open Data.
- **SMART PEOPLE:** Shenzhen, although it claimed to want to encourage residents to participate in governance, did not implement concrete initiatives in its 2018 Plan for its citizens to partake in the city's planning process.
- **SMART LIVING:** The projects analyzed underlined that Shenzhen has implemented infrastructures to become a particularly safe living and culturally vibrant city, with diverse cultural facilities, that incorporates good quality housing and accommodation which in turn increases social cohesion and equality.

Based on these results, Shenzhen's smart city narrative seems to only be satisfyingly checking four of Giffinger's characteristics:

**Table 1 (3)***Research Instrument for This Thesis' Comparative Analysis*

City	Country	Population	Smart Governance	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living
BARCELONA	SPAIN	1,700,000 (2023)	X	X	X	X	X	X
SHENZHEN	CHINA	13,073,000 (2024)	O	X	X	X	O	X
SONGDO	SOUTH KOREA	167,346 (2023)						
THE LINE	SAUDI ARABIA	450,00 (Expected by 2026)						

Note. The cases will be checked -or not- depending on our results. A cross (x) means the characteristics are fully satisfied; a dash (-) means the characteristics are only partially satisfied; and an oval (o) means the characteristics are not at all satisfied.



### 3. Songdo

- **SMART GOVERNANCE:** Songdo's narrative does not directly include various services as well as public and civil actors at various scales in its projects. As in Shenzhen, although most of its functioning is ICT-based, the government officials as well as American and Korean tech companies seem to make the ultimate decisions for urban planning, without much cooperation.
- **SMART ECONOMY:** Songdo's urban projects do promote e-business and ICT-enabled innovations, products, new services and business models, as well as advanced manufacturing and delivery of services, all aimed at increasing the city's livability and productivity. However, the 'international business city' does not seem to have been as successful as expected, and productivity is the main point criticized by the inhabitants and experts as of today.
- **SMART MOBILITY:** Songdo's buses and metros are modern, have real-time CCTV cameras data processing systems, enabling interconnected means of transportation to cover all the city. For instance, offices, parks, hospitals, and schools were built so that they are close to each other, and a large bicycle path runs through the whole city. Finally, the city is very well-connected to Seoul and Incheon thanks to modern train lines and airports.
- **SMART ENVIRONMENT:** Songdo's developers aimed at making the city as green as possible whether it be through green spaces and parks, 0 emission buildings that earned the LEED certification, and the integration of Smart Energy management through energy grids, metering, pollution control as well as an unprecedented water management instruments.
- **SMART PEOPLE:** Songdo promotes the idea of e-skilled, educated and technology trained individuals, who understand how it works and create new innovations based on AI, for instance. Nevertheless, the city does not seem to have implemented concrete initiatives until now for its citizens to partake in the city's planning process or manipulate data for their own urban experience.
- **SMART LIVING:** The projects analyzed underlined that Songdo also has tried to implement infrastructures to become a particularly safe living environment that incorporates good quality housing and accommodation, which in turn increases social cohesion and social capital. As of today, the city does not, however, seem to be a particularly vibrant city concentrating diverse cultural facilities.

Based on these results, Songdo’s smart city narrative seems to only be fully checking two of Giffinger’s characteristics:

**Table 1 (4)**

*Research Instrument for This Thesis’ Comparative Analysis*

City	Country	Population	Smart Governance	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living
BARCELONA	SPAIN	1,700,000 (2023)	X	X	X	X	X	X
SHENZHEN	CHINA	13,073,000 (2024)	O	X	X	X	O	X
SONGDO	SOUTH KOREA	167,346 (2023)	O	(-)	X	X	(-)	(-)
THE LINE	SAUDI ARABIA	450,00 (Expected by 2026)						

Note. The cases will be checked -or not- depending on our results. A cross (x) means the characteristics are fully satisfied; a dash (-) means the characteristics are only partially satisfied; and an oval (o) means the characteristics are not at all satisfied.

