

INCREASING CITIZEN'S LIVABILITY IN THE FUTURE CITY

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# INCREASING CITIZEN'S LIVABILITY IN THE FUTURE CITY: RESPONSIVE CITY, A REMARKABLE SOLUTION

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## Abstract

This study explains the new concepts related to urban management and the relationships between them, examines the changes in societies, and nominates the responsive city as a solution to achieve citizen satisfaction to form a smart and sustainable society. To understand the concept of a smart city, we have reviewed the related definitions. Next, the difference between livability and quality of life is explained. Then, we have introduced a new livability approach to describe the impact of infrastructure smartness level. In the following, we define the responsive city characteristics and the process of turning the smart city into a livable one. We have also shown the overlaps and differences of the mentioned concepts. We have argued that existing research and livability indicators cannot fully consider citizens' intended features in terms of quality of life. Finally, we conclude that the responsive city increases citizens' livability and further individual satisfaction by involving citizens in the city's decision-making and management process.

**Keywords:** smart city, livable city, quality of life, responsive city.

## 1. INTRODUCTION

Awareness of new concepts and applying new technology topics is one of the most important things for managing cities' growth and development in the future. What issues will future cities be formed around? What are Citizens' expectations from city managers or government in the future? What are the tools that new technologies provide to city managers to meet these expectations? And finally, how can we prepare to manage these changes now and in the future?

To understand these concepts, the city must be considered a dynamic system to change and evolve rapidly. In other words, planning for public transportation systems, land use, traffic management, etc. should be formed according to new urban concepts. Otherwise, the waste of time and money, and more importantly, citizens' dissatisfaction and reduced quality of life, will be predictable results. Understanding

these concepts and the relationships between them will enable us to make the best use of new technologies to understand changes, development planning, and urban management in the future.

In this research, we try to show city management responsibility to increase the quality of life in future cities. The concept of the city as a human community is an ancient concept. Thousands of years have passed since the emergence of the first cities in Mesopotamia. Over the centuries, various factors such as water, communication routes, wars, famines, natural disasters, etc. have shaped or destroyed cities (Clark, 2013). Urban management and the Relation between citizens and city managers have long been one of the human concerns. Perhaps one of the first manifestations of this concern can be found in the studies of philosophers such as Plato, someone who was looking for utopia, has offered solutions to achieve it. Solutions that seek to find the best way for managing human communities in cities and maximize citizen satisfaction (Morrison, 2001).

Despite the efforts to managing and connecting communities in cities, the rapid growth and development of urbanization over the past 150 years has created new challenges in this area. The pace of urban development and urbanization on a global scale is impressive. By 1800, 2% of the world's population lived in urban centers. Today this number is equal to 54%; in 2050, it will be close to 65%. The World Health Organization predicts that in the future, 6.5 billion people will live in cities worldwide. That is predictable when we know that more than 1 million people are added to the world's population every week (through childbirth or immigration). In this regard, new concepts for urban development have been introduced ((WHO), 2014). Smart cities, livable cities, and interactive cities are among these concepts. Knowledge of these concepts and new technologies that can be used to achieve them are among the planning requirements for developing cities in the future.

Meijer and Bolivar (2016) have divided smart cities into technological definitions that emphasize using smart technologies, human resource definitions that insisting on smart people, and governance definitions that focus on smart collaboration (Meijer & Bolívar, 2016). In the relevant section, we will refer to the definitions related to each of these three categories.

Livability is not only a qualitative concept but also has different definitions from the perspective of various researchers. Criteria such as security, safety, climate, culture, income level, job opportunities, social equality, educational and medical facilities, quality of private and public transportation, and urban management can be considered factors are influencing a city's livability. According to different living standards, there are various indicators for measuring the quality of life in cities, including Mercer (Mercer, 2019), Monocle (Magazine, 2019), and The Economist (Group, 2020).

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Although there are different criteria for measuring livability and quality of life in cities; The growth of technology, cultural fusion, and growing individualism in human societies have made it impossible for these criteria to suitably meet the individual quality of life standards for all citizens. Therefore, the efficiency of the responsive city in answering this problem is presented. We show that a responsive city concept can be considered a comprehensive solution for managing future cities.

