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"Smarting Izmir: Co-production of Smart Technologies, Transportation and Urban Techno-politics in Turkey"

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Abstract

Science and technology change the boundaries of knowledge and have exceptionally powerful effects on society. The world is transitioning through the digitalisation era, as most of our daily activities are highly dependent on innovative digital and computer technologies. People's needs and demands are shaped by technological advancements. Also, population growth, the economic models of the cities and the power relations between countries always create "trendy" technological improvements within cities. These technological improvements are used not only as political tools but also as marketing strategies on the part of cities. These strategies are presented as socio-technical imaginaries for future cities. This thesis focuses on the Smart City as a new way to solve the problems created by climate change and by the growing urban needs due to rapid population changes.

Science, technology & society (STS) scholars posit that the cities are perfect to study socio-technical change and its process (Hommels, 2005; 2020). Urban techno-politics helps to open the black-boxed relationships between knowledge, power, technology and politics. This study seeks to revisit the Smart City as a socio-technical imaginary with promises and perils that are defined by literature in the case of Izmir Smart Transportation system, which is one of the biggest projects in Turkey, as well as a candidate for the "citta slow metropolis" and "smart enough city" concepts.

In general, this research is focusing on the Smart City and Smart Transportation, narrowing down the scope from worldwide to national and local contexts. In particular, the goal of this case study is to explore how the socio-technical imaginaries are represented in the media and by authorities, what exactly the transition of smarting Izmir is, and whether the municipality is simply following a "trend" or if smart cities constitute a genuine public demand. Furthermore, the research aims to understand the techno-political perspective on open source data and the selected transportation applications. Lastly, the aim is to investigate users' experiences of the smart transportation system in Izmir from their reactions via mobile applications. The research was conducted with multiple qualitative techniques such as interviews, discourse analysis of governmental and non-governmental documents, media reports and social media articles, and user feedback from mobile applications.

1.Introduction

History shows that urbanisation models have a big impact on social, cultural, material, political, economic and technological projects. Governments search for tools to grapple with urban issues in an efficient and sustainable way. Today's technological capacity offers the IoT (Internet of Things) as a tool for finding solutions on how to handle urbanisation with minimal impact on the environment, citizens' lifestyle, governance and rapid urbanisation. Hence, urban population and the intensity of economic and social activities create environmental and social dilemmas (Pira, 2021: 1).

Technology has generally polluted the environment and has caused undesirable changes in society; the question now is whether we could use it in a way that is beneficial to society.

The Smart City intends to be a solution for all urban issues, especially for climate change ones. As an IoT foster application, smart city is one of the significant subjects in urbanisation and technology fields, since technology may be employed to address critical issues that the world is facing and will face, such as climate change and quality of life. Cities, in all their complexities, tend to start the transition of smarting their systems depending on economics, politics, culture and demographics.

The brief history of technology in cities had different names in the pertinent literature up to 2011: Dutton, Blumler, and Kraemer (1987) called them "wired cities", Graham and Marvin (1999) "cyber cities", Ishida and Isbister (2000) "digital cities", Komninos (2002) "intelligent cities", Hollands (2008) "smart cities", and Shepard (2009; 2011) "sentient cities". These common terms correspond to the relationship between ICT and urbanism concepts. The main focus of each of the above is the effects of ICT on urban form, processes and modes of living (Kitchin, 2013). The Smart City is an abstraction of all other previous urban models such as telicity, information city and digital city (Mohanty et. al., 2016).

Likewise, the evolution of technology in the city is influenced by tools for governing and controlling, improving the ICT, interests of big technology companies and demands-needs of citizens. Furthermore, the changes of concepts are interdependent with the different actors and their respective foci.

The Smart City evolution consists of 3 versions. The first generation of the smart city started with a technology-centric vision that was led by tech companies such as IBM and Cisco. The second generation is City-Led, which focuses on improving the quality of life. The third generation of the Smart City is citizens' co-creation, which placed emphasis on social issues, equity and social inclusion. Cities like Vienna and London that follow smart city 3.0 created their cities *with* their citizens and *for* their citizens. Turkey has started the Smarting systems in the early 2000s, and it recently proceeded to focus on empowering cities with the sustainability and the quality of life imaginaries. Turkey follows Smart City 2.0 and 3.0 concepts.

Empowering cities to enhance the quality of their residents' relations constitutes a challenge for technological applications. The social acceptance of technology is the most important part for the use of technology. The local authorities give a picture of their future cities by socio—technical imaginaries. Apart from how the authorities perceive society, the perception of the citizens is significant when it comes to urban decisions and implementations. Investing in imaginaries with concrete materiality can serve both to legitimise and to delegitimise socio-technical orders and the techno politics that produce them (Richers et al., 2018: 9). The Smart City itself, as an imaginary, is represented with features which are related to techno-politics. The complexity of Smart Cities generates urban, social, political and economic challenges, besides opportunities. Representing imaginaries with a lack of regulations, a lack of knowledge and the understanding of the impact on future society can create undesirable results.

In that case, the decision-making process has a big role: it creates the future image of the city and the acceptance of technology in society. By ensuring public trust, legitimised policies allow for the public acceptance of innovative projects. The aim of the research is to investigate the political goals and to analyse the reports, media articles and interviews in order to answer the question: do municipalities follow a "trend" or do smart cities constitute a public demand? In addition, the research interrogates if the decisions answer the urban needs in order to understand the transition of "smarting" the city of Izmir by analysing the users' feedback from the application IZUM by using STS tools.

Today's digital world is removing the physical borders via the internet, which transforms the entire world into a marketplace. Cities offer investments to entrepreneurs. The important question that needs to be answered is the following: are they selling their products for their own benefits or for the benefit of the public? Moreover, small scale entrepreneurs cannot deal with the market growth. The big companies take possession of the products and their aim might change over time. This research questions if the regulations have these two factors in mind and if marketing protects the public benefit and small-scale businesses.

This research focuses on the Smart Transportation Management system in order to understand how it affects society and the environment. The case study was conducted with a qualitative methodology in Izmir's Smart Transportation Management System, which is one of the biggest projects in Turkey and a candidate for the 'citta slow metropolis' with 'smart enough city' concept. The research defines the Smart City understanding of Izmir and addresses which Smart City version aligns with their Smart Transportation System visions on sustainability and high quality of life. The research aims to understand the actors of Izmir and their main motivation regarding the transition with the imaginaries by focusing on two dominant features of the smart cities: high quality of life and sustainability.

1.1. Theoretical and Analytical Framework

Researches on urban related subjects are now often multidisciplinary due to the complexity of the cities. Recently, the science, technology & society (STS) approach got STS scholars, architects and urban planners involved with urban studies. STS scholars conceptualise the city as a "powerful tool in building new boundaries between the social and the technical, and therefore, in building new forms of life" (Aibar and Bijker, 1997: 23). This thesis is a combination of STS and urban planning aspects. Techno-politics and socio-technical imaginaries and co-production are the main STS analytical tools.

Co-produced knowledge is of crucial importance both in various disciplines and in governance, especially for global sustainability. "Aligning knowledge and action for global sustainability is essential to the human future. […] co-production offers a powerful framework for guiding that work. " (Miller & Wyborn, 2020: 88). The definitions of the term in sustainability science and STS fields aim to acknowledge the societal change.

The sustainability scientists define the co-production as: a combination of scientific and societal knowledge, with the collaboration of multiple knowledge producers such as scientists and engineers and nonscientists, who incorporate values and criteria is a way to understand sustainability issues (Kates et al., 2001; Cash et al., 2006; Lemos & Morehouse, 2005; Cornell et al., 2013).

The co-production in STS helps to investigate and critically unpack the science and governance relationships and their power dynamics (van Kerkhoff & Pilbeam, 2017), while sustainability scientists are focusing on the understanding of the complex sustainability issues. STS scholars such as Latour and Jasanoff are mainly analyzing the coproduction of science and governance. They also contributed to "intervening as experts and practitioners in that co-production toward diverse normative ends, including enhancing sustainability, inclusivity, and democracy" (Wyborn et al., 2019: 329). Notwithstanding the above, "producing knowledge is not enough; rather, outcomes must be realized through enacting strategies for change" (Wyborn et al., 2019: 338), as well as the relationships amongst the various actors.

Jasanoff states that "increasingly the realities of human experience emerge as the joint achievements of scientific, technical and social enterprise: science and society are, in a word, co-produced, each underwriting the other's existence." (Jasanoff, 2004: 17). Society and science have a mutually beneficial relationship.

"The term refers to the processes by which knowledge, including scientific knowledge, is framed, collated, and disseminated through social interaction and change, and how such knowledge also impacts upon such change…. [T]he important principle of co-production is that it is a dynamic process, in which knowledge and society continually shape each other." (Forsyth, 2003: 104). The process is not a stable one, and science and society will continue to influence one another in the future. Science is to find solutions based on social experiences, and society is changing alongside the progress of scientific knowledge. Shapin and Schaffer state the following: "Solutions to the

problem of knowledge are solutions to the problem of social order" (Shapin & Schaffer, 1985: 332). In other words, the main concerns of knowledge and social order are aligned with each other. Epistemological solutions follow in the footsteps of those that pertain to social order.

Scientific knowledge is dependent on politics when it comes to grappling with environmental issues. "Scientific knowledge and political order are co-produced at multiple stages in their joint evolution, from the stabilisation of factual findings in laboratories and field studies, to the national and international acceptance of causal explanations offered by science and their use in decision-making." (Jasanoff & Wynne, 1998: 6–7). However, scientific knowledge influences political order just as much as it is influenced by it. With regard to how environmental issues are framed, the aforementioned reciprocal relationship applies not only locally but globally as well.

Co-production means the combination of science, technology, and society. This study agrees with Wyborn et al that "there is a greater need to engage with the politics of co-production to consider whose knowledge counts, how participants are selected to be part of co-production processes, what mechanisms are used to ensure that participants' voices are "representative" of their constituents, how different conceptions of knowledge are embedded in the objectives of co-production processes, and how different knowledge claims and perceptions of evidence are reconciled" (Wyborn, 2019: 340). The actors play an important role in measuring needs and demands. Besides, as Jasanoff mentions, the physical things are significant as much as the ideas. "It is not only about how people organize or express themselves, but also about what they value and how they assume responsibility for their inventions" (Jasanoff, 2004: 15). Thus, values must also be taken into account.

Urban techno-politics studies mainly state that it helps to make black-boxed relationships of infrastructure and actors, institutions, organisations visible (Holmes, 2020) by taking into account complex arrangements of infrastructure and the actors (Foley & Miller, 2020). Furthermore, the stakeholders and the infrastructures themselves shape each other (Foley & Miller, 2020: 311).

Infrastructure is defined as "not only the hardware but organisations, socially communicated background knowledge, general acceptance and reliance, and near-ubiquitous accessibility are required for a system to be an infrastructure" (Edwards, 2003: 188). Understanding infrastructure helps to frame the embedded city components for current and future citizens.

"The manifestations of techno-politics are (re-)constituted in the city overtime" (Foley & Miller, 2020, p. 311). The promises are re-shaped as controversial political and technological perspectives (Parks, 2020). The promises are represented as socio-technical imaginaries— performed visions of desirable future urban worlds enabled and sustained by infrastructures, services, activities, and more or less shared meanings of social life and social order (Jasanoff & Kim, 2016)— influenced by the techno-politics and vice versa. "Socio-technical visions raise a central issue: that they are technologically deterministic, ignoring the user and social dynamics involved in the innovation process of technology" (Bibri, 2022: 844). Technology-led decisions that do not incorporate the social dimension create imaginaries that exclude society. The STIs are just an image when they do

not include variable actors such as government and non-governmental organisations, individuals, experts and so forth. The STIs are an important tool, especially for smart cities, to support the need of political decisions to legitimate innovations in science and technology, encourage the technological activities or justify to include or exclude the diverse actors (Jasanoff, 2015).

The 'socio-technical regime"– 'a coherent, highly interrelated and stable structure ... characterized by established products and technologies, stocks of knowledge, user practices, expectations, norms, regulations, etc" (Markard and Truffer, 2008: 603). "It includes actors' behaviour, thinking and interaction as well as technology and (infra)structures. In the specific case of mobility, there is one dominant regime based on the internal combustion engine and individual motorized mobility, and several subaltern regimes (e.g. public transportation, cycling, walking) as part of the system" (Hoppe et al, 2018: 2). The transportation-related solutions are the way to enrich sustainability and
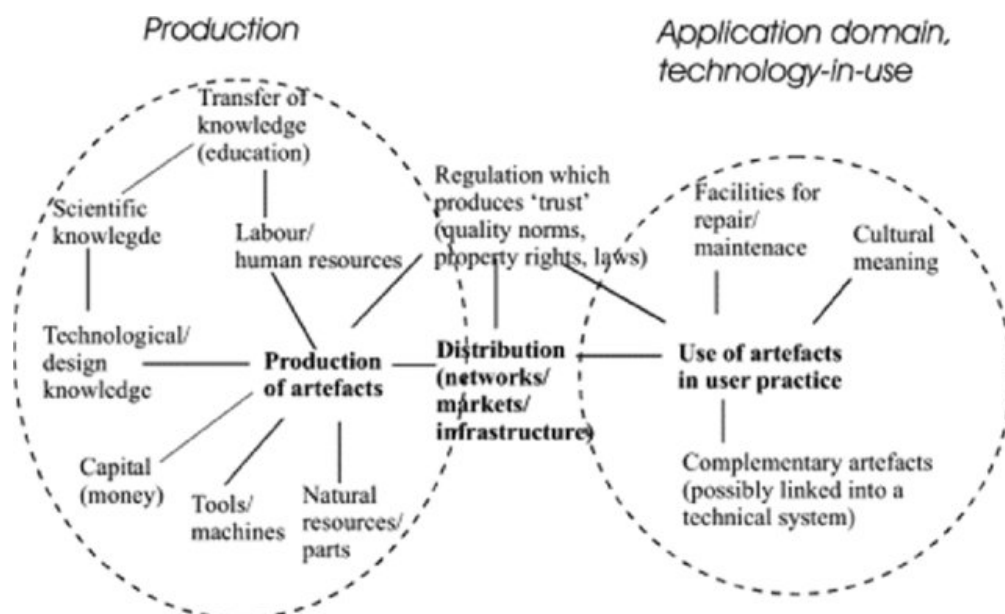
Schema 1. The basic fields and resources of socio-technical systems (Geels, 2004, p. 900)

quality of life imaginaries.

Socio-technical systems as visualised in Schema 1 "consist of (networks of) actors (individuals, firms, and other organizations, collective actors) and institutions (societal and technical norms, regulations, standards of good practice), as well as material artefacts and knowledge" (Markard et al., 2012: 956). Geels speaks of "a cluster of fields, including technology, regulation, user practices and markets, cultural meaning, infrastructure, maintenance networks and supply networks" (Geels, 2005: 446; also see Hoppe et al, 2018: 2).

1.2. Research questions and aim of the study

This thesis discusses theoretical perspectives in the context of the Smart City, Smart Transportation, Techno-politics, Socio-technical imaginaries and co-production. The 3 stages of the study as Smart City in the literature, following with narrowing the scope as Smart Transportation and focusing on one specific application of Smart Transportation. The goal of the thesis is:

- to understand the transition of smarting the city of Izmir,

- to understand the challenges of the smart city and public trust via social reactions,

- to understand how Izmir is politicising the understanding of the smart city.

In accordance with this, it seeks answers to the following questions:

- what are the socio-technical dimensions of Izmir's smart city transition?

- What are the challenges of the social relevant groups in the process of legitimising Izmir as a smart city?

- What is the role of socio-technical Imaginaries as regards the regulations of the Municipality of Izmir?

2. Methodology

The method of inquiry is qualitative, and it comprises interviews with snowball sampling, discourse analysis of newspapers, web pages, news on social media and TV archives, reports of governmental and non-governmental organisations and app stores.

To open the black-boxed relationships, STI and techno-politics of Smart transportation in Izmir, the scope is narrowed down from smart cities in the entire world to Izmir in Turkey. The related subjects are researched from the documents and reports of Turkish ministries, the Municipality of Izmir, the European Union, the U.S. Department of Commerce, the IFC, the World Bank and private companies. More particularly, the strategic plans of Izmir 2015-2019, 2020-2024, the Strategic Plan of ESHOT, Citta Slow Movement Reports, a case study from the World Bank, an IFC Open Source Data Report, a Strategic Plan of the Ministry of Transportation of Turkey, Smart Enough City reports, Izmir's Sustainable Energy Climate Action Plan, Izmir's Transportation Master Plan 2030 and reports of transportation associations are evaluated. The research focuses on the literature definitions, concepts and problems of the smart cities as regards both technology and social science.

The documents, reports and users' comments are analysed in order to understand sustainability and the quality of life and to gain information about the socio-technical imaginaries, the implementation of the smart city in the context of smart transportation, the data policies, the actions of the actors and the transition of the spatial and social aspects of smart applications. Therefore, keywords

related with the smart city and smart transportation are chosen both in Turkish and English in order to get a clear picture of how media is promoting and criticising projects and concepts. Besides that, sustainability actions related with the smarting solutions are investigated in order to see which steps are followed or not.

The interview questions are categorized in a way that reflects the technological, social and political aspects of the smart city problematization. The experts were chosen based on their proficiency in urban planning, smarting systems, urban politics, transportation planning, and smart transportation systems, as shown in Table 1.

TABLE 1: The interviewees			
Persona	Field	Title	Role in Smart Transportation
A	Urban Politics	Academic in Urban Politics	
B	Smart City - Planning	Academic - Advisor of the Municipality on sustainability and smart city	
C	Transportation Planning of Smart Transportation	Head of Transportation of the previous plan	Responsible for the decision-making regarding the 2030 transportation master plan
D	Transportation planning - Governmental agent	Former transportation planner of the previous transportation plan with a private company	Data analysis agent responsible for the decision-making of the 2030 transportation master plan
E	Private company	Software engineer, designer - Entrepreneur of the smart car design	Solving short distance (6-8 km) transportation problems in the city
F	Public Association	Vice Chair of Association of Pedestrians in Izmir	- Reflecting on the decisions of the municipality and ministry, - Reporting problems, - Putting forward demands for the benefit of the public

The aim of the questions is to utilize the experts' opinions in order to understand the uniqueness of the case of Izmir, which is in its early stages as a smart city. The survey is based on semi-structured interviews with open-ended questions about their field and about their personal experiences with the use of the system. The questions seek to find out how governmental and non-governmental organisations describe a smart city as regards the quality of life and sustainability, what are the priorities of the urban policy, how is data collection and security approached, how are the imaginaries covered in the media and in reports, who are the actors and who participates in the

decision-making process, who owns the data, what actions are taken for the transition to a smart city, and what are the visions.