## 4. The Line

- **SMART GOVERNANCE:** The Line's narrative, although it puts its residents experience first, does not in practice include various services as well as public, private, and civil actors at various scales in its projects. As the two last cities we have analyzed, although most of its functioning is ICT-based, Saudi Arabia's government officials seem to make the ultimate decisions for urban planning, without much cooperation with other -civil- organizations.
- **SMART ECONOMY:** The Line's urban projects do promote e-business and ICT-enabled innovations, products, new services, and business models, as well as advanced manufacturing and delivery of services, all aimed at increasing the city's livability and productivity. The results of these projects must be analyzed when the city is finally functioning. As of now, these initiatives on innovation and economic growth seem to be rather promising.
- **SMART MOBILITY:** The Line developers claim that its only transportation system will beat any other, permitting a fast and 0 emission trip of the city in only 20 minutes. Although some critics are rising regarding its feasibility, it for now checks the fact it is ICT-supported and aimed at facilitating the flow of its residents and visitors.
- **SMART ENVIRONMENT:** The city's main narrative is to make the city as green as possible, whether it be through green spaces and parks, free-emission buildings, and the integration of Smart Energy management through energy grids, metering, pollution control thanks to solar energy and hydrogen. The goal is to run on 100% renewable energy. Nevertheless, questions are raised on the impact of building the city in the desert and its impact on the fauna and flora surrounding it.
- **SMART PEOPLE:** The Line's narrative promotes the idea of e-skilled, educated and technology trained individuals, who understand how it works and create new innovations based on AI. Nevertheless, the plan does not seem to include concrete initiatives for its citizens to partake in the city's planning process or manipulate data for their own urban experience.
- **SMART LIVING:** The main initiatives and future projects analyzed underlined that The Line aims to implement infrastructures to become a particularly safe living environment that incorporates good quality housing and accommodation, which in turn could increase social cohesion.

Based on these results, The Line’s smart city narrative seems to only be fully checking two of Giffinger’s characteristics:

**Table 1 (5)**

*Research Instrument for This Thesis’ Comparative Analysis*

City	Country	Population	Smart Governance	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living
BARCELONA	SPAIN	1,700,000 (2023)	X	X	X	X	X	X
SHENZHEN	CHINA	13,073,000 (2024)	O	X	X	X	O	X
SONGDO	SOUTH KOREA	167,346 (2024)	O	(-)	X	X	(-)	(-)
THE LINE	SAUDI ARABIA	450,00 (Expected by 2026)	O	X	(-)	(-)	(-)	X

Note. The cases will be checked -or not- depending on our results. A cross (x) means the characteristics are fully satisfied; a dash (-) means the characteristics are only partially satisfied; and an oval (o) means the characteristics are not at all satisfied.

## 5. Analysis of Results

To conclude, the completed table above shows that traditional cities that become smart, such as Barcelona or Shenzhen, usually implement -satisfyingly- more smart characteristics than cities built from scratch. Moreover, the two characteristics that are the most widespread in the cities for analysis are that of Smart Economy and Smart Environment. We can thus say that their narratives are mostly based on the accommodation of economic growth and environmental sustainability. In contrast, Smart Governance and Smart People are the least favored characteristics in the smart initiatives we have analyzed. Indeed, most initiatives that greatly involved private companies tended to put aside both the citizens' participation, but also other civil organizations' and public services'. Finally, three of the four cities analyzed have parts of the characteristics they can improve for better urban governance. Besides, the annual Smart City Expo which took place in late March 2024 underlined how work still can be done to improve smartness in most cities<sup>109</sup>. Now, the question is whether they are willing to or not.

Of course, Barcelona has leeway to become smarter and more inclusive, as more citizen initiatives could be carried out in the next years. Still, taking Barcelona as the model for other smart cities to follow is relevant, as it concentrates digital innovation hubs, citizen-centric approaches, and decisions taken according to the Paris Agreement. We will try to understand why the other cities fail to implement the other characteristics, if they choose not to, and how they could improve.

Indeed, Shenzhen, if it is regarded as the representation of China's rapid urbanization and technological advancement, it still has a unique opportunity to become the country's most resilient and inclusive city. Because its citizens are educated and know how to use technology, their urban experience could be significantly integrated in the decision-making processes. Moreover, much investment was made to improve health and overall quality of life, which elevates the city as a promising smart city in the future. Nevertheless, because of China's political regime, Shenzhen's leaders make the choice not to empower their citizens with concrete urban projects nor to create community engagement. Thus, unless the Chinese regime decides to implement concrete initiatives in which its citizens can take part in, Shenzhen is not to climb up in the smart rankings.

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<sup>109</sup> *Scse.* (s. d.). Smart City Expo Website.

