

*Technology should be used as needed in smart city projects. Smart cities aren't just technologically advanced; they're also technologically advanced in the right way.*

# Smart Cities for Managers



**REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE**

**DIRECTORATE GENERAL OF GEOGRAPHIC INFORMATION SYSTEMS  
Smart Cities Capacity Building and Guidance Project**

Training Manual



REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE

# SMART CITIES FOR MANAGERS

Smart Cities Capacity Building and Guidance Project

[www.akillisehirler.gov.tr](http://www.akillisehirler.gov.tr)

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"We will broaden new horizons in urbanism with smart cities. We will support all Smart City applications that will expedite the daily life of our people, from access to municipal services to the management of transportation, energy, buildings and devices."

"We are pursuing for constructing smart cities."

"We are setting out the principles to meet the future needs of our cities, not the past or present needs."

"We will leave cities which have identities, to be proud of, to find traces of our civilization for our future generations."

"What is the main thing? The main thing is the human. We will provide opportunities for the human."



**Recep Tayyip ERDOĞAN**

President of the Republic of Turkey



**REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT,  
URBANIZATION AND CLIMATE CHANGE**

“The yields of technological developments are reflected in urban life with the concept of smart cities. One of the elements that makes up the city is culture and the other is happiness of the human. What needs to be considered is to build cities that preserve the cultural fabric and reflect their own identity. I believe that both history and culture should be strictly preserved while making cities smart.”



**Murat KURUM**

Minister of Environment, Urbanization and Climate Change of the Republic of Turkey

**SMART CITIES FOR MANAGERS**

Smart Cities Capacity Building and Guidance Project

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# Preface

Urban populations are increasing day by day in our country and in the world, and as a result of this mobility, cities have to cope with new needs in many areas such as infrastructure, affordable housing, water, environmental cleaning, health services, transportation and security.

The concept of "smart city" comes to the fore in responding to these needs and even creating opportunities for urban development.

With its ability to transform the information it offers into social benefit, the smart city will create gains in the titles of sustainable development, competitiveness and environmental sustainability, increase the quality of life, contribute to economic development, and serve to prepare our cities in a way that reflects the perspective of history and civilization. However, the implementation of smart cities will contribute to the realization of many goals such as "Sustainable Cities and Communities", "Accessible and Clean Energy", "Industry, Innovation and Infrastructure" and "Climate Action" specified in the United Nations Sustainable Development Goals.

In our country, parallel to the whole world, smart city applications are becoming widespread day by day. Therefore, it is important that all public institutions, local administrations, universities, the private sector and non-governmental organizations act in a collective action in order to plan and direct smart city studies on a national scale.

With this motivation, it is to gain the ability to work together by bringing a holistic view at the national level to smart city policies in our country. At the same time, it is necessary to ensure that the investments are implemented with the right projects and activities by prioritizing the investments that are compatible with the determined policies. For this purpose, the 2020-2023 National Smart Cities Strategy and Action Plan, which was built with the common mind of ecosystem stakeholders, which considers national needs and priorities holistically, has been prepared. With the 2020-2023 National Smart Cities Strategy and Action Plan Circular No. 2019/29, it was published in the Official Gazette dated 24 December 2019 and numbered 30988 and entered into force.

The "Smart Cities Capacity Building and Guidance Project" was implemented by our Ministry in order to contribute to the realization of the actions, duties and responsibilities defined within the scope of the 2020-2023 National Smart Cities Strategy and Action Plan on a national scale and to increase the capacity of all stakeholders, especially our local governments.

This document you are reading is one of the guidance documents prepared within the scope of the aforementioned project, and all guidance documents can be accessed at [www.akilisehirler.gov.tr](http://www.akilisehirler.gov.tr).

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# 1

## INTRODUCTION





Smart Cities

The desire to search for the ideal in different areas of life was also manifested in cities with such conceptual such as "virtuous city", "safe city", "green city" and "sustainable city" that aim at ensuring human happiness and improving the quality of life. Recently, "smart city" has been added to these proposals in line with the experienced developments in the sector of information and communication technologies at a dizzying pace. Among the most important triggers of the ideals in question, and search for "population growth" with humanity for the first time an 'urban' as a beginning before 5 thousand years as an established and relentlessly growing "urbanisation" is reckoned.

The world's population grew 135% from 2.6 billion in 1950 to reach 6.1 billion in 2000. The world population, which is 7.8 billion today, is expected to reach 9.8 billion in 2050 and 11 billion in 2100 (United Nations, 2021). The expectation of the world population also

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shows itself in the rate of urbanization. While 30% of the world's population lived in cities in 1950, it is now 54%. In 2050, the hope is 66% (UNDP, 2016).

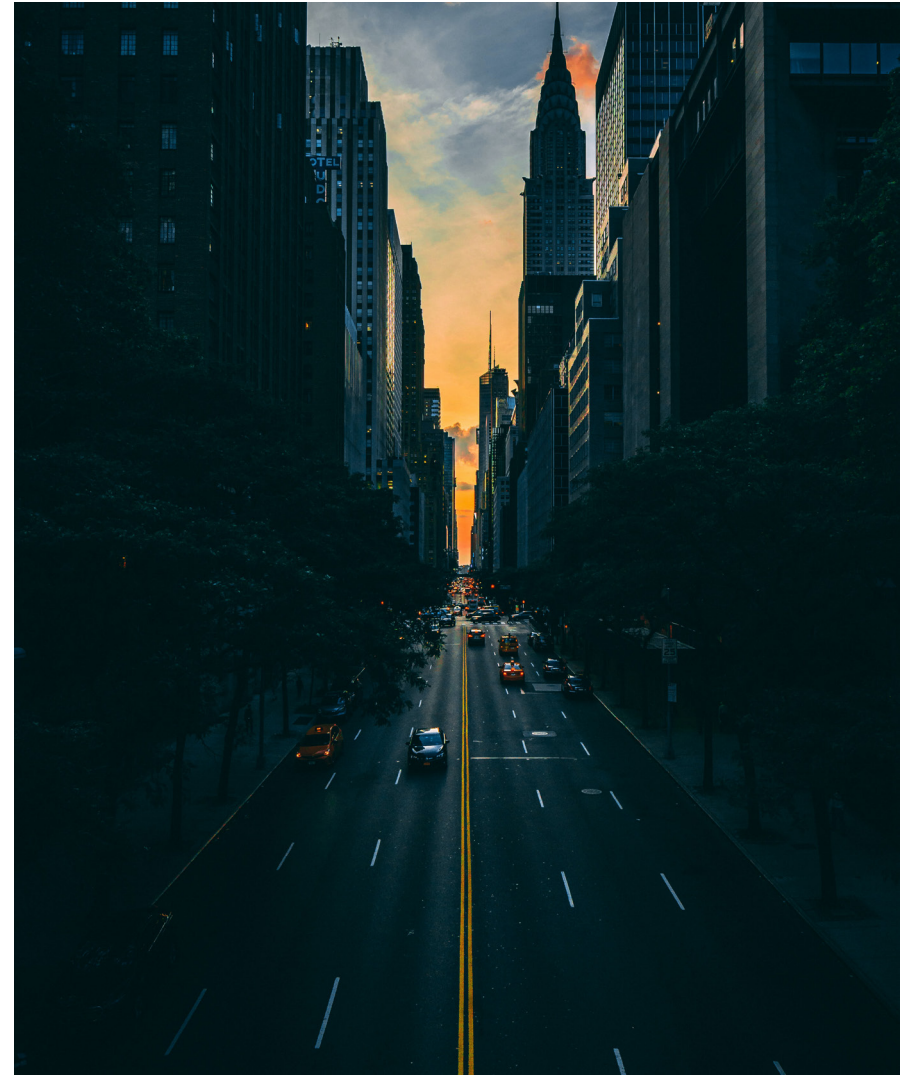
In the 20th century, population and urbanization rates experienced a simultaneous increase in experienced service sector-based development and change due to the time in London, New York, Tokyo, Mumbai, Istanbul, Lahore, Sao Paulo and megacities of labor, such as Bogota, production, consumption and migration made it the centre. These developments, on the one hand, caused problems in areas such as housing, pollution, climate change, energy, infrastructure, accessibility and governance, on the other hand, raised the expectations of citizens in the fields of quality of life and comfort such as public service, income level, security, health and education.

Problems such as the problems that arise with demographic growth and urbanization, and the unconscious consumption of resources in policies implemented to improve the quality of life can be seen as the pains of the transition from a production society to a consumer society or the effects of creative destruction for some urban residents and city administrators. Currently, the concept of smart city; It differs from other ideals and solutions proposals as an ideal that increases efficiency and productivity in the use of society, economic and spatial resources and allows the development of human-oriented policies and strategies.

Accordingly, the Smart Cities for Managers orientation guide was prepared for managers who have adopted the vision of becoming a "Smart City" in a content where they may find detailed responses to questions such as these;

- What is the historical background of the smart city concept?
- What is a smart city?
- What are the smart city components?
- What are the current trends in smart city technologies and applications?
- What is the market share and level of influence of the smart city?
- Why should we be a smart city?
- Who should lead the smart city project?
- How should we start smart city studies?
- How can smart city finance be provided?
- What are the policies and strategies developed on an international/national scale on the subject of smart cities?
- What are the world's cities doing about smart cities?

- What kind of gains does the smart city offer for managers and citizens?
- What will the smart city change/should change in the lives of the citizens?



# 2

## THEORETICAL FRAMEWORK



The ambiguity of the smart city concept has led researchers and practitioners from different geographical areas to develop different definitions. Although there is no common definition used universally in the literature on the concept of smart city, definitions may vary according to the content of the study. (Li, ve diğerleri, 2019); (Nam & Pardo, 2011). The term first used in the Silicon Valley project in the United States in 1993 as "Smart Society" was "digital city" in 1994. Later it was attempted to be explained with concepts such as "wired city", "information city", "pervasive city", "sensitive city" (Keegan, O'Hare, & O'Grady, 2012), (Mone, 2015).

The concept of smart city combines and extends existing paradigms (Manville, ve diğerleri, 2014). In the studies on the subject, it can be stated that the concept of smart city is shaped according to the needs for which solutions are sought in cities. When a comprehensive literature review is made, more than thirty different definitions of this concept are encountered in various disciplines such as urban studies, computer and information technology, sociology and public health. (Table 1), (Wu & Chen, 2021).

Table 1: Smart City Definitions

#	Definition	Reference	Emphasis
1	In our study, we adopt the definition of smart city as a conceptual urban development model that expresses the importance of using human, social and technological capital for the development of regions. (p.844)	Sarma & Sunny, 2017	• Urban Development Model

2	Smart cities aim to solve critical problems in urban areas such as unavailability or scarcity of public services, traffic, rapid development, environmental deficiencies and other types of inequality through ICT-based technologies that are interconnected as urban infrastructure. (p.22)	Bifulco vd., 2017	• ICT • Urban Issues
3	We argue that smart city approaches should contribute to innovation and improve democratic decision-making and transparency through public participation. This participatory process plays a crucial role in creating smarter cities by helping institutions respond to problems, democratize decision-making, learn from citizens' interests and opinions, or increase social capital.(p.22)	Afzalan vd., 2017	•Participation •Transparency

4	<p>One of the basic assumptions of the smart city is techno-utopia[...] (259–60). The term smart city was an empty rhetorical notion that could be filled with any number of comparable or contradictory definitions, as not all cities wanted to be smart, or at least look "nonsense."(s.271)</p>	Sajhau, 2017	<ul style="list-style-type: none"> <li>•Technoutopia</li> </ul>
5	<p>We define "smart cities" as cities where ubiquitous sensors and devices enable more efficient city management processes, smoother information systems flow, and/or optimized use of infrastructure.(p.41)</p> <p>A city that is livable for its citizens, sustainable for its environment and resistant to threats (natural and artificial). A city where smart technologies enable effective governance through citizen participation, optimize (optimize) flows in the city in real time, and (more) smart citizens create innovative environments and business opportunities by sharing knowledge and information. (p.49)</p> <p>Today's smart cities should focus on how citizens' immediate concerns can become part of a smarter city in the long run - economically, socially, technologically and otherwise.(p.49)</p>	Marek, Campbell,& Bui, 2017	<ul style="list-style-type: none"> <li>•Resilient City</li> <li>•Governance</li> <li>•Optimization</li> </ul>

6	<p>The concept of concrete utopia has been used to describe smart city initiatives: advocates of this paradigm (public, private and non-profit organizations) describe the smart city as "a concrete utopia in a human-scale urban space. "Smartness,which is a general concept of innovation and by the significant use of technologies, defined by the technologies that economic actors can provide.(p.82)</p>	Grossi& Pianezzi, 2017	<ul style="list-style-type: none"> <li>• Tangible Utopia</li> </ul>
7	<p>A city can be considered smart even without ICT-based infrastructure or services, but it serves local needs in smart ways (e.g. Geneva). The contrast, however, is that although all smart city standards provide city performance indicators that measure any type of local capacity, such information is considered to be based on ICT(p.146)</p> <p>People should reconsider their expectations from smart cities and understand that such cities aim to improve local life and improve urban planning in response to certain challenges (climate change, economic growth, etc.).(p.146)</p> <p>Evidence shows that the smart city is a city first, and that the cyber-physical intelligence and the intelligence gained by the service can either improve/automate</p>	Anthopoulos, 2017	<ul style="list-style-type: none"> <li>• Local Life</li> <li>• City Planning</li> <li>• Cyber-Physical Intelligence</li> </ul>

	typical functions (transportation, waste management, etc.) or create jobs and increase citizen satisfaction (traffic awareness, energy efficiency, etc.). .) indicates that it is a feature. (p.147)		
8	<p>For this reason, improving the interaction between citizens and different institutional, urban and technological elements in cities, facilitating their daily lives and providing access to education and culture together with environmentally sustainable growth. This, together with the use and application of ICT, helps citizens improve their quality of life and provide an infrastructure that allows their active participation in city life, sustainable growth and efficient use of resources. (p.272)</p> <p>The idea of smart city is therefore a broad concept and relates to the effective management of a city's intangible capital: productivity growth in all areas; affordable cost management; transparency to the public; providing information and communication infrastructures that enable cities to become centers for the production and dissemination of knowledge in all areas; new approaches to participation and urban governance; and providing content to</p>	Navarro, Ruiz, & Pena, 2017	<ul style="list-style-type: none"> <li>• Interaction</li> <li>• ICT</li> <li>• Productivity</li> <li>• Transparency</li> </ul>

	urban areas, promoting scientific, cultural and, of course, entrepreneurial activities.(p.274)		
9	A general definition covers the deployment of application and information and communication technology (ICT) infrastructures to support social and urban growth by increasing the economy, citizen participation and government efficiency.(p.556)	Yeh, 2017	<ul style="list-style-type: none"> <li>•ICT</li> <li>•Participation</li> <li>•Productivity</li> <li>•Economic</li> </ul>
10	<p>Considering the various aspects of local corporate design, context and smart solution experiences, it is not possible to define a one-size-fits-all definition for the smart city.(s.1033)</p> <p>Therefore, key elements of a smart city include inclusive infrastructure that includes more humanistic aspects such as the use of connected infrastructure, business-led development and knowledge networks, voluntary organisations, social capital, ordinary people and communities, as well as social and environmental sustainability. The concept of the smart city is a multidimensional urban development strategy in which people enable the city and are empowered by the use of technology.(p.1035)</p>	Tekin Bilbil, 2017	<ul style="list-style-type: none"> <li>•Inclusivity</li> <li>•Infrastructure</li> <li>•Social and Environmental Sustainability</li> <li>•Urban Development Strategy</li> </ul>

<p>11</p>	<p>10 characteristics of smart cities: 1) technology, ICT, internet, 2) human and social capital development, 3) entrepreneurship promotion, 4) global cooperation and networking, 5) privacy and security, 6) locally adapted strategies, 7) participatory approach , 8) top-down coordination, 9) clear and actionable strategic framework, 10) interdisciplinary planning. Today, smart cities represent a multidisciplinary topic of interest, shaped by constant reflection on urban development, economic growth and urban technology.(p.3)</p> <p>Network technologies play a fundamental role in all smart city strategies, as data management, information coding and information exchange are key features of smart cities. (p.15)</p>	<p>Angelidou, 2017</p>	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Internet</li> <li>• Human and Social Capital</li> <li>• Global Cooperation</li> <li>• Privacy and Security</li> <li>• Locally Adapted Strategies</li> <li>• Participation</li> <li>• Coordination</li> <li>• Openness</li> <li>• Interdisciplinary Planning</li> </ul>
<p>12</p>	<p>The smart city is a new opportunity, fundamentally related to investments in ICT services and infrastructure. . (p.1768)</p> <p>To be smart, a city needs to ensure the balanced development of both physical and intangible infrastructures under an appropriate institutional framework. (p.782)</p>	<p>Manitiu &amp; Pedrini, 2016</p>	<ul style="list-style-type: none"> <li>• ICT</li> </ul>