The interviewees selected were: an academic in city planning (in the field of smart city) and also advisor of the Municipality, an academic in urban politics (for the purpose of understanding the Turkish political aspects in urban planning), an entrepreneur who is an engineer and designer of a smart car company that is solving minor urban transportation problems in Izmir, an urban planner who is a governmental agent and a former urban transportation planner of a private company that built the previous system, an urban smart transportation planner and head of the first project of the Municipality of Izmir, and an Association of Pedestrians. The interviews were conducted via online video calls that lasted between 1-1,5 hours. All interviews were recorded with the interviewees' permission.

Associations are not easy to access. The chosen association of pedestrians was recommended by the other interviewees with the snowball sampling. The reflections and elaborations are investigated with the existing media sources in order to see the social reflections.

A search with the following keywords between 2015-2022 was conducted via social media, Google, YouTube and other well-known web pages: smart city, smarting cities, IoT, Smart Transportation, Smart City Concepts, Smart Urbanisation. In addition, governmental publications (as official reports or on social media) and individuals' videos about the smart cities were utilized. Personal blogs and vlogs were selected to see how citizens, academics and experts understand smartness and smarting technologies in Turkey and the rest of the world. Google Play's and App Store's users' comments were graded by means of discourse analysis in the context of social barriers. The feedback evaluation is to understand the acceptance of the mobile app, where citizens connect and have hands-on experience with smart systems in their daily lives.

2.1. Thesis Structure

The research consists of 6 chapters that cover the pertinent literature review, the case study, the conclusion, a reference to the limitations of the present study, and suggestions for further research.

The First Chapter starts with the introduction of previous studies on the Smart City and STS studies in the existent literature. The theoretical and analytical framework explains the main STS tools that address the main subject. This part offers brief information and discussions on co-production, techno-politics and socio-technical imaginaries.

Chapter 2 is the methodology, that is, it describes how the case study was conducted, what methods are used and how to open the black-boxed relationships of technology, politics and society.

Chapter 3 is about how the debate regarding the Smart City in the relevant literature is connected with the case study. The chapter starts with definitions and continues with the topic of conceptualizing and problematizing technological and social scientific perspectives. It then delineates the features and characteristics of a Smart City. The part regarding challenges and opportunities explores social acceptance of technological changes, public trust and social barriers, opportunities, and briefly explains socio-technical imaginaries: sustainability and quality of life, and Smart City and techno-politics as the core of the research.

Chapter 4 is the case study; its overarching framework is that of the EU and Turkey, but its scope is narrowed down to the local contexts of Izmir. This part focuses on the Smart City, smart transportation systems, open source data and the representation in the media, politics and social reflections. The last part of Chapter 4 focuses on the mobile application IZUM in order to investigate social reactions via users' comments.

Chapter 5 is the conclusion, where the most crucial findings of this research are highlighted.

Chapter 6 acknowledges the limitations of the study and explores ideas for further research.

3. Conceptualizing and Problematizing the Smart City

The goal of this part of the thesis is to discuss the definitions and concepts of various perspectives on technology, the views of social scientists, and the key points of the definitions of the problem that is highlighted in the relevant literature.

Smart City has become a trendy topic in the last few years with the dramatic change of urbanisation and climate all over the world (Silva et. al, 2016). It was introduced in 1994 (Cocchia, 2014), while smart growth appeared during the late 1990s (Neirotti et. al, 2014). According to Google's research engine, the term "smart city" reached its peak in 2015, as it is shown in Graph 1.
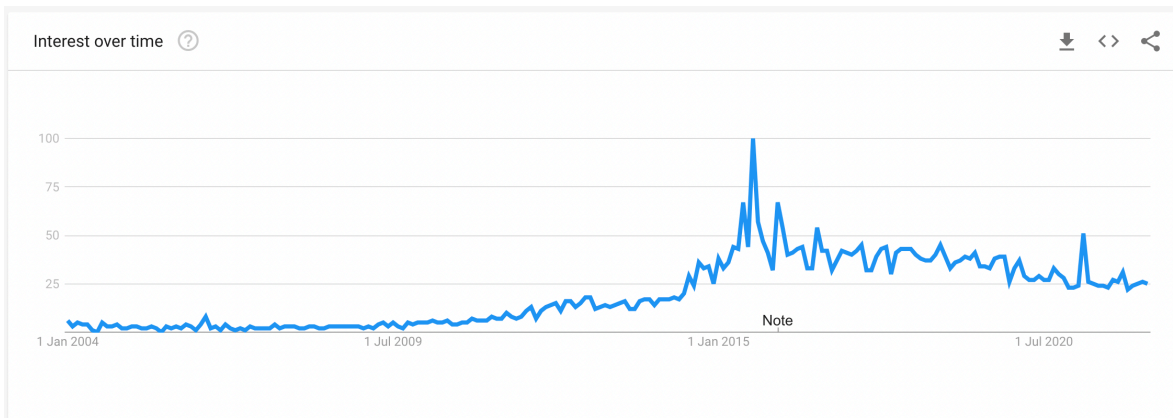
Graph 1: Trends, G. Smart Cities Popularity.
Available online: **https://trends.google.com/trends/explore?date=all&q=smart%20cities** (accessed on 23 April 2022). Worldwide

The Smart City is an abstraction of all other previous urban models such as telicity, information city and digital city (Mohanty et al., 2016). "Wired cities" are a set of telecommunications experiments which basically represent "telecommunications services to both households and businesses" (Dutton et al., 1987: 309). The "cyber cities" concept is related with transport and telecommunications, urban economies/information economies, the urban/cyber cultures the and urban/virtual communities (Graham & Marvin, 1999: 92). The "digital city" is a combination of all urban information in order to create public spaces for people living in the cities (Ishida & Isbister, 2000). "Intelligent cities" are "where the innovation processes meet the digital world and the applications of the information society" (Komninos, 2002: 2). A "sentient city" can remember, correlate, and anticipate through the use of technologies such as sensors and algorithms (Shepard, 2011).

Smart City 1.0	Smart City 2.0	Smart City 3.0
The creators of technological advancements encourage cities to implement their solutions, with the aim of improving the efficiency of urban management. Technology is the key element of the smart city 1.0 concept. Technological innovations are often implemented in cities that are not fully prepared for this process.	Local authorities play the key role in the development of smart cities 2.0. They focus on new technologies, to explore various options for improving the quality of life in cities. Cities introduce programs and projects which support the implementation of modern technologies in various areas of life. In a smart city 2.0, the significance of the quality of life and local governance is equated with that of modern technology.	This is the latest and the most advanced generation of smart cities. Citizens play the key role in urban development. Local residents consciously choose to participate in the process of building modern cities, they rely on modern social participation tools, and are creative. In the smart city 3.0, urban space is created for users and with their involvement.

Figure 1. Souce: Szarek-Iwaniuk & Senetra, 2020, p. 5

Figure 1 shows the concepts of each smart city version. The smart city started with a technology-focused vision of smart cities led by such technology companies as IBM and Cisco. The aim was to use the tech companies' know-how in order to make cities more sustainable. This version focuses only on sustainability issues, excluding the social and political dimensions of the city. The second version, named City-Led, focuses on the quality of life, and local authorities (instead of technology companies) have decision-making roles. The last version is Citizen-Led, which is more citizen-oriented.

Correspondingly, the concepts of each Smart City version are different. The cities are not experiencing the evolution of smart cities in the same order. The most common concepts are the Smart City 2.0 and Smart City 3.0. Some cities are following both, while others only one of them.

Some scholars, companies and governments describe the Smart City as a city that uses technology, digital configuration based on technology, and non-material structures embedded in the urban spaces in order to promote quality of life and sustainable development, and to get more dynamic and innovative urban landscape for better resource-use and fewer emissions, as well as innovations for daily life brought in the networks — collective intelligence (Ishida 2000) (Bifulco et al, 2016) (Anthopoulos 2012) (Pira, 2021). The European Commission aims at a "more interactive and responsive city administration, safer public spaces and meeting the needs of an ageing population" (Smart Cities, European Commission, 2022). Innovative solutions are intensified in order to control the urban population (so that urbanisation has minimal impact on the environment), citizen lifestyles, and governance (Silva et al., 2018). The purpose of the primary concept is to empower cities to enhance the quality of their residents' life (Pira 2021).

Researchers conceptualize smart cities in a variety of ways. Selected concepts from a research by Min et al. mainly focus on the smart city and sustainability subjects, especially from an urban planning perspective (Min et al., 2019). According to Trindade et al., the concept of sustainable

urban development is related to the smart city. Yigitcanlar et al. assert that sustainability is the key to making cities smart (2019). In addition, they state that smart cities are not only a technological concept, but they also comprise productivity, sustainability, accessibility, well-being, lifestyle and governance goals that are related with communities, technologies and policies (Yigitcanlar et al., 2018). Meijer highlights the relation between human capital and the smart city as follows: "The smart city is human capital, as attracting human capital among various individuals and governance, and these human resources are used to operate and maintain the smart city through the use of ICT" (2016). Albino believes that each city has different geographical, environmental, economic, and social limitations which render them too complex to be universal (2015).

In contrast to social researchers, engineering scholars focus more on technological aspects such as the Internet of Things (IoT) application and its global scale influence. Just as in the case of the smart city, there is no standard definition for IoT; nonetheless, it is usually described as that which is "typically used to refer to states-of-affairs in which everyday objects are able to exchange information via the use of standardized (Internet-based) communication protocols" (Rose et al., 2015). The Internet and IoT devices are fundamental for smarting cities. The interactions of Internet-enabled objects as intelligent systems took place in the city planning in order to create smart solutions (Smart et al., 2018). New IoT systems and the noel ways of using the Internet — from the wearable technologies to urban-scale technologies — are not only a network of intelligent objects in digital world, but also real-life social situations such as homes, offices, cities, and so forth (Guo et al., 2012; Li et al., 2012; Solima et al., 2015).

Since the 1970s, the definitions and the concepts of the Smart City vary in the relevant literature. What is more, there is no final and concrete definition of the smart city[1]. Smart cities are defined and conceptualized as urban movements that affect society. The transition from agrarian to industrial and then to modern society shaped the city through the various needs and demands (Hohenberg, 1990). Moreover, the important contribution of digital technologies to urban systems and infrastructure, and many of the tasks in everyday life, politics, ideology and ethics, are significant as technical and instrumental aspects of creating smart cities (Kitchin and Dodge, 2011). The imagination and understanding of the smart city is based on the political and cultural background of the city. Kitchin highlighted the importance of understanding "how smart cities can be reimagined, reframed and remade, both in general terms and with respect to specific issues and initiatives" (Kitchin et al., 2019). The political, ideological and ethical aspects of the smart city shape the systems that are have to do with the different needs of urban society.

In essence, definitions can be categorised as technology-oriented and a combination of soft and hard capital depending on the subject matter of each field. As Yigitcanlar et al. maintain, due to their origin, their interdisciplinary nature, or their generally poor conceptualization, there is not a commonly agreed upon definition of smart cities (Yigitcanlar et al, 2018: 146). This article agrees

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[1] We searched "Scopus", a representative international thesis search engine that provides bibliographic information, to grasp the research flow of a smart city. Using "smart city" search terms, keywords from a total of 5526 articles were extracted from 1970 to 13 March 2019, focusing on the social sciences and environmental science subject areas. Min, K., Yoon, M., & Furuya, K. (2019). A Comparison of a Smart City's Trends in Urban Planning before and after 2016 through Keyword Network Analysis. Sustainability, 11(3155), 1-28. https://doi.org/10.3390/su11113155

with Albino, as there is no standard definition of the smart city, since each city is unique (Albino et al, 2015). For instance, European cities such as Amsterdam, Copenhagen, Manchester and Milan were focusing on the combination of a technological and a citizen-centric approach, while Japan was focusing on a technical-intensive approach, such as using smart grid technologies for energy control (also see Granier, 2016).

The problematization of smart cities depends on each definition of smartness. The relationship between socio-technical imaginaries and political, economic and ecological aspects are explained as follows:

- Alan Wiig believes that the re-imagining of the city is evaluated as an automated, militarized surveillance and policing system. To illustrate, in Camden New Jersey, USA, there is the 'Eye in the Sky' camera network, an interactive community alert network (an anonymous online neighbourhood crime watch) that detects undesirable behaviours in the city. This shows that "the city is becoming a market for repurposed military technologies and expertise, and the securitized city is protecting the interests of capital and enabling orderly and planned economic development" (Kitchin et al., 2019: 9). In North America, surveillance capitalism "secures" smart cities via technology. In contrast, Félix Talvard mentions that economic performance and social inclusiveness are the focal points of the smart cities instead of securitisation (Kitchin et al., 2019).

- Sadowski and Bendor discuss the definition of "smartness" and of the "smart city": if technology is a cybernetic dream of frictionless control, coordinated command, and optimal reactions, smartness serves as a measure of a technology's context-specific adaptability (Sadowski & Bendor, 2019). Therefore, the mediation of a smart city by actors who are promoting socio-technical imaginaries in order to introduce them to society is important. "Whereas science and technology were formerly generally regarded as the domains of facts and artifacts, they are now also associated with storytelling, imaging and imagining" (McNeil et al., 2017: 457). The media, governmental and non-governmental organisations, social groups, and also individuals, play a role in the acceptance of the image of the smart city.

- As Joshi mentioned, smart cities can follow up and unite the infrastructure such as roads, tunnels, airways, waterways, railways, communication power supply, etc., control maintenance activities in order to help optimize the resources and consider security issues (Joshi et al., 2016). The projection of smartness onto the city as a whole goes beyond its technical premise and becomes essential for an urban socio-technical imaginary (Jasanoff and Kim, 2009, 2015), like a set of ideas, beliefs and visions about the future of urbanity.

- Baykurt mentions that smartness is more than new sources of funding and a strategy for branding "to repair flailing urban systems in the absence of public funding and political action" (Baykurt, 2020: 4). In his study, he argues that "the visions of smartness shifted, even in corporate promotions, when the political–economic landscape of cities transformed drastically

following the financial crisis in 2008. Instead of focusing on climate change or sustainability, tech companies reorganized smartness as a viable way to foster economic growth and experimentation in places that were already hit hard by austerity" (Baykurt, 2020: 24).

- "Smart cities technologies turn the city into a 'place of power' (Mukerji, 2003), not necessarily from a single engineered locale, but via the ubiquity (and, often invisibility) of ICT, data, algorithms, and their use in decision-making" (Miller, 2020: 14). In that context, the technology of a smart city is not only changing the urban infrastructure, but also the political power.

- "Smart cities initiatives can be viewed as socio-technical assemblages that are necessarily techno-political (Latour, 1990; Winner, 1986) and 'constitute, embody, or enact political goals' (Hecht, 2009: 257). These techno-political systems shape and become enrolled in both imaginaries of sustainability and socio-technical imaginaries" (Miller, 2020: 3).

In conclusion, urban planning is based on present data in order to project future needs. Smartness helps data collection to capture everyday life in detail and it can project the potential needs in order to solve urban problems. The data plays an important role for the description of the needs and demands. The collection of data and the agents who own and control the data are important in every layer of the smart city, besides the economic, political, social and environmental aspects. On the other hand, data presents economic aspects that tend to be more beneficial for companies than for citizens. The key points of the topic in this section will be discussed in the case of Izmir Smart Transportation system; before this, the case study thesis focuses on the features and characteristics, opportunities and challenges of the smart city in the pertinent literature. The smart city discussions are presented in detail through the views of various researchers. STS tools as socio-technical imaginaries and techno-politics will be delineated after the description of the challenges and opportunities of Smart Cities.

3.1. Features and Characteristics of a Smart City
In order to understand the Smart City this chapter delineates its characteristics and features.

Understanding the features and characteristics of Smart City is important if one wishes to estimate the possible future results of such a project. Smart City provides solutions to rapid urbanisation. The main urban issues, such as health, traffic, pollution, scarcity of resources, waste management and poor infrastructure, constitute an impediment to the development of a city (Borja 2007; Marceau 2008; Toppeta 2010; Washburn, Sindhu, Balaouras, Dines, Hayes, & Nelson 2010, Sujataa et al. p: 903). Besides their use in problem solving, Smart Cities are promoted as providing a better life for people. In the relevant literature, ideal smart cities are portrayed as serving people and reducing working hours in the long term.

Every city has its own culture, character and adaptability to smarting technology. Due to the complexity of the cities, providing well thought-out designs needs regulations that clarify the requirements in many fields. 'Designers [can] no longer hide behind the needs and wishes of the consumer; instead, they have to take responsibility as 'shapers' of society. Doing so entails a shift from a user-centered approach to a society-centered one' (Tromp et al., 2011: 19). The urban designers play a role in how a society changes. Every interaction in the urban milieu creates new values and challenges of a larger scale. Furthermore, needs may be varied due to the long-term diversification of society.

The smart city's focus is mainly on sustainability, quality of life, technological progress. The characteristics with a strong connection to needs provide a solution to the current issues faced by cities. Characteristics and factors of a smart city are classifed as follows:

Smart Economy: (Competitiveness) Competition, simplified and supported entrepreneurship
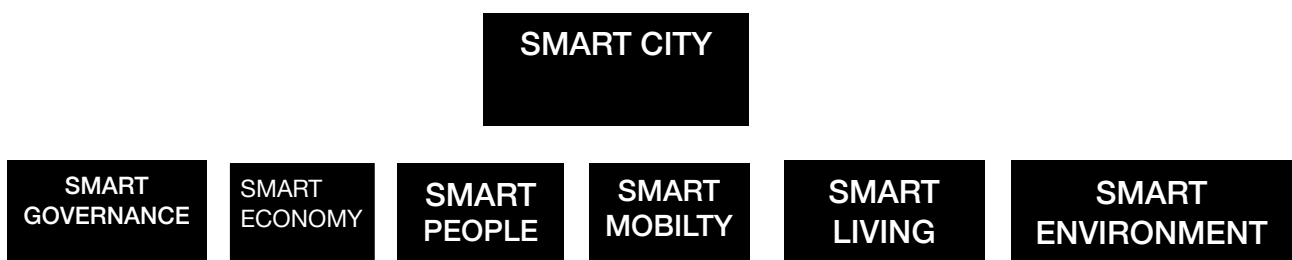
Figure 2. Characteristics of a Smart City. Source: Giffinger et al, 2010

productivity, creativity, innovation and labour market flexibility and connection to local and international markets (Giffinger et al. 2010). "According to several critiques of the concept of the smart city, this idea of neo-liberal urban spaces, where business-friendly cities would aim to attract new businesses, would be misleading" (Caragliu et al., 2011: 48).

Smart People: (social and Human Capital) It is related to the citizens' level of qualification and education. It is also related to the quality of social interactions amongst people, their integration into the community as a whole by means of enriched public relations and global interconnectivity.

Smart Governance: (Participation) Refers to public and social services political strategies and perspectives, participation in decision-making, and facilitation of the participation process for citizens.

Smart Mobility: (Transport and ICT) Includes local and international accessibility, availability of ICT infrastructure, sustainable, innovative and safe transport systems.