This research first studied smart, livability, and responsive city concepts and presented the relationships between them. In the following, the responsive city has been explored to improve citizens' quality of life in smart cities, and its benefits have been stated. Finally, a summary of the content and suggestions for further work will be provided.

**2. NEW URBAN CONCEPTS**

Given the importance of recognizing and understanding new urban concepts, we will examine them in this section. Smart city, livable city, and responsive city are the concepts that will be explained.

**2.1 Smart City**

More than two decades have passed since introducing the smart city concept (Mahizhnan, 1999; Van Bastelaer, 1998). Nevertheless, it is still not possible to provide a precise definition of it. This concept is linked to a variety of other topics including smart growth (Burchell et al., 2000), data analysis (Al Nuaimi et al., 2015; Hashem et al., 2016; Kitchin, 2014; Moustaka et al., 2018), energy management (Kramers et al., 2014), education (Mackenzie, 2000), transportation (Kyriazis et al., 2013) and even sociology (Sandel, 2017). Hence, the way we look at the smart city concept and its requirements affect our understanding and definition.

Considering the mentioned issue and looking at the research background, it can be noticed that the focus of research in this field has shifted from defining the concept of the smart city to studying the applications and technologies used in it (Zheng et al., 2020). Given the variety of definitions available, Table 1 summarizes some definitions provided by different researchers.

It can be seen in Table 1 that the definitions of Hall (2000) and Giffinger et al. (2007), as the initial definitions presented in the field of smart city, emphasize maximizing service to citizens and improving their quality of life (Giffinger & Pichler-Milanović, 2007; Hall, 2000). In the following definitions, the strategies for achieving smart cities and their characteristics have been considered more.

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However, other definitions, directly or indirectly, consider the importance of improving citizens' quality of life in smartening the city. The smart city must create a better environment for citizens to ultimately live in.

TABLE 1 - DEFINITIONS OF SMART CITY

Year/Auth	Definition
Hall 2000	Providing and enhancing services to the citizens by monitoring and integrating all critical infrastructures to optimizing resources, planning maintenance activities, and considering security issues (Hall, 2000)
Giffinger 2007	A futuristic city (with conscious, independent, and decision-maker citizens) that search intelligence solutions to enhance the quality of the services to citizens in different city aspects like economy, governance, people, environment, etc. (Giffinger & Pichler-Milanović, 2007)
Whashburn et al 2009	Increasing the intelligence, interconnectivity, and efficiency of infrastructure and services by using Smart Computing technologies (Washburn et al., 2009)
Chen. 2010	Improving citizens' daily lives by optimizing logistic operations in the city like transportation and using communications and sensors. (Chen, 2010)
Harrison et al 2010	Leveraging the city's collective intelligence by connecting the physical, IT, social, and business infrastructure (Harrison et al., 2010)
Caragliu et al. 2011	A city with participatory governance that focuses on smart natural resources managing, human and social capital investing, and planning to enhance communication infrastructures to improve quality of life. (Caragliu et al., 2011).
Komninos (2011)	Smart city is shaped around their people creation, Innovative institutions, digital communication infrastructure, and knowledge management that make the environment with a high potential for learning and innovation. (Komninos, 2011).
Nam and Pardo (2011)	Smart city physical infrastructure enriched with information to improve human living conditions, achieving efficiency, managing resources and saving energy, identify and fixing problems, managing disaster, making better decisions by collecting data, etc.(Nam & Pardo, 2011).
Barrionuevo et al. (2012)	Developing integrated, habitable, and sustainable urban centers by intelligently using technology and resources for being a smart city (Barrionuevo et al., 2012).
Kourtit and Nijkamp (2012)	Using Creative and Knowledge-intensive strategies can lead to better performance cities and make a smart city. So smart cities result from good investment in human, infrastructural, social, and entrepreneurial capital (Kourtit & Nijkamp, 2012).
Kourtit et al. (2012)	A smart city is formed by creative activities, knowledge-intensive jobs, educated people, output-oriented planning systems, and sustainability-oriented initiatives that lead to high productivity (Kourtit et al., 2012).
Lombardi et al 2012	A smart city results from using ICT applications to influence human, social, and relational capital and environmental issues (Lombardi et al., 2012).
Lazaroiu and Roscia (2012)	"A community of average technology size, interconnected and sustainable, comfortable, attractive and secure" (Lazaroiu & Roscia, 2012).
Bakıcı et al. (2013)	Connecting people, information, and city elements using new technologies to increase the quality of life with creating creative, green, and sustainable cities (Bakıcı et al., 2013).
Marsal-Llacuna et al. (2014)	Smart cities benefit from Information technologies (IT) to enhance urban performance. Improving service efficiency, optimizing infrastructure, forming interactive economics, and promoting innovative business models in private and public sectors are the smart city aims (Marsal-Llacuna et al., 2015).