<p>13</p>	<p>As a matter of urban policy making, I argue that the smart city acts as an extension of existing, globally oriented entrepreneurial economic development strategies.(p.537)</p>	<p>Wiig, 2016</p>	<ul style="list-style-type: none"> <li>• Economic Development</li> </ul>
<p>14</p>	<p>Smart cities are defined in terms of the consequences of the smart city concept: smart cities are more efficient, sustainable and more enjoyable to live in. (81). ). The use of ICT is a key feature of the smart city concept. (81–2). The concept of smart city implies that a city has a passion to improve its economic, social and environmental standards and therefore its competitiveness compared to other cities. (p.82).</p> <p>Smart cities can be understood as a situation that allows individuals to indicate which needs are not being met, to report their needs, and to have a reasonable expectation that local authorities will help them meet their needs. (p.83).</p> <p>As a social manifestation of the technical development of urban areas, smart cities will affect basically two different human needs according to Maslow's hierarchy: security and self-actualization.. (p.84)</p>	<p>Klimovsky vd., 2016</p>	<ul style="list-style-type: none"> <li>• Productivity</li> <li>• Sustainability</li> <li>• Copetitiveness</li> <li>• Governance</li> <li>• Security</li> </ul>

15	Considering the current developments in technologies, design and social relations, the smart city is one of the possible paradigms for the future of cities.(p.1713)	Russo, vd.,2016	<ul style="list-style-type: none"> <li>• Paradigm</li> </ul>
16	A smart city is ICT-powered public sector innovations made in urban environments.(p.526)	Gil-Garcia, Zhang, & Puron-Cid, 201	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Public Sector</li> </ul>
17	A "smart" city uses digital technologies to improve performance and well-being, reduce costs and resource consumption, and communicate more effectively and actively with its citizens. [...]Cities can become smarter only by fostering greater cooperation between politicians, companies, entrepreneurs and citizens.(p.92,3)	Snow vd., 2016	<ul style="list-style-type: none"> <li>• Performance and Wellbeing</li> <li>• Digital Technologies</li> <li>• Cooperation</li> </ul>
18	The smart city can break the crisis into a smaller, planned series that can be resolved later with preventive action. [...]The smart city tries to prepare for mass urbanization by pre-implementing its expected effects on infrastructure and resource management.(p.580)	White, 2016	<ul style="list-style-type: none"> <li>• Crisis</li> <li>• Infrastructure and Resource</li> <li>• Management</li> </ul>
19	Smart cities are hybrid models that combine democratized open innovation with centralized city support, coordination and monitoring. [...]This study reveals that	Ben Letaifa, 2015	<ul style="list-style-type: none"> <li>• Mixed Model</li> <li>• Centralization</li> </ul>

	smart cities differ from smart (intelligent) and creative cities by offering a balanced centralization between technology, institutions and people (p.1415)		
20	Therefore, the smart city can basically be defined as a smart balance point between technology and the ultimate goal of sustainable development and improved urban living conditions. (p.53).	Wiig, 2015	<ul style="list-style-type: none"> <li>• Improved Urban Living Conditions</li> <li>• Balance Point</li> </ul>
21	Smart cities are clustered areas with a high density of learning and innovation. Creativity, innovation and entrepreneurship in such areas, combined with digital infrastructure, aim to drive economic growth and a better quality of life.(p.602). The era of social and environmental sustainability, increased urban tourism and natural resource extraction is crucial for smart cities.(p.604)	Kraus vd., 2015	<ul style="list-style-type: none"> <li>• Clustrered Space with Learning and Innovation</li> <li>• Creativity</li> <li>• Innovation</li> <li>• Entrepreneurship</li> <li>• Economic Growth</li> <li>• Life Quality</li> </ul>
22	A smart city consists of BT devices, industry and business, governance and urban services, neighborhoods, housing and people, education, buildings, lifestyle, transportation and environment. Because the idea of a smart city is made up of such diverse elements, it may inadvertently bring	Hollands,2015	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Industry and Business</li> <li>• Governance and Urban Services</li> <li>• Neighborhoods</li> <li>• Housing and People</li> <li>• Education</li> <li>• Buildings</li> <li>• Life Style</li> </ul>

	together disparate aspects of urban life that do not belong together, obscuring some points and bringing others ideologically to the fore.(p.64)		<ul style="list-style-type: none"> <li>• Transportation and Environment</li> </ul>
23	<p>What is certain, though, is that smart cities represent a multidisciplinary field that is constantly being shaped by advances in technology and urban development.(p.95)</p> <p>Smart cities are also based on a complete system of visioning and thinking about technology-driven urban development that continues to influence current urban development policies and priorities on a global scale. Contrary to what many believe, an effective smart city strategy should leverage both technology (i.e. digital intelligence) and information (i.e. human intelligence) to drive spatial development.(p.104)</p>	Angelidou, 2015	<ul style="list-style-type: none"> <li>• Multidisciplinary</li> <li>• Vision</li> <li>• Thought System</li> <li>• Digital Intelligence</li> <li>• Human Intelligence</li> </ul>
24	The smart city is a type of global research and urban strategy that aims to improve the quality of life of citizens in metropolitan areas and to use innovation and high technologies to solve the difficult problems created by increasing urbanization.(p.862)	Dameri & Ricciardi, 2015	<ul style="list-style-type: none"> <li>• Life Quality</li> <li>• Urbanization Problems</li> <li>• Innovation</li> <li>• High Technology</li> </ul>

25	<p>This concept can be briefly defined as cities that use information and communication technologies to increase the quality of life of their inhabitants while contributing to sustainable development.(p.267)</p> <p>The smart city is about the learning capacity of its citizens and institutions, and focuses on the relationships between improved local communities in solving their common problems.(p.277)</p>	Capdevila & Zarlenga, 2015	<ul style="list-style-type: none"> <li>• Sustainable Development</li> <li>• Life Quality</li> <li>• ICT</li> </ul>
26	<p>The smart city is a clustered space that is affected by the implementation of a digital infrastructure with the overall aim of achieving economic growth and a high quality of life, as well as a high rate of learning and innovation as a result of creative citizens and institutions, but also aware of the scarcity of natural resources.(p.214)</p> <p>Six characteristics of a smart city:          1) Availability and quality of ICT infrastructure and use, 2) Business-led urban development, 3) Social participation of urban residents in public services, 4) High-tech and creative industries, 5) Role of social and relational capital, 6) Social and environmental sustainability</p>	Richter, Kraus, & Syrja, 2015	<ul style="list-style-type: none"> <li>• Innovation</li> <li>• Life Quality</li> <li>• ICT</li> <li>• Participation</li> <li>• Urban Development</li> <li>• Social Development</li> <li>• Social Capital</li> <li>• Social and Environment</li> </ul>

<p><b>27</b></p>	<p>A smart city seeks to solve various urban problems (public service unavailability or shortages, traffic, over-development, pressure on land, environmental or health problems, and other forms of inequality) through ICT-based technology that connects as an urban infrastructure.(p.82)</p> <p>It is envisaged that smart cities will create a better and more sustainable city, where people's quality of life is higher, their environment is more livable, and their economic prospects are stronger. (p.82)</p>	<p>Lee, Hancock, &amp; Hu, 2014</p>	<ul style="list-style-type: none"> <li>• ICT</li> <li>• Life Quality</li> </ul>
<p><b>28</b></p>	<p>On the one hand, the concept of the 'smart city' refers to the state of urban spaces being composed of 'all kinds of software', i.e. pervasive and ubiquitous computing and digitally used devices embedded in the very fabric of urban environments [...] and these devices monitor city flows and processes offers real-time and mobile computing, often real-time and mobile, used to manage and organize [...] and are used by many urban citizens to interact with and navigate the city generating data about them (p.2 )</p> <p>A smart city is a city whose economy and management are driven by innovation, creativity and en-</p>	<p>Kitchin, 2014</p>	<ul style="list-style-type: none"> <li>• Innovation</li> <li>• Creativity</li> <li>• Entrepreneurship</li> </ul>

	<p>trepreneurship brought to life by smart people.(p.2)</p>		
<p><b>29</b></p>	<p>There is widespread consensus that smart cities should be characterized by the widespread use of Information and Communication Technologies (ICT) that helps cities better use their resources in various urban areas. (p.25)</p>	<p>Neirotti vd., 2014</p>	<ul style="list-style-type: none"> <li>• ICT</li> </ul>
<p><b>30</b></p>	<p>In general, the smart city can be defined by Information and Communication Technology (ICT) infrastructures that facilitate an increasingly smart, interconnected and sustainable urban system.(p.48)</p>	<p>Debnath vd., 2014</p>	<ul style="list-style-type: none"> <li>• Sustainable Urban System</li> <li>• ICT Infrastructure</li> </ul>
<p><b>31</b></p>	<p>The smart cities (IBM) model proposes not a revolution in urban morphology [...] but a reformist optimization through data, monitoring, interconnectedness and automatic routing mechanisms. (p.316)</p>	<p>Soderstrom, Paasche, &amp; Klauser, 2014</p>	<ul style="list-style-type: none"> <li>• A Reformist Optimization</li> </ul>
<p><b>32</b></p>	<p>The smart city should be able to actively generate smart ideas in an open environment, by directly involving citizens in the co-creation of products or services, by promoting Open Data sets or by developing appropriate living spaces.(p.136)</p>	<p>Bakici, Almirall, &amp; Wareham, 2013</p>	<ul style="list-style-type: none"> <li>• Open Data</li> <li>• Smart Idea</li> </ul>

33	<p>"Smart city" as a general term to describe innovative IT-based urban ecosystems.(p.218)</p> <p>Smart cities create an intense innovation ecosystem with extensive social interactions from the knowledge workforce that creates economic value through the acquisition, processing and use of knowledge.(p.223)</p>	Zygiaris, 2013	<ul style="list-style-type: none"> <li>• Innovation Ecosystem</li> <li>• Economic Value</li> </ul>
34	<p>Smart cities can also be understood as places that generate a certain form of spatial intelligence and innovation based on sensors, embedded devices, large data sets, and real-time information and feedback.(p.120)</p> <p>Therefore, smart cities need to develop strategies and partnerships on how to use their existing internet structures, testing environments, applications and know-how and enhance the public-private partnership for access, use and benefit. (p.122)</p>	Komninos, Pal-lot, & Schaffers, 2013	<ul style="list-style-type: none"> <li>• Spatial Intelligence</li> <li>• Innovation</li> </ul>
35	<p>We believe a city will be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure promote sustainable economic growth and a high quality of life through smart management of natural resources through participatory governance.(p.50)</p>	Caragliu, del Bo, & Nijkamp, 2011	<ul style="list-style-type: none"> <li>• Economic Growth</li> <li>• A High Quality of Life</li> </ul>

36	<p>First and foremost, progressive smart cities must start seriously with people and the human capital aspect of the equation, rather than blindly believing that IT itself can automatically transform and improve cities. (315)</p> <p>Second, the thriving smart city needs to bring about a real shift in the balance of power between the use of information technology by businesses, governments, communities and ordinary people living in cities [...] while at the same time driving economic sustainability and growth. (p.315)</p>	Hollands, 2008	<ul style="list-style-type: none"> <li>• Human Capital</li> <li>• Economic Sustainability</li> <li>• Use of Information Technology</li> </ul>
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Resource: (Lim, Edelenbos, & Gianoli, 2019)

In addition to academic studies on smart cities, it seems that international institutions and organizations also define smart cities in their studies within the framework of the concept.

Republic of Turkey Ministry of Environment, Urbanization and Climate Change defines the concept of smart city as a more livable and sustainable city that uses new technologies and innovative approaches implemented through cooperation between stakeholders, realizes it based on data and expertise, and produces solutions that add value to life by anticipating future problems and needs. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a).





European Commission; defines the concept of a smart city as a place where traditional networks and services are made more efficient through the use of digital and information communication technologies for the benefit of residents and businesses (EC, 2018).



International Telecommunication Union; While considering the smart city concept, the economic, social, environmental and cultural needs of current and future generations; defines it as an innovative city that uses information and communication technologies and other tools to increase the quality of life, efficiency and competitiveness of urban service delivery. (ITU, 2016).



International Organization for Standardization; defines the concept of smart city as a new concept and a new model in which new generation information communication technologies such as Internet of Things, Cloud Computing, Big Data and integrated Geographic Information Systems are applied that will facilitate the planning, management, construction and smart services of the city (ISO, 2015).



British Standards Institute; It is the physical and digital integration of the systems around us and established by people in order to offer citizens a sustainable, prosperous and participatory future (BSI, 2014).

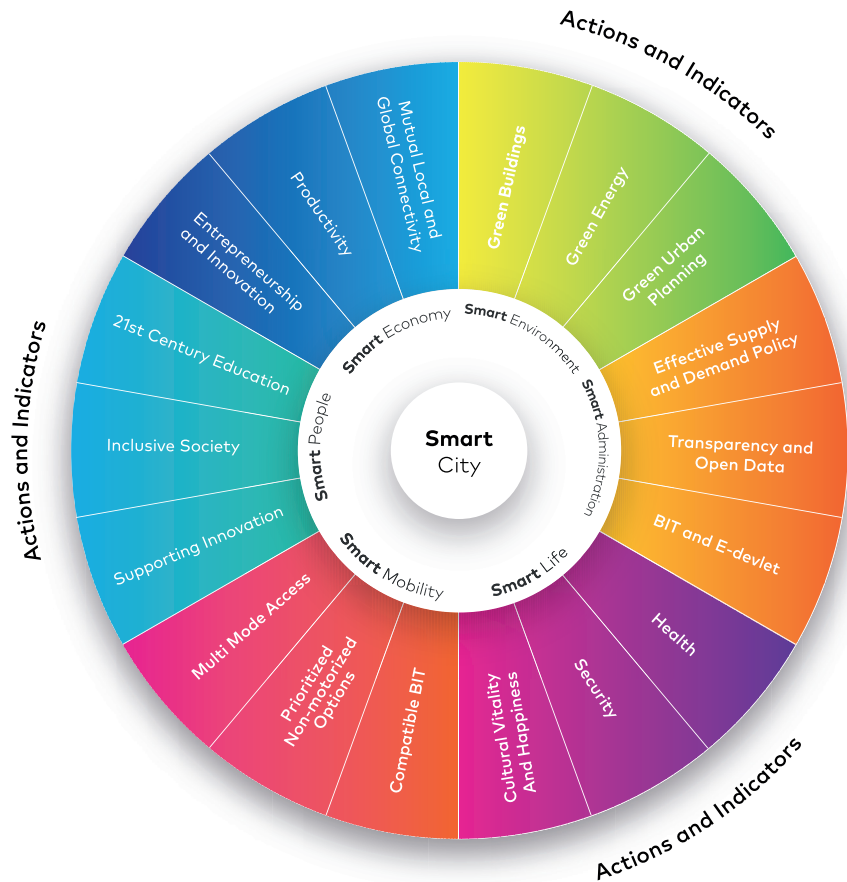


Smart Cities Council; collecting data from smart devices and sensors embedded in their roads, power grids, buildings and other assets; which shares this data through an smart communication system; it then defines smart cities as cities that use smart software to create valuable information and digitally enhanced services (Smart Cities Council, 2012).

All these definitions of a city,

(i) human and social capital, (ii) traditional infrastructure and (iii) affirms smartness when it promotes sustainable economic growth and a high quality of life through investments in disruptive technologies (technology that rapidly replaces previous technologies) and smart management of natural resources through participatory governance (Deloitte, 2015). In this context, it can be emphasized that the definition of the concept of smart city is shaped according to the needs of the city and requires the use of new generation Information Communication Technologies (ICT). It can be said that there is an emphasis that can be shared under certain headings in the definitions made by researchers and international organizations about the concept of smart city. These highlights, which appear to be components of a smart city, deserve to be looked at in detail.