Smart Environment: (Natural Resources) Refers to attractiveness of natural conditions, pollution, environmental protection, sustainable resource management.

Smart Living: (Quality of Life) Covers several aspects of quality of life such as cultural facilities, health conditions, individual safety, housing quality, education facilities and social cohesion (adopted from Giffinger et al., 2010).

Technology usage has the power to be beneficial for society, government, environment and economics by understanding its characteristics and its effects on a smart city. Each smart category includes or affects all other smart characteristic parts as part of a network. For instance, without smart governance the smart transportation management will not be the answer at the social level. In other words, the elements of each part and the effects on each other are the keys to achieving Smart City goals.

Smart mobility helps to save time and leads to less traffic violence and fewer accidents, which is what smart transportation contributes to smart living. Smart economy is attractive to entrepreneurs because it provides market options and efficient economic models.

It is important for smarting systems that human capital investment is understood and stimulated by society. Educated users provide the feedback that will strengthen the re-imagining of cities and provide smart solutions to traffic problems. Therefore, society will involve and adapt to all types of projects to sustain the systems. Public trust is also a significant issue, directly connected to the legitimization of the policies.

Smart Governance means transparency that provides participation instead of being merely a control mechanism. For instance, every user needs to know the policies, ideologies and ethics behind the smart transportation system and smart environment. The priorities of every local authority can be different, but the smart governance and smart human capital allow for sensible decisions.

In their in-depth literature review, Albino et al. identified the most common characteristics of smart cities as follows:

- a city's networked infrastructure that enables political efficiency and social and cultural development

- an emphasis on business-led urban development and creative activities for the promotion of urban growth

- social inclusion of various urban residents and social capital in urban development

- the natural environment as a strategic component for the future (Albino et al., 2015: 13).

The smart cities' characteristics have a significant role in every step of the process, from decision-making to implementations. However, each characteristic has different process requirements and different imaginaries. In addition to Giffinger's characteristic scheme, Neirotti et al. describe the smart characteristics conducted with hard domains and soft domains (Figure 3).

SMART CITIES				
SOFT DOMAIN	Smart Living	Smart Economy	Smart Governance	Smart Citizens
HARD DOMAIN	Smart Mobility	Smart Environment	Smart infrastructure	

Figure 3. Characteristics of Smart Cities. Souce: Neirotti et al., 2014

Hard domains are listed as energy grids, public lighting, natural resources, water management, waste management, environment, transport, mobility, logistics, office and residential buildings, healthcare, public security, while soft domains are education and culture, social inclusion and welfare, public administration and (e-) government, economy (P. Neirotti et al., 2014: 27). Tangible hard domains give faster results comparatively to intangible soft domains. Local authorities tend to invest hard domains because it is easier to measure in comparison with soft domains. (Neirotti et al., 2014, Abadia et al., 2022). In addition, the priorities of the urban decisions affect the investments.
The policy makers determine the priorities depending on their political approaches. Every city has different missions and visions. As a result the technological sufficiency and investment volume will not be equal for each characteristic. As Baykurt mentions, the smartness definitions and interpretations are relevant to local political cultures, to the availability of funding structures (venture capital vs. public funding) and to entrepreneurship concepts and civic engagement with their historical background (Baykurt, 2020: 6).

In fact, the Smart City divisions are related to urban characteristics. Smarting characteristics are connected to become a network. The stages and their descriptions can be different in every city depending on its priorities. The characteristics give an idea about how political decisions are connected to urbanization and what their main goal is.

3.2. Smart City Challenges and Opportunities

This chapter highlights the challenges and the opportunities of the Smart City and their relationship with society as a whole in terms of public trust.

'A science and technology study (STS) perspective on these matters is helpful in moving beyond this "universal alarmism" by emphasizing the ambivalence inherent to all technologies, the significant potential of contestation of, and resistance, to technology-supported forms of discrimination, and the deeply contingent nature of the process of appropriation of new technologies and, as a consequence, of the social "effects" of technologies' (Coutard & Guy, 2007: 713). The technology in urban decisions affects society as well as the environment. The opportunities as socio-technical imaginaries ought to be accepted by society as a whole.

The highlighted opportunities of Smart Cities are:

- Increasing the use of ICTs and innovations with smart network: connection of the city's infrastructure and services (Cranshaw, 2013; Hemment & Townsend, 2013; Hollands, 2008; Glaeser, 2011),

- Encouraging business: Collaboration between local government, industry, and communities, that avoids conflicting interests and contradictions (Hollands, 2008),

- High level of transparency of knowledge: Smart Cities are supporting open source data so that citizens or communities engage with and empower one another (Hollands, 2008),

- Real-time monitoring: helps to act quick and in real-time based on the available data (Kitchin, 2013),

- Citizen empowerment: Smart City provides social learning, education, and social capital (Hollands, 2008) and creative, cheap, and quick solutions to urban problems (J. Y. Lee, Woods, & Kong, 2020),

- Social and ecological sustainability: to reduce the negative impacts of human activity (e.g., CO2 emissions, waste) (Yigitcanlar et al., 2019).

The authorities and the media point out that smart cities offer an opportunity to improve the quality of life and sustainability through the help of technology in daily activities. The smart system offers interests like sports, art, education etc. that are common to everyone and related to the socio-cultural background. The use of IoT builds social groups with shared activities (Zeeuw et al. 2019). The digital version transforms the social network by gathering everyone into one platform. Besides social interaction, the digital transformation of the cities directly improves the interaction between society and the government. In addition to that, the smart systems strengthen participation in urban decision-making.

Smart City can enable the communication between government and citizens. More interaction and participation means strong public trust and political legitimacy, which are the most important criteria to apply when it comes to any change in the city. The democratic participation in related policymaking and governance buttresses public trust and political legitimacy. Hartley indicates that the literature review shows that "relatively high levels of trust and legitimacy in smart cities (compared to those of security and privacy) can be juxtaposed against pessimistic views in some literature about the political legitimacy of technocratic rationalism" (Hartley, 2021: 17).

Furthermore, experts and researchers in multiple subjects are needed to project the future needs and demands, especially given that the authorities do not have enough expertise in complex Smart Cities.

According to social scientists, "technocratization and the data-driven movement are perilously enamoured with empiricism as their legacy, reductionism as their problem-framing approach, and initiatives like smart cities as their prescriptions; however, they offer at best an incomplete view of the factors that converge to generate existential crises" (Hartley, Kuecker, and Woo 2019: 180). Hartley emphasises that the technocratic imaginary stakes its political credibility on enhancing transparency, accountability, and effectiveness; these have been seen by governments as building blocks for strengthening trust and legitimacy (Hartley 2021: 17). Kitchin defines technocratic governance as the procedure by which "all aspects of a city can be measured and monitored and treated as technical problems that can be addressed through technical solutions" (Kitchin, 2014: 9). Therefore, they also mention the use of technology in governance creates public concerns of which is in relation with tensions between technocracy and democracy and the lack of successful track record in solving complex ecological, social, and economic problems related policy making of fast few decades of science and technology. "These expert inputs create a threat to the political regimes which build legitimacy on rhetoric, personality, and gestures or projections of power in such era as pandemics and climate change" (Hartley 2021: 17).

On the other hand, technology has the image of 'disrupting employment and depoliticizing policymaking while transforming how people relate to one another' (Hartley 2021: 17). Hartley mentions 'technocratic systems and policy design logics emerge from social and value-laden settings; neither materializes from a mythical purity of logic but is fashioned in politically and epistemically contested environments' (Hartley, 2020: 237). Technocracy makes the policymaking without the politics with its "common-sense" problem-solving notion that is focused on efficiency and effectiveness.

Habermas claims that 'smartness in cities cannot be more technocratic than democratic'. (Calzada, 2020: 1145)(Also see Habermas 2015). Technology improvements adversely affect democracy in the form of technocracy. In other words, the participation is less in the technological decisions, which is important for gaining public trust, since it presupposes technical knowledge. The participation is important for the social acceptance of any decision.

Technological knowledge is important for smarting the cities in order to be implemented by actors and accepted by society. However lack of knowledge in technology decreases the participation in decision making. Caragliu et al. believe that "when the investment in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" (Caragliu et al., 2011: 50). Thus, technology experts take the role of decision making and users' feedbacks improve the outcomes.

The essential fact of smart city, as in the case of other IoT applications, is to be understood and accepted by society with a certain awareness of data sharing of the users. Citizens cannot participate in decision making when it needs technological knowledge, however the outcome of the decisions creates social barriers. The most concerning social barriers are:

- Trust on controlling devices.

- Service satisfaction.

- The reliability of the services.

- Privacy and security.

The acceptance of technology is possible with approval of the social barriers. The changes in societal level and political-economic adaptability emerged when products have the technological capabilities of strong data processing and real-time sensing.

In contrast, Harvey highlights the understanding of 'the utopian and dystopian visions of the smart city are accepted by local governments because of a blind faith in techno-determinism or complete reliance on urban entrepreneurialism' (Harvey, 1989) (Baykal, 2020: 4). Furthermore, technology provides new sources of funding for repairing urban issues. Regardless of priorities, in order to avoid undesirable results, it is crucial to understand the promises of the decision-makers and the concomitant perils.

TABLE 2. The promise and perils of smart cities	
Promises	Perils
Will tackle urban problems in ways that maximize control, reduce costs, and improve services, and do so in commonsensical, pragmatic, neutral and apolitical ways through technical solutions. Will create a smart economy by fostering entrepreneurship, innovation, productivity, competitiveness, and inward investment. Will enable smart government by creating new forms of e-government, new modes of operational governance, improved models and simulations to guide future development, evidence-informed decision making and better service delivery, and by making government more transparent, participatory and accountable. Will produce smart mobility by creating intelligent transport systems and efficient, inter-operable multi-modal public transport, better and dynamic routing and real-time information for passengers and drivers. Will make smart environments by promoting and creating sustainability and resilience and the development of green energy. Will create smart living by improving quality of life, increasing choice, utility, safety and security, and reducing risk. Will produce smart people by creating a more informed citizenry and fostering creativity, inclusivity, empowerment and participation.	Treats the city as a knowable, rational, steerable machine, rather than as a complex system full of wicked problems and competing interests. Promotes a strong emphasis on technical solutions and overly promotes top-down technocratic forms of governance, rather than political/social solutions and citizen-centred deliberative democracy. Solutions treat cities as ahistorical and aspatial and as generic markets, promoting one-size-fits-all technical fixes rather than recognizing local specificities. The technologies deployed are positioned as being objective, commonsensical, pragmatic and politically benign, rather than thoroughly political, reflecting the views and values of their developers and stakeholders. Promotes the corporatization and privatization of city services, with the developers of smart city technologies capturing city functions as market opportunities which are run for profit rather than the public good, and potentially create proprietary technological lock-ins. Prioritizes the values and investments of vested interests, reinforces inequalities, and deepens levels of control and regulation, rather than creating a more socially just and equal society. The technologies deployed have profound social, political and ethical effects: introducing new forms of social regulation, control and governance; extending surveillance and eroding privacy; and enabling predictive profiling, social sorting and behavioural nudging. The technologies deployed potentially produce buggy, brittle and hackable urban systems which create systemic vulnerabilities across critical infrastructure and compromise data security, rather than producing stable, reliable, resilient, secure systems.

Source: Based on analysis in Kitchin (2015b). Also see Colletta et al. 2019, p. 5

The technological solutions for the urban issues are promising; however, priorities of decisions makers and cultural differences influence the promises or vice versa. The promises as shown in

Table 2 as urban problems can be solved with apolitical, neutral technological solutions, economic opportunities for entrepreneurs, high participation with transparent e-governance, better traffic solutions, sustainable energy, improving quality of life, safety and security. Furthermore, Kitchin's analyses show that smart cities can be monotonous, robotic, technocratic, a reflection of the views and values of developers and stakeholders, beneficial for specific private entities rather than for the general public, systematically and technologically dependent with hackable systems, and thus social inequality lurks behind the aforementioned promises.

Cities in general are unique in their history, their culture, and their socio-spatial specificities. In contrast, smart cities are more likely to create ahistorical and aspatial generic markets. Even though smart systems provide commonsensical, pragmatic, neutral and apolitical ways through technical solutions, the way of problem-solving of Smart Cities can create monotonous, unequal cities with technological vulnerabilities, like machines.

New actors such as entrepreneurs and technology companies play a role in causing policy changes. As a result, technocracy is the new democracy of the cities that include the qualified actors. However, that form of governance limits citizen participation since technological knowledge is a sine qua non prerequisite, although e-governance is more transparent, participatory and accountable. There is no one-size-fits-all approach to technology, and citizens using technology have different needs.

Enabling city as new market of technology-makers is a risk to the common good, and it potentially creates proprietary technological lock-ins. The companies prioritize their profits rather than the city's needs.

Technology is useful to improve the transparency of the government with evidence-informed decision-making and better service delivery. Also smart governance allows citizens to access information and to participate, which allows for better connection and communication between government and citizens. Nevertheless, the technocratic notion of smart cities hinders political/ social solutions and citizen-centred deliberative democracy.

To sum up, the socio-technical imaginaries mostly mention that smart systems will create smart living by improving quality of life, increasing choice, utility, safety and security, and reducing risk. However, the system can be hackable and vulnerable across critical infrastructure and compromise data security, rather than produce stable, reliable, resilient, secure systems. The risks can be bigger than the existing system which affects the economy, politics, and society.

3.2.1. Socio-technical Imaginaries: Quality of life and Sustainability

The main point of this chapter is to understand the two dominant socio-technical imaginaries (STI) of Smart Cities as Quality of life and Sustainability.

Socio-technical imaginaries are "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015: 4) that are important to structure the experiences.

Smart Cities are popular with STIs because of their collective visions of desirable and feasible techno-scientific futures (Jasanoff 2015; Ballo 2015). Moreover, the STIs are necessary to justify and encourage the new investments in science and technology (Jasanoff 2015). STIs demonstrate the symmetrical relation of techno-science and society, that creates the coproduction of "political orders and techno-scientific projects" (McNeil et al. 2017: 449)

Sadowski claims that "socio-technical imaginaries cut through long-standing cultural categories built around the dyadic relations of mental and material phenomena" (Sadowski and Bendor, 2018: 543). STIs are essential in buttressing technology by dint of combining idealism and materialism (Sadowski and Bendor, 2018). "Whereas science and technology were formerly generally regarded as the domains of facts and artifacts, they are now also associated with storytelling, imaging, and imagining" (McNeil et al. 2017: 457). STIs are related with what is desirable through the use of technology and, additionally, they instruct us about how cities should be managed.

The researchers are mentioning quality of life will be better with smart systems in cities, while providing the needs of present and future generations concerning economic, social, environmental as well as cultural aspects (Ibrahim M et al., 2018). Joshi et al. listed the six pillars for smart living as:

Social: To engage society with the Smart City, considering the communication among citizens who wish to know all about the city and each other, actively play a role for planning and design, etc (IFF. 2020 Forecast). It is also important not to target a single group but all citizens with daily chores. To keep up with a media landscape that is changing rapidly.

Management: The Smart Governance aims to solve the issues regarding limited transparency, fragmented accountability, unequal city divisions and leakage of resources. By the help of e-government, which is an initiative to improve the decision-making process, public policy-making and public governance, the citizens participate collectively.

Economy: 'A key indicator to measure growing city competition is the ability of the city as an economic engine' (Giffinger, Kramar, & Haindl, 2008). The smart economy considers all economic competitiveness as entrepreneurship, trademarks, innovation, productivity and flexibility of the

labor market and the integration in the national and global market. Economic capability shapes the innovations and maximizes the benefits in the Smart City. Additionally, the smart city initiatives are key for business creation, job creation, workforce development, and improvement in productivity.

Legal: Besides the technological innovations the policy making is fundamental for the Smart cities. The legal compliances ensure successful smart city with well-prepared policies by the government (Mauher & Smokvina, 2006) 'The policies must conform to both technical as well as non-technical requirements that are imperative for urban growth' (Yigitcanlar & Velibeyoglu, 2008).

Technology: The major factor in making a city smart is technology, which can certainly help in raising the quality of living. On the other hand, 'educating and training employees with IT skills can be a major challenge. Politics, cultural differences and lack of inter-departmental cooperation are some of the organizational barriers that lie ahead of smart city development' (Ebrahim & Irani, 2005).

Sustainability: Economics and social development are not enough to enhance quality of life without the environmental solutions. Brundtland commission report (The United Nations Report 1987) explains sustainable development concepts as: focusing on the world's poor and although development is limitless from the technology purview, it still has many limitations considering the environment's ability to satisfy our present as well as future needs. Social, Economic, and Environmental sustainability is the issues that should be considered.

In the history of the preindustrial economy of "two universes, two ways of life foreign to each other…" can be found the emergence of the capitalism (Braudel, 1977: 6). Braduel describes one universe as "the structures of everyday life" that shapes consist of habits, customs and behaviors inherited from the past that human beings do unconsciously as part of a daily routine (Fields, 1999). The exchanges in the market with development of capitalism and modernity shaped social interactions in the city.

According to Braudel, the town as a market is more than a bazaar that includes invisible and visible political and cultural aspects. Today's digital world is removing the physical borders via the internet that transforms the entire world into one market. The communication-centric society can access any kind of information via the exchange of data. The system requires that the data and information of households and businesses are kept safe and secure.

Social life is created by human interactions that make society a single unit (March et al., 1989: 160). The individual in a social network takes a social role to act as a cultural subject with the help of cultural traditions and everyday life (Talu & Taskin, 2016: 425). The quality of life in society is based on everyday life behaviours. The combination of urban decisions and STIs improve the quality of everyday life interactions and cultural traditions that make the cities unique. Also, uncertainties of the STIs face social, cultural, and political barriers to change. For some countries it

is likely to be expressed as modernized activities and consumption or less carbon emission, while it is representing social justice, accessibility etc.

According to the study of Zeeuw et al., sociocultural backgrounds shape the social use of the IoT depending on the users consumption behaviours. Hence, the social dynamics are interrelated with the social use of the IoT in the city and the household (Zeeuw et al., 2019). The reciprocal relation between society and smart cities is challenging. It can be invisible to some citizens. However, the smart city is about all citizens on a daily basis, not just a particular group of people.

Julien Damon sounds the alarm and warns of the "two sides of urbanisation", involving an unequal model of urban growth in conurbations, split between smart territories (concentration and increased efficiency of social facilities and services, multiplication of activities, higher standard of living and education)... and the increasing presence of slums (Cathelat, 2019: 34). The technological changes affects social life in many aspects, however the different social groups in society might be affected differently.

