THE SCIENCE FICTION OF THE PAST,
THE REALITY OF THE PRESENT – SMART CITIES

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ABSTRACT. The concept of "smart cities" has gained recognition in the last few years because of the increasing urban population coupled with rise in the number of urban problems. Smart cities – usage of information and communication technology (ICT) to enhance the standard of living, thereby, represents a digital solution for the urban communities that aims for economic growth and sustainability. The present paper offers an overview of this innovative concept. Smart Mobility, Smart Economy, Smart People, Smart Environment, Smart Living and Smart Governance are the six pillars of a smart city. However, the article puts an emphasis on smart governance, while providing a brief description of all the other dimensions. By highlighting some of the benefits and challenges that smart governance offers to urban citizens, it presents the significance of collaboration between different stakeholders including citizens, public institutions and government officials. In conclusion, the study argues smart governance is essential for promoting good governance practices but there is a need to consider the other factors such as social inclusion and basic human rights while adopting this new method in decision-making process.

Keywords: smart governance, smart cities, sustainability, technology

JEL Classification: O18, Q56, R59

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Introduction

Smart cities are an expression of adaptability to fast-changing societies, a result of population explosion, continuous migration of citizens from rural areas to urban areas as well as rapid technological advancement. Mankind's creation brought along a number of advantages and challenges. Together with its six dimensions (Smart Economy, Smart Mobility, Smart Environment, Smart People, Smart Governance and Smart Living), the concept of "smart city" evolved and so did its objectives, which are shaping themselves according to our needs.

The world is facing diverse problems from hunger, global warming (and natural hazards) to armed conflicts and uprising extremist attitudes in politics. Without doubt, there is a connection between all these issues. As such, smart cities are a common reaction of society. They are an expression of adaptability, a result of population explosion, migration and technological advancement.

In earlier times, their purpose was limited to integrating ICT (Information and Communication Technology) in order to improve the quality of life for citizens. This has then transformed into a contemporary concept – smart sustainable city. However, it did not take a long time for society to realize that "smartness" and "sustainability" must go hand in hand or else the consequences will be manifested in the form of serious environmental threats. The Sustainable Development Goals proposed by the UN along with international treaties such as the Paris Agreement further emphasize the significance of considering sustainability approaches while designing smart cities.

Smart Governance, one of the six pillars of smart city, is a classic example of modern governance approach which can promote economic development by improving the efficiency and quality of public sector services. By definition, governance means control and guidance of organizations while respecting principles such as – without limiting to these – transparency, accountability, responsibility – codes and regulations.

Moreover, smart governance serves to change citizens' lifestyles for the greater good while paying attention to feelings, values and rights. In this context, the greater good reflects actions which aim to preserve our nature by teaching people to live and take care of it, to ease our lives by using artificial intelligence and any other technological innovations.

Since governance plays a major role in the sustainability of smart cities, it is crucial to ensure that all the smart city initiatives are not just profitable but also respect the basic governance principles and human needs. Though it is not always possible for the people ensuring a smart governance to put human rights or values above the desired economically growth.

We study the existing literature to form an opinion on the given subject. The present article is organized as follows. The first half of the article begins with a brief explanation of the concept of smart cities, how it emerged and what are its six pillars, while the second part discusses in detail about the smart governance and some of the key benefits and challenges that it brings along. Lastly, the paper ends with a brief conclusion, which provides some suggestions for the future smart city initiatives based on the findings of the study.

Literature Review

The study of smart cities is not a newly developed subject as many of us would expect. It actually generated controversies, which led to multiple definitions. The result of many years of research and studies is the lack of a globally recognized definition and common understanding of the term. It has been said that technology is the key factor to transforming normal cities around the world into smart cities (Washburn et al., 2009) and this is the view eastern countries adhered to. For example, in China, smart cities represent IoT – Internet of Things. Even western states such as Germany agree that it symbolizes the implementation of new technologies addressing energy and transportation problems (Lai & Cole, 2022).

Having no universal connotation, a smart city distributes its focus equally on technological as well as the socio-economic dimensions; the latter being related to aspects such as governance, people and quality of life (Sharifi & Alizadeh, 2023).