Of course, the focus of various researchers in this field can be different. Accordingly, Meijer and Bolivar (2016) categorize existing definitions according to their focus on technology, human resources, or city

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government(Meijer & Bolívar, 2016). They consider "technological focus" definitions that emphasize the new technologies can reinforce the urban system(Lee et al., 2013; Walravens & research, 2012). "Human resource focus" definitions that pay attention to smart people as the main users of smart cities while considering technology(Lombardi et al., 2012; Shapiro & statistics, 2006; Winters, 2011). Finally, "governance focus" definitions are based on the interactions between different city stakeholders(Kourtiti et al., 2012; Kourtiti & Nijkamp, 2012).

Transparency of smart governance is recognized as the most critical factor in the quality of life of citizens. Collaboration, Participation and Partnership, communication, and Accountability are also known to be other factors associated with citizens' quality of life with city governance(De Guimarães et al., 2020).

According to Giffinger et al., the smart city is based on six components: the smart economy, smart people, smart governance, smart environment, smart living, and smart mobility (Giffinger et al., 2010). Other researchers accepted these components as the smart city's main components (Lombardi et al., 2012; Perera et al., 2014).

The similarities can be considered to enhance living standards, integrate systems to exchange information, inform citizens about the environment, and maximize sustainability. Differences are pronounced in domains or elements of smart cities (Lai et al., 2020).

In recent years, due to the emergence of new concepts of future cities and the researchers' efforts to find new topics in this field, there is less focus on defining the smart city. For example, managing the municipal infrastructure using smart city technology is one of these topics (Vershitsky et al., 2021). By accepting one or more of the above definitions, researchers are now trying to study existing technologies' potential capabilities to achieve new concepts in cities instead of offering new ones. Livability and quality of life have long been related to the smart city concept(Shapiro & statistics, 2006). Some researchers consider the importance of citizens' quality of life in smart cities' development (Appio et al., 2019; Camboim et al., 2019; Carvalho et al., 2018; Ismagilova et al., 2019). Livability and quality of life are also become more important due to changes in people's lifestyles and increasing urbanization. However, this field's lack of sufficient research has been pointed out(Wolfram, 2018). Therefore, understanding the concept of quality of life and livability will play a significant role in developing new solutions and using technology in this field.

## 2.2 The concept of quality of life and livable city

What are livability and quality of life? Do these two have the same meaning? What does livability have to do with the smartness of the city? Can smartness alone increase livability? How can we relate these concepts to each other? In this section, we will look for answers to these questions.



Creating the concept of livability can be considered the result of Environment-Behavior Studies (EBS). These studies combined architecture, urban design, and urban planning on the one hand, and social and behavioral sciences on the other. Following studies that began in the 1950s and 1960s, researchers tried to provide design strategies and guidelines by analyzing how people use the urban environment and their expectations. These studies' results in the 1980s and early 1990s led to widespread livability as a concept for planning in future cities (Ahmed et al., 2019; Moore, 2004). Therefore, it can be stated that the concept of livability is much older than the smart city. However, today the smartness of a city is an integral part of its livability.

