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How the smart governance model shapes cities? Cases from Europe

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Abstract

Purpose – This study aims to discuss the transformational effect of the smart governance concept, which is one of the complementary elements of the smart city concept and to explain the change in governance structures according to the developments in information and communication technology.

Design/methodology/approach – In this study, the case study as one of the qualitative research methods is preferred, and smart city models of Barcelona, Amsterdam, Kocaeli and Ankara are examined.

Findings – In the research, scientific studies in the academic literature were evaluated according to the content analysis, and as a result of this analysis, the cities examined were grouped as "beginner," "medium" and "advanced." In the group, the characteristics of smart cities and the services they offer were taken into account. In this context, smart governance methods and their transformational effects are analyzed.

Originality/value – The most important contribution of this study to the literature is to identify the important characteristics of developed and successful smart city initiatives and to encourage their application to other developing world cities as a best practices model.

Keywords Smart city, Governance, Smart city governance, Turkey

Paper type Case study

Introduction

Smart governance is defined as following developments in information and communication technologies (ICT) and adapting them to governance approaches to improve decision-making processes through cooperation between different stakeholders (Pereira *et al.*, 2018, pp. 145-162). According to the research conducted by Meijer and Bolívar (2016, pp. 394-408), there are three concepts at the focal point of studies related to smart cities. The first of these is the technology-oriented approach supported by ICTs. The other is the human resources approach that drives local development and innovation processes and corresponds to a well-educated population. The last concept is the governance phenomenon that explains the partnership and network relationships between local stakeholders, from the inhabitants of a city to its corporate structures. When the relevant literature is examined, smart city governance comes to the fore as an increasing and up-to-date field of study. So much so that, based on European cities, theoretical studies on smart city governance (Pereira *et al.*, 2018, pp. 145-162; Meijer and Bolívar, 2016, pp. 394-408; Meijer, 2016, pp. 75-85), developing literature draws attention.

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In this context, the study, as emphasized by Meijer (2016, pp. 75-85), sets out from the point of empirical examination of the relationship between technological tools and governance, which come to the fore smart urbanism and to be examined under various themes. The main problem of the research is how the development level of smart city categories will affect administrative capacity. A case study from qualitative research methods was preferred in the study. It is essential to understand the complexity and context of an event in its natural environment with the method in question (Punch, 2014, p. 144). In the analysis of the data obtained through the documents, content analysis was preferred, which defines the data by bringing it together around certain concepts and themes.

While the concept of the smart city is explained in the first part of the study, smart city governance is explained theoretically in the second part. The cities in question within the context of smart governance are analyzed comparatively under themes determined as cooperation with stakeholders and citizen participation, governance mechanisms and smart governance and the transformative impact of smart city governance is analyzed. In the study, the cities examined, based on the existing components in the literature that smart cities should have, were categorized in terms of quality and content analysis was applied. The main problems of the study can be expressed as: What are the factors that enable being a smart city? What is the effect of governance-based policies in smart city projects? What are the political reforms in the transformation into smart cities?

Literature review

Smart city

The concentration of the world's population in urban areas brings cities to a key point as both a new social experience and problem-solving areas (Angelidou, 2015, pp. 97-106; Katz and Bradley, 2013). In addition to the demographic pressure, the existence of a series of problems such as global climate change and the instability of the economic structure necessitates the reconceptualization of cities and city administrations and formulating new policies in this context (Shelton *et al.*, 2015, p. 13). The demographic change, developments in ICTs and urban problems, briefly mentioned, bring the concept of smart urbanism to the fore. The smart city concept is not new. The term was first used in the mid-1800s to describe the new productive and self-governing cities of the American West. There are contemporary origins in the smart growth movement of the 1990s (Yigitcanlar *et al.*, 2018, p. 146) . The concept of smart growth, developed within the framework of new urbanism, encourages collectivistic ideas. It aims to increase the urban environment and quality of life in cities. Therefore, it desires to make cities more compact and less soil-consuming (Vanolo, 2014, pp. 887-888). A smart city is a place where previously unresolved problems such as social exclusion and climate change are resolved through digital technologies. The concept has come to the fore in industrial policy discourses on urban development (Martin *et al.*, 2018, p. 269). The smart city is global because it attracts investment, innovation and talent; however, as each city has its characteristics, the smart city is also a local phenomenon (Appio *et al.*, 2019, p. 8). The knowledge and innovation economy is the driving force of the smart city discourse. Factors such as technological pressures and demand-pull have shaped smart cities. Technological pressures indicate that society is driven by new supply mechanisms. Demand drawing refers to products that are developed and commercialized by social demand (Angelidou, 2015, p. 99). The smart city is an application of the concept of the Internet of Things (IoT). The concept of IoT aims to overcome the problems caused by urbanization and population growth in smart cities that aim to carry out activities in cities with the least human interaction (Silva *et al.*, 2018, p. 697). Kumar *et al.* (2020, pp. 45-49) mention four schools that explain smart cities: Accordingly, the restrictive school advocates