As in the United Nations Report (1987: 36) development focusing on the world's poor and although development is limitless from the technological viewpoint, it still has many limitations considering the environment's ability to satisfy our present as well as our future needs. In their article titled "The Concept of Sustainability in Smart City Definitions", Toli and Murtagh argue the following:

> Sustainability oriented approaches are related to the use of soft and hard capital, where soft capital is considered as human capital and societal structures and hard capital as the city infrastructure and material resources, combined through diverse technologies, with the purpose of enhancing environmental aspects of the city, boosting the economy and ensuring a high quality of life. In contrast, non-sustainability related definitions particularly highlighted the importance of ICT in order to optimize the performance of the city and the use of resources, while the ultimate purpose of enhancing the quality of life remains still a high priority. (Toli and Murtagh, 2020)

The discussion on smart city can be used for sustainability issues, and the concerns about sustainability may lead the city to smarting solutions. Schaffers et al believe that "The more recent interest in smart cities can be attributed to the strong concern for sustainability, and to the rise of new Internet technologies, such as mobile devices (e.g. smart phones), the semantic web, cloud computing, and the Internet of Things (IoT) promoting real world user interfaces" (Schaffers et al., 2011: 434). According to Ahvenniemi et al., "the role of technologies in smart cities should be in enabling sustainable development of cities, not in the new technology as an end in itself. Ultimately, a city that is not sustainable is not really smart" (Ahvenniemi et al. (2017: 242).

Yigitcanlar and Kamruzzaman claim that "there is not strong evidence on: (a) A positive correlation between technology adoption and sustainable outcomes, and; (b) The impact of city smartness on CO2 emissions change over time. Despite to their promise, so far, smart city practices in the UK

cities have failed to make a considerable contribution to the sustainability agenda beyond the rhetoric" (Yigitcanlar & Kamruzzaman,2018: 57).

Sustainability can be defined as the way of economic and social development without disrupting the environment. According to Miller: 'Though imaginaries of sustainability present a set of goals and values for science and technology, techno-politics dominated by corporate actors and techno-scientific optimists may ultimately prevent cities from opening up space for alternative imaginaries' (Miller, 2020: 365). Miller claims that the imaginaries of sustainability must articulate and develop the performative power to shape new forms of social and technological arrangements and notions of the good life (Miller, 2020).

Sustainability and quality of life are two big promises of the smart cities project. Yet as shown by the example of the UK, sustainability is not always achieved as previously imagined. The techno-politics and city relations are important to answer what is behind the socio-technical imaginaries as a political goal, so the next part aims to understand the pertinent literature.

3.2.2. Smart City and Techno-politics

This chapter addresses the theoretical approaches of techno-politics in the Smart City project. The research adopts the techno-politics definitions and the approaches from the nuclear powers to smart city.

The scholars rely on hybridity, actor-network and co-production theories that explore possibilities for bringing all different aspects together. Gabrielle Hecht studies the French nuclear program to "trace the social, political, and cultural life of reactors" which, she argues as "hybrids of technology and politics" (Richers et al., 2018: 9). The techno-politics is 'emerged in the history of technology tradition to account for the ability of competing actors to envision and enact political goals through the support of technical artefacts' (Gagliardone, 2014: 3). The main political goals lead the actors to use technology. For instance, besides their macro-level goals, the technological improvements in nuclear power are used for Cold War politics.

The techno-politics are "hybrids of technical systems and political practices that produce new forms of power and agency" (Edwards and Hecht, 2010). Hecht discusses the role of technology in political power: "these technologies are not, in and of themselves, techno-politics. Rather, the practice of using them in political processes and/or toward political aims constitutes techno-politics" (Hecht, 2009: 256-7). The city has complex political processes from local to national level. When the technology in the city enables techno-politics, techno-politics enable the technology in the city.

According to Ezrahi, the interaction between opinions of political scheme and cultural materials lead to 'different political configurations of liberal-democratic politics' (Ezrahi, 1990: 10). The

cities have their own identity and character based on their history. Also they have their own political culture, regulations and institutions. The nations as Benedict Anderson demonstration "imagined community" and cities are invoked "to perform political, cultural, and sometimes even technological work" (Hecht, 2001, 255). Involving society in the technological and political practices plays a significant role in the socio-technical imaginaries of the cities.

The socio-technical imaginaries in the city strengthen the relation between technology and politics, and also techno-politics produce the socio-technical orders with the help of imaginaries. The regulations can activate or limit the transformation related with who is doing what, and with which purpose and goals. Politics and policy, which set the conditions and measurement of the implementations, have the role of guiding the transformation (Shove & Walker, 2010). For instance, in order to concrete the soft domains as social equality, urban decisions need to include all the different parts of society that are controlled by the regulations.

Foley et al. define techno-politics as 'the combination of physical artefacts or other man-made objects that exist within the geo-political borders of the city and are constituted through arrangements of power and authority that embody, or enact political goals' (Foley et al., 2020: 6). For instance, the smarting technologies in the cities are competitive. The cities, which are defined by the geo-political borders, use the technological improvements for marketing or branding purposes. The innovation in technology helps to strengthen their reputation and global relevance.

"Techno-politics as a way to reinterpret reality, empower people, facilitate action, and challenge the established social norms embedded in our understanding of technology and society". (Miren and Milan, 2018: 2) The smart city is the form of IoT that has technology integration with the citizens. Daily life changes with the technology that affects the social norms, which are imposed by means of techno-politics.

This research follows Hecht's perspective that technology shapes the political power that produces multiple purposes. The STIs and techno-political approaches of the actors are important to achieve the successful smart city as it is planned.

The third generation of Smart Cities offers the 'new deal trend' of a possible commercial contract between expectations and offers. Cathelat proposes:

· Less talk about technology than about solutions;

· Less praise of theoretical general performance than of convenience for operators and users;

· Less pushing towards the absolute must of cutting-edge hi-tech, and more focus on calibrating the right solution, if necessary, even a low-tech solution;

· Less sales pitching on the "you must have" mode, more on "we must solve". Examples of digital techniques used for problem-solving (Cathelat, 2019: 305)

In the new understanding of the smart city, citizens contribute more. The Smart Cities that are adapted to Smart City 3.0, like Vienna, prioritize gender equality, affordable housing, and citizen engagement.

The new version of Smart City 3.0 has empowered the citizens to make decisions by involving the process of problem definitions, while Smart City 2.0 is regulated by local authorities. Enabling the citizen-led cities strengthens socio-technical adaptation. The new version does not create the socio-technical imaginaries by the local authorities for the society in their mind. Conversely, the society itself chooses the imaginaries as they want to achieve by taking their place in decision-making. Furthermore, the new version of the smart cities shapes the political process.

To sum up, the technology in the city has political ramifications. The decision-makers, the social contributions and participations, the range of regulations and priorities, the main actors, and what is the main political goal are all important in smarting the cities. Techno-politics is a way to unbox the blackboxed relationships of the infrastructure arrangements and stakeholders. The next chapter aims to understand the case study of Izmir Smart Transportation with the guidance of the previous studies.

4. Smart City in Turkey: The Case Study of Izmir

Who decides? Who controls the resources, the design of projects, how services are run, the level of participation conferred, and for what purposes? (Wilcox, 1994: 3)

Compared to the United States and to other European countries, Turkey has fewer numbers of Smart City projects because of limited funding, a shortage of qualified human resources, and a lack of Global Information Systems (GIS) infrastructure. Currently, 3% of Turkish municipalities completed investments and implementations of their Geographic Information Systems (GIS) and the cities have started to introduce the smarting systems, particularly in transport and urban services (International Trade Administration U.S. Department of Commerce, 2022).

The Smart City is promoting the future, and it is important that youths invest in smart technology. According to the Statistical Institute of Turkey, currently Turkey's youth population (15-24 ages) is 15,3% of the total population of 84.680.273 . The future projection of youth is 14,3% in 2025, 14,0% in 2030, 13,4% in 2040, 11,8% in 2060 and 11,1% in 2080 (Statistical Institute of Turkey, 2022). In comparison with the 27 countries of Europe, the number of youths of Turkey is higher in 2021. Besides, in terms of numbers, 12.9% of the total population of Izmir is youth. The 2021 statistics show that internet usage of youths in Turkey is 97.1%, while in Europe it is 95% (Eurostat, 2022; Statistical Institute of Turkey, 2022).

The smart city notion started in the early 2000s in Turkey. The smart technologies need strong economic power, investment and knowledge. Turkey has limited smart technologies, especially in transportation systems, because of its economic power (Orselli & Akbay, 2019). Turkey is following the EU measurements for smart city and sustainability that is important to understand if it

fits in with the sociocultural background or dynamics of daily life. EU defines the smart city as one "which contains technical dimensions, especially emphasized through innovation, and social dimensions through the notion of "systems of people"".

The socio-technical imaginaries address sustainability, time consumption and energy, social interests with modern art, sports, entertainment, healthy and safe transportation alternatives. In other words, the cities can become smarter, more livable and more sustainable. In addition, the reports and media promote smart cities related with modern life.

The Turkish Smart City approach is in between Smart City 2.0 and Smart City 3.0 since it is open to citizen contributions and led by the local authorities besides the European support. The most important aspects are politics, strategy of what will be served. Moreover, urban structures are furnished with layers of systems. Turkey applies the existing examples of what other countries are already using.

Brookings Institute reported with Global Metro Monitor that China, Turkey and Middle East have fast developing cities. Turkish cities İzmir, İstanbul, Bursa and Ankara are four cities from Turkey out of 10 cities (Mirghaemi, 2019: 42). In 2016 and 2018, the World Bank supported Sustainable Cities I and II Projects in Turkey with loans of $133 million and $91.5 million aims to improve the economic, financial, environmental, and social sustainability of Turkish cities. The cities joined the Green Cities Program, 'which identifies, prioritizes, and connects the cities' environmental challenges with sustainable infrastructure investments and policy measures'.

Izmir is the first city that prepared Green City Action Plan with 105 million loan to construct the Fahrettin Altay - Narlidere metro line with a total length of 7.2 kilometres including underground stations and electromechanical works. Following Izmir, Ankara and Istanbul has started their Green City Action Plans (International Trade Administration U.S. Department of Commerce, 2022)

In May 2009, Turkey became the first country to benefit directly from the fund, with financing to support a large-scale renewable energy and energy efficiency program. Besides, the local authorities are trained with United Nations program about "Sustainable Urban Development Network" and Investment trainings enhanced awareness to accelerate sustainable development in Turkey. The program has started with 20 municipalities of Turkey including Izmir. Innovation centres are established in some cities with that program.

The case of Izmir is new to smarting systems: it is unique and it has awards with the GreenUP project on the subject of sustainability and zero emission projects by HORIZON2020. Also, Izmir is the first city to be given the title "Citta Slow Metropol" and will follow with "smart enough city". The citizen-led products, the data collection and the plans led by the local authorities render Izmir a smart city, between Smart City 2.0 and Smart City 3.0.

The main vision of Izmir is the use of smartness in an efficient way called "smart enough city" in order to have a high quality of life and ecological sustainability. In order to be sustainable, a modern city with high quality of life standards must align with the smart enough city concept.

Izmir is unique with its awards for its projects regarding Sustainability. In Barcelona Smart City Expo World Congress in 2019, Izmir participated and generated four main recommendations in its report:

1 Avoid committing to a "smart city" agenda and to policies and investments that maximize the role of technology. Instead, focus on a "smart enough city" approach.

2 Update the city's current strategy, considering the most urgent challenges for Izmir, its citizens and its ecosystem.

3 Develop a better digital "nervous system" throughout the whole administration, to leverage and enhance the role and use of technology, develop a better capacity to engage and empower citizens, and to deliver better services. To achieve this, it might be useful to:

4 Use an iterative approach to strategy formulation, creating opportunities for the Mayor's team to reflect on the progress made, discuss available data and citizens' feedback, reframe their challenges, reorganize their strategy and policies (Smart City Expo World Congress, 2019: 4).

Selected case smart mobility as a hard domain is the first smarting attempt of some cities as Izmir, which is voted to invest in a smart transportation system to get more information and projects to analyze. Even though the smart transportation systems were in strategic plan of 2015-2019 with

Strategic Heading	Strategic Goal	Strategic Objective(s)
Quality of Life - Public Transport	2. Making Izmir a Smart City with A high Level of Quality of Life and A Well-Developed Transport Network	2.1: Public Transport Will Be Affordable, Energy Efficient, Fair, Comfortable, Available to and Accessible for all residents
Quality of Life - . Urban Transportation	2. Making Izmir a Smart City with A high Level of Quality of Life and A Well-Developed Transport Network	2.2: A Sustainable Transport System Will be Created with a Harmonious Interaction Created With A Harmonious Interaction Between Different Modes of Transport, Offering Different Options

Figure 4 : Strategic Plan 2020 – 2024 objectives , Source: p: 67.

previous mayor, it was not the priority. The new mayor of Izmir focuses on smarting systems more than the previous, to make the city sustainable and improve the quality of lives. Sustainable mobility will be implemented as priority and planned by outsourced companies which will be chosen via a tendering procedure (Figure 4). The project is a collaboration between the European Union and the municipality of Izmir. In Turkey, it is not only Izmir that is implementing this kind of

projects, but also Ankara, Kocaeli, Konya, and other cities, which are supported by the World Bank and the European Union as well.

First, the case study aims to understand the socio-technical imaginaries as they are represented in the media, how they are promoted, what is the project in detail, what are the reactions and thoughts of the public in the case of Izmir; second, to understand the techno-political perspective on open source data and the selected transportation applications; third, to understand the users' experiences over the reactions of application feedback page.

The access of information played a significant role in choosing Izmir as a case study.

4.1. Smart Transportation

This chapter aims to understand one of the popular IoT, namely Smart Transportation, with its layers as hard domain.

Being mobile in the city is important to be a part of where citizens are living and working. In cities the transportation is at the heart of the planning which allows citizens and visitors to explore and to have access to their daily needs such as work, education, socializing, shopping, and emergency purposes.

The main issues for transportation are: inefficient time management that creates traffic jams, pollution, delays, adapting different weather conditions, safety for accident prevention, providing accessibility to everyone. Besides that, transportation provides strong evidence that showw the municipality is working, because hard domains are tangible and easy to measure.

The main goal of Smart Transportation are: "local and international accessibility, sustainable, innovative, and safe transport systems, live traffic congestion management, and smart parking" (Kalašová 2021: 47) The components of the smart transportation system are Administrator, Driver, GPS, users. The layers of the system are: data, application and presentation to manage vehicle traffic, informing via notifications, view map etc.

All service design is related with the needs and demands of the users. Furthermore it provides safe traffic, time-energy saving with a strong information system to improve the quality of lives, and it supports the idea of sustainability with less energy consumption.

In order to create a roadmap for integrated planning and implementation of smart city projects, the seven steps guideline of the European Innovation Partnership on Smart Cities and Communities (EIP-SCC) is as follows:

1. Envision: Long-term vision and objectives are developed or adjusted. In addition, possibilities for collaboration within the city are explored.

2. Decide and commit: The long-term vision is materialized as a strategy. The parties decide and commit on how to start preparing the plan for the smart city implementation.

3. Plan: Based on the strategy of the previous step, a plan with concrete actions, targets, milestones, and key performance indicators (KPI) is elaborated.

4. Do: The actual implementation of the plan is performed. Adjustments, alterations, and amendments are expected.

5. Check: The progress is monitored, based on the KPI established in the plan step. If problems surface, solutions are explored.

6. Act: Solutions to the problems in the previous step are implemented

7. Replicate and scale up: Experience is shared and communicated, facilitating replication and upscaling of successful solutions. (Smart City Guidance Package 2019: 2019)

TABLE 3: The architecture of the framework	
Sensing layer:	The sensing layer, also referred to as perception layer or object layer, integrates the physical devices, i.e., hardware (such as sensors, actuators, sensor nodes and gateways) of the IoT framework.
Network layer	The IoT devices of the sensing layer, i.e. gateways and sensor nodes, communicate with the middleware layer using network protocols, such as WiFi and 3G/4G/5G, which are handled by the network layer
Middleware layer	The middleware layer comprises the software that connects the sensing and application layers , intermediating the communication between the sensing and application layers.
Application layer	The application layer serves diverse domain applications that may require delivery of data, either in real time or in a delayed manner.
Security Layer	The security layer provides the other four layers of the IoT framework with security mechanisms to guarantee data protection and to prevent intrusions in the smart city applications

Source: Peralta Abadía et al., 2022, pp: 13-16

The guideline is based on "the experiences and expertise of cities, businesses, citizens, research institutes and non-governmental organizations that collaborate in the EIP-SCC" (Peralta Abadía et al., 2022: 5)

The architecture of the framework is fundamental to connect the physical and digital worlds and to integrate the IoT of the large number of heterogeneous devices (Al-Fuqaha et al., 2015). Peralta Abadía et al. created a five-layered IoT framework architecture for smart city applications, which comprises: an application layer, a middleware layer, a network layer, a sensing layer, and a security layer that is shown in the Table 3.

The layers illustrate the digitalization of the system and its physical equivalent in the Table 3. Sensing layer is to recognize desired activities and objects; network is connecting the devices and protocols; Middleware is connecting network layer to Application layer, which includes the data as real time or record; Security layer is to keep all data protected and includes all other four layers.

The evolution of Smart City inevitably causes changes in Smart Transportation. Citizen-led smart mobilization samples of this new deal trend are:

Helsinki: The all-in-one app to travel around tow. The ultimate multimodal mobility service.

London Starling Crossing: Starling Crossing is an interactive pedestrian crossing that responds dynamically in real-time to make pedestrians, cyclists & drivers safer and more aware of each other.

Singapore / Rouen - self-driving taxis: Current innovation related to driverless vehicles will open up interesting opportunities for customized individual travel.
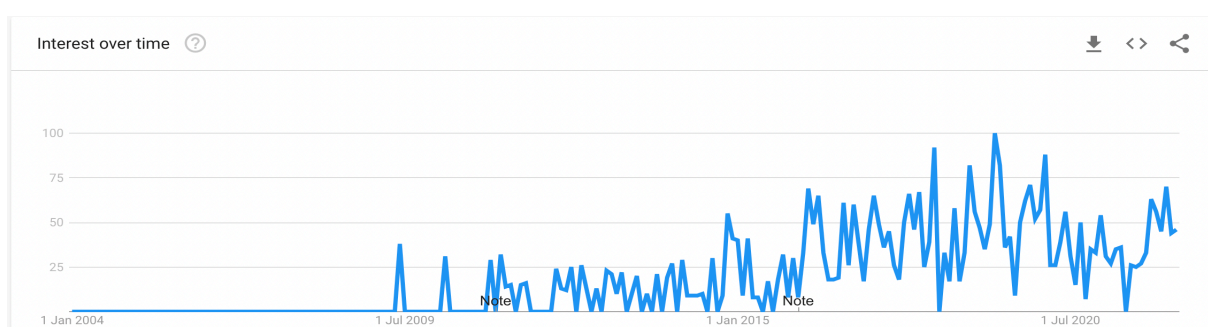
In addition, the healthy city is promoted as carless, developing public transportation, cycling and walking routes, eco-friendly technology of mobiles and car-sharing alternatives. The technology can be used to identify the needs before the implementations take place. Demand-based alternatives are local solutions and easy to adapt to daily lives.