Quality of life and livability, despite the similarity, have different meanings. Livability can be considered a programmable and targeted concept; while the quality of life considers individuals' user experience (VanZerr & Seskin, 2011). For example, livability can include planning to increase citizens' choice of the transportation system, creating affordable housing, creating a competitive business environment, improving neighborhoods, and revitalizing communities. Each of these goals can be identified with specific definitions and subsets. In comparison, life quality is a concept researched in many other fields besides urban planning studies and will depend on the user experience. For example, increasing the right to choose about transportation systems and creating routes for active transportation can ultimately increase citizens' health and reduce air pollution, resulting in improved quality of life.

Livability has a qualitative nature, so one of the common methods for measuring it is using multi-criteria decision-making methods. The Analytical Hierarchy Process (AHP) is one of the most widely used methods in assessing livability (Ye et al., 2020). A review of the research background shows that the AHP method is used in studies related to evaluating the viability in Tehran (Ghasemi et al., 2018), comparing the livability of tourists and residents and its relationship with sustainable development (Liu et al., 2017), and assessing the livability from the perspective of tourists (Mushtaha et al., 2020). On the other hand, some studies have used this method in connection with GIS studies. These include improving the livability assessment model in cities in developing countries (Onnom et al., 2018) and developing an open-source GIS-based model for assessing livability based on stakeholder feedback (Antognelli & Vizzari, 2016).

According to the literature, there are different measurement criteria to measure livability. People with different cultural, social, and economic backgrounds will have different perspectives about a city's livability and quality of life. Livability has various aspects the type of user relationship with the environment affects it (Knox & Mayer, 2013). A city may have an admirable position in the availability of transportation systems and an unfavorable situation in terms of air pollution. In this case, the person who cares more about transportation choices than air pollution will experience a better quality of life. Therefore, it should be known that the quality of life concept is more than a specific standard or measurable criteria.

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However, creating different measurement criteria for quality of life and livability makes it possible to compare cities with each other and can be used to plan and compare results. Indexes such as Mercer, The Economist, and Monocle are more commonly used to compare cities' quality of life. Each of these Indexes adds weight to some of the criteria. Therefore, the annual ranking of cities can be different according to the index. In addition to these indexes, some studies focus on subjective perceptions of personal well-being for examining the quality of life in cities (Gajdoš & Hudec, 2020).

Criteria for livability and quality of life change over time. The dramatic growth of technology in recent years make this change clearer. The development of technology creates new areas for the city's livability and criteria for measuring it. For example, three decades ago, high-speed internet wasn't a requirement for work environments, but good mobile phone networks could have been convincing to many citizens. Nowadays, having an Internet network that can support high-quality video calls is a basic facility. This is also true for people's perception of the quality of life in any subject.

Direct and indirect technology benefits for Citizens make the smartness of a city the key factor for livability. Cities that can't quickly adapt to these changes will easily be eliminated from the livability competition. Because improving smartness equals improving livability.

All livability factors aren't related to the smartness of the city and its infrastructure. For example, the city climate is considered an effective factor in livability. Although using smart infrastructure improved air quality, technology doesn't mean clean air necessarily. A small city with no technology can have much cleaner air than a smart metropolis. Smart infrastructure in this small city can prevent future air pollution and improve life quality even more. Out of this topic, Living in Madrid is more pleasant for someone who likes sunny weather than living in London.

Our solution to consider the impact of city intelligence on its livability is the livability angle concept. In Figure 1, suppose different factors affecting livability are defined on the XY coordinate axis plane. The value of  $X_i$  indicates the importance of the livability index and the value of  $Y_i$  is equal to the index value in the city. In this case, the index page area, which is obtained by multiplying  $x_i$  and  $Y_i$ 's values, will indicate the livability index's livability on the city's livability. Hypothetically, we call this index  $I$ .

To determine the impact of being smart or not smart on the livability of the city, we considered the measured smartness associated with the  $I$  index as a vector in the Z direction. The corresponding value of this vector will be equal to the measured smartness values associated with index  $i$ . We now consider the  $Z_i$  vector's torque effect on the livability plane's rotation on the X-axis. The angle created by this torque will be called the livability angle. All the livability indicators and the effect of smartness on them were calculated similarly to obtain the total livability angle.