With regard to this view, the European Commission (n.d.) defined the concept of "smart city" as a location where digital solutions are used to make regular, old services and network more effective for the convenience and benefit of businesses and communities' residents. It was also described as a place where resources are used more efficiently, with less to no emissions at all.

"Smartness" and "Sustainability" are two distinct concepts and must not be confused. Even though the paths of these terms intersect many times, it is important to understand that a sustainable city is not always a smart city. This convergence is seen as a "problematic event" by some authors as it symbolizes two different types of urban imagination. Sustainable city is perceived as an added promise of achieving sustainability goals to the idea of a smart city.

However, the underlying issue is that there is very limited proof in literature which suggests that such goals are ever accomplished in smart cities. As a solution to this problem, some are optimistic about the appearance of "smart-sustainability" (Woods, 2020)

Besides the European Commission, the United Nations Economic Commission for Europe (UNECE) and the International Telecommunication Union (ITU) claim that "*A smart sustainable city is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects*". Keeping in mind the Sustainable Development Goals adopted by the United Nations, there is a growing need to embrace and incorporate sustainable city initiatives into the process of smart city development (Kutty, et al., 2020).

In a world full of controversies, many sub-types of smart cities have emerged. Societal smart cities, climate smart cities are all results of the paradox we live. Despite global access to information, technology, possibilities and wealth, we are witnesses to degradation of biodiversity, crises, global health risks and so on (Mendes, 2022).

The majority of researchers consider that smart cities are based on social, cultural and even human aspects (van Twist et al., 2023). This approach has citizen attributes, rights, values and responsibility in the foreground (Panchanathan et al., 2017) and aims to create pluralistic spaces that are conductive to more inclusive smart cities (Sharifi & Alizadeh, 2023).

This leads us to societal smart cities. These are the ones that facilitate the integration of social rights and technological advancements to address a broad range of challenges (Breuer et al., 2019) through association with values as democracy, citizen-centeredness and justice (Kitchin et al., 2019; Masucci et al., 2020). In fact, cities in general can be defined by the collaboration of private individuals, businesses, developers, local government and public institutions. Taken individually, each of them has different goals, but smart governance considers them one and aligns their goals in order for them to share the benefits.

There are citizens that seem to not be fully content with the measures it takes to create such an environment and, as such, they show dissatisfaction. This feeling can be passive or active depending on how people choose to react to it (van Twist et al., 2023). Unplanned transitions to smart cities have the potential to create social issues such as social exclusion and inequality (Shayan & Kim, 2023). Six significant pillars have been identified for the development of any smart city. These factors include social, management, economic, legal, technology

and sustainability, a framework known by the first letters of all these pillars in form of the acronym – SMELTS (Joshi et al., 2016).

Due to the existent discrepancies in the existing literature on Smart City, these are not widely-accepted. Other authors claim the following to be the six pillars of smart city: smart economy, smart mobility, smart environment, smart people, smart governance and smart living (Matos, et al., 2019).

Smart economy, by its virtue, creates economic opportunities for the people of the society by using innovation as an instrument, while promoting sustainable and inclusive economic development (Kapoor, 2017). On one side, there are studies that support that smart economy is a necessary requirement for developing a smart city. However, there are researchers that assert that smart city is a prior condition/prerequisite in order to develop a smart economy and offer the citizens with a number of economic opportunities. In other words, some believe that a city is declared smart due to its smart economy, others claim that smartness itself is the main cause for a city to be called smart. Therefore, till now, the relationship between the two remains unclear because we do not know whether smart city is a cause or an effect of a smart economy (Kézai et al., 2020).

Smart mobility refers to the implementation of a smart transportation system that is required to enhance the quality of life. It can also be defined as a system that encourages citizens to use integrated platforms that help them access transportation services. Smart mobility is considered an eco-friendlier solution (Tahmasseby, 2022). Although the traditional transportation system provides citizens many advantages, it still affects the environment and the society negatively, giving rise to various ecological and social issues such as vehicle dependency, air pollution and accidents. In this context, smart mobility, thereby, represents an innovative but at the same time, a sustainable solution. As a result, smart services must be incorporated into the city's transportation system, allowing inhabitants to use more innovative transportation technologies (Kussl & Wald, 2023).