To sum up, the smart transportation systems are developed thanks to technological improvements. The smart transportation does not only have a physical dimension, but it also has a social dimension. The worldwide examples show that the socio-technical imaginaries are more citizen-oriented. The projects are promising time-saving and safety protocols that will serve both quality of life and sustainability. The next part of the study is about smart transportation in Turkey and it will be narrowed down to the case of Izmir.

4.2. Smart Transportation in Turkey

'Historically Turkey has always provided an important trading link between Asia, the Middle East and Europe and this function has grown steadily, especially with the development of the Transit International Routier (TIR) trucking system' (World Bank Group, 1982: 1).

The transportation planning process before the smart city is described by persona D as: the municipality plans to collect their own data from public transportation, semi-private/ private public transportations, private mobiles, industries, hospitals, universities, etc, manually with agents, sometimes with municipality or by themselves. They analyze the existing city issues and project how it can be planned with future populations for 5years. They present the feedback to the municipality and they investigate it. Then the municipality accepts the plans, and the ministry of environment and urbanism investigate for approval. Another plan is prepared every 5 years, and there are revisions to see if the plan actually works.

Graphic 2. Trends, G. Smart Cities Popularity.
Available online: **https://trends.google.com/trends/explore?date=all&geo=TR&q=smart%20cities** (accessed on 23 April 2022). Turkey

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Initially the smart traffic management, based on the smart city concept, was developed with action plans by the ministry of environment and urbanisation of Turkey under the title of 'developing smart transportion and smart road systems' and 'smart transportation and tourism solutions for safety and disasters' in the strategic plan for 2013-2023 (Ministry of Environment and Urban, 2019: 27). It was followed by other planning policies of the ministry of development with titles such as Strategic plan of Ministry of Transportation, Marine and Telecommunication (2009-2013), Information Society Strategy and Action Plan, Transportation and Communication Strategy Goal 2023, National Climate Change and Strategy Report, National Science Technology and Innovation Strategy and Action Plan, Transportation Safety Action Plan, Energy Efficiency Strategy Report (Akbas, 2013: 272, Kalkınma Bakanlığı, 2013: 131-177).
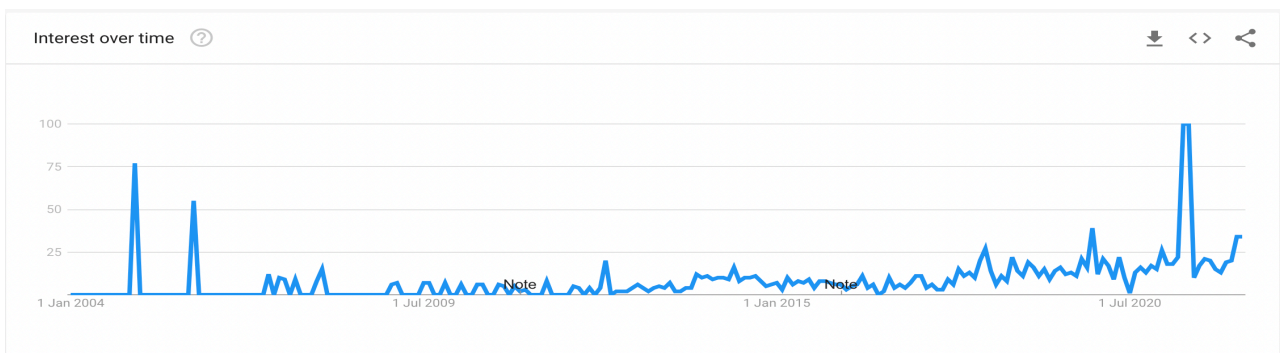
Graph3: Trends, G. Smart Transportation Popularity.
Available online: **https://trends.google.com/trends/explore?date=all&geo=TR&q=ak%C4%B1ll%C4%B1%20ula%C5%9F%C4%B1m** (accessed on 23 April 2022). Turkey

Graph 3 and Graph 2 show that smart transportation researches started in 2004 while Smart City started in 2009. The interest in Smart Transportation is higher than that in the Smart Cities.

Turkey participated with the vision 'the future we want', which is an internationally-agreed document constituting a "roadmap" for sustainable development in United Nations Conference on Sustainable Development. Hence, Turkey agreed to follow new regulations including the new transportation technology for smart cities for 2030. (Kalkınma Bakanlığı, 2017). Initially Istanbul, where 20% of the population of Turkey resides, started the application for smart transportation and it was followed by the cities of Konya, İzmir, Kocaeli, Eskişehir, Antalya, Ankara, Bursa, Gaziantep, Manisa. However, compatibility, integration and interoperability issues are the main obstacle (Association of Smart Transportation System, 2017: 7).

The Ministry of Transport & Infrastructure stated in its 2013-2023 Action Plan that all cities will implement: smart traffic light systems according to traffic density; green wave systems where cars, after encountering one red light, pass through subsequent green lights when maintaining a specific speed; digital traffic signs; and solar-powered bus stops with digital arrival time boards.

Turkey is in the early stages of smart mobility. Mostly the cities have their own smart transportation systems locally and there is no main central institution. The smart transportation system decisions

are mostly based on the international conferences and workshops. The foundations are mainly supported by the World Bank and the International Finance Corporation (IFC), which is the partner of the World Bank, and by the European Union.

The smart transportation decision-making process mainly prepared with the experts because of the lack of skill in the governmental organizations, which have only a minor organizational infrastructure (Kurban et al., 2017). In other words, the political decisions have new actors, and this means new forms of power and agency. The combination of technology and politics with its new policy positions and outcomes affects the national and social identity.

On the news channels in Turkey, the smart cities are talked in interviews that describe what they are and what is their main goal. Examples are mainly given from Europe, Japan, USA, India, and promoted as information, energy usage, sustainability, security, health controls, accessibility of the emergency, transportation technology.

Smarting Izmir Transportation has started in 1999 as a pilot work: the ESHOT, which is the municipal-owned operator of the bus network in Izmir and its surrounding service area. The historical path of ITS systems of ESHOT is briefly shown next:

1999	Introduction of smart-card e-ticketing on pilot basis
2004	Completion of e-ticketing roll-out for all travel on ESHOT
2006	Automatic vehicle location implemented
2007	Introduction of transferable tickets across modes on pilot basis
2008	Completion of transferable tickets across all modes
2009	Fuel issue and stock control system
2009	Operations Control Centre
2010	Real-time passenger information at bus-stops and on buses
2010	Passenger surveillance systems

(The World Bank: Intelligent Transport Systems - Izmir, Turkey, 2022)

In accordance with the Strategic plan of 2020-2024, Izmir decided to develop smart transportation system as a first step of the smart city. They chose to be a 'smart enough city', which means to apply smart technologies depending on the priority as smart transportation systems. Their motivation is to minimalize the traffic density with adaptive signals to control the traffic flow, the waiting time on the red light, to provide secure lines for emergencies like ambulances, fire-fighting trucks etc., the integration of public transportation, parking areas, and controlling rule violation.

Currently, the Izmir Municipality attaches more importance to Smarting Transportation to improve the quality of life. In the strategic plan the strategic goals and objectives are listed in the figure. The technological projects are not only the technology-based, but they also include politics, economics,

and society aspects. The detailed political schema and its aims and actors will be detailed in the following section.

4.2.1. Political structure of urban decision-making process of Izmir Smart Transportation System

Izmir has more smart city 2.0 applications than smart city 3.0 applications in its Smart Transportation Systems. The local authorities play a bigger role than the citizen-led schemes; however, recently, the citizens and associations have come up with their own solutions. In this section, we will answer how Izmir decided to become a "Smart City", who are the actors in decision-making, the aims of the projects, a brief history of the municipality and the Smart transportation system of Izmir.

According to Kalkisim, after the 1990s, Turkish municipalities' mayors played a fundamental role in promoting, with their personal efforts, the policies of their cities. In addition to that, "social municipality applications mostly shaped as social aids, social services and cultural activities" (Kalkısım, 2016, p. 216). [...] "The applications offered to solve the social problems are mainly implemented as feeling including benevolence, mercy and personal satisfaction, and social supports" (Kalkısım, 2016: 217).

[...] "Every city in Turkey has different municipalities, governmental and non-governmental organisations. The political attitudes of management, social and economic, geographical, cultural, demographic structure and climate specifications of cites make the cities different. Besides, the financial resources and incomes creates differentiations in the services" (Kalkısım, 2016: 219). Izmir is a west coastal city in Turkey, and one of the cities that Kalkısım mentioned.

According to Turkish regulations 'everyone has the right to ask for the data. The institutions should deliver the data to the citizens in 15 days' (Legal Gazette, 2013). This rule evolved to an open source data system in smart city. Izmir's open-access data strategy report points out that their aim is to be transparent and to strengthen democratic participation. The open-data model is adapted from the open-data maturity model of The Department for Environment, Food and Rural Affairs of UK by Open Data Institute.

The city plans are based on the currently collected data with a projection over the next 5 years through the vision. Depending on the project, in charge on the plan are mainly the offices of municipalities, the government, the ministries, or some private planning offices. After researching and plan-making and before implementation, citizens give their feedback on the urban plan, and objections or disputes are discussed. If participation in the decision-making process is high, the disagreements are fewer.

Actors in Turkey	Responsibilities for the urban decisions
Ministry of Environment and Urbanization	Gives feedback of the municipality, accepts or rejects the projects.
Municipality	Owns the plans and manages the investments
Private Companies	Chosen by municipality with tender method
Participants	Citizens and the communities who give feedback after the municipality announce the planning decisions
Monitoring	Can be the police or any other authority responsible for the project; traffic is monitored by the police department

Figure 5: Actors and responsibilities in urban decision

Figure 5 shows general responsibilities, which can be different with various urban scenarios or emergencies. The plans that are prepared by the municipality get the approval of the Ministry of Urbanization and Environment. If the municipality does not have knowledge or skilled labour in order to implement the plans, they start a tender to collaborate with outsourced companies. After the companies submit the plans of the projects that they prepare, with the guidance and the feedback of the municipality, the companies implement the plans. The final plans are open to feedback from the citizens and associations before their final implementation. The decisions are democratically open to the public during the announced meetings.

Izmir currently comprises eleven metropolitan districts: Balcova, Bayrakli, Bornova, Buca, Cigli, Gaziemir, Guzelbahce, Karabaglar, Karsiyaka, Konak and Nardilere. Each of these was a former district centre managed by the Izmir Municipality that supports the opposition party of the Turkish Government. Turkey does not have a dominant decision-maker on urban politics and there is no impact of polarization of Turkish parties on urban regulations. However, it is mostly a disorganized and complicated decision-making process.

The market actors play a significant role in decision-making as regards urban planning. Power relations play a big role in that; there is resistance from the public on the decisions. In addition to that, there is a central and local management contradiction over the political views that affect urban activities. There have been many projects that did not achieve their goal. Moreover, knowledge management is not strong enough.

Decision-making comes from the mayors, who have their own teams in the municipalities all over Turkey. In Izmir, the applications of the municipalities are important and are directly related to the

mayor. The municipality can entirely change the previous plans and the team. The actors' positions and motivations play an important role in constituting and transforming political power.

The current mayor, Tunç Soyer, applied the "Citta Slow" movement when he was in charge of the district of Seferihisar in Izmir. As a small area, Seferihisar district had successfully won the title of "citta slow" in 2009 for economic reasons such as tourism. Today, his aim is to apply the "citta slow metropol" movement in all of Izmir by rendering the city as the first city in the world with that title.

On the other hand, the municipality's 2020-2024 strategic plan announced that the city will be green and mobile-free with the help of technology. Izmir has one of the biggest smart transportation projects. The city has partially applied smart transportation technologies in order to prioritize the public's needs in the city center. The mayor had the political power to implement the "citta slow" movement, which gave him the opportunity to continue with this plan. The experts mention that without resolving the main problems, such as infrastructure, the smart city cannot be as expected.

Kitschelt (1986) claims that: "The Socio-technical Imaginary concept helps us to identify the (dis)continuities in the ways in which imaginaries reconstitute underlying constitutional relationships in the triad of state–society–environment" (Beck et al., 2021: 147). The policies highlight the sustainability and quality of life for the citizens, however it is important to question who gets to participate, who is entitled to speak for sustainable futures as well as who does not.

The urban decisions and visions affect the transformative socio-technical change. Participation is related to how policy makers imagine the citizens. Mayor Soyer stated at the International Cittaslow General Assembly that "we are volunteering to work with more than 4 million citizens to become the first 'Calm Metropolitan City'. I hope we will help lay the foundations for a better world". Izmir is open to citizen contribution for sustainability and slowing the city initiates from a local to a global scale.

The previous urban vision of the municipality of Izmir was the one of "becoming a symbol city of democracy where one can live free and happy in peace" (2015-2019 Strategic Plan of the municipality of Izmir: 9). The current strategic plan is "to be a city that draws its strength from the harmonious coexistence of differences, learns from the world and inspires the world, and where prosperity, justice and harmony with nature are integrated with every aspect of life" (2020-2024 Strategic Plan of the municipality of Izmir: 5).

The current mayor of Izmir mentions the following: "[…] The 'smart' concept stands close to democracy, as building smarter cities means resisting these forces. Only when democracy meets technology are we able to open new channels to carry democratic values to the people, and show them that democracy remains mankind's best innovation. This is why finding smarter ways to approach and develop a digital transformation strategic plan for our city represents the main challenge ahead of Izmir." The main goal is to create a democratic city by focusing on sustainability and on quality of life.

In the past few years the rapid population rise affected urban policies especially as far as the transportation system is concerned. The interviewee Persona C mentioned that urbanism in Turkey is not planned. The historical background of Turkey and of course Izmir was planned randomly, which causes constructional problems in the city. It should be the priority to solve urban planning problems that occurred in the past, rather than smarting the city. The application of the smarting is compatible with the new developments, not for the main centre.

In Izmir, the municipality is working on the "citta slow metropol" movement and does not consider the alternatives, such as public participation, or even solutions from previous plans that served sustainability; they do not focus on the main urban problems.

In the strategic plan, the targets are listed as quality of life, infrastructure, economics, democracy, nature, strategy comprise smart transportation plan, learning with experiences - institutional capacity, art and culture. All sections have different targets related with smart transportation. The main goal is to improve the infrastructure, and, secondly, to improve the quality of life. In the quality of life section, the main plan is to provide a smart transportation system. The strategic aim for the transportation sector is to promote sustainable models of transport such as walking, cycling and the use of public transportation.

The selected reports describe the quality of living as improving smart transportation, as shown in Figure 6. Improving the quality of life is related with better transportation systems, green energy, encouraging citizens to use healthy transportation options and strengthening the connection to the coastal area for all citizens.

The municipality lays emphasis on pedestrianization and cycling as regards the citta slow metropolis movement's goals, with strong public transportation to reduce traffic in the city. The authorities and the associations in Izmir do not have the capability to produce and implement smart systems. Even the experts at the universities or in the private sector or the municipality tend to collaborate with a company from Denmark which has experience. Moreover, interviewee A questions how the municipality will interpret and monitor the outcomes without the skilled labor to produce the systems.

Plan /Actor	Priority / aims	How to
The strategic plan 2020-2024 of Izmir Municipality The Urban Development Strategy and Action Plan of Izmir Report of IZKA Izmir Regional Plan 2014-2023	Improving quality of life by accessibility, health for everyone Improving the connection between rural and urban areas and rural infrastructure. Supporting health, sport, green energy The integration of transportation and alternating the public transportation for all groups of society Improving access to seaside for all Improving the emergency lines, roads, squares	Improving Sea transportation actions Railways projects Tram projects Developing metro line Buying railway trains Rehabilitation and development of cycling roads Smart transportation system Improving the traffic signs horizontal/vertical Climate change and Green Energy Actions Building Sustainable Energy Power Plants
Izmir Sustainable Energy Climate Action Plan (SECAP) (is funded by European Union the report prepared By AECOM)	To create more sustainable urban mobility: mass transit and local mobility Public Transport Will Be Affordable, Energy Efficient, Fair, Comfortable, Available to and Accessible for all residents A Sustainable Transport System Will Be Created With a Harmonious Interaction Between Different Modes of Transport, Offering Different Options	High speed railway projects Increasing urban railway systems Promoting a shift away from road journeys towards increased use of maritime and rail transportations for both freight and passenger transport
To create Citta Slow Metropolis	Community, Good Governance, Mobility, Urban Resilience, Good Food and Slow Neighbourhood.	Widespread, accessible and affordable public transportation Uninterrupted and safe integration between transportation modes Increasing proximity-oriented walkability Increasing the use of bicycles
Report of The World Bank | Intelligent Transport Systems - Izmir, Turkey", 2022	Develop a secure and effective revenue collection system – this has formed the backbone of the subsequent ITS applications Enable modal and service integration through minimizing personal costs of interchange Develop enhanced operations management capacity to provide reliable services and deal with disruptions Provide improved passenger information in real-time Provide surveillance for passenger and personnel security Obtain data for planning, resource optimization and performance monitoring	

In addition, instead of one centre or a research department on technopolitical platforms, there are multiple actors involved, such as outsourced companies, associations or individual developers. In other words, it is a new way of "seeing" and managing the city.

4.2.2. Sustainability and Smarting in Izmir as a Socio-technical Imaginary

Smartness is not only a technical premise involved in urbanization but also a cornerstone of an urban sociotechnical imaginary (Jasanoff and Kim 2009: 2015). It is a set of ideas, beliefs, and visions about the future of urbanization (Sadowski, 2018: 542). The smart systems get importance after focusing on improving the quality of life and sustainability theme with 'Smart Enough City and 'Citta Slow Metropolis' visions.

Izmir is selected as the Climate Neutral and Smart Cities Mission of the European Union among 377 cities with its local government vision and action plans against climate change. President Tunc Soyer explains: "After the 2022 European Award given to our Izmir by the European Parliament two days ago, we received another good news today. As Izmir, we have been selected for an important mission of the European Union. This election is an indication that Izmir is a European city and how well it deserves the 2022 Europe Award. Izmir is a pioneer again, creating value again. Our aim is to build a city, country and world that is compatible with nature, resilient, high in welfare and protecting its biodiversity" (2022).

According to Miller, 'these techno-political systems shape and become enrolled in both imaginaries of sustainability and socio-technical imaginaries' (Miller, 2020) (Hommels, 2020: 412). With the information circulation the STSers question if the techno-politics is national-scale or global. The statements of the mayor refer to both national and global scale, since climate change is a global scale problem. However, the actions regarding the city are localized within its geographical borders.

The report of the Izmir Sustainable Energy Climate Action Plan measured that the 2nd highest emissions are emissions from the transportation system (23%). 1% of all emissions are from public transportation (The European Union, 2020). Izmir chose transportation as a priority to improve the quality of life in order to improve the future of urban transportation with innovative solutions. The target scenario of 2030 is to reduce the carbon emission, as shown in the Figure 7, by improving transportation with smart systems in cohesion with the improvement of the quality of life. Smart mobility, as a hard domain, is the first smarting attempt of some cities, such as Izmir. The municipality voted to invest into the smart transportation system. The center of Izmir was prioritized in order for the smart transportation technologies to be applied because of its density and its needs.