the adoption of technologies called the IoT and its integration into city infrastructure. The transformational school suggests that enhanced human capacity is a by-product of technological progress. The rational or pragmatic school states that it would be better to create technologies to facilitate the daily lives of smart communities. The critical school highlights the growing dissatisfaction with the smart city concept and practice. It highlights the increasing rate of poverty in smart cities.

Smart cities can be defined in two main approaches. On the one hand, the scientific literature suggests a comprehensive conceptualization of the smart city; on the other hand, smart city initiatives are developed as sector-based initiatives and organized around stakeholder groups and urban challenges (Anez *et al.*, 2018, pp. 5-7, Wolfram, 2012, pp. 175-180). There are three different definitions of smart cities in the literature. In these definitions, the factors of using smart technologies, having smart people and cooperating with smart cities, come to the fore. Governance-focused publications highlight interactions between various stakeholders in the city (Meijer and Bolívar, 2016, p. 397). The definition of smart sustainable cities combines traditional urban sustainability with the innovative participatory methods and ICT needs of modern cities (Huovila *et al.*, 2019, p. 149). Increased use of urban services by citizens is associated with a higher level of satisfaction and efficiency (Belanche *et al.*, 2016, p. 76). The transformation process into smart cities depends on the collective integration of technological, corporate and governance components. The smart city mission requires the use of technologies to ensure economic growth and improve the quality of life of citizens (QoL) (Kumar *et al.*, 2020, p. 2). Smart city initiatives are defined as a top-down effort by a leader who adopts ICTs and corresponds to a set of policies and visions to set goals and support implementation processes in this direction. For this reason, political leadership is a fundamental variable that ensures the adoption of smart cities (Wang and Ming Wu, 2016, p. 275).

Complementary elements of smart cities

The smart city is in connection with some elements related to urban life. The mentioned elements examined under six headings: smart economy (productivity), smart society (high social and human capital community), smart governance (good governance and policy), smart environment (sustainability) and smart life (liveability and prosperity) (Lombardi *et al.*, 2012, p. 139; Yigitcanlar *et al.*, 2018, p. 149). The smart city is concerned with environmental protection, technological improvement and quality of life and produces smart people willing to live in these cities, supporting technological and ecological urban processes (Vanolo, 2014, p. 894). In terms of planning, smart cities emphasize the sustainability of technological networks and the environment with investments in human, social and physical capital (David and McNutt, 2019).

Smart economy

The smart economy is about economic competitiveness, productivity, labor market flexibility and refers to the ability to integrate and transform with local and national markets (Giffinger, 2011). The smart economy, which is characterized by the transformation of human capital such as knowledge, skills, creativity, entrepreneurship into products and services, also emphasizes the green economy by creating green companies that aim to encourage renewable energy resources and increase energy efficiency within needs and costs (Kumar and Dahiya, 2017, p. 39).

Smart society

The concept of smart society, which adapts to changes in the environment depending on the quality of human and social capital, is open-minded and contains a cosmopolitan set of values, as well as having a democratic structure and active participation in public life (Gupta *et al.*, 2017, p. 25; Vanolo, 2014, p. 887).