Songdo's smart projects are quite different in their aim, even if they lack similar characteristics. Indeed, the city's issue is that most of the buildings that were supposed to be built and promote inclusivity, creativity, and productivity are not noticeable in the city's landscape yet. Because it was late in most of its works, Songdo lacks many of what it promised, and that ultimately affects the citizens' quality of life and participation in the projects. As the city is still under construction, not much community engagement has been granted to the inhabitants. In order to fix this problem, Songdo could first share surveys to gather the citizens' current needs and ultimately favor the construction of demanded infrastructures. Before worrying about the future of the city, while not undermining long-term prospects, Songdo's leaders and project developers should worry about implementing what is in their people's best interests. This would enable to make people stay, attract others to come, and gradually improve the city's inclusive governance.

Finally, while The Line's project is extremely ambitious, notably in using technology to fight against climate change at a local level, some specific things could prevent it from being a model of smart city in the future. The city is far from being built, and criticizing what it could be, even if it is a way to project, would be counterproductive. Naturally, the project's aim to make Saudi Arabia more attractive is easy to come around and raises ethical issues. Thus, what could be done to prevent what some say is going to happen in the city when it is built is twofold. First, The Line's creators and architects should be aware -or reminded- of the potential impacts a metal mirror and the creation of a new bay could have on the current landscape surrounding the city. Second, they need to consider potential initiatives and ways to build the city in which inclusivity and equality between the citizens is assured.

All in all, the following statement is proposed:

Barcelona, Shenzhen, Songdo, and The Line showed us that making a city smart surely takes time, and while smart initiatives often reflect specific interests, multiple stakeholders must be integrated and cooperate to make urban governance better.

## **CONCLUSION**

The study of the smart city concept and its practical renderings conducted throughout this thesis has demonstrated how it has integrated the realms of politics, but also, and inherently attached to politics, that of environmental concerns and citizen participation. Examining the different smart discourses at different scales is necessary in academic works, as it aligns with the current transformations and perks of our globalized world. While this thesis could have only focused on the origins of the smart city concepts, it had the ambition to take the analysis further and look at concrete case studies, in which the smart city narratives of a few selected cities were dissected and tried to be understood. Indeed, if the smart notion has taken so much importance in the last few years, it is because very specific conditions favored -and still favor- its development.

As a matter of fact, the smart city notion is strongly linked to technological breakthroughs and mass urbanization. Today, new urban projects heavily rely on new forms of communication as well as modern and connected infrastructures. Nevertheless, it is the evolution of these projects and the astonishing number of new cities declaring themselves smart that was of interest in this thesis. But it was not all. Our interest was also in analyzing the various definitions of the notion which can be found in the available literature. The smart city concept has multiple and broad dimensions, as not only mere soft governance has to be reconsidered, but also means of transportation, housing, water, and energy. Because it brings together numerous actors from all parts of the World, all affected by contemporary urban issues, the concept of smart city is hardly ever comprehensive and implemented homogeneously.

Taking the examples of Barcelona, Shenzhen, Songdo, and The Line, this thesis thus interrogated the relationship between urban governance and smart city narratives. It became relevant to wonder whether the latter are used as a showcase for different interests and strategies, by altering both the citizens' role in decision-making processes and that of the government leaders. First, by seeing smart city tools being implemented in its city, an inhabitant can ask himself how its role in urban governance is to change, whether positively or negatively. As a matter of fact, smart city initiatives, as we have seen with our case studies, completely modify and raise questions on the transition to a less 'traditional' public participation decision-making process. In most cases, the human-centered approach is the least considered by government leaders in the implementation of smart city projects, whether at a small or large scale within the city.

Finally, to end our critical review of smart city concepts and strategies, I would like to make a wager that smart city narratives will not stop growing and serving different political and societal interests in the next few years. On the contrary, as demographic and environmental stakes are not to be solved anytime soon, more and more solutions will be needed. Moreover, with the constant technological innovation such as the Atlas robot by Boston Dynamics and High-Speed Trains tested in China reaching up to 460km/hour, it is safe to imagine that cities and their actors will continuously develop and compete for smartness.

With that said, while the smart city frenzy is real, and the way we currently rule our cities will shape the future of humanity, it might be time to turn to *wiser* cities, able to learn from the past and others for the common good. Thus, we all ought to remember that accommodating technological innovations, resilience, sustainability, and inclusivity is key for future urban governance.