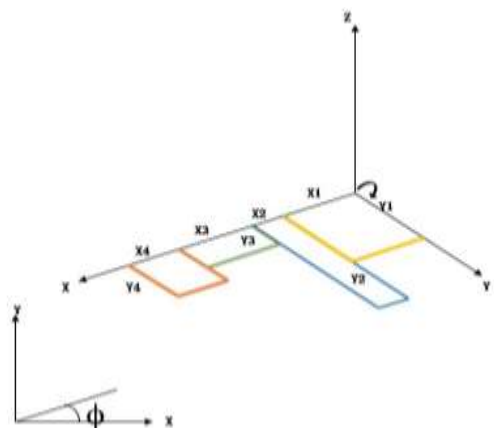


FIGURE 1 - THE CONCEPT OF LIVABILITY ANGLE

2.3 Responsive City

Gerhard Schmidt defines the responsive city as "harnessing the power of information technology to support an integrated trans-disciplinary planning approach that engages the large scale and complexity of future city systems"(Gerhard Schmitt). The intelligible explanation for the responsibility concept is the government's response and attention to citizens' opinions about the city using information technology. This is a mutual relationship that the city (actually the city government) tries to respect the citizen's opinions and suggestions (the city's real owners) about the planning and urban design. On the other hand, citizens feel responsible for improving their living environment through continuous participation in selecting city managers, decision-making, and urban planning.

According to the mentioned explanations, responsibility isn't a modern feature for cities. Venice, for example, was governed by the citizen's opinion Centuries ago(Acemoglu & Robinson, 2012). What distinguishes the responsibility concept in the past and present is the growth of technology, the spread of democracy, and people's desire to comment on how their city is governed. Indeed, Citizen participation in smart city management is necessary for its proper development(Schware & Deane, 2003). Today, freedom of expression is a universal value. The development of technology has made citizens' relationships much closer with each other and the city government. Social networks and mobile phones act as links between citizens and the government, and related applications can facilitate and accelerate citizens' views to the government (Goldsmith & Crawford, 2014).

Smartness does not necessarily lead to a responsive city. However, smart infrastructure and the data and information it generates make it much easier to interact with citizens. This is similar to the relationship between livability and smartness. Smartness does not necessarily lead to a city being livable or interactive, but smart infrastructure accelerates achieving quality of life and responsibility.

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Although the responsive city is more evident in city governing, the process of transforming a smart city into a responsive city has three areas: government, infrastructure, and citizens. The government must accept the citizen's opinions and enable them to participate in governing the city. Cities such as Amsterdam, Vienna, and Singapore are among the cities that have adopted responsive policies (Gerhard Schmitt; Zandbergen, 2018). Transparency, Collaboration, and Participation play a crucial role in forming an open government based on citizens and government's relationship (Harrison et al., 2012). The scope of this interaction can be very wide. From the mayor or decision-makers' election to implementing a local development plan or designing a small recreational space, citizens' opinions can influence the work process.

To achieve a sustainable interaction with citizens, their participation in decision-making is so serious. In addition to the government's role in inviting and encouraging citizens to provide feedback, they must be actively involved in decision-making. The aforementioned is important because citizen participation in decision-making has led to a dialogue between them and finally is effective in shaping sustainable urban communities. It should be noted that trustworthy privacy policies help obtain frank opinions (Seckler et al., 2015).

In addition to developing the infrastructure needed to create interaction, the interoperability of existing infrastructure must also be considered. Infrastructure development means creating a hardware and software infrastructure to receive feedback from citizens. For example, social networks are a good platform for receiving citizens' opinions on a large scale, and the data obtained from them can be used in city management. On the other hand, existing infrastructures must influence the existing ecosystem to adapt to their interactivity and, if necessary, be able to take on roles beyond data collection. Only then will a mutually beneficial responsibility be formed between these infrastructures, the environment, and the citizens (Zandbergen, 2018).