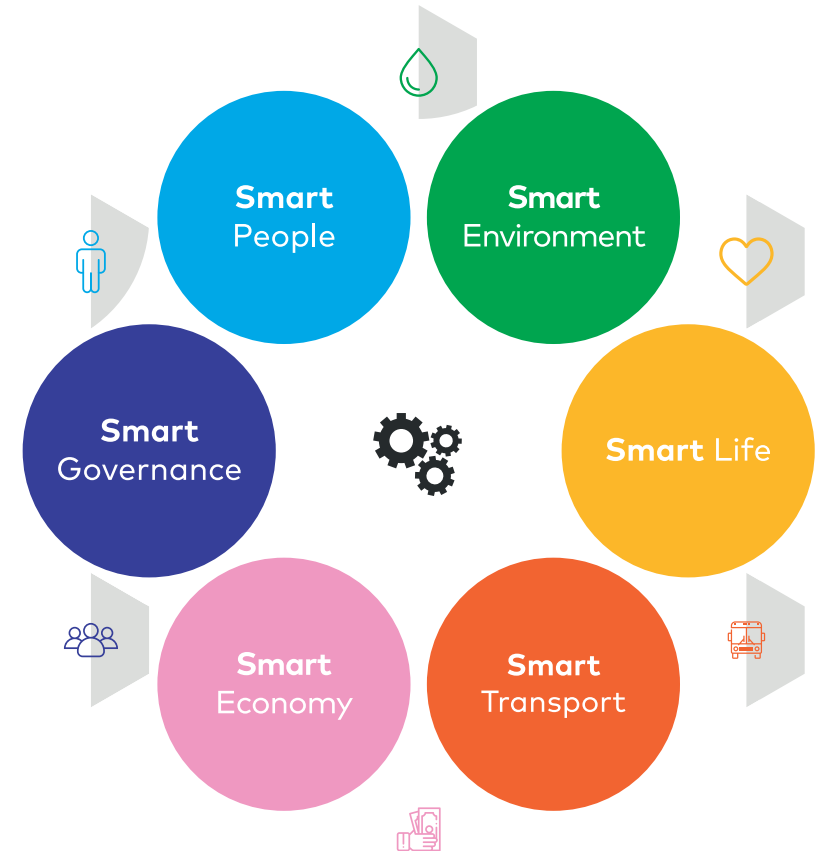
Smart city expert Boyd Cohen explains the concept of smart city with 6 main components (smart economy, smart environment, smart management, smart life, smart mobility, smart people) and 18 sub-components, actions and indicators that support these components (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).



Shape 1: Smart City Components- Boyd Cohen

Resource: (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018)

Cohen also examined the smart city concept in three different stages by linking it to periods and some schools. (Fast Company, 2015). The first period (Smart Cities 1.0) includes studies on smart cities under the guidance of technology companies; The second period (Smart Cities 2.0) covers the works carried out with the support of innovative and technological solutions under the leadership of the local administration, and the latest period (Smart



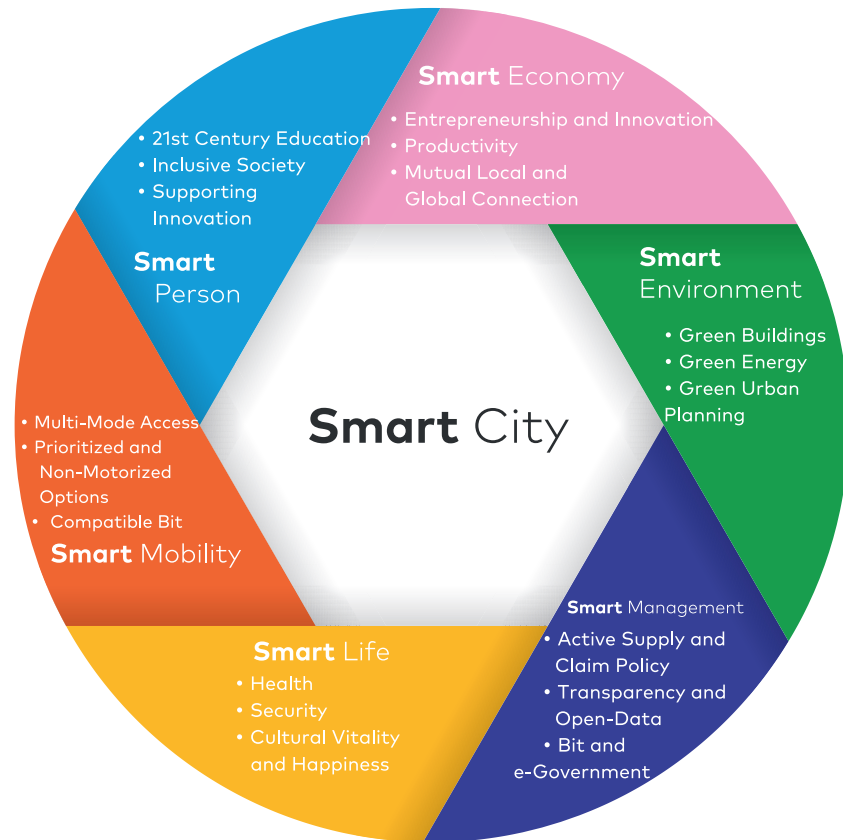
Shape 2: Smart City Components-Deloitte ve Vodafone

Resource: (Deloitte & Vodafone, 2016)

Cities 3.0) covers studies conducted particularly with citizen participation (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

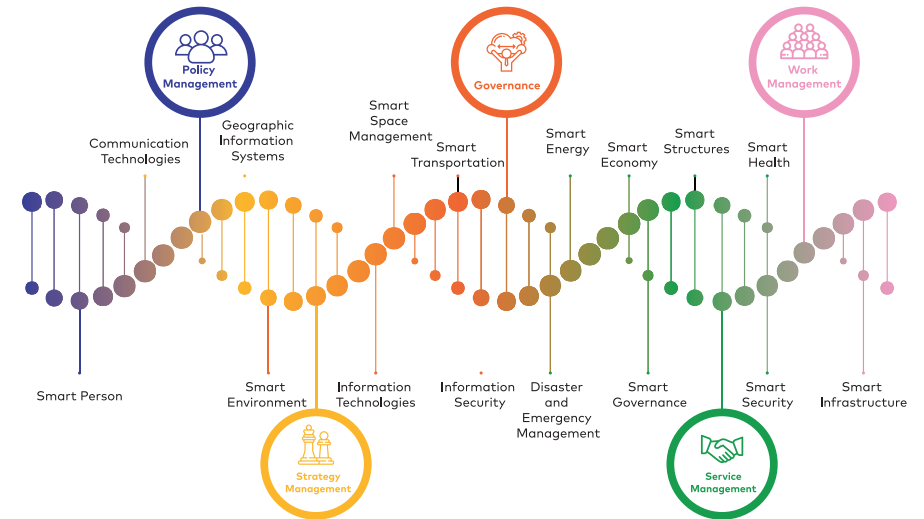
In the report titled "Smart City Roadmap" published by Deloitte and Vodafone companies in December 2016, the core components of smart cities include six components (Shape 2), (Deloitte & Vodafone, 2016).

European union; deals with smart city components, where concepts such as sustainable urban mobility, sustainable built environment, energy, information and communication technologies, integrated infrastructures and processes in transportation, citizen-oriented policies and regulations, integrated planning and management, information sharing, performance indicators, open data management, standards, business models, procurement and financing, under 6 main headings. (Shape 3).



Shape 3: Smart City Components-European Union  
Resource: (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018)

R.T. In the context of the "2020-2023 National Smart Cities Strategy and Action Plan" prepared by Ministry of Environment, Urbanization and Climate Change, Smart City Components are gathered under a total of 21 sub-titles defined under the main headings of "Smart City Management" and "Smart City Applications". (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a).



Shape 4: Smart City Components- R.T.: Ministry of Environment, Urbanization and Climate Change (Resource: Ministry of Environment, Urbanization and Climate Change)

## 2.1. SMART CITY MANAGEMENT

- **Governance:** Management activities aimed at strengthening and enabling city-level leadership among the necessary stakeholders in smart cities, and finding effective ways to ensure sustainability.
- **Strategy Management:** These are the activities aimed at developing Smart City Strategies and transforming them into road maps that guide the city, and ensuring that the practices are implemented with this perspective.

- **Policy Management:** These are activities to identify and implement policies that outline the principles that guide the following Smart City topics.
- **Holistic Service Management:** These are the activities aimed at providing urban services in a holistic way and interacting with each other through inclusive channels and increasing their maturity, in which Smart City solutions are used.
- **Business Management:** It is the activities related to the management of the business layer between the service and technology layers in order to provide urban services using Smart City solutions.

## 2.2. SMART CITY APPLICATIONS

- **Smart Environment:** It can be described as a guarantee of environmental sustainability and nature by protecting the natural assets of the city with the management of waste, air, water, soil, combating climate change with the support of Information and Communication Technologies, and making environmental management taking into account green city planning.
- **Smart Security:** It is the whole of the functions of measuring city security and ensuring its effectiveness, designed to protect citizens and provide crisis management against threats that may arise against the current security situation in cities by using technology.
- **Smart People:** An individual with high awareness, participation and creativity, a lifelong learner, incorporating information technologies into his life, the main element of human and social capital and the focal point of city life. The topics of Social Infrastructure, Cultural Interaction and Addiction

are covered under the Smart People component. Social Infrastructure; activities and services aimed at raising the quality of life of people and society, such as education, health, culture, tourism, art, sports and social assistance, which constitute the cornerstones of the social structure.

- **Smart Structures:** society for all buildings in a city; It includes systems that aim to increase the quality of life by touching basic needs such as housing quality, housing quality, building security measures, building air conditioning and energy systems with a rational and technological approach.
- **Smart Economy:** It is the handling of micro and macro dimensions of a city's economic inputs, outputs and activities within the framework of smart industries. In the face of increasing consumption factors in every field, it aims to use existing resources efficiently and to develop measures for increasing consumption and to increase the quality of life. Competitiveness, brand value and sharing economy are prominent concepts.
- **Smart Space Management:** It means the ability of cities to be resistant to natural disasters such as earthquakes, floods, landslides that will cause loss of life and property, to be socially, culturally and economically livable and sustainable, and to develop in accordance with the principles of urbanization.
- **Smart Health:** These are applications and services that improve health services, increase individuals' awareness of their health, and enable smart analysis of health data.
- **Smart Governance:** It expresses a governance that enables faster, more precise and more efficient decision-making, unlike traditional public administration methods, with the principles of transparency, participation and accountability in public administration processes such as analysis, planning, implementation and policy making.



- Information Technologies It ensures that the processes of producing, collecting, processing, operating and sharing information (sound, data, text, image, etc.) are carried out with the support of technology. Within the scope of the Smart City, it provides horizontal support to many services such as Information Technologies, city management, energy, transportation and infrastructure.
- Smart Transportation: These are ICT-enabled and integrated transport systems. It includes sustainable, safe and interconnected transportation systems, including tram, bus, train, metro, car, sea and air transportation, bicycle and pedestrian, the use of one or several modes of transportation.
- Smart Energy: Highly energy and resource efficient and increasingly supported by renewable energy sources, providing cost and energy savings; It is the management of energy with integrated and flexible resource systems for strategic

planning, as well as grids based on insight, public value and innovative approaches.

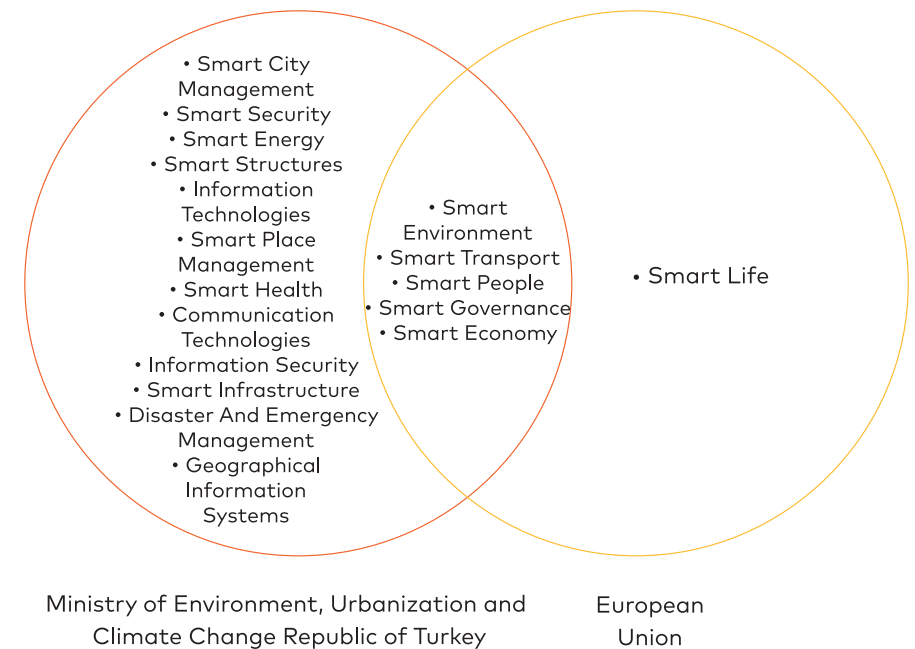
- Communication Technologies: It is the whole of infrastructure, technology, standards and equipment related to the transfer of information. Communication Technologies within the scope of Smart City; It is in a position to support many services such as city administration, energy, transportation and infrastructure horizontally.
- Information Security: It is the preservation of information by applying the risk management process in line with the elements of confidentiality, integrity and accessibility. Within the scope of Information Security; It is aimed to be prepared for future threats by holistic protection and handling of technology, systems and infrastructures (network, software, device, data, etc.).
- Smart Infrastructure: Systems that transmit, analyze, mea-

sure, monitor the data collected by sensors used in the Smart Environment, Smart Transportation and Communication Technologies components, and create public value and intelligently respond to user demands and changes in the environment for improved performance and user experience.

- **Disaster and Emergency Management:** It is a set of applications and systems that reduce the damages that may be encountered by taking precautions, ensure the preparation for disasters and emergencies, intervene when an event / situation occurs, intelligently analyze the disaster and emergency data, and cover the process of returning to normal life.
- **Geographic Information Systems:** Geographical data, which has spatial interaction with many sectors; It is the set of hardware, software, human resources, standards and methods required to produce, supply, store, process, manage, evaluate, analyze, share, visualize, present and keep up to date (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a).

When the approaches of the European Union and Republic of Turkey: Ministry of Environment, Urbanization and Climate Change to the smart city components are examined at the level of titles, it is possible to see that Republic of Turkey: Ministry of Environment, Urbanization and Climate Change exhibits a more detailed, transparent and practical approach, as well as an understandable and facilitating approach.

The fact that the concept of smart life is not included as one of the smart city components of the Ministry of Environment, Urbanization and Climate Change should not be seen as a deficiency; on the contrary, it is about the ministry's vision of "... adding value to life ..." smart city and considering the concept of smart life as a human-centered structure beyond a component and above all components.



Shape 5: Smart City Components Comparison; European Union- T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı

# 3

## SITUATION DETERMINATION



## Global Risks and Challenges for Cities

Global problems such as climate change, wars, disasters, epidemics, population growth, migration, malnutrition make our world harder to live from day to day. It is possible to see the negative effects of this situation in all other living things, especially in human beings, and in urban settled areas. In order to overcome all these problems and the negativities experienced, individual tasks, as well as national and even international institutions/organisations; The United Nations is the most important one of these organizations.

The United Nations implements programs such as the "Development Program (UNDP)" and "Human Settlements Program (UN-HABITAT)" to solve global problems and achieve the goal of a better urban future.



Shape 6: Sustainable Development Goals

Resource: (UNDP 2016)

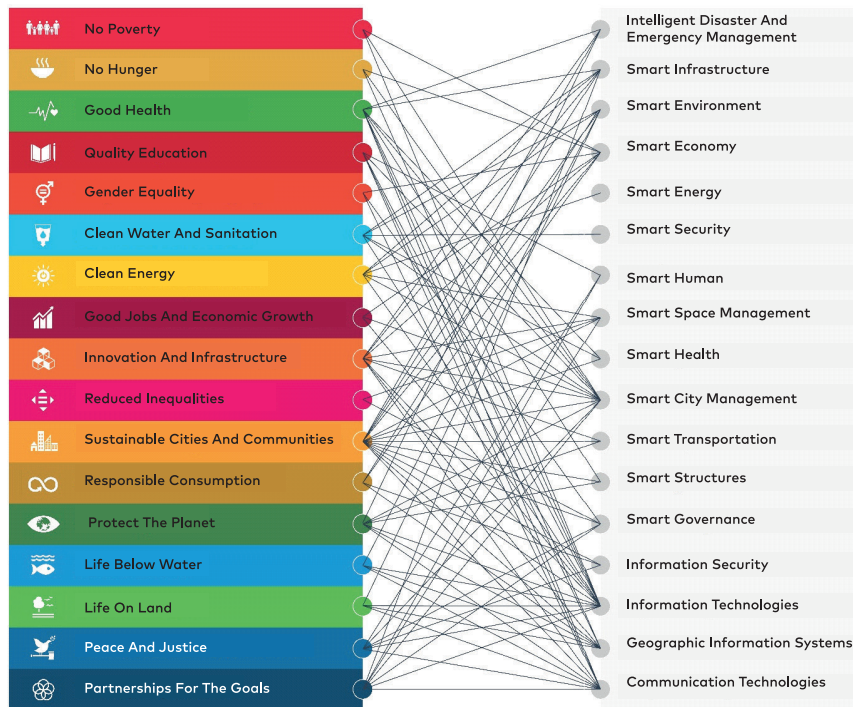
UNDP is a program that helps eradicate poverty, reduce inequalities and exclusion, build resilience so that countries can sustain progress, and achieve the 17-headed "Sustainable Development Goals (SDGs)" in nearly 170 countries and regions (Shape 6), (UNDP, 2016).