Smart governance

Smart governance is the use of new communication channels for citizens and is called e-governance or e-democracy. Especially, the concept of smart governance, which emphasizes participation in decision-making processes, is closely related to the transparency of administrative systems and the availability of public services (Vanolo, 2014, p. 887; Lombardi *et al.*, 2012, p. 139).

Smart environment

The smart environment, which is closely related to the principles of sustainability and efficiency, draws attention to natural and green areas that do not contain pollution. It includes policies such as natural resource management, waste management system and systems to protect the existing green areas of the city from external factors, smart environment, reduction of carbon dioxide emission, efficient use of electricity and water (Albino *et al.*, 2015, pp. 5-21; Gupta *et al.*, 2017, p. 25).

Smart life

Smart life is characterized by the possibilities offered to small and large culturally diverse communities. Also, smart life, which corresponds to an environment where educational facilities such as universities are provided, technological equipment and devices are provided for every inhabitant of the city to have a healthy life, tourism and health centers are located and social adaptation problems are not experienced (Gupta *et al.*, 2017, p. 25). It removes the barriers to citizens' access to a quality life.

Smart city governance

Smart city governance, which emerged in many countries as of 2005, directs administrative organizations to adapt to infrastructure support systems and to establish better connection channels to better respond to the needs of citizens (Kumar, 2015, p. 10). For this reason, in contrast to the management approach that neglects the use of technology and social participation, taking advantage of technological developments in the axis of a higher quality of life and centering social participation gives the concept of governance to being "smart" (De Guimarães *et al.*, 2020, p. 2). Smart city governance adopts a public administration perspective, which emphasizes that the solution of social problems is not only a matter of developing good policies, but rather an administrative issue. Besides the environment, which expresses the regional and transnational position of cities, public administrations are also key actors in the governance process. Public administrations invest, develop and implement policies that promote smart sustainable development (Gil *et al.*, 2020, p. 34). Similarly, Chourabi *et al.* (2012, p. 2291) call the ICT-based governance smart city governance and explains it as the interaction of elements such as technology, society, information resources and social norms to support activities related to city management. Nam and Pardo (2011, pp. 284-291) consider the support of administrative organizations and governance-oriented policies as indispensable conditions for the design and implementation of smart cities. Smart city governance is inherently collaborative and hybrid. Public-private

partnerships are an effective model for presenting smart city initiatives (Sancino and Ve Hudson, 2020, p. 719). New inter-agency partnerships and alliances emerge with the development and implementation of data-driven governance projects. These reflect the extra-regional networks of key actors and institutions that finance and implement specific plans in cities (Shelton *et al.*, 2015, p. 16). Stakeholders are aware of each other's actions, coordination between actors is ensured through active participation and mutual support (Angelidou, 2014, p. 5). The four stages of smart city governance are listed as smart city management, smart decision-making, smart management and smart urban collaboration. The first stage shows that government structures and processes need not be transformed. At this stage, smart governance is about making the right policy choices and implementing them effectively. The second stage covers the need for smart decision-making processes and the implementation of decisions. The third stage emphasizes a high level of transformation as it requires a restructuring of the internal organization of the state. The fourth stage refers to the collaborative transformations of cities by various internal and external actors. The literature review shows that some publications identify the smart city with smart governance; some publications perceive the smart city as innovative decision-making ways, innovative management and innovative forms of cooperation (Meijer and Bolívar, 2016, pp. 399-400). As can be seen in Table 1, within the model related to smart city governance, in innovative organization and management, smart management is medium-high; as innovative governance networks, smart city collaborations have a high degree of transformational impact.