Persona C describes how Izmir described the smart transportation system as: "Smart solutions help to solve this kind of problems, and the primary needs guided the municipality to start using this technology for public good, from the city center, where the population is the highest, and expanding to the entire city depending on the density of the population."
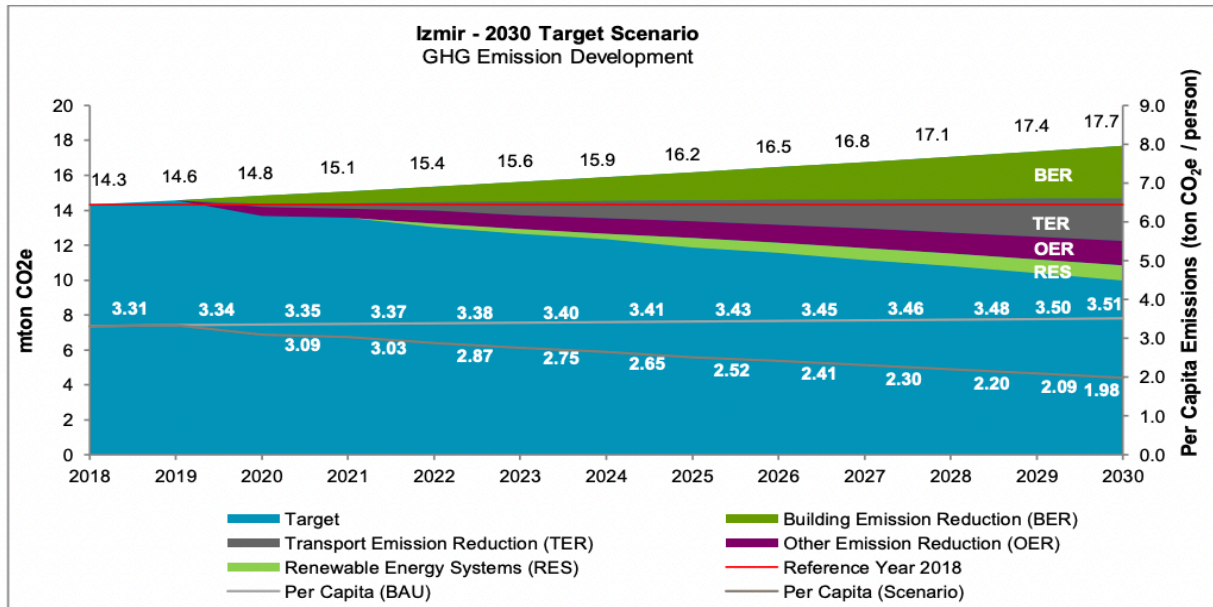
Figure 7 :Izmir Target Scenario, 2030 Source Action Plan p:

"The sociotechnical imaginaries concept, in particular, offers an interpretive lens to explore underlying normative, but often inexplicit, rationales and justifications of policy choices for governing emerging technologies and distributing their risks and benefits" (Beck et al., 2021: 144). One of the biggest sociotechnical imaginaries is sustainability that focuses on both human and planetary futures (Beck et al., 2021). The main vision of the municipality of Izmir is to create a carbon zero and slow city. The objective is to create a local government model prioritizing slow philosophy and good living. The vision of the municipality is presented in their webpage as follows: "to be a city that draws its strength from the harmonious coexistence of differences, learns from and inspires the world, and integrates welfare, justice and harmony with nature with every moment of life".

"Sociotechnical imaginaries therefore serve as modes of societal self-organization that contribute to opening up or closing down possible horizons of future action, and thus shape the channels within which political actors make decisions, or make particular choices more or less plausible knowledge garnered by dominant institutions can paradoxically be an impediment to social action through the silencing of other relevant forms of knowing and through the production of particular forms of non-knowledge" (Beck et al., 2021: 145). By focusing on the "Cittaslow Metropolis" movement, other alternatives are not presented to society.

"By bridging idealism and materialism—that liminal space where the smart city exists— sociotechnical imaginaries play a critical role in framing what technology is made and why. The success of new sociotechnical imaginaries relies on their fit with existing cultural norms and moral values, social structures and material infrastructure, political institutions and economic systems, and hopes and aspirations" (Sadowski, 2018: 543). The draft principles of the concept of the "Cittaslow Metropolis" are "community and solidarity", "good governance", "urban eco system", "people-

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oriented economy", "food for all" and "eco-mobility". The Cittaslow network has 30 members from 266 countries. Cittaslow's philosophy is slow living in order to provide a higher quality of life for its citizens while preserving their identity (Izmir Municipality, 2022).

"The technocratic imaginary stakes its political credibility on enhancing transparency, accountability, and effectiveness; these have been seen by governments as building blocks for strengthening trust and legitimacy" (Hartley, 2021) It is possible to raise the quality of life in a smart city by implementing policies that are considering the equal distribution of benefits, trust in technology, protection of privacy and the degree of public input. Smart transportation-related applications and open source data access are built to encourage the universities and entrepreneurs to develop new products to create sustainable, environmental, healthy green cities. The "Cittaslow Metropolis" and "Smart Enough City" movements' goals align with the aspect of sustainability.

Persona A is concerned that the outcomes of the Smart City can cause inequality in the society that is promoted by the authorities. The priorities are not considering society as much as the entrepreneurs. Regulations and standards are prepared in order to secure investments and city branding. They highlight two main questions: "Is it what citizens demand or need?", and "Is it connected with the actual problems of the city or is it connected with making a model in order to get investments?" In order to answer these questions, the participation and citizen contribution will be discussed.

4.2.3. Participation and Citizen-led Contributions

"The techno-politics that become embedded in emerging smart technological systems will shape how urban communities attempt to provision services as well as monitor and control the social, ecological and economic outcomes that will characterise this latest evolution in urban infrastructure" (Miller 2019: 15).

Izmir adopts Smart Enough City process which is need-based smart applications. On the one hand, the citizens become involved with the announced projects either voluntarily or with an exhibition or gamification. On the other hand, as highlighted in the Action Plan Report, Izmir needs support to build the smart system. In the 2020-2024 strategic plan, the citizens and associations are included as actors and the mayor calls upon the citizens to build the sustainable "smart enough city" all together.

The authorities and the associations in Izmir do not have the capability to produce and implement the smart systems. Even experts at the universities, in the private sector, or in the municipality tend to collaborate with an experienced Danish company in order to implement the smart transportation system.

Izmir's social interaction and collaboration is known as one of a high level. Citizens are getting involved in the decision-making. The municipality promotes the smart city by putting the quality of life and compatibility with nature as a priority. Internationally, Izmir is the first city who created the

term "Cittaslow metropolis". The pilot study was conducted in a neighborhood in Izmir, and one of the major projects was climate-proof streets. It was mainly co-designed and the participation was high as the projects on Smart transportation and climate resistance.

Democracy helps citizens access the information they require to make a difference in their communities, scrutinize decisions, and participate in the city's democratic decision-making processes in a more informed way. Technology facilitates wider democratic participation from individuals and groups and greater transparency and accountability in democratic institutions (European Center, 2016). Mayor Tunc Soyer mentions the importance of democracy, and his main goal during his speeches is to make Izmir a democratic city.

The participation of society when it comes to smart transportation is not the same as in other decisions that have to be made and that are related with the city. The citizens are actively involved in the data collection and it is open source that helps entrepreneurs to develop a system for their needs. For instance, cycling workshops help and promote participation. Another example was the European Cycling Challenge, where Izmir won the first prize. The application measured up to 30 km of cycling behavior, where the participants (either as individuals or as groups) cycled to go home, work or shopping. With the help of this application, a heat map was created to show which routes were used the most by the cyclists.

Persona B stated that the 3rd generation of the smarting system means that society is a part of the smarting systems, that is, citizens express their needs and some of them are actively collaborating with the municipality in the development of these systems. There are other projects, conferences, or activities not with the 'smart' tag but as city without automobiles, urban mobility which helps raise awareness. The only problem is they are not permanent. More multidimensional entanglements occur, for example, in the collective framing of risks, their long-term as well as short-term nature, their implications for vulnerability and resilience, as well as responsibilities for and ownership of those risks and benefits along disparate technological pathways linked to sustainable futures (Beck et al., 2021).

Independent actors can participate in practices and processes such as petitions, campaigning, party formation with the help of ICTs (Kurban et al., 2022: 501). Workshops and conferences on smart cities and ideas were developed; however, there was no implementation after those. An online platform called sehirsizin.com by Vodafone (a free service to gather ideas from society for smart city ideas) is currently inactive. As it happens with other workshops and conferences, the company platforms are not continued as expected or promoted.

Persona B mentions: The focus of Voluntary Local Reporting (VLR) this year is on smart transportation. It is volunteer reports, not municipality or academics. It is a production of the network for 1 year observation over different sources. Izmir attends the conferences, competitions, workshops worldwide about sustainability, smart cities, "Cittaslow" and other relevant concepts.

Citizens, associations and non-governmental organizations contribute to the smarting of technology for public benefit. For instance, the Mediterranean Academy built a bio-atlas and uploaded the photos of the various livings, and the experts are evaluating and approving. One of the risks is that small actions are targeted at businesses which might shift the public benefits to company benefits. For instance, in Izmir, independent developers or associations built alternative solutions that created a digital agora and square like in the 90s. They collected the information from the old days in order to digitalize it. A second example is: the need map. During the pandemic, earthquakes and floods, food logistics stopped, and with this platform the people shared their needs and others brought the needs over to that digital platform, which was created for the first time and used in Izmir. A third example is a platform for farmers who could not pick cherries. With the help of this platform, citizens volunteered to help.

The citizens get involved in the decision-making process either voluntarily or with participating exhibitions or gamifications. The citizen-led products and data collection and local authority-led plans situate the Izmir Smart City in between Smart City 2.0 and Smart City 3.0. For example, Ford Otosan's competition 'develop your city' targets to define a neighbourhood (alsancak) of Izmir and create smart mobility. The outcomes can be applied to other cities, with some required adaptation.

The infrastructure and the other urban components involved aim to connect the plan with smarting where and when needed. Individual and collective users get involved in techno-politics in order to generate "parallel discursive arenas where members of subordinated social groups invent and circulate counter-discourses to formulate oppositional interpretations of their identities, interests and needs" (Fraser, 1990: 67). Moreover, "technologies can free and empower people as well. ICTs can augment freedoms and civil rights; they can empower people, strengthening the ability of people to participate" (Milan & Gutierrez, 2018: 105).

In the newspapers, the announcement is mainly that the Turkish Cities will be smarted as the European cities. There are no controversial comments or discussions in the newspapers. However, on social media some people believe that smarting is not for people of lower income levels and that it will create inequality. In contrast, some people believe that with the help of technology the city can be developed and be sustainable for its future needs. However, the lack of information from the municipality makes the citizens try to come up with their own solution.

In summation, it is important that individuals collaborate in order to expand the knowledge base and increase the capacity. The outcomes are: well-being for individuals, new or revised services, products, policies, funding or institutions. The layers are: the individuals, the communities, stakeholders and organizations, the systems of policies and institutions (also known as knowledge systems). Social and cultural norms are shaped by each other to create sociocultural conditions. Also, co-production processes impact each layer differently. The thesis will be narrowed down to an understanding of how individuals interact with the product and services and how they access the data with existing systems, structures, and processes of policy and institutions. The next parts will discuss the Open Source Data in Izmir and the public trust in the case of IZUM application.
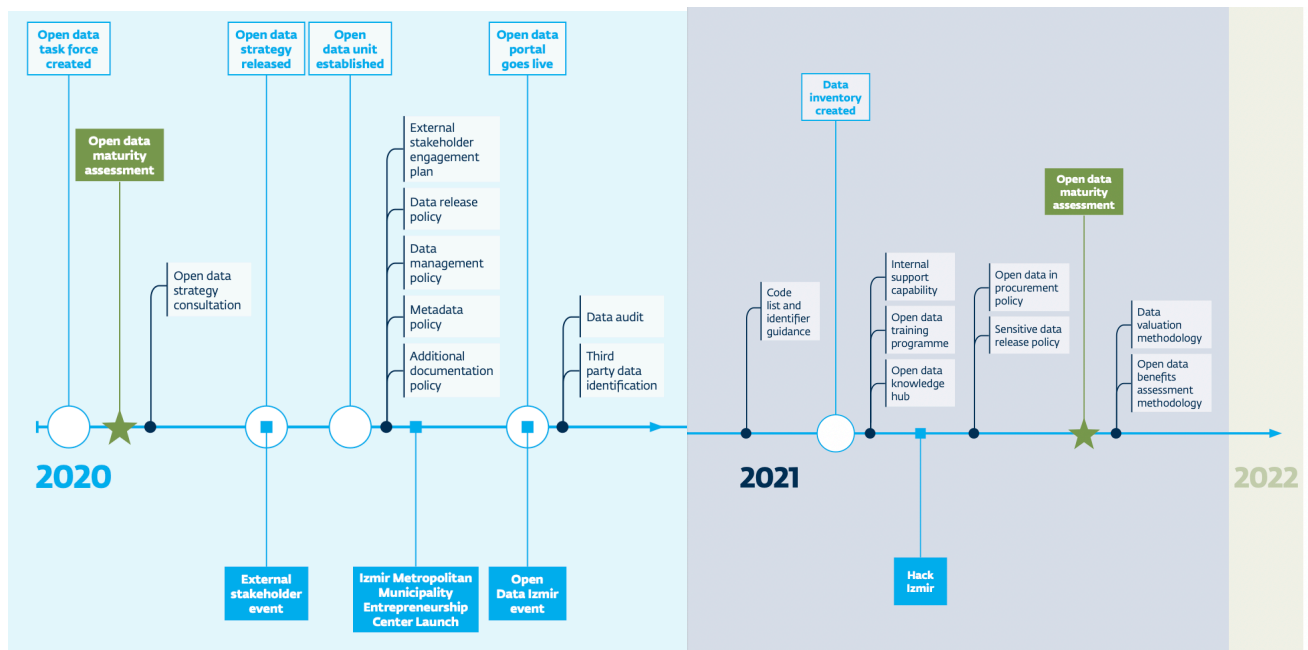
4.3. Open Source Data in Izmir

This part of the research is to understand the data approach of the Smart City and Open Source Data understanding of Izmir. Questions regarding the regulations on data and how the transition is planned are answered. In addition, the topic is discussed with the interviewees. Since there is limited information on the media on open source data, the research mainly focuses on the web page of the municipality, governmental reports and interviews.

Big data has opportunities and risks that need to have regulations based on priorities and values. The thematic categories of high-value datasets of the recent Open Data Directive (Directive (EU) 2019/1024) are Geospatial, Earth observation and environment, meteorological, statistics, companies and company ownership, as well as mobility.

"The legal basis for the release of open data in Turkey is unclear, although the 1982 Turkish Constitution (amended in 2001) refers within Article 74 to the right of access to public information, and establishes that everyone has the right to obtain information. Access to public information is regulated by Law No: 4982 of 2004 on the Right to Information. Within the scope of the law, any citizen can request data from government bodies that is available in physical paper or electronic forms, and should receive it within 15 working days" (International Finance Corporation, 2020: 10).

TABLE 4 - Open Source Related Reports

Year - Report	Organisation	Related Statement	
2015–2018 Information Society Strategy and Action Plan2	(Ministry of Development)	"public data held and produced by public agencies, including local governments, will be available to third parties for the development of value-added services, and hereby,	Article 67, pp. 109–110.
2016–2019 National E-government Strategy and Action Plan3	(Ministry of Transport and Infrastructure)	the objective on broadening the use of open data emphasizing economic benefits of open data	Objective 4.2, pp. 50–51.
2020–2023 National Smart Cities Strategy and Action Plan4	(Ministry of Environment and Urbanization)	establishing national and local smart city open data platforms, and ensuring their operability and sustainability	Act 19, pp. 582–593.

Previous strategy plans by governmental organizations highlighted the importance of the use of open source data as shown in Table 4. The transition of the digitalization of existing laws is shown on the implementation roadmap in Schema 2.

Schema 2: Open Souce Data Implementation Roadmap Souce: International Finance Corporation, 2020, pp: 4-5

The previous private transportation company, which applied the existing project for 2015-2030 in Izmir, gathered the data manually. Persona D explained the process as follows: "Some data are from the municipality and the rest is manually gathered from the busy areas, especially on working days, because people are going to work or school and need transportation more. The company made interviews with 3% of the population on Tuesday. Some of the questions were: "Where did you go yesterday?", "How did you go there?", "Are you happy?", etc. Some data are from the machine of the metro and bus, however it was difficult to gather information on where people get off because there is no record in Izmir to see how long they are commuting; they pay only when they get inside. Offices and universities estimate how many workers and students they expect in 5 years. The minibus and the dolmus (a sort of minibus), which are owned by private companies, gave the data. Also, some of the agents used the transportation to count the people one by one to find the valid numbers. The company placed emphasis on the students and the employees who need to use transportation more, and it included people with special needs, baby strollers, etc. They observed their daily life activities and needs. Persona C believes that data collection will be easier and trustful. However, the municipality needs to work on security with skilled agents. The IT department of the municipality operates and shares with formatted the data. Nevertheless, currently, computer language knowledge is needed in order to evaluate the collected data.

The municipality of Izmir does not have any background or skilled workers in order to prepare the strategic plan for open source data. The International Finance Corporation (IFC) prepared the strategic plan of open source data for the municipality of Izmir in September 2020 in collaboration with Manchester's Open Data team, and Izmir Municipality's Open Data Task Force, with

numerous interviews and focusing on participants from the government, the business community, representatives of civil society organizations and academia (Schema 2).

The strategy report of open source data highlights the necessity of data production that will be used for the benefit of all stakeholders of the city, such as the citizens, the businesses, academia and administration, and it will share the insights and the expertise of the administration and of others. In Izmir's case, the open data practice is still developing. Hence, the report mentions that the sustainable data program cannot be developed by the municipal government alone.

Cities' thematic priorities for open data are: the environment, transportation, data related to smart city programs, and agriculture. These are fields that are aligned with the city's vision as a "Cittaslow Metropol".

The strategic goal of Izmir is to have open source data on infrastructure, the quality of life, the economy, democracy, nature, learning and arts and culture in order to create a more citizen-oriented and collaborative smart city. The data does not belong to anyone since it is open sourced. Open source data is beneficial for participation, cultural events, tourism, administrate service delivery, effective information sharing, collaboration with the other stakeholders, awareness of the city challenges and opportunities, feedback, new investments, efficient business decisions, transportation information, academic researches.