"SKA", which was launched by the United Nations in 2016 by building on the "Millennium Development Goals" and includes new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, aims to eradicate poverty, protect our world, and promote peace and harmony for all people. This is a call to action for a prosperous future. (UNDP, 2016).

Where smart city components determined by Republic of Turkey: Ministry of Environment, Urbanization and Climate Change are assessed against the SKA sub-objectives., "Health and Quality Life", "Quality Education", "Accessible and Clean Energy", "Industry, Innovation and Infrastructure", "Sustainable Cities and Communities" and "Climate Action"(Shape 7)

UN-Habitat, the other UN programme, brings together subnational and local governments, parliamentarians, non-governmental organizations, indigenous and local peoples, the private sector, professionals and practitioners, the scientific and academic community and other relevant stakeholders at the conference held every 20 years. It ensures that common policies and strategies are developed and commitments are made. The last of the conferences (HABITAT III), which is extremely important in terms of contributing to the solution of the problems in the world, was held in Kito (Quito) in Ecuador in 2016. "By 2050, the urban population is expected to nearly double, making urbanization one of the most transformative trends of the 21st century. Population, economic activities, social and cultural interactions, as well as environmental and human impacts, are increasingly concentrated in cities, which

poses major sustainability challenges in terms of housing, infrastructure, basic services, food security, health, education, decent jobs, security and natural resources, among others. The expression "causes the problem" gives us a sense of the basic urban problems and needs that will be felt today and in the future (UN-HABITAT III, 2016).



Shape 7: Relationship Between Sustainable Development Goals and Smart City Components\*

\* It was created by the authors considering the definitions and conceptual contents of Sustainable Development Goals and Smart City Components..

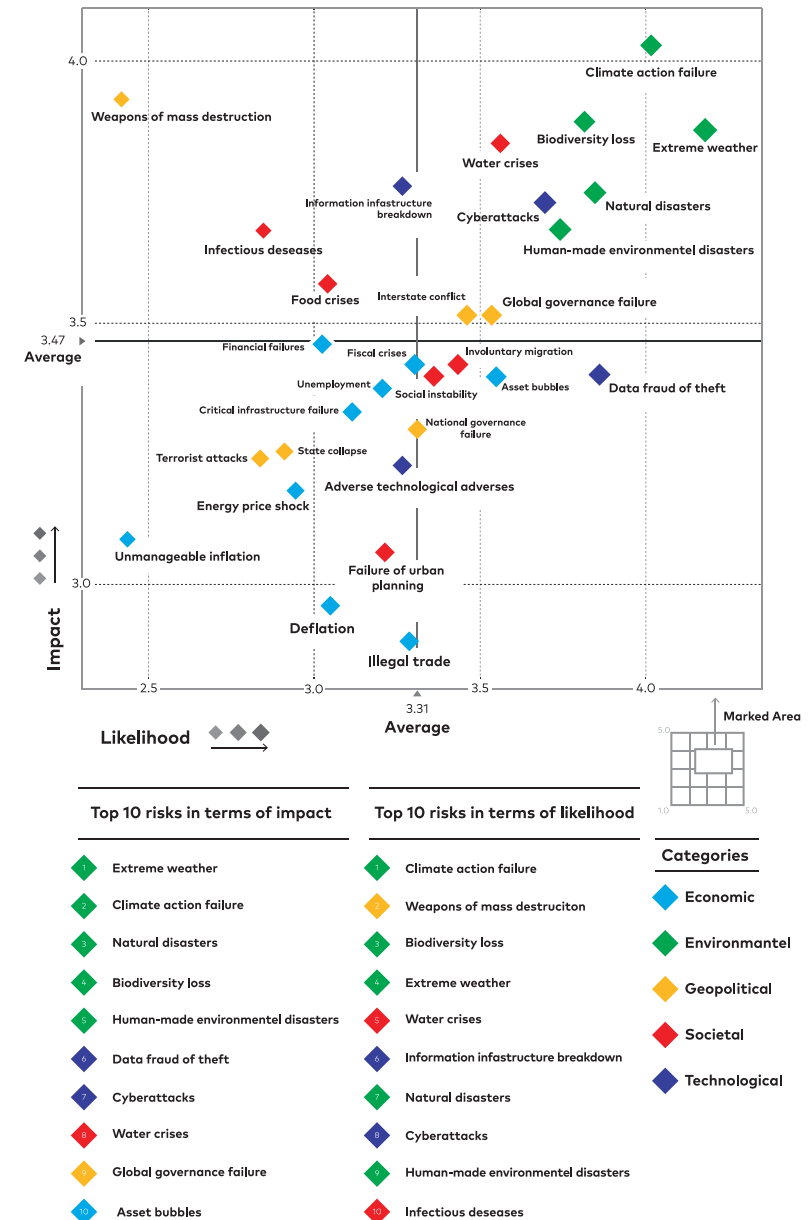
Within the Habitat III process, provide information about "New Urban Agenda", "Social Engagement and Equality", "Urban General Frameworks", "Local Development", "Urban Economy", "Urban Ecology and Environment" and "Urban Housing and Basic Services" have been taken into the background. Several papers have been published. In the "Smart Cities Statement" positioned under the title of "Housing and Basic Services", the increase in the urban population and urbanization rate; It is mentioned that problems such as slums caused by unplanned urbanization cause infrastructure deficiencies and social segregation, natural resources are rapidly depleted, traffic congestion, noise and air pollution increase as a result of the widespread use of motor vehicles. (UN-HABITAT, 2015). In this context, it is mentioned that information and communication technologies have important potential to propose smart solutions to overcome the problems and difficulties that arise and to make cities inclusive, safe, flexible and sustainable. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019c)

The research carried out to identify the problems that cities are waiting for as a solution gives us an idea of the global risks and difficulties that cities are facing. The most remarkable research on this issue is that of the World Economic Forum (WEF). The results of the research, which has been carried out regularly since 2007, are published under the name of "Global Risks Report". The report, the last of which was published in 2020, ranks the risks classified under the headings of economic, environmental, geopolitical, sociological and technological, according to their probability of occurrence and level of impact. All of the 5 risks with the highest realization rate; It is seen that 3 of 5 risks with high impact level are gathered under the heading of environment. The report states that smart urban practices, which are brought about by the development of information and communication technologies, are an opportunity to rid our world and living spaces of these risks. In this context, one of the examples presented in the report is the work of

an emerging company that managed to obtain enough heat from sunlight to meet the requirements of industrial operations using artificial intelligence and mirrors (Shape 7), (WEF, 2020).

In spite of the policies and strategies developed by institutions and international organisations concerning the problems of our world in the concepts of natural and cultural resources, spatial structure, population and demography, economy, functional connections, participation, transparency and justice, there are also reports with the expectation that these problems will continue to increase. In the Smart Cities White Bulletin published by Republic of Turkey:Ministry of Environment, Urbanization and Climate Change in 2018, the relevant findings are included. Accordingly, the main problems that cities will face today and in the future are grouped under 10 main headings. The headings and particulars are listed below. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018);

- Population Growth: employment, housing, nutrition, migration, infrastructure
- Global Climate Change: agriculture, disaster, infrastructure, water, migration, energy
- Longevity Expectation: health, care, employment, education
- Resource Depletion: pollution, nutrition, economy
- Pollution: Infrastructure, water, health, finance
- Increased Energy Requirements: pollution, finance
- Technical Manpower Demand: education, employment, entrepreneurship, hi-tech
- Increasing Communication Needs: finance, infrastructure, hi-tech, security
- Problems in Rural: nutrition, employment, housing, migration
- Aging Infrastructure: finance, hi-tech, employment



Shape 8: Global Risk Impact-Probability (Diagram)

Resource: (WEF, 2020)

The resolution of the above problems, the fulfilment of expectations and the more efficient use of existing resources add importance to the Smart City perspective. It is possible to understand this from the growth experienced in the smart city market, as well as the strategies and actions taken by national and local governments to be included in the smart city ecosystem.

### 3.2. SMART CITY MARKET ANALYSIS

Unlike the examples above, it is possible to get an idea of the size of the smart city market through research that highlights our recent past. (Smart Cities Council, 2012). According to this;

- The Global e-Sustainability Initiative (GeSI) predicted in its Smarter 2020 report published in 2010 that technologies and industries related to smart cities will become a market of 2.1 trillion USD by 2020.
- ABI Research stated that the market size, which was calculated as 8.1 billion USD in 2010, will reach 39.5 billion USD by 2015.

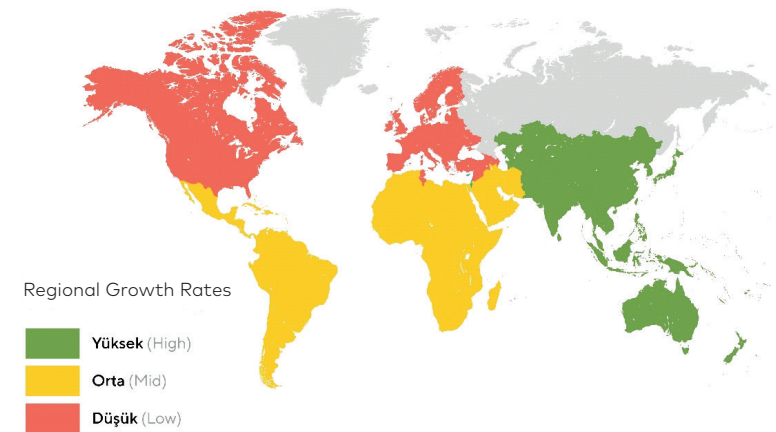


The Smart Cities Council sees increasing the size of the smart cities market as the end result of increased awareness of all that is smart and all the intermediate technologies. However, various research institutions argue that the reasons such as high implementation and maintenance costs, lack of expertise and competence of users, privacy and security concerns about IoT, high initial investment cost, rapid urbanization, inability to manage the increasing demand for smart urban life, and global broadband connectivity are due to the growth of the market. He argues that these are the biggest obstacles in front of him. The same organizations also say that the growth of smart cities market will be stimulated. by governments investing in urbanization and technology to keep up with the demands of the age (Markets and Markets, 2020), (Grand View Research, 2020), (Technavio, 2020), (Smart Cities Association, 2016), (Market Research Future, 2017).

The proliferation of smart city projects that will be supported by government decisions in developing economies, which is one of the main market trends of smart cities, will undoubtedly affect the market growth. While developed economies have been trying to build smart cities for a decade, emerging economies are still in the planning stages. However, it is seen that some pilot projects are also implemented in these countries. For example, the Indian government has initiated pilot projects in 100 cities and the Chinese government in approximately 500 cities (Technavio, 2020).

Research shows that North America, where developed economies are concentrated, and North and West European countries are the largest smart city markets; shows that the fastest developing/growing market covers the countries that are still implementing pilot projects in the Asia Pacific region (Shape 9). As a result, North American countries have focused on developing high-level infrastructure that fosters market growth, protection of the environment, low power use and network connectivity and Internet of Things applications.

With the structure of several industry actors such as Ericsson, Schider Electric and Siemens in Europe such as England, Germany, Germany, France; A market observation is made between countries such as India and Sweden, with various business classes, smart city projects, other digital technologies in Germany, among countries such as India and Qatar. In the Asia Pacific region, on the other hand, the collective initiatives and increased investments of various governments are driving the growth of the market. At this stage, significant developments in smart city, artificial intelligence and other similar technologies are playing an important role in market growth. (Market Research Future, 2017).



Shape 9: Smart Cities Market Market -Growth Rate by Region 2019-2024

Resource: (Morder Intelligence, 2019)

With the expected growth of the smart cities market, the number of smart cities is expected to rise to over 26 by 2025, including 16 in North America and Europe. At the same time, over 70% of global spending on smart cities is expected to come from the US Western Europe and China by 2030. In this process, smart cities in the USA and Europe will continue to spend on 5G and autonomous and robotic technologies. However, the Covid-19 outbreak has caused some expenditures to be prioritized. For example, most cities in the US and Europe are investing in open data initiatives and renewing their investments in 5G, smart grids, artificial intelligence, data centers and other smart city-related areas with China's "new infrastructure initiative" introduced in 2018. In cities, the expected trend of investment in contact and application trackers, open data platforms, autonomous vehicles and drones to fight the epidemic, smart grids, smart traffic management, autonomous vehicles, smart lighting, e-governance services and data-enabled public safety (Frost & Sullivan, 2020).

Although it is an indisputable issue that the investments that will enlarge the smart city market will increase the quality of life of human beings and the efficiency in public services, it is expected that the advancement of automation and the widespread use of autonomous and robotic vehicles to replace manual work will have negative effects on the labor market.

"How are the rapid developments in Smart Cities technology reshaping the economy and society?" published by Deloitte in 2015. The report, entitled, contains very interesting findings about the labor market and the risks that occupational groups are likely to face. As indicated in the report, the 20 common occupations (probability <0.1) that are least at risk with developing smart city technologies are listed as follows:

- First-line managers of mechanics, assemblers, mechanics

- and production workers
- Dentists, orthodontists and prosthodontists
- Child, family and school social workers
- Doctors and surgeons
- Teachers and trainers
- Mental health counselors
- Human resources managers
- Recreation workers
- Training and development managers
- Computer systems analysts and computer systems administrators
- Diploma nurses
- Mechanical Engineers
- Pharmacists
- Logisticians
- Psychologists
- Sales and marketing managers
- Training and development professionals
- Public relations and fundraising managers
- Chief executives
- Architects

The 20 common occupations at high risk (probability > 0.9) are as follows (Deloitte, 2015).:

- Marketers

- Insurance workers, insurance compensation officers, insurance adjusters
- Cargo and forwarding agents
- Packaging and filling machine operators
- Supply officers
- Bookkeeping, accounting and auditing clerks
- Real estate brokers
- Bank and rental clerks
- Cashiers
- Dental lab technicians
- Electromechanical equipment installers
- Administrative assistants
- Desk clerks
- Office clerks
- Receptionists and desk workers
- Postal service officers
- Assistant lawyers and legal assistants
- Couriers and messengers
- Accountants and auditors (private sector)
- Truck and tractor operators

Although there is widespread public agreement that all sectors and professions will be affected by smart city applications, there are differences that cannot be agreed in terms of the degree/level of this effect. A similar situation is encountered in the estimations made for smart cities market sizes. While researchers can-

not achieve consensus on the numerical value of market size, they agree that the market will change rapidly.

### 3.3. SMART CITY TECHNOLOGIES AND NEW TRENDS

The basis of smart city thinking is to use resources effectively and efficiently, to prioritize sustainable investments, to be innovative and to benefit from technology at an advanced level in line with needs. In this respect, national and local governments should benefit from new methods and technologies and meet the city's basic needs.

- **Open Data**

Data is important to both local authorities and citizens. Clive Humby expressed this situation as "the oil of the age", referring to the value that data adds to the economy (TED, 2018). Data is very important not only for commercial establishments, but also for the daily lives of citizens (such as when a bus arrives at a stop), or for municipal administrators (such as how much fuel a bus consumes). For this reason, it is important to focus primarily on projects for which data will be obtained. However, processing and sharing the collected data will create a leverage effect. The main thing in the world today is that the data should be open and the data that should be kept should be specifically specified. The sharing of non-personal data obtained from an established system with taxes levied on citizens should be the basic criterion.

- **Sharing Economy**

The sharing economy is based on the idea of sharing an existing resource in today's world where resources are scarce. It is the sharing of a tool or an asset that a person does not need with others. The sharing economy is generally known in the world with titles such

as "the world's largest hotel chain without a hotel", "the world's largest taxi company without any taxi". However, the sharing economy can also be worked with different models locally. For example, an underutilized workshop can share hand tools with neighbors.