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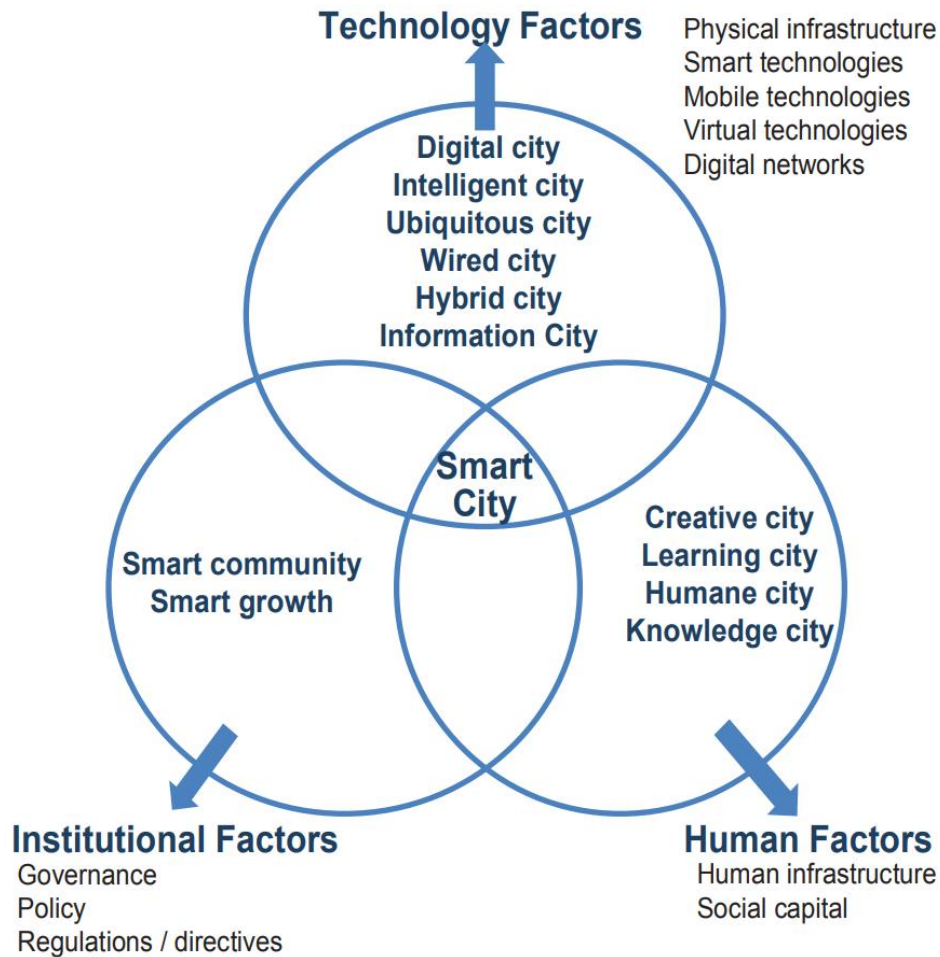
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## APPENDICE 1