Apart from private uses, individuals can also keep track of their own data. Citizen-generated data are collected from grassroots projects and organizations such as biodiversity and cycling. They voluntarily share to get benefit in public usage. Open source data is calling entrepreneurs to develop systems. For example, Ford Autosan's competition "Develop your city" targets the neighbourhood of Alsancak in Izmir in order to create smart mobility.

One of the goals of having open-source data is to encourage investors and entrepreneurs to prove their financial contribution that will be beneficial for all stakeholders. Persona B mentioned that there is a risk of data sources being more beneficial to private companies than to the public. The public image is more important than being part of the private sector's marketing strategy. It should not be imaginary forms that cannot be implemented. The focus should be on how it could be a part of everyday lives.

Transportation policies involve smart technologies in main transportation planning. The main focus is the pedestrians and cycling in the transportation system for a sustainable mobile slow city. The technological complexity is affecting participation. The systems have control centres and standards. However, pedestrians and cyclists do not have standard routes as public transportation means or other transportation types do. Pedestrians and cyclists have different lifestyles and participation is important in order to give feedback to the municipality and implement a decision-making process.

Persona A claims that data management is not transparent and safe. Public knowledge and participation do not suffice to ensure public trust. The data is not used by the entrepreneurs as

expected. Persona F mentioned that they do not do any research about the data, and the effect is not known yet. They assume that the data is protected but without any confirmation. The reports are even mentioning the importance of information and education, but the organizations do not have enough knowledge about the secure data.

The monitoring of the data is another issue in Izmir. Persona D stated: "The police department is in charge of monitoring the traffic. Depending on the projects, vendor companies and the municipality collect the data, and it is anonymous. For instance, IZUM system calculates the production over the data collected by this monitoring system. On the pedestrian streets, the car recognition system lets the cars pass (they are not allowed) for personal use. Only service trucks for shops or ambulances, etc. are allowed. The police track the data, not the municipality."

The private companies are sensitive to the data. Persona E is open to sharing the vision and solving city problems: "They care about the GDPR as a company rule and work ethic, not as government regulation. However, the municipality did not mention anything on the open source data that it required. That shows that the information of the projects is not enough and does not succeed in captivating the attention of the entrepreneurs as they expected. On the other hand, citizens or private companies generate alternative solutions for public use." The following question can be asked: are the company rules and the personal efforts of citizens more promising than the municipality in practice? Izmir is open to development; yet the collaboration between universities, municipality, government, private sector and citizens is not strong.

Transparency is important for public trust and investments. The open source data accessibility and clarity is important as well, as is safety. The strategic plans are mentioning the importance of cybersecurity and how important it is to work on that. The interviewees, media and the comments show that the importance of GDPR is not well-known and open source data is not efficiently used. The number of the people that reached the open source data is between 0 and 20 (web page of the "Open Source Data Portal of Izmir Municipality", 2022).

Interviews, the media and social media showed us that the users are sharing their data to audiences who are unknown or uncontrollable. On the other hand, open source data is not known enough by citizens or entrepreneurs despite what the municipality were aiming for in their strategic plan notes.

To sum up, open source data plays a big role in supporting a smart city as regards democratic participation. With the help of data, designs and plans become more efficient and valid. The strategy plans highlight the regulations of the participation and data production, however monitoring and safety are not strong in the current system. Smart City plans and regulations are influenced by the European cities and committees given that Smart City strategies exist there longer than they have in Turkey. With the experience of the Europeans and common interests, such as sustainability issues, collaborative work is promising.

4.4. Public Trust: A Study on an Application

"The design of co-production is not simply about what scientists and their partners do in making science more usable and putting it to work in sustainability policy but also how that work relates to and interacts with existing systems, structures, and processes of policy and institutions" (Wyborn et al., 2019: 330).

The primary purpose of a smart city is to improve the quality and performance of public services. Initially, Izmir started with a smart transportation system that incorporated information and communication technologies. Traffic management systems are monitoring, controlling, optimizing and operating traffic in urban areas.

The face-to-face communication is important for trust especially in political policymaking, and science. Besides technology shifted the communication remotely, and 'illusion of intimacy' can disguise itself as trustworthy local communication (Collins et al, 2022: 11). On the other hand the tangible projects help to gain the public trust of countries such as Turkey.

The streamed live data into the Transportation Management Centers allow transport officials and citizens to receive real-time updates about the city's transport conditions and availability. In Izmir, traffic flow and density can be monitored via the online platform Izmir Transportation Center (IZUM) since 2018. The most important benefit of the system is the use of road capacities at high efficiency, a safer vehicle and pedestrian traffic, shortening travel times, reduced accumulation and waiting times at the intersections. Currently, Izmir's citizens can download the free application "IZUM" on their smart devices. A summary of the system can be found at the beginning of this section. Although the system has been in operation since 2018, Izmir wants to place more devices and enhance the system continuously.

Public transport in Izmir consists of the following:
- Urban bus services, operated by ESHOT and Izulas, with 1,560 vehicles
- Urban ferry services, operated by Izdeniz; 24 ferries, using 8 quays
- Metro rail, operated by Izmir Metrosu; 1 line, launched in 2000
- Suburban commuter rail, operated by IzBan; 2 lines, launched in 2010
- Peri-urban/hinterland bus services, operated by ESHOT
- Hinterland paratransit services, operated by dolmus

Intelligent Transport System Applications at ESHOT: Automated Fare Collection, Automatic Vehicle Management, Passenger Information Systems, ITS-Facilitated Functions. The steps of implementation are as follows: Mass-transit schemes aligned with the Transportation Master Plan of Izmir 2030; this action is already in progress, including:

1. Procurement of construction works of Buca metro.

2. Construction of metro line including civil and E&M works.

3. Procurement of metro vehicles.

4. Handing over to Izmir Metro for operation.

5. Development plans to be updated considering planned main transportations hubs, transportation hubs, transfer points and P&R locations.

6. Metro station designs to take into account planned P&R areas.

7. Construction and operation of park-and-ride systems.

8. Local mobility schemes:

1. Feasibility studies to be prepared for scaling up existing scooter schemes and share-bike incentives.

2. Development plans to be updated considering planned pedestrianization projects

3. Preparation of hardscaping and landscaping design of pedestrianization projects

4. Construction of pedestrianization projects

5. Development plans to be updated considering planned cycling routes

6. Preparation of cycling infrastructure design

7. Construction of cycling infrastructure

8. Undertake and implement awareness raising campaigns on road safety (Izmir Sustainable Energy Climate Action Plan, 2020: 68).

To apply smart traffic management, e.g. introducing a command centre that action owner is Municipality of Izmir and actors are IZUM, Citizens, Entrepreneurs (for new app development), NGOs (cyclists, pedestrians, logistic sector representatives, etc). Financial support is, Municipal Budget, IFIs, PPP, IIBank.

The system is reproduced without public participation. The associations of transportation and individuals choose to give their feedbacks in a formal way. They write their concerns, needs or proposals to municipality. These feedbacks are not in the open source data. The only criticism regarding the existing project is the IZUM mobile application feedback section.

4.4.1.Izmir Transportation Center (IZUM)

Related with Green City Action Plans which is supported by World Bank IZUM is announced as 'Turkey's most comprehensive smart traffic system'. The 24-hour control system keeps all the main arteries of the city and manages the traffic. The system cost 61 million 500 thousand TL. The Center aims:

- to observe and control traffic violations,

- to use road capacities with high efficiency,

- to render vehicles safer and to monitor pedestrian traffic,

- to shorten travel times, to reduce the accumulation and waiting times at the intersections.
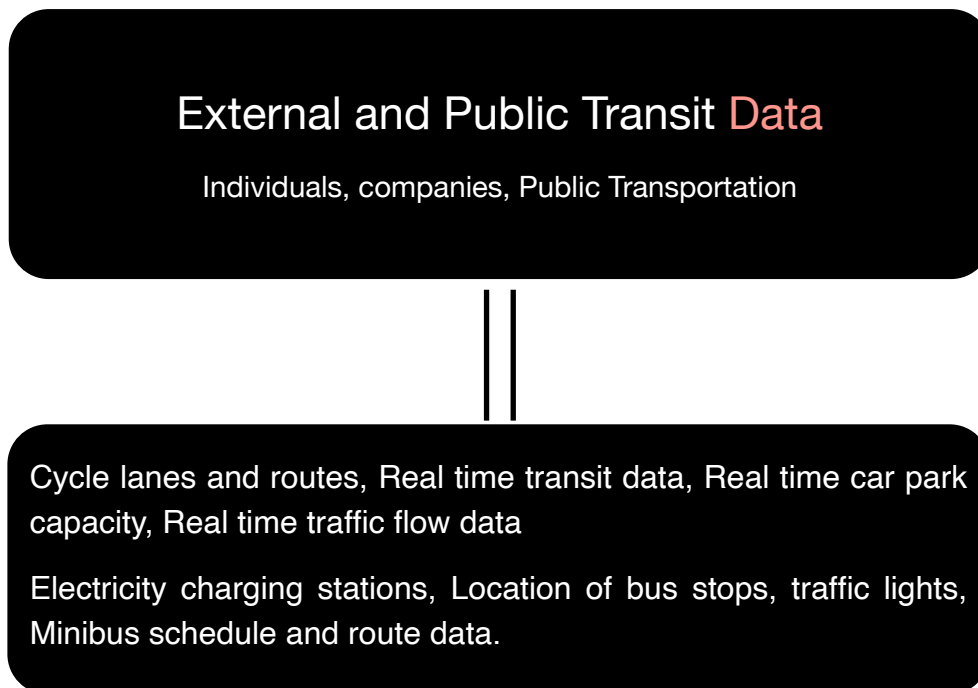
Figure 8: Data sharing schema

The Data scheme (Figure 8) represents the Data collection and the shared data.

Social Reactions on IZUM:

Related with the transportation system, the app IZUM was developed in 2017 by the outsourced company Invipo (the company was working on smart cities with the previous mayor). However, even though the new mayor focuses on smart technologies, the application has not been updated.

The end-users interact with the IZUM app. The app is a useful tool to understand more about the smart transportation transition. The app is where political decisions and citizens meet. The research focused on the feedback with social barriers. The application was built before Tunc Soyer was elected and has not been updated: the last update was made on 2018 on the App Store, and on 2017

on Google Play. Data protection and security policies were updated on May 5, 2017 on Google Play.

The selected negative feedback of the application in the App Store from 2017 counts 10 comments in total, and the rating is 2.0 over 5 with 357 votes:

'useless' 'not working' 'You are making an application, you are paying serious money to a company, but are you inspecting it? I think no, what kind of app is this? Even though you know the bus number, it is not on the list. If you do not know the number, there is no line to call?' 'Trip planning not working.' 'Neither the cameras nor the bus lines are working. The application is beyond garbage'

On Google Play, the selected user negative feedback since 2017 counts 27 comments in total ,and the rating is 2.0 over 5.0 with 1100 votes and 100k+ downloads:

'It would be better if an application was made that will not make you wait at the bus stop. Thanks to GPS, we can learn where the bus is and how soon it can arrive according to the traffic jam. Pharmacies on duty do not appear.'

'If we could do Izmirim card transactions, then it would be a compact and sufficient application. Insufficient for now. We have to use 2-3 applications.'

'The application does not show the busy traffic, impossible to understand'

'The people who do not like the app are Izmir haters'

'I don't trust the routes and timelines'

'It is a shame Izmir has that application, nothing is working'

'Tunc Soyer do not sleep, the application is a failure. It is beyond garbage. Scandal.'

'The bus line does not work, why does the citizen download that app?'

'The traffic density part of the app does not work, we wrote comments, sent emails and no-one is answering'

'Municipality does not hear us. During the pandemic the halkapınar hub has a big crowd. We are expecting service not lies'

'It is not working like CHP (the Turkish party) municipality system'

'The traffic that has entered the opposite lane in the direction of Bayraklı tunnels exiting Çiğli is advancing step by step, there is another accident on the golden road and there is 0 accident in the application.'

13 positive comments over 27, mostly in 2017. Some of the selected positive comments:

'Izmir always do the best'

'Very good idea, well done.'

'Awesome, I hope you will keep working'

'The server should be better in the future and if you consider feedbacks it will be better'

'A worthy application for Izmir. It is also necessary to congratulate this application creator company Invipo. The interface and the functions are well done.'

TABLE 5 - The feedback interpretation related with social barriers	
The social barriers	Negative feedbacks
Trust on controlling devices	4
Service satisfaction	5
The reliability of the services	9
Privacy and security	0

The users' comments listed through the social barriers on IZUM application (Table 5). Some comments have two or more negative aspects. There is no feedback on privacy and security. The reliability of the services has the highest impact as a social barrier, following service satisfaction and trust on controlling devices. Privacy and security do not have any social barrier since there is a lack of knowledge and awareness. The interviews and reports mention its importance, however the reports do not have enough action plans regarding privacy and security.

The feedback for the application is not only for the application itself but also a reflection on politics, the city or the mayor itself. The comments are for the current mayor, and the party of the municipality, which opposes the current government, is rarely mentioned. Some comments are supporting the current mayor even though they do not give positive feedback on the application.

The IZUM app has the potential to be adopted by the users because they give feedback on how to improve ideas, and some gave a second chance (Paker and Cotur, 2021). The users' attitude is negative in their comments - accessibility to the system, general the system quality, quality of the benefits, valid knowledge, complexity of the system, time cost of the system.

The people who recommend the applications are few and some are supporting the mayor and his work. They mostly do not recommend the application since it has not been advertised and promoted. Beyond technological and investment concerns, some citizens feel unheard by the municipality. The trust from the citizens is low, and they mention that they are disappointed since their party disappointed them.

Public transport information system is the most important thing for most of the citizens. However, the system does not sync and is not on one dashboard, something that causes difficulties in traveling continuously. For example, the app does not show traveling from a bus to a tram in one line. The users need to use two apps in order to see one travel plan. It is not a user-friendly design and it does not show the time schedule.

The regulations and all the scenarios behind the projects have good intentions and good reports, however the application itself is not useful, synced, or beneficial to users. There are some other applications that are being developed by individuals. Society takes care of its own needs. There are two reasons as do not want Izmir to change their political party, they want to support them. In other words, they want to keep opposing the central government. In that sense they believe they support their city and find their own solutions.

The municipality does not have any answer for the negative feedback. That makes the citizens feel unheard. Citizens give their reactions over their policies and other projects of the municipality from within the application. Some users offer to make the application on the App Store and on Google Play. Furthermore, there are alternative applications developed by citizens.

In the digital era, re-framing the urban issues is needed to make their focus more citizen-centric, with the traditional version in mind. This transition is possible with a strategy, multi-stakeholder negotiations, policy changes and investments with comprehensively thought plans. Transparency and democratic participation builds public trust more than the promotion of technological inventions. The participation of Izmir's Smart Transportation System is not as strong as the other urban decisions.

In order to provide well thought-designs, it is necessary to shape requirements so that they take democratic participation in many fields into consideration, because of the complexity of the cities. Furthermore, the transparency of ideology, policies and ethics of the projects affect the participation of society, public trust and the acceptance by society itself. Izmir's citizens participate either voluntarily or with an exhibition or gamification. Hence, the lack of participation and the lack of promotion of smart transportation is only the use of the police to monitor the traffic violations.

5. Conclusion

The Smart City concept is emerging as an answer to rapid urban growth and climate change. Each city has its own political and social structure and history by which to choose the implementations. Izmir has started Smart City plans and implementations with smart mobility that strengthens the socio-technical imaginaries related with quality of life and sustainability.

The competition between mayors, the motivations and their ideologies play an important role in transforming political power. Izmir opposes the government, so it is under more pressure to influence the other cities in a positive way. Izmir emphasizes sustainability, quality of life imaginaries in related with 'Citta Slow Metropol' and 'smart enough city' concepts. The case of Izmir's smarting systems is unique, with awards with GreenUP project on sustainability subject and zero emission projects by HORIZON2020. On top of that, Izmir is the first city to be titled 'Citta Slow Metropol'. The economic and knowledge capacity of Izmir Municipality led to the support from the EU and the World Bank.

The political, ideological and ethical aspects of smart city shape the systems that cater to the different needs of the city and society as a whole. The answers to how Izmir chooses to invest in smart city can be listed as:

- The vision and plans on sustainability, car-free city subjects aligns with Smart City features,
- European support and their success on project proposals in International Conferences and workshops on cycling, smart transportation,
- Citizen-centric approach and strong collaboration with citizens,
- The city centre has dens traffic due to population growth,
- To be transparent and strengthen democratic participation,
- To provide high quality of life and ecologically sustainable transportation,
- Smart enough policies to invest and to make the transition in due time.

Izmir Municipality urban plans focus on sustainability and quality of life improvement that align with the Smart Enough City principles that are influenced by the European Cities to create sustainable, democratic, modern and citizen-centric cities. With the smart enough city and citta slow metropolis concepts, the decision-makers are promising to create slow, sustainable cities that provides quality of life. Accordingly, the main vision of the Izmir Municipality, initially the smarting transportation project, has begun to reduce carbon emissions in Izmir.

One of the opportunities offered by a smart city is the empowerment of the citizens. The smart mobility needs to be in collaboration with the society. The citizens of Izmir are supportive and willing to work in accordance with the local authority. The number of youths who use the internet in Izmir had the potential to create and produce intelligent systems as well as giving feedbacks. From that point of view, the smart technology implementations have the potential to become part of everyday life. In other words, the future citizens of Izmir can adapt the smart system by "creating a more informed citizenry and fostering creativity, inclusivity, empowerment and participation" (Kitchin, 2015).

Yet, in the newspapers and on social media the promotion of smart cities is not strong enough. Citizens are not well-informed and they are not aware of the existence of smart transportation applications. The media only mentions that smart cities features will be applied as they are in Europe. This title shows that the motivation of smarting technologies in the city is to make Turkish cities as modern, technologically-adapted, sustainable, economically developed with high quality standards of life like the European Cities. Besides, Izmir is collaborating with the European Commission and participated in workshops, exhibitions, competitions, conferences to develop the decisions and regulations.

In Izmir the idea of generating Smart Systems mainly started with workshops, conferences and programs. This improved the idea of Smart Transportation Systems that can reduce personal mobile usage with increasing bicycle and pedestrian routes. The outcomes of the projects have not been applied to or mentioned in any reports or plans. Moreover, the projects that are discussed and mentioned in the conferences and workshops have not been implemented. There are activities and thoughts, however they are not applied and there is no reason found why this is so. The implementations of smart transportation system of Izmir will be run by outsourced companies.

Well-designed networks with locally-adapted systems are the key to concretize the imaginaries in accordance with public values. The outsourced regulations do not efficiently represent the local urban needs of Izmir and will not be the answer to the future city needs. The participation of different actors is important as is taking under consideration the different types of knowledge, voices and demands. Also, who is choosing the actors and what are their priorities that influence the technology in the city and the future city image.