- **Solution as a Service**

It is based on the logic of leasing services such as hardware, software, platforms, instead of buying them as a service. It is a method preferred recently by both citizens and municipalities. For example, when we say "transportation as a service", it means that instead of owning a car, the citizen can rent a car whenever he wants, or rent a taxi, bus, train, scooter whenever he wants. In transport as a service, the citizen can pay the fee according to the membership model, with a unique annual price for all, with methods such as pay as you go.



- **Big Data**

The concept of big data has been understood for some years, but at times it is misunderstood. There are basically three fundamental properties of big data. It is also called 3V because of its English initials: Volume (The size of the data), Velocity (the speed of the data), Variety (The Diversity of the Data). So a huge amount of data in a single field is not big data. Big data is the ability to provide you with other predictions and decision support services by synthesizing data from different data sources. Big data should be used as a very important tool in the quality of the service offered to the citizens.

- **Internet of Things (Connected Devices)**

This concept, known as the "Internet of things" in the world, is actually based on the direct communication of devices in the field between them and the center. In other words, devices that communicate directly with each other and with the center are mentioned. These devices can be controlled from the center and their software can be updated, and they help the city operations to be more efficient with the help of the data they transmit to the center. E.g; A car that shares the data it receives from the fog lights with the center can transmit the formation of fog in that area to other vehicles and to the center.

- **Artificial Intelligence**

Artificial intelligence applications are now being used in municipal and banking applications. With the development of these technologies, it will make a significant contribution to both efficient use of human resources and faster service production. Application of artificial intelligence finds use in all application domains of the city.

- **New Auto Technologies**

As regards new vehicle technologies, electric vehicles are at the forefront for cities. Because a significant part of the emissions in cities originate from fossil fuel cars. For this reason, the widespread use of electric vehicles in the city is important for the future of cities. Another prominent issue is autonomous vehicles. Autonomous vehicles will contribute to the reduction of accidents involving human elements in the city, as well as benefiting from the sharing economy with mobile applications, reducing the number of parked vehicles in the city and contributing to a more livable city life. In addition to these, as in the case of the Internet of Things, the presence of connected vehicles in the city will make a significant contribution to traffic congestion.

- **Block Chain**

Blockchain, which has come to the fore with crypto money in recent years, but offers a completely different registration method instead of central registration, whose service area is not limited to this, is an important smart urban application in providing secure services. Its use in municipal applications in the world is increasing day by day. For example, municipal services such as licence transactions, electronic commerce and the land registry can be converted to the blockchain method.

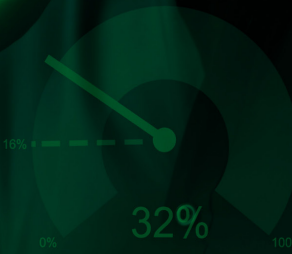
# 4

## POLITICS AND STRATEGIES



5 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

03.41%	0	12.84%
45.82%	2760	68.09%
27.7%	220.9	02.83%
47.26%	641.5	41.01%
29.2%	922.2	12.63%
23.97%	59.4	-19.76%
20.01%	1920	30.63%
45.87%	8200	27.31%
03.41%	7701	12.84%
45.82%	220.9	68.09%
27.7%	641.5	02.83%
47.26%	922.2	41.01%
29.2%	59.4	12.63%
23.97%	1920	-19.76%
20.01%	8200	30.63%
45.87%	8200	27.31%



## 4.1. INTERNATIONAL POLITICS AND STRATEGIES

National and local governments implement policies and strategies to become part of the smart city ecosystem. International organizations such as United Nations, World Bank (WB), Organization for Economic Cooperation (OECD), European Union (EU), Association of Southeast Asian Nations (ASEAN), African Union (AU), the Smart Cities Council (SCC) and the Smart Cities Association (SCA) and information communication technology companies; It tries to facilitate this process in cities with supports such as financing, experience and cooperation. One of these organizations, the World Bank (WB); It aims to develop collaborations by actively working with cities, governments, international communities, multilateral and bilateral development agencies, academia, private sector and NGOs in developing countries for inclusive, resilient, competitive and sustainable societies. In this context; emphasizes that it supports the "Smart Cities" approach, which focuses on the needs of cities to plan, build and deliver their services in environmentally and socially more sustainable ways through the "Global Sustainable Cities Platform (GPSC)", which includes many national and international institutional stakeholders. (World Bank, 2017).

The World Bank is also supporting a variety of events such as symposia, workshops, conferences and workshops that require policy coordination and explore investment options to build inclusive cities, Secure, resilient and durable. Supporting the youth summit held in 2019 with the theme of "Smarter Cities for a Resilient Future", the bank thus paved the way for a global exchange of ideas for smart city designs and applications, enabling the examination of problems on the basis of technology, infrastructure, human development and sustainable development that may affect young people and future generations. The Economic Cooperation Organization (OECD) provides support to governments that want to be included in the smart city ecosystem within the scope of the

"Development of Smart Specializations", "Green Growth" strategy, and the "Smart Cities and Inclusive Growth Program".

The organization, which emphasizes that it may take time to discover the innovation capacity in smart city systems in general; With the strategy of Developing Smart Specializations, especially R&D and innovation investment policies for regional economies; It aims to create a common vision within the framework of industrial and innovation that aims the economic, scientific and technological specialization of a region, along with its productivity, competitiveness and economic growth, of public policies and policy circles. In this context, it supports the implementation of commissions with broader stakeholders related to the smart city, to experience examples and increase specialization in smart city systems with a variety of reports.

Green Growth Strategy; by mechanisms that prevent environmental degradation, loss of biodiversity and the unsustainable consumption of natural resources; is expressed as ensuring economic growth and development. The smart city is seen as an important factor in the transition to a green economy. In strategy, it is argued that public transport to promote green growth, low carbon energy production, smart electricity grids, public investments in green infrastructure such as energy efficiency, water and health in public buildings should be increased, and therefore environmental tax regulations are needed to encourage R&D investments that will facilitate the development of green technology and industries. (OECD, 2010).

In addition, the OECD "Smart Cities and Inclusive Growth" Program aims to (OECD, 2019):

- Redefining the concept of smart cities around the contribution of digital innovation for better lives of all people
- Measuring how smart cities are performing and ultimately delivering good results for citizens
- Guiding local and national governments in their efforts to reshape city governance, business models and stakeholder engagement

According to the European Union (EU) and the European Commission, considering trends in urbanisation, changes towards knowledge-intensive economies, cultural trends, increased consumption of resources, and emission shares, cities; becomes even more of a focus to achieve economic growth, social inclusion and environmental sustainability. Especially cities with old infrastructures and technologies have some difficulties in front of their goals of becoming a sustainable city. Lower tax revenues



and austerity measures by local authorities have highlighted the risk of delaying the transition to a green economy.

In the EU 2020 strategy, "Smart, Sustainable and Inclusive Growth" was highlighted. Within the scope of the sustainable urbanization goal, "Europe's Green Capital", "EU Sustainable Energy Week", "Sustainable Urbanization Conferences", "Eurocities", "Car-Free Cities Network", "European Environment Agency", "Jessica", "European Network of Many initiatives such as "Living Labs (ENoLL)" and "URBAN-LEDS" are supported and activities are carried out within this scope. The "European Innovation Cooperation Initiative for Smart Cities and Communities" (EIP SCC) aims to tackle some of the common challenges affecting cities. In this context; The EU is committed to national and regional financing and private investment, including Horizon 2020 and the Cohesion Fund.

At the 32nd Association of South-east Asian Nations (ASEAN) Summit conducted in Singapore in 2018, the proposal to establish the

"Smart Cities Network" (ASCN), a cooperation platform composed of 26 pilot cities engaged in achieving the common goal of development as smart and sustainable cities. Going forward, ASCN aims to establish regional and global partnerships to improve the development and initiatives of smart cities in the region. For example, urban and regional issues are expected to be addressed through smart city solutions that focus on public-private partnerships that develop digital processes and infrastructure.

Over the past two decades, smart cities have been seen as a more efficient way of building and high-quality cities, have become a general vision and strategy document for some countries, while in others, they are the vision and strategy document of cities. For example: With the "Smart Cities Mission & Guide" strategy plan announced in 2016, India aimed to help local governments implement smart city strategies that can produce effective and beneficial results for citizens and to strengthen local development. In this context, we note that the strategic plan has 3 primary purposes; Developing (reinforcing) cities, Renovating (redeveloping) cities, and Expanding cities (developing green spaces) (Government of India Ministry of Urban Development, 2015).

South Korea began its journey as a smart city through public initiatives as part of the U-CITY (City everywhere) project announced in 2000. Following the publication of the first national smart city plan in 2009, the plan was updated in 2013 and 2019. In this process, local smart city plans compatible with the national smart city plan were prepared and started to be implemented by ensuring the participation of the public. The Smart City Plan, which was recently released in 2019, focuses on the following concepts: (Smart City Korea, 2019).

- New Industry Platform; autonomous vehicles, sharing economy and robotics

- Sustainable City; reduction of waste of resources, waste management and governance
- Life quality; reducing costs, saving time and increasing safety.

Denmark has set itself two major purposes with its smart city strategy released in 2016. The first is that the capital city of Copenhagen will be the world's first carbon neutral capital by 2025. To achieve this, it applies innovative solutions for water and heating sources, transportation, waste management and alternative energy sources. The second purpose is to implement a smart city/digitalisation strategy in close cooperation of citizens, universities, private companies and public authorities in Aarhus, Denmark's second largest city. (Invest in Denmark, 2016).

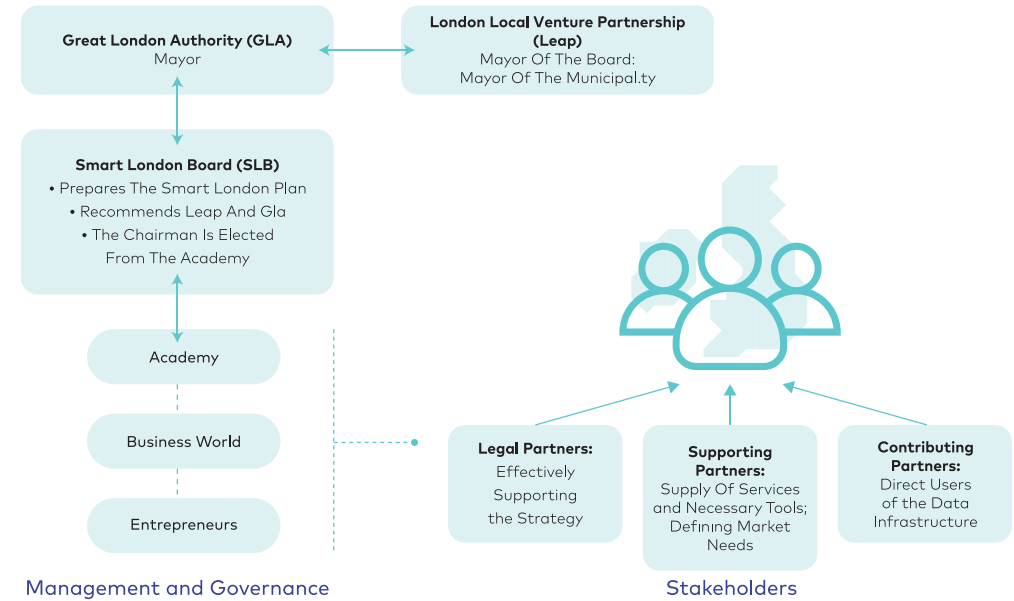
The Government of London (England) (Greater London Authority-GLA) has announced its roadmap for making London the 'smartest city in the world' with the master plan "Smarter London Together" in 2018. Building on the latest Smart London Plan from 2013 (updated in 2016), the roadmap represents a new approach based on shared tasks. With the roadmap envisioning the participation of 33 local governments in the city, more than 40 foundations, major public institutions such as TfL and the Met serving all Londoners, technology communities, universities and other cities;

- Transportation
- Environment
- Health Inequalities
- Housing
- Culture
- Economic development
- London Plan

Implementing strategies in their titles; It aims at fulfilling tasks such as "disseminating services that care about user experience", "open data and transparency", "quality internet infrastructure and smart streets", "digital entrepreneurship" and "collaboration". (Shape 9), (Mayor of London, 2018).



## Smarter London Together



Shape 9: London Smart City Approach  
Resource: (Mayor of London, 2018)

With its smart city strategy announced in 2019, Vienna (Austria) aims to prepare the city by 2050 in line with its vision of "Providing a high quality of life for everyone in Vienna in all areas through social and technical innovations by maximizing the conservation of resources". The 2019 Smart City Vienna Strategy Document, which was prepared on the basis of the strategy document published in 2014, demonstrates its focus on goals identified under three broad headings (Stadt Wien, 2019a).

### 4.1.1. Quality of Life

- Vienna is going to be the city that has the highest quality of life in the world.

- Vienna will focus on sociability/governance in policy design and administrative activities.

#### 4.1.2. Protect of Sources

- Vienna will reduce its local per capita greenhouse gas emissions by 50 per cent by 2030 and 85 per cent by 2050 (compared to the 2005 baseline).
- Vienna will reduce its local final energy consumption per capita by 30% by 2030 and 50% by 2050 (compared to the base year 2005).
- Vienna will reduce its carbon footprint in per capita consumption by 30% by 2030 and 50% by 2050.

#### 4.1.3. Innovation

- Vienna will lead the field of innovation by 2030.
- Vienna will become the digitalization capital of Europe.

Sydney (Australia) announced in its Smart Cities Strategy released in 2020 that it was going to take action based on the vision of "a dynamic, responsive city that enables collaborative innovation and uses technology and data to create a thriving, inclusive and resilient future for all". Sydney aims to achieve five key outcomes through smart, ethical and secure use of data and technology, supported by smart infrastructure in its smart city strategy (City of Sydney, 2020).

- Supporting connected and empowered communities
- Increasing global competitiveness, attracting and retaining global talent
- Preparing the environment for the future and increasing resilience
- Developing lively, livable spaces
- To provide efficient community-oriented services

Russia's Moscow Smart Cities Strategy Paper covers the years 2018-2030. The following purposes have been adopted in the document prepared with the vision of "comfortable, developing, cultural and safe urban environment for every person" (Moscow City 2030, 2018b):

- Ensure sustainable growth in the quality of life of Muscovists and ensure favourable conditions for work and other activities through the use of digital technologies.
- Central, end-to-end and transparent city management based on big data and artificial intelligence
- Increasing the efficiency of public spending, including initiating public-private partnerships in information and digital technologies and communications.

The goal of the Smart Cities Strategic Plan that Stockholm (Sweden) announced in 2017, taking into account the opinions of more than 3,000 residents, businesses, universities and representatives from the business world, and the smart city experiences of different cities; He explained it as "making Stockholm economically, ecologically and socially sustainable through innovative digital services, openness and connectivity". In this context, the main focus of the strategy document is to take full advantage of the opportunities that come with technological developments in fields like the

Internet of Things (IoT), artificial intelligence. (AI), big data analysis and open data (Stockholms Stads, 2017).

## 4.2. NATIONAL POLICY AND STRATEGIES

Policies and strategies on a national scale in the smart city area were first introduced by the R.T. It was included in the "2020-2023 National Smart Cities Strategy and Action Plan" prepared by Republic of Turkey Ministry of Environment, Urbanization and Climate Change and entered into force with the Presidential Circular No. 2029/29 on 23 December 2019. However, it is known that various policy papers have been prepared in previous years on smart city focus areas. The first of these is the National Science and Technology Policies 2003-2023 Strategy Document. In this document, as an important part of smart urbanism, in line with the goal of "Improving the Quality of Life", "To be able to develop smart vehicles and smart road systems for road transportation" and "Fire and safety for transportation and tourism superstructures" within the scope of "Acquiring the Ability to Develop Contemporary and Safe Transportation Systems" policy. "to develop systems" actions were determined. Within the scope of the 2010 - 2012 Medium Term Program prepared in 2009, it was envisaged to prepare an "Urban Development Strategy and Action Plan". In the Ninth Development Plan 2010 Programme, "Increasing the Living Standards of Cities and Ensuring Sustainable Development" was determined as the priority policy and it was aimed to prepare a "Sustainable Urban Development and Action Plan". In line with this scope, 2010-2023 KENTGES Integrated Urban Development Strategy and Action Plan has been prepared (Shape 11), (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a).



Shape 11: High-Level Policies and Thematic Strategies for Smart Cities  
(Resource: (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a)

In the Tenth Development Plan (2014-2018), a large area was allocated to the smart cities sector. In this plan, smart city goals are included under the headings such as transformation in the manufacturing industry, livable spaces, sustainable environment, and urban infrastructure. In the 2015-2017, 2016-2018, 2017-2019 and 2018-2020 medium-term programs, respectively, goals related to urban transformation and smart planning are included.