Smart Environment is also referred to as ambient intelligence. Smart environments, using different techniques or approaches, sense the changes in the surroundings (for instance, temperature changes or any sudden movement) and react accordingly in return. There are various projects that reveal the possibility of utilizing ambient intelligence so as to minimize energy usage. Many such projects have even created prototypes of smart environments and published the findings that clearly demonstrate that they have the potential to lower energy consumption without disturbing in any way the user's comfort or environment. One may conclude that the smart environment, as an emerging notion, is capable of resolving several problems (Torunski et al., 2012).

Another pillar of smart cities is represented by smart people. Smart People are those who have both formal and informal academic capital and exhibit themselves as innovative people or groups (Surya & Manaf, 2021). All of these factors can be observed in the education level and advancement of human resources capable of utilizing technologies and possessing a socio-cultural nature acceptable at all stages of community education (Surya & Manaf, 2021).

Smart living is a combination of technological and human aspects of a smart city with the purpose of bringing smartness in places such as homes, workplaces and other buildings (Ghansah et al., 2022). This is continuously described as an emerging trend that consists of technological improvements allowing people to take advantage of modern ways of living. The concept of smart living is based on cost-effective construction materials, innovative constructions process, help in designing and creating facilities that meet everyone's needs (European Union, 2015).

Smart governance is in perfect coordination with the above-mentioned factors. It represents a multitude of policies, resources, social norms and information that interact to support city activities. Due to its principles – participatory governance, transparency, accountability (World Bank, 2016), smart governance leads to the social and environmental results sought by citizens (Mutiara et al., 2018).

But smart governance is more than just a pillar creating the foundation of smart cities. It covers and solves smartness vulnerabilities, societal goals such as urban sustainability or economic development (Tomor et al., 2021).

Moreover, it must not be forgotten that "smart city" is an umbrella term which includes different spheres of study (Lai & Cole, 2022). Its multidimensional nature obliges us to try to harmonize all the dimensions at the same time, instead of choosing to focus on one facet. The term can be classified into two different domains. On one side, we have the hard domain which addresses the technical infrastructure of smart cities, for example water and buildings management. On the other side, the soft domain represents the social aspects of smart cities such as culture (Lai & Cole, 2022).

A smart city would be created by integrating every problematic aspect, beginning with transportation, health care, energy supply education, services, food, infrastructure, water, and safety. This model cannot be included in only one dimension and this is the reason why academics repeatedly claim that all dimensions must operate concurrently. All these features of smart cities are then divided into many areas based on urban development. By breaking down the assessment of a smart city's maturity level into many metrics, policymakers can better determine the path of urban growth (Ningrum, 2021).

Cities around the world have become smart cities in their way to address climate change, aspect which reveals that smart cities are capable of fighting challenges we suffer from. For example, Singapore's goal in the last decade has been to reduce and control emissions by using sustainable energy, action supported by the Paris Agreement, adopted by more than one hundred countries at the United Nations Change Conference (Bhati et al., 2017).

Research Methodology

The main scope of this article is to fill in the literature gap by thoroughly analysing the concept of smart cities and emphasizing its relation to smart governance. For this purpose, we use literature review methodology.

For carrying out the research, each of these pillars have been used as main key words on different search platforms such as Science Direct and Web of Science. The sources cited in this article are thus credible and have been published between the years 2009-2022. The criteria that we chose to select and filter these sources were as follows: relevancy to the given subject and recency of the sources. In order to avoid researcher bias and to have an objective approach, a sufficient number of articles have been used. All the data sources have been mentioned in the References section.

By highlighting the impact of societal changes on the evolution of a smart city, the study attempts to answer the following Research Questions (RQ):

RQ 1: How did the concept of smart cities evolve over time?
RQ 2: Which is the foundation of a successful smart city?
RQ 3: What advantages and disadvantages does smart governance present?