Figure 2 shows the requirements and method of upgrading a smart city to a responsive city in three areas: citizen, infrastructure, and government.

Figure 3 shows how citizens, city government, and urban planners interact to implement a responsive city project. Citizens vote to elect city officials. In the next level, they produced useful data for urban management. The data collected by the appropriate infrastructure. The city government then processed data and converted it into information. When the government body intends to implement a plan, it first consults citizens on whether or not to implement it. Of course, this is mostly true for projects with high budget requirements. If approved by the citizens, the government provides its requirements and related information to planners and designers.



FIGURE 2 - REQUIREMENTS AND PROCESS OF TURNING A SMART CITY INTO A RESPONSIVE CITY

On the other hand, planners and designers use different methods (such as social networks and human factor methods) to receive citizens' opinions and converge the initial design with their expectations. Citizens can also give their opinions to designers outside this framework. This cycle continues until the project is completed and even after its implementation (to make useful corrections).



FIGURE 3 - COMMUNICATION OF CITIZENS, DESIGNERS AND CITY GOVERNMENT IN A RESPONSIVE CITY

2.4 How are smartness, livability, and responsibility related?

We knew the concepts of smartness, livability, and responsibility in a city. We see the differences between these concepts as well as their overlaps in Figure 4.

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In this figure, the red area represents a purely smart city without citizen’s participation. This city has a smart infrastructure but does not consider the criteria of livability and responsibility. In this case, a lot of budgets have been spent, but the citizens' satisfaction has been ignored. This has often happened in the development of today's smart cities(Engelbert et al., 2019).

The blue area represents a livable city that does not meet a smart and responsible city's criteria. Imagine a city that benefits from appropriate educational, cultural, transportation, and other infrastructure. There is no air or noise pollution and it is a good place to live. Although it is difficult to imagine such a city at present due to the prominent role of smartness in a livable city today, such a situation can be considered. The yellow area represents an interactive city. Such a city lacks intelligence and does not meet many of the livability criteria.

The C area represents the combination of livability and smartness in a city. In this case, the city has a smart infrastructure and provides living standards; however, the government doesn't interact with citizens. The B area represents a city without smartness but livable and responsive. As stated in the responsive city topic, Venice has been in this situation for some time in its history. The A area indicates the conditions in which a city is smart, livable, and responsive. The smart infrastructure build following citizens' demands on livability, and the city government considered their views for city managing. The A area represents an ideal future city

In the next section, we will see how sharing these three concepts (the district can create the highest quality of life for citizens).

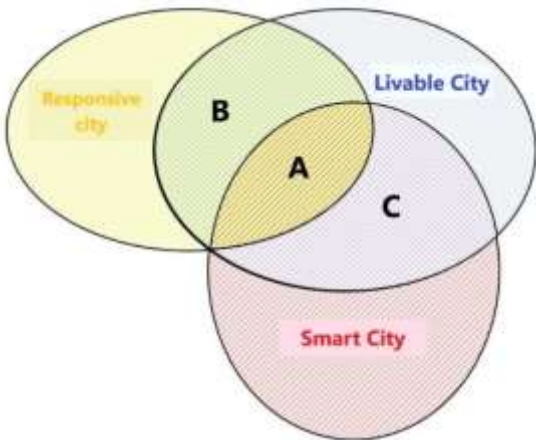


FIGURE 4 - OVERLAP OF THE CONCEPT OF THE SMART, LIVABLE AND RESPONSIVE CITY CONCEPT.

### 3. HOW DOES RESPONSIBILITY IMPROVE THE QUALITY OF LIFE?

Despite all efforts to converge livability criteria with individuals' opinions, there is a gap between the goals set for livability and the existing mental perception of it (Okulicz-Kozaryn, 2013). The reason is the different

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definitions of livability for different people. Studies show that people's interests and criteria for enjoying life and feeling good vary according to countries' personalities, culture, and income level (Cheng et al., 2016). Research related to cross-cultural and latitudinal psychology also shows the effect of location on individuals' personalities and attitudes (Van de Vliert & Van Lange, 2019; Van de Vliert, 2020).