The European-influenced smart city in Izmir is not the demand of the citizens, as evidenced by their weak participation. It is a risk to shift business for the benefit of a small group of people instead of

the public's. As a result, the citizens interact with the smart city as consumers and residents, besides being the product of the market as data. When the smart cities are not compatible with the main urban problems, it becomes an image for politicians as marketing and branding the city or enabling their main political goal. Under this facade, the smart city as a market is attractive to private business investments more than it meets the public's demands. The imaginaries can be beneficial for businesses as well. The success for the smart cities is possible if it caters for society's needs instead of being employed as one of the politicians' tools and competitive advantages

In the strategic plan of open-source data that is prepared by IFC for Izmir Municipality, quality of life is related with easy transportation information access; however, the comments of the application show the lack of accessibility to the information. Thus, the strategic plan mentions that data security should be developed. Without data protection the urban systems will be buggy, brittle and hackable which create systemic vulnerabilities. The citizens and associations do not have knowledge about the data protection.

The interviews and the reports show that the open-source data is not used as planned. Izmir uses smart systems in order to collect data and exploit it for public needs. The lack of education and information do not make that clear, even within the municipality. Not only the definition of the smart city but also the application and the data ownership are unknown to society. Also entrepreneurs are not using the data as the municipality aimed in the beginning.

The data does not belong to anyone since it is open-sourced. Except for the private uses, however, individuals can also keep track of their own data. Voluntarily they share it so as to get benefit in public usage. The open source data is calling out to the entrepreneurs to develop systems in Izmir. The most important risk of data is the problem of security. Data protection is not a priority in Izmir Smart Transportation System; it might be misused, so the system should use encrypted communication. Users' comments regarding the applications are not promising.

The expert views in the interviews showed how important education and information are in the use of the smart systems. The data and energy sources should be secure and sustainable, and supported by regulations even before their design. Data risk should be considered by the authorities, who should prepare a clear strategy with Izmir citizens.

The open source data and the regulations aim to enable the citizen and entrepreneur contributions. The small scale investments are being targeted by big companies at this time. The big companies buy the product and they build their own policies or the small-scale businesses can change their policies with the growth. One of the challenges is to keep the project as beneficial for the public as possible from the start of the projects. For instance, Istanbul's Smart Automatic Parking was launched as a public service; however, it became more of a profit for businesses rather than society. Hence, there is a risk for Smart Cities to become more beneficial to private companies than to the public.

Policy makers promote technology as beneficial to society and urban life in Turkey. On paper, the system works; however, the implementation is not as successful as they promote it to be. The facade is mainly used to highlight the work that has been done for the city; nonetheless, this work is not obvious within the city. The follow-up and monitoring is not strong. The lack of experts as IT scientists, data analysts, etc. causes the cities to give the projects to outsources. However, after applications there is not enough experts to monitor in the municipality.

To create a successful Smart System, the infrastructure of the central network is a key in Smart City Planning to connect and monitor the system. The smart applications in neighbourhoods or small areas do not address all city issues in the long term, and they create social inequalities in the city. With this perspective the living lab approach structured the European policy initiative "i2010" as a guide for developing and implementing new technologies which "support the provision of services for broadly-based innovation deployment to industry, bringing technology test beds into real-life user environments" (Office for the Official Publications of the European Communities, 2006: 13). However, Turkey does not have living labs yet. Not having a centre of network and living lab causes discrepancies between the government's organisationnel priorities.

On the other hand, from a financial point of view, systems are expensive and the cities tend to build the hard domain applications partially. As a system itself, the network will not be continuously smart enough. For instance, the application of each transportation module in Izmir is different and it is not accessible and connected.

The lack of a comprehensive network and academic collaboration entails risks to public trust, application usage, and the economic benefits of only some groups. The reports adopted from Europe are not focusing on education and public participation. As a result, the market and financial benefits are regarded as more important than the public benefits. Furthermore, the experts and entrepreneurs are the new actors involved in technology-based decision-making. The industry and authorities, as service providers for users and the environment, make decisions based on their visions. In other words, each category has its own subcategory, and prioritizing them depends on society, politics, economics.

The research highlights are:

Lack of organization, the communication between the actors is weak.
Lack of alternative options,
The implementation of the smart systems is expensive,
Lack of participation of different groups and citizens,
The applications are not efficiently designed to be used by citizens,
Lack of security regulations. The data is open to be hacked or misused,
Lack of skilled labour, agents in the municipality,
Lack of education for users and government agents.
Weak interaction between users - the applications and between applications - applications
Lack of permanent solutions, temporary solutions do not have continuity,
Lack of transparency of the policies and the coverage of the regulations is insufficient

In comparison to the United States and to other European countries, Turkey has fewer numbers of Smart City projects because of the limited funding, a deficit of qualified human resources and a lack of Global Information Systems (GIS) infrastructure.

In addition, future projections of the cities are related with the number of internet usage and youth. The key factor is participation in the decision-making process in order to negotiate and produce actively in the system. The participation level in the smart city makes the citizen a leader, a tester or a consumer/product (Arnstein, 1969; Cardullo & Kitchin , 2017). The statistics of the youth and use of internet in Turkey is higher in comparison to European cities. However, the knowledge, background and education are not comparable to the ones from European cities, and the outcome of these activities has not been applied. The lack of participation renders the citizens as products or consumers in the Smart Cities of Turkey.

European cities have more experience in the technology, stakeholders and public relationships of Smart Cities. For instance, cities such as Amsterdam, Barcelona, London and Stockholm are more aware of the importance of transparency, participation, and collaboration, so they take public values into consideration. Enabling the citizens' interaction strengthens political goals such as increasing the quality of life with services, infrastructures and other general conditions.

The democratic, wealthy cities in Europe that have a well-educated population as Winterthur, Switzerland and Amsterdam, Netherlands focus on public values. They try to create strong integration between society and smart city solutions. Amsterdam has started many smart city projects at the grassroots, without any government involvement (Neuroni et al., 2019). In Turkey there are smart city projects which are built by the citizens and organizations as well; however, they are not successful and adapted as Amsterdam. Hence, Amsterdam has more experiences in Smart

City concept than Izmir, and the social awareness and participation is higher than that of Izmir. Another difference is that the main urban problems are ignored and the smart city solve partial problems in the cities like Izmir.

Wintherthur is focusing on energy sources, renewable energies, with clear targets such as health and mobility. In comparison to Winterthur, Amsterdam is more process-oriented than goal-oriented (Neuroni et al., 2019). Izmir can be considered as goal-oriented; however economic differences affect the results.

The co-production process alters the institutions as well as the individuals. The stakeholders should be aware that the decisions will change existing science-society interactions.

The technological improvements are competitive between the cities and nations, since it is a way to strengthen their reputation and global relevance. Branding cities towards technology means changing its main goal in order to satisfy the citizens'demands and shifts to a market place. However, ignoring human capital dimension in technology will not create authentic and vibrant places. The machine-like, monotonous smart cities curb the variation in the city and threaten to create a digital divide and social inequality.

Drawing on recent works by scholars, the description of the Smart City is depending on the cultural background and overall political goal. Besides, the definitions are supporting the socio-technical imaginaries for techno-political goals. Some researchers are concerned that the smart city is a new way of funding a new market, since implementations are not as successful as promoted and the initial problems of the city are different than what the actors focus on, while others believe that the monitoring system is a new way of control and a new market for repurposed military technologies. Therefore, Smart Cities technologies make the city a 'place of power' (Wiig, 2017; Sadowski et. al.; Kitchin et al. 2019; Baykurt, 2020; Mukerji, 2003).

This research argues that the concepts and regulations of Smart City understanding cannot be global because of the complex nature of the cities. The one-size-fits-all understanding excludes local specificities and creates cities that are ahistorical, aspatial, and reduced to generic markets. However, the local values and daily-life behaviours are important to sustain the culture. From this viewpoint, the regulations that take local values and needs into consideration will change the Smart Cities.

6. Limitations

This research was conducted based on information and opinions by academics, experts, government agents and association and media, social media with the keywords 'smart' 'smarting city' 'smart technology' 'smart city' 'smart cities' 'auto system' 'smart systems' 'smart traffic' 'akıllı' 'akıllı kent' 'akıllı şehir' 'otomasyon' 'akıllı trafik'.

Izmir is new to 'smarting systems', the projects finished while I was writing my thesis and I have updated it in accordance with recent news and announcements. Some projects in the Strategic plan have not been implemented yet. The aim of the study was to measure the potential risks, with limited time and literature. The questions can be answered after the usage of the system and by comparing the data outcome.

The political aspects were avoided because the volume of the collected data is not enough. The study is based on the limited interviews, media and reports.

7. Further Studies

Literature is not enough on social aspects or political regulation of smartness and data protection policies as STS field for Izmir: '*relative lack of engagement from STS scholars with long-standing questions of global urban hierarchies, and ... the problem of urban difference*' (Farias, Blok, 2017, pp. 574–575). The problems of each city and its reactions to technology are unique. Hommels argues, "because STS concepts pay attention to *both* the social shaping of technology (or, here, spatial artefacts) *and* the technological shaping of society, they have more to offer [to analysts of the built environment] than traditional sociological concepts that can be found in the work of Giddens, Bourdieu, Harvey, or Foucault" (Hommels 2005, 329).

Under capitalism, people's time is valuable. With the help of the smart cities, people save their time instead of waiting in traffic. However, it is important to know how people are using their time. It would be valuable if a research that makes the connection to the use of time was conducted.

Moreover, Izmir is a coastal city and a link that connects Middle East to Europe. Transportation is not only important for the locals but also important for the international trade market. The global socio-technical imaginary of smart cities is to create sustainable cities. Izmir's smart transportation system aims to contribute to the global fight against climate change. Further studies with global relationships can be discussed.

Further research on the knowledge and awareness of society is needed to measure how many people know the projects applied. The question is if the government is afraid of technocracy and if it is not sharing all data as it should be doing.

The Smart City is a new form of city that affects society, politics and economics and the relationships amongst them. The contentious urban issues such as urban violence and urban slums of smart cities can be researched.

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Appendix
The Smart Projects in Izmir

Intelligent Management of Signalized Intersections:	All streets and intersections of Izmir are monitored and managed remotely based on real-time data. The system makes use of the generated data from traffic loads on junction arms and connected junctions in order to create the most appropriate signal plans according to the measured values. Not in pre-planned patterns, but automatically adjusted by computers according to the needs of any given situation.
Traffic Monitoring System:	With 103 cameras placed at important transportation points of the city, the city traffic can be monitored live both on IZUM and on the mobile application and web page.
Traffic Measurement System:	The information obtained by the 'traffic measurement sensors' placed on the main arteries is analyzed by the system and offered at the drivers' service. Traffic forecasts can be prepared in a week.
Traffic violation systems:	Under the headings of speed violation system, red light violation, parking violation and clearance (height) violation, whether the drivers act in accordance with the rules will be monitored 24 hours a day. The system will start in collaboration with the General Directorate of Security after the signing of the relevant protocol.
On-road car parks:	The system detects the occupancy of roadside car parks via underground sensors. The application shows the available parking spaces.
Pedestrianised Area:	Remotely-controlled cork barriers are placed at the entrances and exits of pedestrianized areas such as Mimar Kemalettin, 1. Kordon, Karşıyaka Çarşı, Kemeraltı and Kıbrıs Şehitleri. The system determines which vehicle can enter and when, based on license-plate reading. Barriers move for emergency response vehicles, and only vehicles with a defined license plate may approach.
Variable Message System:	Instant information billboards for the drivers with 'Variable Message Systems' placed on the main arteries.
Parking Lot Management and Guidance System:	Including disabled vehicle capacity of 65 parking lots for 11,079 vehicles in total provides users with real-time occupancy information via the website, mobile application and parking information screens along with the navigation service.
Talking Pedestrian Button for the Disabled:	Buttons for the visually impaired provide information about the street name, the shape of the intersection, and the traffic lights at the intersection in audio form. The sound level is automatically adjusted to 5 dB above the surrounding noise.
Public transportation:	Provides facilities of public transportation. Cameras are installed on all 1500 buses and passenger counting systems and on-board computers were installed at all doors. Bus information concerning the driver, the current number of passengers on the bus and the location of the bus is made available.

Accident and road closure information:	Information of closure due to any accident or work and providing alternative roads to the users through the system.
Meteorology systems:	Air temperature, road temperature, humidity, system, rain and wind information is available to drivers via led screens and the website.
In project scope;	402 Smart Junction Traffic Monitoring Camera at 110 points, 201 Traffic Measurement System, 47 DMS (Variable Message System), Mass transportation management system for 1500 buses , Priority system for 164 fire trucks, 30 Meteorology Measurement Systems, 151 Red Light Violation Systems, Parking Violation System at 114 points, Speed on 9 routes, Overhead Detection System was installed at 15 points in the corridor. In total, over 1 million meters of cable was pulled.
Administrative building	Turkey's first "Laser Video Wall" is used as the control room in the IZUM building in Buca/Toros, which is on an area of 1300 m², and it manages transportation in Izmir. The call center operates 24/7. The building has a R&D room, a traffic museum where historical materials related to urban traffic are exhibited, and technical-administrative work offices in order to follow new developments regrading traffic engineering.

Smart Stop:	Started with 10 stops in Izmir as Pilot and the target is to be applied throughout the entire city. With the QR code passengers can see the transportation info and give feedback.
The "Emergency Izmir"	Application developed by Izmir Metropolitan Municipality to reach people in order to help during natural disasters or emergencies such as earthquakes, fires, or accidents.
Smart Parking Lot Building:	Since May 2022 Izmir has Turkey's largest car park and one of the 5 largest in Europe, with a capacity of 636 vehicles. The building is a green building, with an autonomous system that can accommodate 6 cars at the same time and pick up a car in 3.5 minutes. The main goal is to improve sustainability and quality of life, given that the system decreases carbon emissions.
Izmir Agriculture Mobile Application	It helps agricultural producers of İzmir get professional agricultural support by analyzing satellite imaging systems with agricultural algorithms, monitor the status of the field remotely, and make spraying, fertilization, irrigation and aquaculture decisions with data support, and also with the open market module. In addition, it informs them of where they can exhibit their products for buyers.
Izmir Art app,	Ultimate Izmir Events Guide, provides detailed information about concerts, activities, and special events, as well as arts centers, community centers and artworks in Izmir

IzmirNET	The project brings together the units of Izmir Metropolitan Municipality under one roof in 500 km range. It serves as a common network infrastructure for government agents at speeds ranging from 1 Gbps to 10 Gbps with a length of active fiber optic cable.
WİzmirNET	The aim is to provide wireless, high-speed, free and unlimited internet service in various parts of the city. Free internet service is provided at 316 points in total, including 70 Parks and Squares, 20 Ferries, 7 Piers, 60 Buses, 17 Metro Stations, 41 Tramways, 80 Villages and 21 Transfer Centers in 30 districts. In addition, free internet service is provided in an area of 1,100,000 square meters on the 22.5 kilometer uninterrupted coastline of Karşıyaka, Göztepe, Bayraklı, Alsancak and İniraltı coastlines.
E-process	The main goal is to use e-government transactions such as market prices inquiry and other information inquiries. WEB site where the citizens can: - make their payments, - submit advertisements and fire insurance statements, - apply for eligibility report of fire compliance, - access the cemetery information system - access the infrastructure information system.
SMART NOTICE PROJECT (AIS) IMPLEMENTATION FUNCTION	With the development of Machine-Learning and Image-Processing technologies, real-time detection of learned visual scenarios with low margin of error has become possible. Applications built with image processing are of great importance in the infrastructure of Smart Cities. As İzmir Metropolitan Information Processing Department Software Branch Directorate, we have decided to produce a solution for the detection and rapid response of Forest Fires, which we consider to be the most critical of the current problems in our Region. Details: The cameras with 360-degree monitoring in 11 regions. Smoke scenes detectors in the region through the Artificial Intelligence module are processed in real time.
Izmir - Plan Project	It is aimed to use information technologies effectively in the planning processes of the Department of Reconstruction and Urbanization, to obtain and maintain plan data as smart data. Provides all processes of the Izmir Plan Project. The aim is to manage queries such as urban area uses, construction and settlement conditions, constraint areas, lawsuit decisions, geological survey information in an electronic environment in a safe, systematic and fast manner and to plan the Izmir of the future with accurate data by using decision-making mechanisms.

Bizİzmir	The features of the Application are as follows: • Available parking spaces in the car parks in the city. • Balance of his Izmirim card and top up balance on their card. • BizPuan that gives bonus points to use for concerts or courses for free or donates to a social campaign. • The pharmacies on duty and navigate the traffic to see shortest line through cameras. • The list of assembly areas in emergencies. • Prices list of vegetables and fruits. • The tariffs of transportation vehicles. • Available number of bicycles and bicycle stations. • Announcements about water-cuts and malfunctions. • Citizens can participate in surveys and express their opinions. • List of voluntary works.
Esrefpasa Mobile	The application allows the users to follow up the health check-ups. During pandemic online doctor meeting with e-appointment. Features of the application include: • Pharmacy on duty and directions to the nearest pharmacy • Analysis, pathology and imaging results performed at Eşrefpaşa Hospital • Making an appointment with the appointment assistant from the relevant branch according to the complaint • Making a video appointment • View application history • Hospital information • Personal follow-ups (height-weight, pulse-temperature-tension information, etc.) • Prescription and drug information written to the patient
Izmir Academy	The platform is open to all the citizens, who may get professional trainings according to all kinds of interests. The citizens can earn Biz Points through the app and spend it among 554 training courses. İzmir Academy is the first online education platform designed for Citizens Public Institutions. The software will be developed for the audio books project to be published through the app via İzmir Academy.
Cemetery Information System	Cemetery Information System allows the information of digital maps of cemeteries with integrating and analyzing the data, by collecting the information about the burials in the existing cemetery under the Department of Cemeteries of Izmir Metropolitan Municipality in a common database by the Geographical Information Systems Directorate of the Map and GIS Department.

City Guides	The "Izmir Three-Dimensional City Guide" prepared and constantly updated by the Izmir Metropolitan Municipality Geographical Information Systems Branch Directorate in 30 districts under the jurisdiction of all buildings and purposes of use, workplace names, official/private institutions (health, education, etc.), pharmacies and pharmacies on duty, transportation points, important historical buildings and information, cultural and tourism facilities, and photos of buildings and roads are displayed. At the same time, it provides an up-to-date database in terms of information needed by public institutions as well as private institutions and organizations and individuals. The user can design his/her own map on the guide and create his own layers.
2D City Guide	Real-Time Map broadcast application, prepared by the staff of the Geographical Information Systems Branch Office of İzmir Metropolitan Municipality, is a software that provides real-time presentation of the geographical data in the jurisdiction of Izmir Metropolitan Municipality, stored as "Geographic Information System Database (CBSVT)".
Digital Trunk Radio System	The system meets the digital radio communication needs of public security and emergency aid institutions of İzmir Metropolitan Municipality in every situation, including crisis and disaster.