Results and Discussions

Highways are not the only things that connect the modern-day cities. Data networks have also played a major role in urban transformations. This is the reason why an open access to data is a key to empower any given society. The rapid pace of technological advancements has ultimately made governments rethink their traditional methods and approaches of the decision-making process. This "doubt" gave birth to the concept of Smart City by igniting the smart growth movement in the 90s (da Silva & Fernandes, 2020).

The initial concept of "smart city" reflected only the integration of the kind of technology that ensures a better quality of public services. We can talk about efficiency, daily use of renewable energy through solar panels which empower street illumination. Another example is the purchase of electric public transport vehicles such as buses.

At first sight it may seem that these are not technological advancements, but this would mean we assume that smart cities did not exist prior to the last two decades. Truth be told, innovations address multiple problems, in this case both sustainability and smart environments for better lives. From this point of view, many cities around the world claim to be smart. Among them are Vienna, London, Dubai, Singapore, Hong Kong and so on (Tahmasseby, 2022).

In Rio, the first discussions over the smartness of the city took place in 2009. They were caused by it becoming the official host for the 2016 Olympics. Local authorities then elaborated a strategic plan aiming to increase city's economy. Probably one of the most important actions was to motivate the private sector to interact and engage with the public one. This encouraged people from various backgrounds to invest in their environment and gain courage to work hand in hand with public institutions.

Earlier in this article we mentioned that the decision of developing such an environment as a smart city be taken simultaneously. While improving services is always a welcomed measure, more radical changes that affect lifestyles must be implemented cautiously. Local councils and central governments must conduct studies, anticipate conflicts, consult people, maybe even organize referendums if necessary.

The construction and development of smart cities is receiving increased funding from governments due to a number of issues, including the rising need of infrastructure and asset management. The Consumer Technology Association made a prediction that in 2020, the world would invest US$34.35 billion only on the construction of smart cities. There are plenty of studies and reports that indicate the estimated revenues to be invested in smart cities are about to grow massively every year. One such example is presented below.

Figure no. 1 is a graphical representation of forcecasted global revenues produced by companies in global smart cities from 2020 to 2025 in billion U.S dollars. It can be clearly deduced from this graph that the revenues are expected to gradually increase annually. By 2025, it is speculated that the global market for smart city technologies, goods, and services would generate approximately 241 billion US dollars (Statista, 2022).
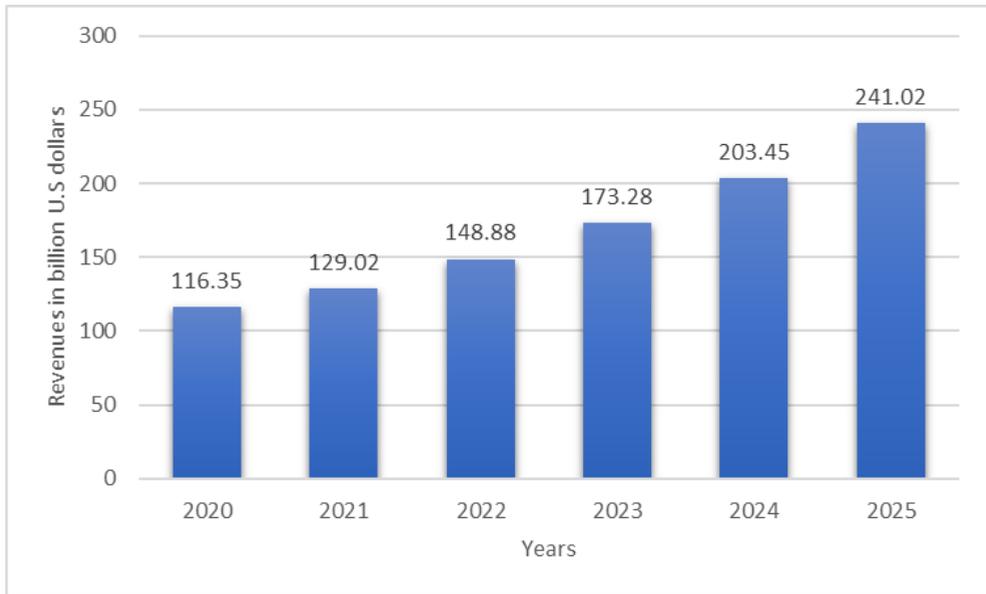
Figure 1. Projected revenue generated by companies in the global smart city from 2020 to 2025*(in billion USD)
Source: Statista (2022)