Also, studies show the effect of age and generational change on attitudes toward livability and its requirements. For example, different generations have different tendencies to use active transportation (Lee, 2017). More precisely, examining the characteristics of the millennial helps us to better understanding this issue. The impact of differences between the millennial and older generations on urban lifestyle is undeniable (Cervero, 2020). Therefore, it can be expected that future generations will welcome different perspectives and lifestyles due to the great changes in the world of technology. On the other hand, the elderly (Ferrell, 2018) and children (Delgado, 2019) should have the required social rights of livability. Older people need to maintain their place in society, and children need to achieve a pleasant future in life.

This is predictable. Because institutions or researchers try to be comprehensive in defining criteria and indexes for measuring livability and consider all aspects. This is generally positive. This attitude can cover many people's satisfaction indicators if we consider people's expectations and communities according to the normal distribution. Besides, the competition to provide the best criteria for measuring livability makes the use of new technologies. Thus the complexity of studies increasing day by day. Researchers are constantly seeking to identify better livability criteria (Harun & Jaffar, 2018; Lihu et al., 2020).

Because of the above, we argue that the development of technologies and the combination of cultures lead to a greater dispersion of human ideas about livability and quality of life than in the past. If we consider citizens' interests and opinions in the normal distribution, the changes will be following Figure 5. Increased migration, the emergence of subcultures, increasing religious, cultural, and social minorities, increasing prosperity in developing areas, and the emergence of new needs are some of the things that can increase the dispersion of living standards.

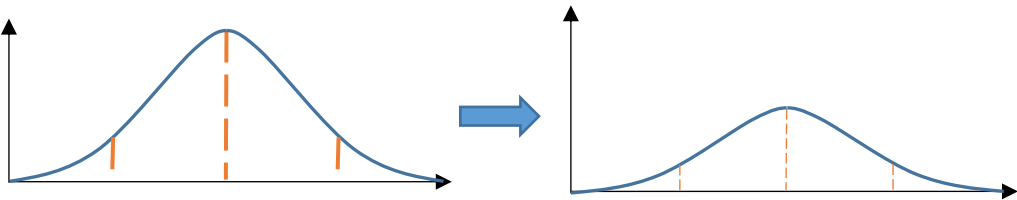


FIGURE 5 - THE NORMAL DISTRIBUTION OF CITIZENS' INTERESTS AND LIVABILITY CRITERIA CHANGE. THE LEFT AND RIGHT GRAPH, REPRESENT THE PAST AND THE PRESENT/FUTURE, RESPECTIVELY. THE VARIETY OF LIVABILITY CRITERIA GROWS OVER TIME. THUS BECOMES MORE DIFFICULT TO FIND AN INDEX THAT REFLECTS THE TASTES OF ALL INDIVIDUALS.

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Because of these issues, sometimes livability indexes instead of better anticipating people's needs confuse them. It isn't possible to provide a uniform version of the livability index for all people worldwide. Hence, different countries have tried to define livability indexes according to their culture and social needs. Nevertheless, it is impracticable for research criteria to meet the living of all individuals.

Therefore, in our opinion, responsibility can be a solution. In a responsive city, everyone has the right to have their say in planning and designing urban spaces, using smart facilities, how to spend budget, and so on. This allows city managers to use the collective wisdom of citizens to manage the city. In this case, all people from different subcultures, age groups, countries, and economic classes can be sure that their views on livability and quality of life are heard by city officials and implemented if possible.