### Three Fundamental Components of Smart City, Nam and Pardo.

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## APPENDICE 2

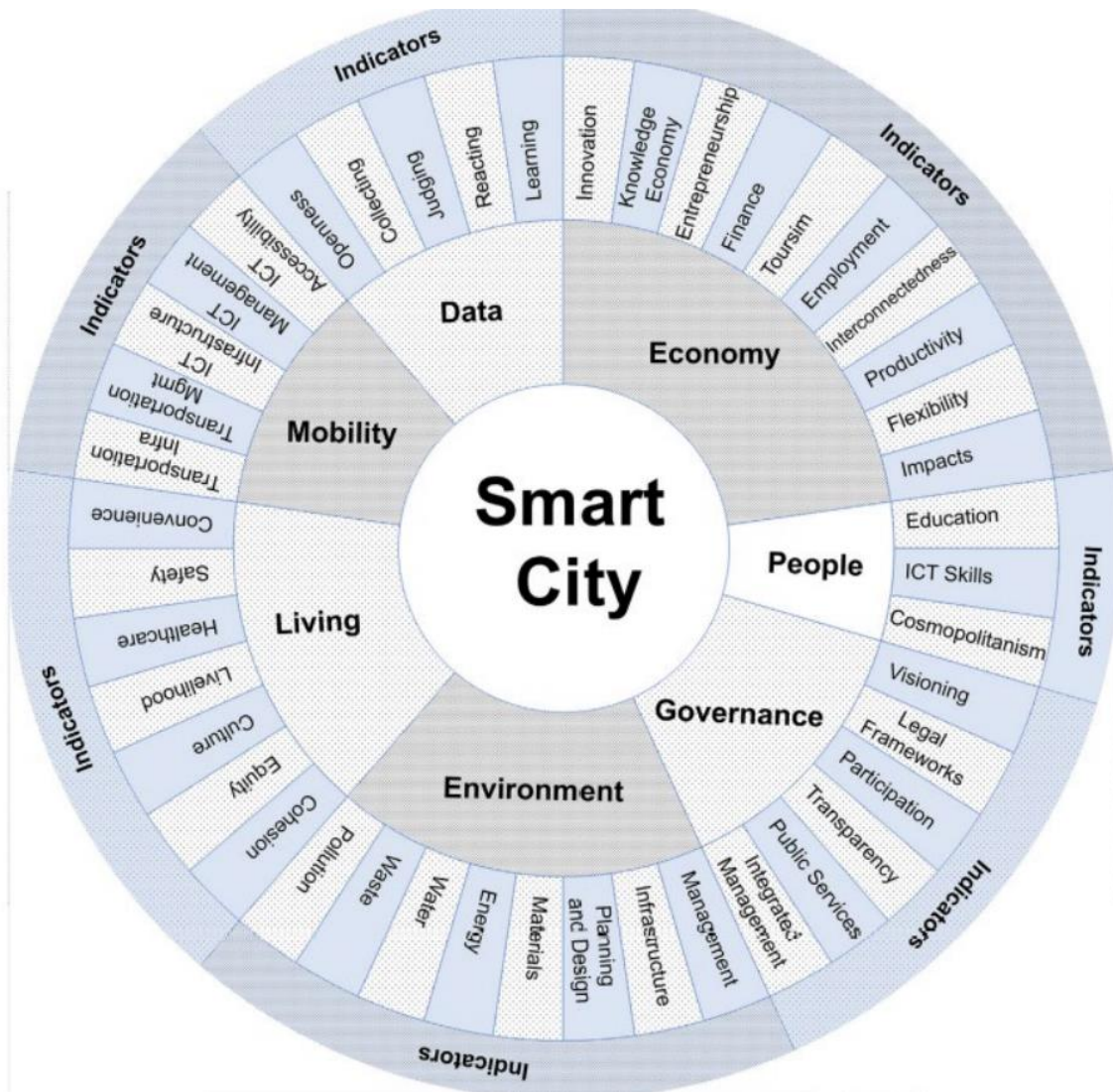


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## APPENDICE 3

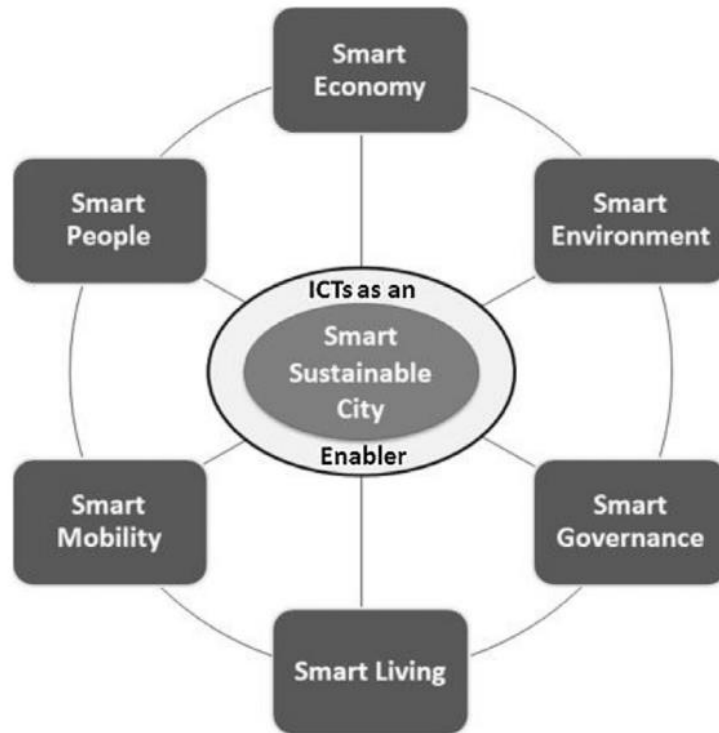


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## APPENDICE 4



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