When discussing the urban challenges that smart cities solve by using ICT (Information and Communication Technology), it is essential to mention the improvement of public services and decision-making process of government officials, besides the common ecological and socio-economic issues. It is believed that one of the biggest challenges in building an effective smart city is Smart Governance because it involves many actors such as government officials, investors, organizations from the private sector, public institutions, citizens, communities and so on. Each one of these actors carry their own personal interest, which could either be a common interest or contradictory in nature. They all collaborate and coordinate with one another for successfully implementing different operations (da Silva & Fernandes, 2020).

The concept of smart governance emerged in the late 20th century along with the smart growth movement. Smart Governance represents transformations, reforms or shifts made in the traditional governance with the help of technological advancements. The main purpose of this concept was to create a sustainable city, which allows the citizens to easily access the quality public services.

By understanding modern technology better, the governments can innovate social governance. Modern technology such as big data, AI (artificial intelligence) and IoT (internet of things) are the present-day tools that are used by smart governance to formulate future policies that are in the best interest of the citizens. They assist the government in accomplishing long-term good governance objectives (Liu & Qi, 2022).

As shown in figure no. 2, smart governance is also considered one of the six pillars of a smart city (Matos, et al., 2019).
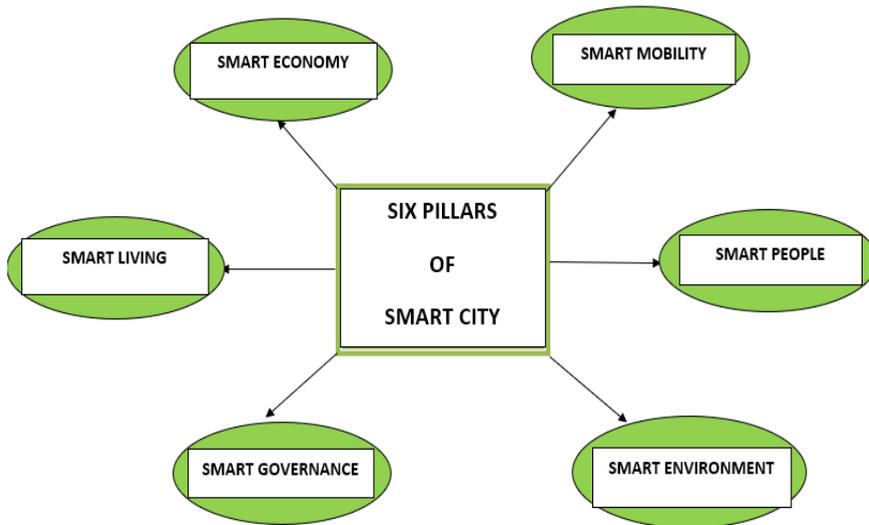

Figure 2. Six pillars of a smart city
Source: Matos et al. (2019)

In the figure shown above, each pillar seems to be separate from the others, but it reality they are interdependent. An effective smart city is based upon smart governance and smart governance includes all the other pillars – smart environment, smart people, smart mobility, smart economy, smart living. This suggests that smart cities have actually been created to serve the interest of people, to improve quality of life.

Quality of life means happiness, clean air, preserved nature (so sustainability), good services and organization, which is why it is completely dependent on the level of smartness of each city.

As the cities and organizations have started to embrace digital technologies, the governments are also following in their footsteps. In the past few years, some governments have begun to use instruments and advanced technologies in order to make the communication with citizens and companies much easier (Corydon et al., 2016). By introducing smart and adaptive techniques in governance, the process of decision-making and monitoring can be simplified and improved. For this purpose, the requirements are better information technologies, backed up with collaborative governance (Mandić & Kennell, 2021).