If we look at the Executive cycle of a project in a responsive city; we see positive points compared to the non-responsive projects. Including:

- Using citizen's opinions allows us to benefit from more people's knowledge to implement a project. In many cases, planners and designers can't consider all aspects of project implementation. It may occur due to lack of experience, lack of proper initial studies or lack of familiarity with the culture and the local community of the project collecting citizens' opinions is a low-cost and useful way to cover these weaknesses.
- Citizens are more eager to participate in the urban decision-making process if citizens feel that their opinions are important in designing and implementing a project. In addition to the positive social dimensions, this partnership is even effective in financial issues such as paying taxes.
- Designing and executing projects in this way also has indirect beneficial effects. Citizens' interaction with the city government helps to create social communities. For example, when the majority opinion determines the implementation of a project. Citizens conferring on it, Pros and cons try to attract like-minded people and persuade the other group. This ultimately leads to more citizens' connections and the emergence of interactive urban communities.
- The city government is obliged to consider all citizens' views with different cultures, races, skin colors, genders, and economic incomes. Therefore the principle of social equality is respected. This will also lead to the satisfaction of the citizens.

A responsive city is a solution that makes citizens have a more livable and sustainable city while enjoying the benefits of intelligence. Figure 6 shows the advantages of combining the concepts as mentioned earlier as steps along with each other. It is noteworthy that smartening a city improves the quality of life of citizens indirectly. Smartness helps the city administration to improve citizen's quality of life. Using facilities and technologies, urban resources optimally, and controlling annoying factors such as pollution is more possible in a smart city. In a responsive city, citizens use the smart infrastructure to Communicate with the government and influence city management.



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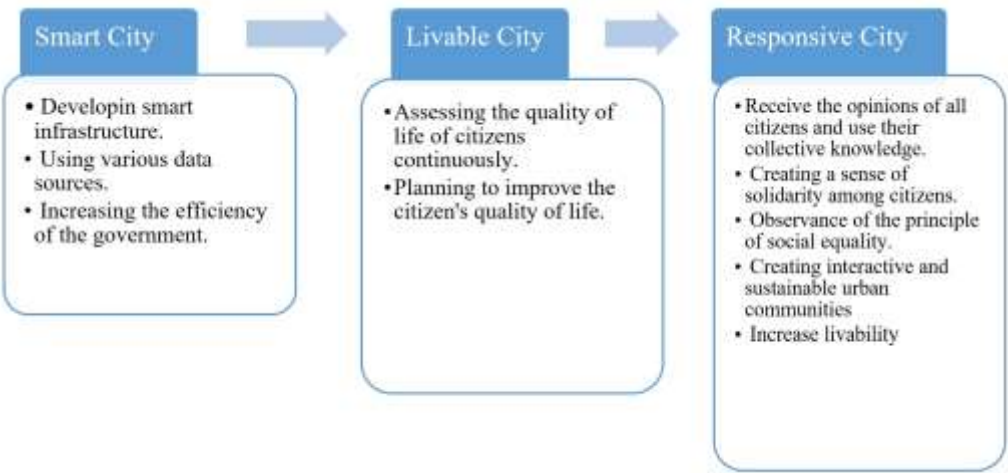


FIGURE 6 - THE IMPACT OF THE CONCEPTS OF SMARTNESS, LIVABILITY, AND RESPONSIBILITY ON THE LIVES OF CITIZENS

4. CONCLUSIONS AND SUGGESTIONS

In this study, we explored the concepts of smart city, livable city, and responsive city. As we have seen, the definition of a smart and livable city is not easily possible. However, the difficulty of these definitions has different reasons. The smart city has different definitions from the perspective of researchers, according to their field of research. Studying the smart city definitions shows that improving citizens' quality of life is an important goal for most researchers.

Livability and quality of life depend on people's understanding of the environment, their expectations and needs, and ultimately their user experience. Livability and quality of life have different definitions for each of them according to the impact of different factors (including culture, religion, nationality, economic conditions, etc.) on citizens' perceptions and expectations. Therefore, contrary to what the quality-of-life indexes consider, the same indicator cannot determine the level of satisfaction of all citizens of a city.

In this study, we tried to show responsive cities' ability to improve citizens' quality of life. Responsive approaches can be considered as a suitable solution to increase the livability of a city. They take into account the demands of all citizens in decision-making, planning, and urban management.

Suggestions for continuing the research process recommend in two sections. On the one hand, researchers in this field should examine the citizen's differences and explain how a city can interact to respond to these differences. On the other hand, the solutions, laws, and policies needed to make a responsive city should be explored.

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