One of the important studies on Smart Cities is the 2015 Investment Program. "Smart Cities Strategy and Feasibility Study Project" was included in this program. With the Eleventh Develop-

ment Plan (2019-2023) published in 2019, the policies developed on Smart City were handled in a holistic and prioritized manner with reference to the National Smart Cities Strategy and Action Plan, and the vision was "99. With the National Smart City Strategy and Action Plan prepared in Turkey, it guides the goals of local governments to become a Smart City." defined by the expression.

The goal of "Goal 1.1 Smart City Ecosystem Governance Mechanism Will Be Established", which is among the purposes of the strategic purposes of the 2020-2023 National Smart Cities Strategy and Action Plan, "An Efficient Smart City Ecosystem Will Be Established" and one of the actions related to this goal is the "Preparation of a Smart City Strategy and Roadmap." It was stated that the necessary studies should be carried out in order to implement, monitor, evaluate and ensure the sustainability of the strategy prepared with the action with a very high critical level of widespread impact. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019a).

It is expected that Smart City's local strategies will be prepared by municipal governments along with key policies and strategies that draw a vision about Smart Cities and Smart City Components, will be in harmony and coordination with high-level policy, thematic and national strategies. In the 2020-2023 National Smart Cities Strategy and Action Plan Circular No. 2019/29; "Developing the ability to work together in the field of smart cities within the scope of corporate responsibilities and realizing the holistic perspective brought to smart city policies at the national level will be ensured by the implementation of the right projects and activities by those responsible." (T.C Resmi Gazete, 2019) has drawn attention to the importance of this issue.

Another dimension of preventing potential incompatibilities in studies on the smart city concept is linked to coordination be-

tween central and local governments. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b). This situation states that in the 2020-2023 National Smart Cities Strategy and Action Plan Circular No. 2019/29, "under the coordination of the Ministry of Environment, Urbanization and Climate Change, all public institutions and organizations within the scope of the 2020-2023 National Smart Cities Strategy and Action Plan fulfill their duties and responsibilities." (T.C. Resmi Gazete, 2019) appears to be emphasized. As a result, local governments have revised their organisational structures. The number of smart city units, which used to be a handful of local governments, is now over 30. The smart city unit, which we are used to seeing as a directorate under the department of Information Technologies, especially in metropolitan municipalities, is represented by the "Smart Urbanism and Innovation Department" in Bursa Metropolitan Municipality. In the process following the establishment of the responsible units, we see that the administrations also announced their Local Smart City Strategies. Bursa, Istanbul and Sakarya Metropolitan Municipalities are some of the municipalities that can be given as examples in this regard. One dimension of these developments, which aim to increase the efficiency of public service, is the organization of promotions and organizations with the participation of the public. In this sense, the Smart City Ideas and Project Competitions distinguish themselves as the most participative and conscious organizations.

# 5

## METHODS and TECHNIQUES



5 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

This year  
Last year  
Next year proj

03.41%	2760	12.84%
-65.82%	220.9	68.03%
-21.7%	641.3	41.01%
-67.26%	932.2	12.63%
-29.2%	59.4	-19.76%
23.97%	1920	30.53%
20.01%	8260	27.31%
-45.61%	0	12.84%
03.41%	2760	68.03%
-65.82%	220.9	41.01%
-21.7%	641.3	12.63%
-67.26%	932.2	-19.76%
-29.2%	59.4	30.53%
23.97%	1920	27.31%
20.01%	8260	
-45.61%		

32%



## 5.1. BASIC APPROACHES IN SMART CITIES

It is also referred as a "system of systems" for smart cities run. All elements of a city must be brought together and citizens must be involved in the processes. The smart city can be described as increasing and facilitating the quality of life from the citizen's perspective. In terms of management, it is better management of the city from many different dimensions such as increasing its efficiency and sustainability. As a result, the smart city concept can be viewed from six different angles.

- **Strategic Perspective**

A directorate that intends to embark on a Smart City journey should define its vision, set goals and purposes in that direction, and establish a road map. In this process, rapid acquisition projects should be included in the short term.

- **Organizational Perspective**

In order for smart city studies to be followed holistically and to spread to the whole organization, organizational changes must be made. The more effective and competent managers of smart cities in an organisation, the more successful studies on smart cities will be.

- **Sustainability Perspective**

Sustainability is an important issue in a city with all its dimensions, such as economics, the environment and society. Sustainability approach is one of the most basic principles in smart city studies in terms of the effectiveness of the studies and the use of resources by future generations.

- **Environment Perspective**

Projects to be carried out in a city must be in harmony with the environment, not harming the environment, thus increasing the quality of life.

- **Technology Perspective**

Smart city projects require the use of technology as needed. Smart cities are not just technological cities, but they are cities that use the latest technology in the right way.

- **Social Perspective**

One of the main goals of the smart city is to increase the quality of life, comfort, safety and happiness of citizens. In studies on smart cities, comments from citizens should be taken into account and the necessary studies should be carried out accordingly.

- **Financial Perspective**

In order to realize smart city projects, business models should be established together with stakeholders and the private sector by using innovative models.

- **Efficiency Perspective**

Efficiency may come down to doing more work with fewer resources. While implementing smart city projects, the efficiency approach should be taken as a basis when choosing the technology to be used.

As part of all these perspectives, it seems possible to make some suggestions to decision makers to speed up the journey of the smart city (Cisco, 2014).

- Going beyond planning
- Benefit/Cost should be studied,
- New sources should be explored,
- Internal support should be improved,
- Technology options should be explored,
- Moving to mobile technologies,
- Lessons should be learned from other cities,
- Finding the right business partners



## 5.2. SMART CITY PLANNING METHODOLOGY

Smart city planning methodology has no standard form, as can be understood from the smart city strategies given at national and local levels in the "Policies and Strategies" section. The example of Stockholm shows us that in addition to the involvement of representatives of all segments of society, the experiences of different cities are also benefited from. However, it is possible to talk about the methodology, in which the basic requirements, especially participation and transparency, and the vision gain importance, when the approach is similar to that used in strategic planning.

The document named "Local Smart City Strategy and Roadmap", prepared by Republic of Turkey: Ministry of Environment, Urbanization and Climate Change within the framework of the "2020-2023 National Smart Cities Strategy and Action Plan", can be shown to be a world example with its complete and explanatory structure. It has been assessed through four basic work modules: Current Situation Analysis, Vision Determination, Purpose and Goals and Roadmap Creation. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b).

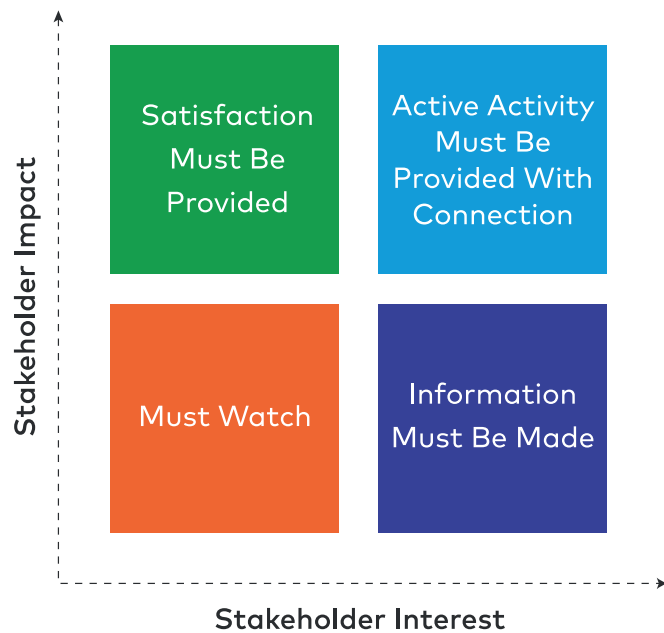
### 5.2.1. Current Due Diligence

From a strategic management perspective, it is very important to determine the current situation in a broad framework and to conduct detailed research on related issues. Thus, it becomes easier to choose the right way and methods to reach the desired goal. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b).

As part of the determination of the current situation, a quick assessment should be made and an idea of the situation of the city should be obtained. This evaluation is a preliminary evaluation

that should be made before the work starts. Preliminary studies need to be carried out under the leadership of city leaders, universities, non-governmental organizations, public administrators, local administrators and ultimately the mayor. The preliminary study is also intended to serve as a basis for the detailed study of smart cities.

As part of the current status assessment, a literature review may be required as required. However, considering the literature studies carried out by the Ministry of Environment, Urbanization and Climate Change within the scope of this project, there is no need to write a literature again, but it is necessary to organize trainings under the title of "what is a smart city" and to reach a consensus around the same concept.



Shape 12: Stakeholder Map

Resource: (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b)

Another important task in assessing the present situation is the identification of stakeholders. At this stage, stakeholder identification is important as they will be involved in the project throughout the entire journey. Institutions and public organisations, municipalities, universities and non-governmental organisations will add value to the Smart City journey through their knowledge and experience. In that context, a stakeholder map should be prepared (Form 12).

Finally, analytical studies such as SWOT (Strengths - Weaknesses - Opportunities - Threats) and PEST (political, economic, socio-cultural and technological) analysis should be undertaken. In addition, face-to-face meetings should be held from the relevant units of the local administration about the current situation of smart cities. Within the scope of these studies, it is necessary to determine the maturity level of the smart city in the current situation, and collect information on ongoing and planned projects under the responsibility of the relevant units.

### 5.2.2. Setting the Vision

Increasing urbanization and growing cities around the world is now an accepted reality. This situation poses significant challenges to cities. For this reason, municipal governments should work both to develop new ways to address these difficulties and to turn these difficulties into opportunities.

The point to be reached in the smart city, which is described as a journey, should be decided together by the city's leaders and stakeholders. A vision statement is a description of where a city wants to be in the future. This statement should create excitement and be accessible. Therefore, the vision statement should be able to inspire its stakeholders. Being specific to the city and being

related to the dynamics of that city makes the vision statement realistic. The vision statement needs to be developed with input from project stakeholders and inspire visionary city leaders during the current due diligence phase.

### 5.2.3. Purpose and Goals

In order to achieve the vision drawn for the smart city, certain goals and purposes must be determined. Each city may have different challenges and areas for improvement. Elements such as actions and activities to achieve purposes, responsibilities, work-plan, stakeholders and oversight should be identified. In addition, specific approaches need to be identified in order to identify the resources needed to perform these actions, assess available resources, build better partnerships with stakeholders, and effectively achieve expected results.

When we look at the global examples of smart cities, we see that some cities only present partial files of smart city projects, while some cities put forward a strategic plan that covers all the stakeholders and institutions of the city. Cities should set their methods according to their specific needs and maturity. At this stage, one point must be emphasized: The smart city project, which began with great enthusiasm, must be completed within a reasonable time before this excitement dissipates.

Furthermore, municipalities in Turkey are required to develop a strategic plan. This issue should be taken into account when drawing up a smart city roadmap. If traditional strategic plans are to remain valid, a situation such as the repetition or conflict of the same goals and purposes may be encountered. The situation requires attention. Updating local government strategic plans as a smart city strategic plan should be the best way to proceed.

### 5.2.4. Draw a Road Map

This stage; In order to achieve the vision and goals, a Smart City Roadmap should be created that includes key outputs such as benefit realization analysis, roadmap covering long/short term transformation plan. It is important to include these elements in this roadmap (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b):

- To determine the governance processes,
- Establishing a cooperation mechanism between stakeholders and determining the interoperability needs of the city,
- Developing smart procurement and supplier management strategy,
- Mapping digital assets with information technologies and determining clear, service-oriented actions in this context
- Establishing a risk management plan to effectively address smart city critical success factors.

In this road map, rapid acquisition projects should be put forward by setting certain priorities in order to provide community support. Low-cost solutions, which can generate significant gains, will increase community support for smart city projects and increase cohesion among stakeholders.

A roadmap for smart cities should define a policy that directs all initiatives. This policy should define and address the roles, responsibilities, strategies and purposes of stakeholders in the Smart City context. In addition, a plan needs to be developed to provide resources to begin the smart city transformation. In addition, methods should be determined on how to use technology in the way of becoming a smart city. Increasing participation through governance at this stage can increase efficiency in service delivery.

If city residents are involved in the process, it can be assured that they are part of the solution by increasing uptake. In this context, transparent governance mechanisms need to be improved as well (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2019b).

The created roadmap must be followed with roles and responsibilities and a temporal plan. For this reason, organizational changes would be required to monitor this plan prepared at the highest level.

### 5.3. MATURITY LEVELS IN SMART CITIES

Maturity assessment models are used in various areas to assess the development of organisations. While there are some differences between them, as a result, it is used to determine the status of institutions and organizations between "beginner level" and "most advanced" in a subject. The maturity level model is used to determine the actual maturity of a smart city set short and medium-term goals for development, prioritize technology, collaborations, staffing and other investments, and reveal maturity differences between units (Government of India Ministry of Urban Development, 2015).

Ministry of Environment, Urbanization and Climate Change is studying the mature model of smart cities at five different levels (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

#### 1. Level: Smart City Planning

This is a city that has weak coordination among units and has yet to create a vision for the smart city.

#### 2. Level: Defined Smart City

Cities with a smart city plan but also independent silo-based projects.



### 3. Level: Supported Smart City

A city with a smart city plan and where projects are partially interconnected.

### 4. Level: Compatible Smart City

A city that has integrated projects, established business models, and received strong support from the local and central government in this regard.

### 5. Level: Smart City that Creates Synergy

It is a city that has created a smart city ecosystem that is fully connected to each other and has gained value throughout the city.

Assessments of cities at maturity levels are the result of very detailed studies such as how they use data, how they use technology and how they relate to their stakeholders. Its maturity level reveals how ready it is for smart cities in all aspects. While evaluating cities through the maturity model, it is of course possible to see advanced results in some subjects and beginner-level results in some subjects. There is no example of a level four and level five smart city in the world today.

A progressive pathway for cities can be defined using key indicators from maturity models tailored to smart cities. At each stage, the help of criteria such as strategy, culture, processes and technology not only allows the current situation to be seen, but also defines what needs to be done for the next stage.

## 5.4. SMART CITY INDICES

In order to view the results of any work performed, it is necessary

not to specify the measurement criteria from the start. Thus, it can be seen how close or far away the targets are in each time period. Many international organizations related to cities publish indices and conduct a comparison study. "The Institute for Management Development (IMD), Smart City Index"; "Instituto de Estudios Superiores de la Empresa (IESE), Cities in Motion Index"; "Roland Berger (RB), Smart City Strategy Index" and "Eden Strategy Institute, Top 50 Smart City Governments" indices are the most respected and accepted among these indices. These studies show that cities compete, and in which areas they are good and in which areas they have to work more.

City indexes are mainly assessed by dividing them into six categories (Falconer, 2014):

- Economic performance-based (financial, commercial, etc.)
- Technology-based (broadband speed, open data, etc.)
- Urban structure-based (transportation, infrastructure, energy, etc.)
- Innovation-based (knowledge, creativity, entrepreneurship, etc.)
- Environmental based (sustainability, water quality etc.)
- Based on quality of life (happiness, safety, music activity, etc.)

Looking at the indicators of the general order, one sees the ranking of cities. However, once detailed, each manager is able to see the state of their own city. The indices quantitatively examine the economic, social, institutional and technological level of a city. The indices, which generally examine under these basic headings, score the data obtained here based on basic criteria such as sustainability and efficiency. For example, under the heading of econo-

my, there are topics that can be improved in the medium and long term, such as the number of hospital beds per capita, as well as studies that can be done in the short term, such as open data. An index can show us the differences with other cities and where we need to improve.

The most common categories of indices are listed below.

- Environment:
  - ◇ Total household water consumption
  - ◇ Carbon dioxide (CO<sub>2</sub>) release
  - ◇ PM<sub>2.5</sub> μ/m<sup>3</sup>
- Transport:
  - ◇ Number of individual cars
  - ◇ Fatal traffic accident rate
- Economy:
  - ◇ Unemployment rate in the city
  - ◇ Number of patents per year in the city
- Human:
  - ◇ Internet usage rate

- ◇ Female labor force participation rate
- ◇ Literacy rate
- Life:
  - ◇ Number of theaters
  - ◇ Gini coefficient
- Governance:
  - ◇ Open data
  - ◇ Internet bandwidth

# 6

## SPATIAL SMART CITY PROJECTS and PRACTICES



03.41%	0	12.84%
-65.82%	2760	68.03%
-27.7%	220.9	02.83%
-67.26%	641.3	41.01%
-29.2%	932.2	12.63%
23.97%	59.4	-19.76%
20.01%	1920	30.53%
-45.87%	8260	27.31%
03.41%	0	12.84%
-65.82%	2760	68.03%
-27.7%	220.9	02.83%
-67.26%	641.3	41.01%
-29.2%	932.2	12.63%
23.97%	59.4	-19.76%
20.01%	1920	30.53%
-45.87%	8260	27.31%



## 6.1. SPATIAL SMART CITY PROJECTS

The applications of smart cities can vary in the space of the city. It is possible for a city that has demonstrated its smart city vision to develop space projects under four headings in terms of the area and content they cover.