Even though governments across the world make attempts to utilize smart city applications while collaborating with citizens and companies in various fields, there are citizens that seem to be not fully content with the implementation of new technologies, thereby, showing the feeling of discontentment. The discontentment of citizens could be active or passive depending on how they choose to manifest it. According to a study, two possible responses of the government in such a situation may be "overcoming or embracing resistance" (van Twist et al., 2023).

While the creative streak of humans has brought along several benefits such as efficiency and cost savings for exercising governance, it has also given rise to new challenges.

Firstly, despite the fact that theoretically smart cities and smart governance practices are associated with terms such as 'sustainability', in reality, this approach often looks at human beings as nothing more than sources of data. In the presence of an environmental crisis and the ongoing mass extinction of species, this 'human-centric' approach to smart cities has been questioned several times. Consequently, smart urban governance is often disapproved of due to its 'technocratic' approach (Sheikh et.al., 2022). According to the more-than-human literature, under smart governance, where enhancement and optimization of the social services for citizens takes all the limelight, nature and its needs remain ignored. Due to the absence of inclusion of nature in the smart cities, the environmental issues may remain unsolved (Sheikh et.al., 2022).

Secondly, after years of numerous experiments, smart city initiatives, trials and errors, the authorities are finally realizing that smart city frameworks begin with humans and for humans; not for technology. Furthermore, "smartness" does not only reflect or symbolize instalment, usage and adaptation of new technological structures, rather it aims to make better decisions for improving the standard (McKinsey Global Institute, 2018). The spike in social media usage coupled with recent AI sentient analysis advancements has given rise to a new trend, that is, using the citizens as the source of the data and not just the data collectors or owners. In other words, humans are emerging as the new sensors.

Since cities are known to be evoking emotional experiences from the citizens because of their attachment to the geographical location, the research question that must be addressed in the future urban planning is 'What function should emotional data play to enable public involvement in smart city governance? (Willis & Nold, 2022).

As a matter of fact, the global smart city market is growing at an exponential rate, but the demand for data governance and management is also rising rapidly. In fact, data governance is the key to successful smart city initiatives (Chiasson & Holland, 2020). Although data plays a central role in urban planning, scholars argue that because of the recent technological advancements, the citizens are failing to have an active and meaningful participation role in the smart city agenda because of using emotions data that captures people's facial expressions and reads their state of emotions and feelings. The smart city framework allows citizens to exercise control or do the citizens just represent a symbolic data source for public and private organizations. The main issue that must be highlighted in the context of the 'people as sensors' model is that it provides an extra edge to the algorithm during the decision-making process. Therefore, researchers argue that this approach is not apt for being used as an instrument while implementing smart governance practices (Willis & Nold, 2022).

From smart governance's point of view, Rio respects principles such as participatory democracy, transparency and citizen centeredness.

Citizens had, from that year onwards, more active possibilities. They could make observations about changes in urban landscape through an app called Mapeando, they organized movements and took part in activities addressing climate change – for example the Climathon. Besides this, local councils created opportunities for them to share initiatives and ideas regarding business, economics of the city and population mobility.

Conclusions

To summarize, smart cities are an intriguing approach for tackling urban issues and generating eco-friendly, effective, and liveable communities. They are the present reality of the modern-day world, a by-product of the societies that are trying to accept and embrace technology as well as an innovative solution for accomplishing long-term objectives such as sustainability, liveability and economic growth.

Smart cities possess the ability to raise their inhabitants' quality of life (smart environment), enhance urban services such as public transportation (smart

mobility), encourage economic growth through the use of modern technology (smart economy), manage the utilization of resources as well as promote data-driven decision making (smart governance), and public participation. (smart people).

By implementing smart city initiatives, various actors within the society face its positive (economic prosperity, high standards of living) as well as negative outcomes (digital gap, privacy risks). Hence, one may conclude that smart cities represent a digital solution but at the same time also raises serious concerns. Therefore, it is crucial to understand that smart city solutions should be implemented responsibly while also taking into consideration various other factors such as social inclusion, basic human rights, social well-being.

When it comes to adopting smart governance, the city enables the organizations to increase their level of accountability, transparency and openness, that is, good governance practices in decision-making processes. However, on the other side, it also raises security and privacy concerns.

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