- **Improvement Projects:**

It is planned in an existing residential neighborhood to reach the purposes of Smart City. In this model, existing structures will remain largely intact and will be supported by smart applications. This strategy can also be completed in a shorter time frame and replicated elsewhere in the city. A fast transformation can be achieved by choosing historic or tourist places in cities.

- **Urban Transformation Projects:**

An existing built-up area, determined with the projects of urban transformation, is under reconstruction with the infrastructures of the smart city. Thus, both the unstable buildings are renewed and made safer, and the currently inefficient infrastructures are renewed with new methods and technologies. In addition, new information and communication technologies that need to be used are re-established during construction. One of the most popular is the port of the Royal Sea of Stockholm.

- **Green Space – Smart Cities Built From Scratch:**

It is the choice of a large area where there was no construction before and the construction of a smart city in order to meet the need for the increasing population or to attract finance to the city. (Government of India Ministry of Urban Development, 2015). These cities, with numerous examples worldwide, include Lingang New City in China, Masdar City in the United Arab Emirates, Song-

do in South Korea, Mairdar City in Mongolia, GIFT (Gujarat International Finance and Technology City) in India, Neom in Saudi Arabia, and Lusail in Qatar. In addition, there are many examples of smart cities, big and small, maybe throughout the neighbourhood.

Its main characteristics are the existence of structures like central heating, central cooling, smart buildings, building automation centers. Such cities are generally established in free zones and are also used as a method of attracting international technology and finance to countries or cities (Government of India Ministry of Urban Development, 2015).

- **Smart City Projects Spreading to the Whole City:**

It envisions the application of selected smart city solutions to existing city-wide infrastructure. The implementation of smart city solutions will involve the use of data and technology to improve infrastructure and services. For example, the implementation of smart city solutions (smart traffic management system) in the transportation sector can reduce the average commute times to citizens and thus have positive effects on the productivity and quality of life of citizens.

## 6.2. International Smart City Practices

- **Amsterdam (Holland)**

Amsterdam continues to study smart cities with a method that can be described as bottom-up or bottom-up. In this sense, it is one of the leading cities that approach smart urbanism within the framework of a program. In the city of Amsterdam, where bicycles are the most widely used in the world, projects are usually assessed from an environmental point of view.



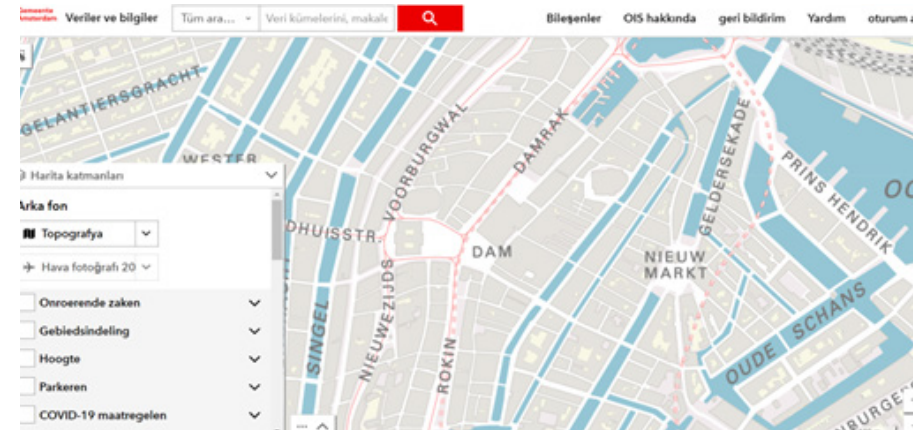
Amsterdam - Netherlands

Amsterdam's smart city strategy is known as the "Amsterdam Smart City Programme". The idea for this venture emerged in 2007 and was realized in cooperation with the Municipality of Amsterdam, the Amsterdam Innovation Engine and Liander Energy. The Amsterdam smart city strategy is included in the city's strategic plan. The plan seeks to regulate the energy consumption of Amsterdam through climate goals. The goal of Amsterdam is to be the most sustainable city in the world by 2025 (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

Amsterdam has supported new smart city projects through cooperation between public and private institutions. In this context, more than 100 projects have been completed in focus areas such as transportation, economy, governance, education and life. Through this process, more than 160 organizations have been active supporters of the Smart Cities Strategy.

As in many cities, living laboratories have been set up in different areas of the city of Amsterdam. It is built around a social platform called Amsterdam Smart City Platform (ASC), which supports and facilitates new Smart City projects by creating a collaboration between public and private organizations. These laboratories, which work on urban problems, are supported by many public and private institutions. Since its creation, these laboratories have completed over 100 projects in areas such as the economy, the environment and transport.

Amsterdam adopted the concept that "data is supposed to be open unless there is a good reason to be open". In this statement, Amsterdam is at the forefront of open data. However, Amsterdam has determined that the openness of the data is not enough, that employees, citizens and external stakeholders may not benefit from open data even if the data is open, and has implemented the Amsterdam Datapunt (Datapoint) platform in order to avoid this situation (Shape 13), (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).



Shape13: Amsterdam Datapunt Platform

Resource: (Gemeente Amsterdam, 2020)

At the Johan Crujff Arena, renovation and development studies were conducted on the smart city concept. Studies were carried out under six headings: basic infrastructure, customer journey, facility management, fan experience, security and sustainable economy(Yilmaz, 2020).

The Smart Citizen Kit also plays an important role in Amsterdam's smart city projects. With this project, which started in 2014 as a European Union project and then spread all over the world, the first applications of sensors related to air and noise pollution, which were distributed to citizens, started in Amsterdam. (Shape 14), (Yilmaz, 2020).



Shape 14: Smart Citizen Kit  
Resource: (Smart Citizen, 2020)

- **Barcelona (Spain)**

As part of smart city management and smart health apps, 70,000 older city residents have access to one-button health call centres (WFEO, 2020).

- **Bristol (Britain)**

Bristol, which has a population of 442,500 and became Europe's Green Capital in 2015, is known as the leader of smart cities in the UK, along with London. As part of the Replicate Project, the city of Bristol is developing a range of integrated smart energy, urban mobility and computing solutions in the settlements of Ashley, Easton and Lawrence Hill. The project has targets such as carbon neutrality, total clean energy consumption by 2050 and the elimination of inequalities between populations.

One of the many works planned as part of the project is the establishment of an integrated energy system. This is supported by many other activities such as retrofit applications for energy in buildings, clean transportation systems, energy management systems on a neighborhood basis and strategic planning.

In the context of the integrated energy system, applications such as the following are practiced holistically.

- Neighborhood heating and cooling systems
- Biomass boilers
- Smart street lighting
- Generating electricity through photovoltaic panels in buildings.

However, as a result of the national legal changes made while the project was being implemented, the development of new biomass boiler technology was abandoned and it has been preferable to build on and integrate existing district heating and air conditioning systems. (EC, 2017).



Barcelona - Spain



Bristol - England

### Chicago (United States)

Smart meters, which are part of smart energy applications, have reduced the city's energy consumption from 10% to 15%. (WFEO, 2020).

- **Copenhag (Denmark)**

Road sensors, which are among the smart transportation, smart security and smart space Management applications, detect the approaching cyclists and turn the traffic signal green for the cyclist (WFEO, 2020).

- **London (United Kingdom)**

The most successful aspect of London in the smart city is the continuous updating of the "Smart London Plan" documents they

have prepared. One of the important outputs of this process is the establishment of the London Smart Board. Experts from all areas of interest in the city gather at this board meeting, which consists of representatives of universities, technology companies, consultancy companies and non-governmental organizations (Mayor of London, 2018).

One of the Technology and Innovation Centers spread across the country is the "Future Cities Catapult" established in London. The centre develops projects related to smart city technologies (Catapult Future Cities, 2020).

Transport applications such as the public transport card "Oyster", the low emission area and the charging of congestion are at the forefront. Apps such as the open data platform and the white desktop mobile app are among the apps that can be viewed in London.



Copenhagen - Denmark



Chicago - USA

- **Mexico City (Mexican)**

With the help of sensors developed within the framework of disaster and emergency management, it saves residents 90 seconds for evacuation in case of an earthquake. (WFEO, 2020).

- **Moscow (Russia)**

One of Moscow's most important projects is the digitalization of nearly all public services. In fact, it is very important that they provide these services through the communication centres they have set up in different parts of the city. E.g; All services in different areas such as passport, vehicle-buying and population transactions can be performed from the same center. Having also described the smart city architecture, Moscow has designed its technology architecture as four layers: digital infrastructure, data, services and end-user interface. When Moscow is compared with other cit-

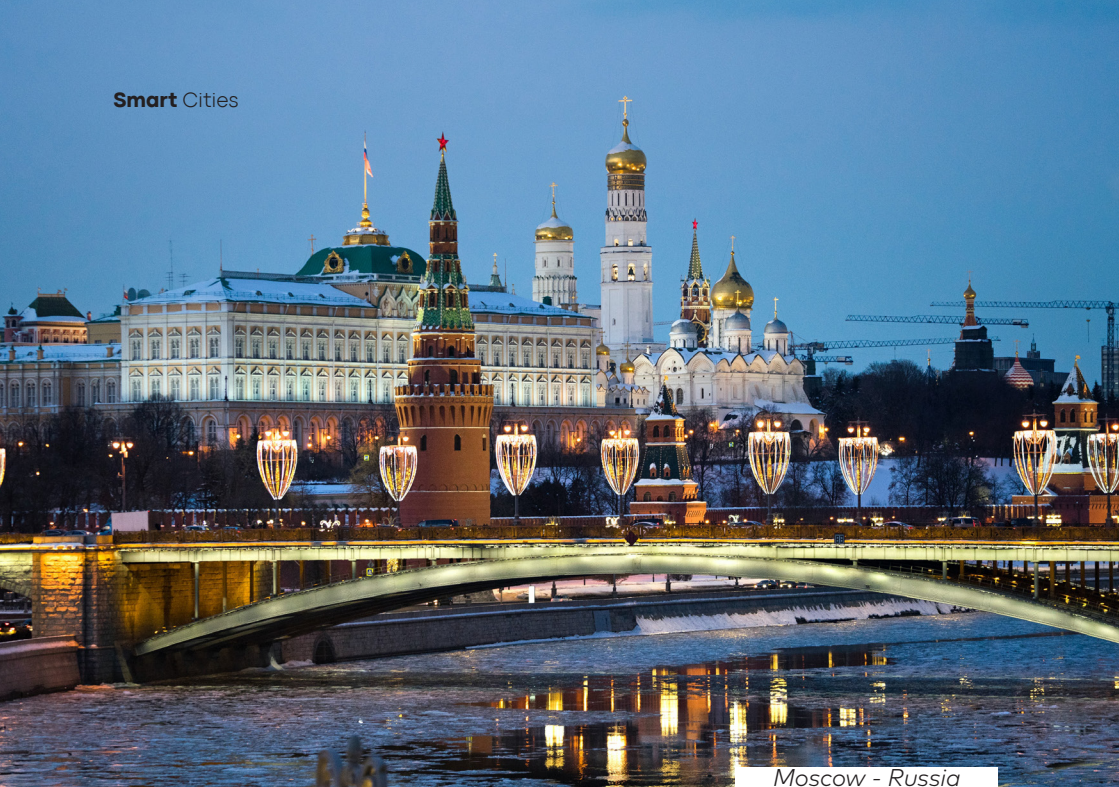
ies that started the smart city program, it can be said that it is the city that emphasizes technology. In Moscow, which also includes significant work on open data, data is shared in more than 1,000 thematic areas (Moscow 2030, 2018b).

- **Nairobi (Kenya)**

With more than 90,000 smart water meters developed as part of smart environmental practices, water theft and leaks are avoided (WFEO, 2020).

- **Philadelphia (United States)**

At OpEx, where waste management was delivered with 500 solar energy compactors, the city gained USD 1 million per year (WFEO, 2020).



Moscow - Russia

- **Phuket (Thailand)**

The city of Phuket stands out as the country's first official smart city, emphasizing sustainable development, innovation park and smart tourism initiatives. (WFEO, 2020).

- **Port au Prince (Haiti)**

Drones are used to assess earthquake damage by identifying areas of debris to 92% accuracy during and after the earthquake. (WFEO, 2020).

- **Pune (India)**

In order to make transportation more efficient and improve access to green spaces, the Indian city of Pune develops projects with the aim of being the "most livable" city with its living laboratory prac-



Nairobi - Kenya

tices, mobility, livability, digital management, start-up ecosystem and digital experience center(WFEO, 2020).

- **Seoul (South Korea)**

The city of Seoul is gaining a name with new applications in terms of smart city development as a "living lab" for smart city experiments. Electric vehicle technologies, security services, smart devices, digital participation and governance, and open data are high on the agenda (WFEO, 2020).

- **Singapore**

Shown as one of the most successful sustainable cities, Singapore has developed smart city solutions in areas such as digital governance, civic participation, water system and public services through programs focused on information and communication



Marina - Singapore

technologies such as the Smart Cities Program and the Smart Nation program (WFEO, 2020).

The autonomous vehicles project is part of it. While most countries have established test sites for autonomous (driverless) vehicles as enclosed or relatively small areas, in October 2019 Singapore expanded the test area to cover all public roads of western Singapore (approximately 1,000 kilometers (620 miles), one-tenth of the city-state's total. form). Also, as part of its goal to serve three new towns with self-driving buses by 2022, 100 bus drivers have begun training as safety operators of the autonomous vehicle bus. In March 2019, Volvo has partnered with Nanyang Technological University in Singapore, which can be used to serve these areas. It launched the 12-meter autonomous vehicle electric bus. Autonomous vehicles should be included in the Land Transport Master Plan to turn Singapore into a 45-minute city and 90% of trips are



Seoul - South Korea

scheduled for completion by 2040. (Consultancy Asia , 2020).

Another project in Singapore involves police robotics. Although the crime rate in Singapore is below the world average, the robotic police project aims to minimize crime, deter and detect criminals (Ministry of Home Affairs, 2019).

The office building named "Capital Tower", which was put into service in Singapore in 2000, is considered one of the first smart buildings in the world. The building has many smart energy efficiency systems, including systems with energy recovery. Examples include the use of motion detectors in toilets and elevators and the use of double-glazed windows to reduce heat loss. In addition, there are systems that save water in the building and systems that regulate the air quality by monitoring the amount of carbon dioxide and carbon monoxide in the air instantly. Each of these

systems can be operated from a control panel and, as a result, the systems are combined.

- **Stockholm (Sweden)**

Stockholm, which has managed to significantly reduce its carbon emissions since the 1990s, is under migration pressure and its energy consumption poses serious obstacles to the fossil fuel-free Stockholm target for 2040. In this context, applications for waste energy recovery are carried out using the low energy neighborhood approach. These are, in particular, the following applications:

- Recovery of waste water heat in the waste water network
- Recovery of waste heat from data centers and vacuum waste systems
- Recovery of waste heat from refrigerators and freezers in supermarkets
- Use of the obtained waste heat in the district heating system.

These applications are also implemented through integrated energy management. To complement the integrated energy applications, retrofit (improvement of window and airtightness properties) applications have been made at the building level, HVAC air conditioning systems have been installed, effective lighting systems and heat pumps, building energy management systems and adaptive heat management systems, etc. was established. Thanks to the applications tested on a surface of 36,000 m<sup>2</sup>, the energy demand has been reduced by 3,333 MWh per year. Energy savings totalled 4918MWh. In addition, 1,187 tonnes of carbon emissions were avoided each year (EC, 2017).

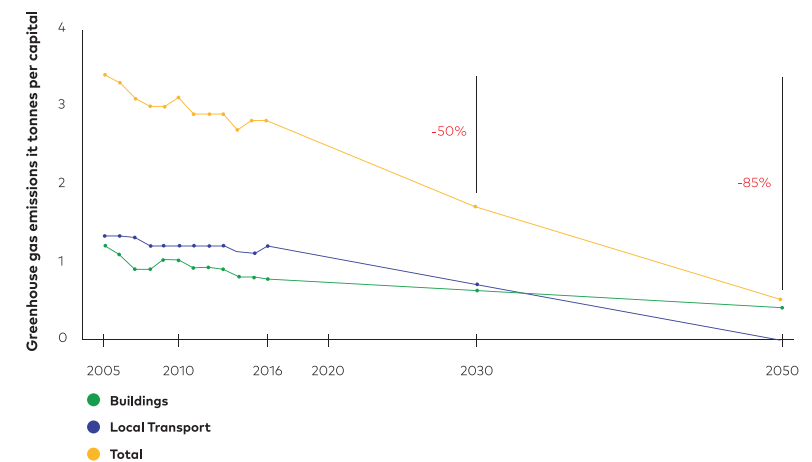
- **Vancouver (Canada)**

More than one million smart meters monitor power usage and target outages (WFEO, 2020).

- **Vienna(Austria)**

Vienna has been at the top of the list of sustainable and liveable cities for a number of years. Vienna has also demonstrated a persistent approach to being a smart city. New strategies were implemented by updating the Smart Cities strategy papers. In its document targeting the year 2050, Vienna builds on three principles: Quality of Life, Conservation of Resources and Innovation.(Stadt Wien, 2019a).

Vienna aims to achieve 30% of its energy requirements by 2030 and 70% by 2050 from renewable energy sources. Again, Vienna reduced the number of automobile trips from 40% in 1993 to 28% in 2018; The 2030 target is 15%. This is a major purpose when considering the impact of individual cars on emissions (Shape 15).



Shape 15: Vienna 2050 Carbon Emission Targets

Resource: (Stadt Wien, 2019a)

### 6.3. NATIONAL SMART CITY PRACTICES

- **Istanbul**

As a city which has been the capital of civilizations in terms of population, history and culture for centuries, Istanbul was the first city where numerous strategies were implemented. It has also played a leading role in important projects on smart cities. At the beginning of these are the reduction of emissions with natural conversion and energy saving with LED conversion of traffic lights. In addition, the White Desk application and the Mobile Traffic application have taken their places among the leading applications in the world. EDS system and Mobile EDS vehicles are also important innovations in the field of transportation. A taxi platform and mobile application have been developed for the rehabilitation of commercial taxis, aiming at more efficient use of taxis in traffic.

In addition to these firsts, Istanbul Metropolitan Municipality was the city which launched the first smart city program in Turkey on an urban scale. In the project, which started in 2016 and lasted for two years, work was carried out in four basic work packages: starting with literature review and examining world examples, analysis of the current situation touching all stakeholders of Istanbul, strategy development and technology architecture in which goals and purposes are determined. As a result of these studies, short, medium and long term projects and smart city architecture have been put forward for Istanbul. Again, within the scope of this program, comparison of Istanbul with the leading cities of the world, index study and maturity evaluation studies were also carried out. As part of the Smart City Architecture project, the architectural design of the following services was completed (Istanbul Büyükşehir Belediyesi, 2018):

- Public Transport Data Collection Service
- Smart Parking Service
- Smart Building Energy Management Service
- Smart Lighting Service
- Common Meter Infrastructure Service
- Smart Water Transmission Network Service
- Smart Waste Water Management Service
- Domestic Waste Service
- Blockchain Based Bike Sharing Service
- e-Istanbul Platform
- Istanbul Economic Development Platform
- City Measurement Sensor IoT Platform
- Istanbul City Security and Emergency Management Platform
- Istanbul Cyber Security Platform
- Smart Transportation Coordination Center Platform

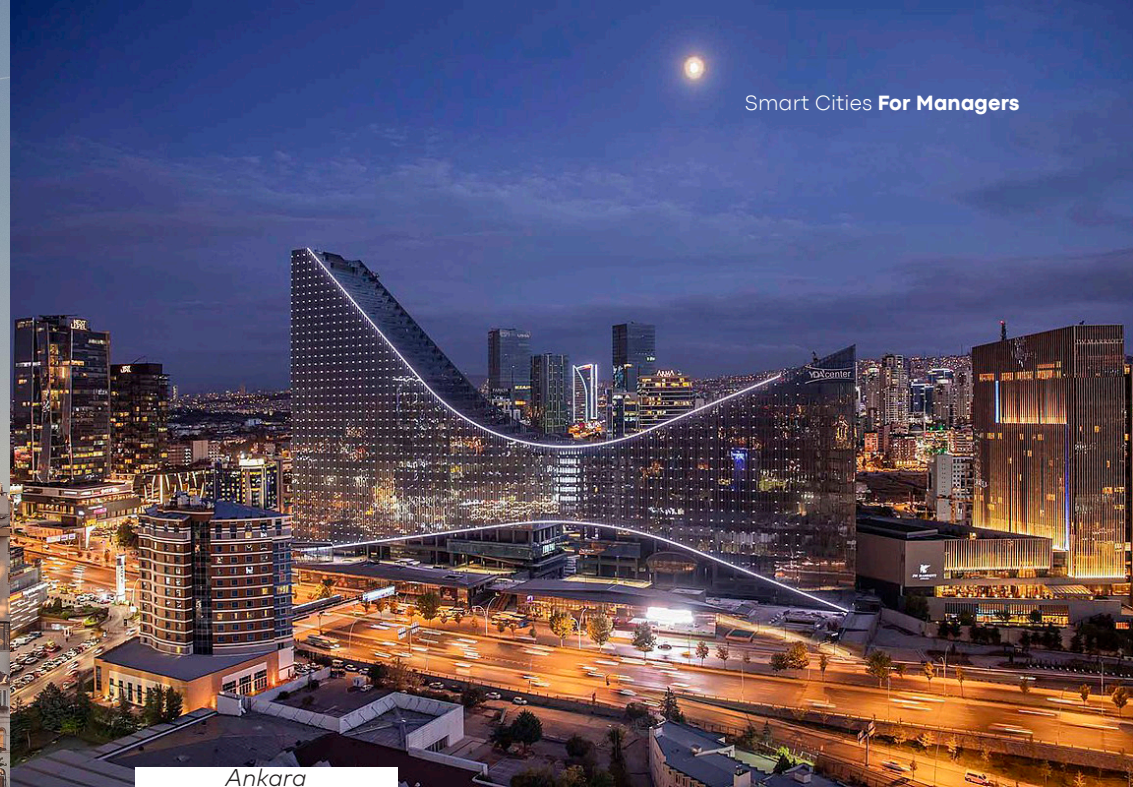
Başakşehir Living Lab (Technology and Innovation Center), established by Başakşehir Municipality in Istanbul, is one of the pioneering practices in Turkey allowing youth in the district to benefit from both education and entrepreneurship support. In addition, Zemin Istanbul, which was established by Istanbul Metropolitan Municipality with the support of Istanbul Development Agency in 2018, offers a wide range of services from primary school to university graduates at the Şişhane subway station.



Istanbul

Spine Tower, which is located in Maslak, where the number of smart buildings in Istanbul has increased rapidly in recent years, and the construction of which was completed in 2013, has been awarded the "Best Architectural Project" and "Best Office Architecture in Europe and Turkey", is an example of smart building applications. The building, which is Leed Gold certified, is defined as a sustainable building through energy-efficient and smart systems.

Rainfall accumulated on the roof of the building is stored using pumping systems and reused inside the building. For building lighting, energy-saving lighting fixtures are selected. Thanks to the sensors in the building, the lighting, heating, cooling and ventilation systems are activated when necessary, preventing the decrease in user comfort and providing savings by preventing unnecessary energy consumption. smart building systems are monitored and managed using one automation system (Spine Tower, 2014).



Ankara

- **Ankara**

Ankara Metropolitan Municipality has installed camera systems in different places such as main roads, roads and community living areas to support security. In order to keep children's playgrounds under observation 24/7, camera systems were installed in 20 parks, and the images were made available to the residents of the city via the web. In addition, city traffic is monitored with a total of 360 cameras installed at important points, including boulevards, main streets and some important intersections, and the situations which could adversely affect traffic are determined and transferred to the units concerned (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

As part of the integrated solid waste management system implemented by the Ankara Metropolitan Municipality, the transfer, treatment, recovery and disposal of mixed collected waste is car-



Bursa



Konya

ried out. It is aimed to establish an integrated solid waste management system. The amount of energy recovered daily is 1289 MWh. This figure is close to 5% of Ankara's daily energy needs. This application is the first in Turkey and thousands of national and international people visit these installations in the districts of Marmak and Sincan each year. (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

Ankara implemented a satellite-based positioning system with 10 stationary GNSS stations. This system is managed by interface software running on a server in Ankara Metropolitan Municipality, and the data of all fixed stations comes to this software and is evaluated here. With this application, processes of generation and correction of geometric data, very important in the field of zoning and town planning, are performed (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

- **Bursa**

Bursa, Turkey's fourth largest city, is also a pioneer in smart city applications and insights. Bursa conducts smart planning studies by creating for the first time in Turkey an independent Smart City department. With the smart city consultancy project that started in 2019, it determines the smart city strategies of the city. Bursa Metropolitan Municipality has important successes in studies such as Geographical Information Systems applications and e-municipality studies. It is also one of the first cities to implement dynamic signaling applications, also known as smart junctions. In order to prioritize transit networks and enhance their comfort, it has also implemented innovative applications such as QR and NFC payment, as well as the number of vehicles.



Shape 16: Konya Science Center

Resource: (TUBİTAK Bilim Merkezleri, 2020)

- **Konya**

Konya was one of the main cities in terms of urban development. In addition to streetcar systems built many years ago, it is one of the main municipalities in the use of environmentally friendly vehicles such as the longest bike lanes. In addition, there are large buildings such as stadiums, science centers, sports and congress centers with LEED certificate given to environmentally sensitive buildings

in Konya. In order to implement smart city systems throughout Konya, sensors and cameras, the centers where this data is collected, and wired and wireless communication infrastructures that provide communication have been established. Konya Metropolitan Municipality has created a fiber optic communication infrastructure of 181 km in total in the last 10 years, thus ensuring the communication of many systems such as KGYS, EDS, signalized intersections and digital radio communication. Digital radio communication system covers 90% of Konya and besides wireless communication service, it provides communication from points without GSM network integrated with GPS, SMS, fixed and mobile phone lines, Konya is the first municipality to implement this system (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

One of Konya's most significant projects is the Konya Science Center, constructed in 2014 (Shape 16).

Konya Science Center, the first international science center in Turkey, was established to provide fun and interactive environments for visitors of all ages, to bring them together with science and technology, to arouse scientific curiosity and desire to learn, and to generate new ideas.

Konya Metropolitan Municipality, which also has important works in the field of environment and energy, established an electric power generation facility in 2011 in order to evaluate the methane gases formed in the Solid Waste Storage Area, where the solid wastes of the city are stored. The 5.6 MWh facility is operating at full capacity and serves the daily electricity needs of an average of 26,000 homes. A greenhouse has also been established to take advantage of the heat generated at this facility.

Another important work carried out by Konya is the Konya Mobile Application. Many information such as projects, events and ser-



İzmir

vices, city cameras, online transactions, places to visit, ATUS, Bicycle Rental System, Elkart and Parking Lot can be accessed through this mobile application (T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, 2018).

- **İzmir**

With the city bike rental system called "BİSİM", implemented by İzmir Metropolitan Municipality in the field of smart transportation, it is aimed to popularize the use of bicycles, which is a healthy and environmentally friendly transportation vehicle, in the city. The system is used in conjunction with the İzmir Card and credit cards and payments made from rental kiosks (BİSİM, 2014).

- **Kayseri**

The main goal of the smart city app called "Smart Lighting", which is implemented in the area of smart environment in Kayseri, is to



Sakarya

save energy in lighting. Kayseri Metropolitan Municipality, which reaches its users through the website called Smart City Kayseri, continues its smart city studies with Smart Irrigation, Smart Parking, Fleet Tracking and Management projects for Municipal Vehicles, and workshops about smart city components. (Smart City Kayseri, 2021).

- **Sakarya**

Within the scope of the "Serdivan Urban Automation Project", which is being implemented in the field of smart management in Serdivan district of Sakarya, in the range of the network infrastructure for the E-Municipality application, to plan the measures to be taken against natural disasters quickly and effectively, and to reach the citizens faster by local governments (T.C. Serdivan Belediyesi, 2015).



Eskişehir



Antalya

- **Eskişehir**

Tepebaşı Municipality have been granted. a grant of 5 million Euros by applying to REMOURBAN (Regeneration Model For Accelerating The Smart Urban Transformation) one of the components of the European Union's call for a project called "Smart Cities and Producing Solutions for Societies" in the range of Horizon 2020-Research and Innovation Framework Program.

Within the scope of the project, to come up with innovative solutions and designs by combining information and communication technologies, energy and transportation sectors in a single point, to expand the urban transformation model in districts and cities, to increase the quality of life of the people of the city, to ensure the adoption of innovative business models for urban renewal and to ensure social acceptance and environmental sustainability are targeted. From this perspective, in the project; Some applications

such as creating the Smart City Monitoring Portal, the regulation of bicycle paths and the use of renewable energy sources will be implemented (RemoUrban, 2014).

- **Antalya**

With the on-site collection of packaging waste and environmentally friendly neighborhood map projects carried out by the municipality of Muratpaşa in the field of smart environment, wastes are collected from the homes of citizens and points are loaded onto the card in question. With these points, training and purchase payments are possible. Waste collected over time has increased 25 times and cleaning expenses have decreased 15% in 2017. 156 thousand households participated in the project. Financial gain and resource savings were achieved with the Project (T.C. Muratpaşa Belediyesi, 2017).

# 7

## CONCLUSION AND EVALUATION



Smart cities remain a blurry concept and it is not unique to our country. Numerous international studies highlight that smart cities are different and sometimes misunderstood in practice. Therefore, first, the concept of a "smart city" should be clear in people's minds and the same should be understood by everyone involved. For this, it may be necessary to conduct a search in world literature and see what different cities are doing in this regard. Republic of Turkey: Ministry of Environment, Urbanization and Climate Change has prepared the necessary documentation in this context. However, the smart city is above all a paradigm shift. Therefore, a local manager (city leader) who makes the decision to become a smart city should form a team that will ensure this transformation together, and then make other stakeholders a partner in this transformation. In compliance and coordination with high-level policy, thematic and national strategies, it is also stated in the 2020-2023 National Smart Cities Strategy and Action Plan Circular No. 2019/29. "To fulfill the duties and responsibilities of all public institutions and organizations within the scope of the 2020-2023 National Smart Cities Strategy and Action Plan, under the coordination of the Ministry of Environment, Urbanization and Climate Change." It is important to ensure that central and local governments are coordinated.

The common definition meeting actually shows that we developed the action plan. After this project is formed, there is a need to analyse the current situation in the city. The scope of current due diligence is to reveal how ready the city is for smart cities, what needs come to the fore for a more livable city, and what is present in the city as an inventory. Following this step, the Smart City vision should be revealed and shared with stakeholders. Wherever the local administrator wants to see that city in the future, the city will move in that direction. As an important prerequisite for that, the people around the leader must also share that vision.

Once the vision statement has been presented and shared, the strategies and related activities that need to be put forward to

achieve this vision should be defined. We should not forget that, Every action to take must lead to the vision outlined. In this context, the activities to be carried out by different units should definitely be reviewed. In this context, short, medium and long-term goals should be set. Depending on these purposes, programs and projects will be determined. After the vision statement has been put forward and shared, the strategies and related activities that need to be put forward to achieve this vision must be defined. It should not be forgotten that; Every action to be taken must lead to the vision drawn. In this context, the activities to be carried out by the various units would certainly need to be reviewed. In this context, short, medium and long-term purposes should be laid down. According to these purposes, programs and projects will be established.

When country and international application examples are examined, it is possible to see in what areas and solutions smart city projects offer. In that sense, it is a question of giving an idea to the collaborators of the project. However, each city has its own needs and its own priorities. While doing the project work, it should be considered as a result of looking for a solution to a need, rather than making a copy.

An important study on smart cities is technology architecture. It is important to define the data to be collected in smart cities, sharing methods, development platforms and services available to citizens. The "Smart City Architecture", which the Ministry of Environment, Urbanization and Climate Change has started to prepare on a national scale, should be implemented locally.

To sum up, the smart city is an urban management style that uses technology as a tool and focuses on livability, sustainability, innovation and efficiency. It is a journey realized with a new perspective.

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The smart city is above all a paradigm shift and a journey. The smart city manager, who will lead this transformation, should draw up the roadmap of this journey with a holistic approach together with all its stakeholders. In this context, it is important to develop and implement smart city projects that focus on sustainability, efficiency and innovation. This work in your hand is a handbook for smart city managers.



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