In summary, smart city governance includes governance that focuses on citizen participation, public and private sector partnership, data-based policy-making and thus corresponds to the increase in the quality of life of the city (Pereira *et al.*, 2018, pp. 153-154). Also, smart city governance, which removes the barriers to access to public space, emphasizes the principle of interaction based on trust and communication between the administration and the citizen (Figure 1). Grossi *et al.* (2020, pp. 637-639) make a trio of prescriptive articles highlighting the potential of smart governance, articles criticizing smart cities in a neo-Marxist way and technology-oriented empirical work. Accordingly, it puts forth technocratic and critical perspectives. From a technocratic perspective, citizens are consumers of the smart city. Technocratic rulers make the city better for the citizens. In the critical perspective, it is claimed that the privacy of the citizens is invaded and the smart city becomes the decision-making object of the citizens.

Methodology

Evaluation of smart city governance model as a process: measurement method

The study followed the guided analysis of quality content. Relevant literature studies and theories are based. The category development process is based on deduction. In the

Table 1. Conceptual framework of smart city governance

Dimensions of smart governance	Level of impact on transformation	Focus point
Smart city management	Low	Good governance
Smart decision-making	Medium to low	Innovative decision-making processes
Smart governance	Medium-high	Innovative organizations and governance
Smart collaboration	High	Innovative governance networks

Note: Meijer and Bolívar (2016), p. 399

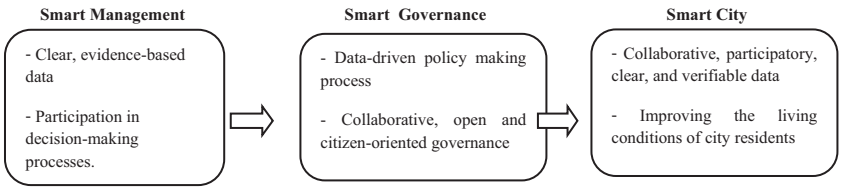
categorization, Hutchison's and Giffinger's frames were combined as background. It was thought that integrated smart city strategies would help city dwellers to be more informed, participatory and connected. These strategies also encourage businesses to be innovative, productive and agile (Angelidou, 2015, p. 102). The content analysis offers valid inferences and analytical structures from existing texts. It facilitates the process of understanding the phenomenon under study. Terms such as "smart city," "smart city research," "smart city management" and "smart city planning" were used in Web of Science, EBSCO and ABI/Inform databases to analyze the meaning of smart cities and the perspectives of different academics. All articles are reviewed and categorized according to their content and perspective. In the articles, the perspectives supporting the smart city were more intense, while those questioning the existence of smart cities pointed to problems such as social inequality, transparency, privacy and protection of personal data. The cities examined within the scope of the study were coded according to their characteristics as "beginner," "intermediate" and "advanced" according to content analysis. Apart from the content analysis, the comparative method is also used to determine the qualitative differences for the cities examined in the discussion of the findings.

One of these measurement methods is the acceptance of the smart city governance model as a process and the factors that make up the model in this way (Ruhlandt, 2018, pp. 4-23; Lombardi *et al.*, 2012, pp. 139-149; Marsal-Llacuna, 2016, pp. 1195-1216). These factors; citizens, various public institutions and organizations, political parties, research centers, universities, private sector organizations and the concept of stakeholders that includes civil society (Ruhlandt, 2018, pp. 5-6). Stakeholders of smart city management can be grouped under four titles as political, social, economic and thought units. Political stakeholders administrative institutions, organizations and political parties; social stakeholders civil society and organizations; economic stakeholders include public and private companies and the stakeholders include universities and research centers (Anez, 2018, p. 7, Papa, 2013, pp. 7-15).

The participation of different stakeholders in decision-making processes in smart city governance is a driving force for city management. Therefore, smart city governance guides communication between public administrations and other stakeholders by focusing on citizen participation (Bifulco *et al.*, 2017, p. 22; Lombardi *et al.*, 2012, p. 148).

Although it is mentioned under the scope of stakeholders, the most important factor of the smart city governance model is citizen participation (Ruhlandt, 2018, pp. 5-6). Bifulco *et al.* (2017, pp. 24-37) and Marsal-Llacuna (2016, p. 1195-1216) argue that citizen participation is a dominant element both in the production of innovative public services and the creation of common values in smart city governance.

The second factor of the model in question is the governance mechanisms that will ensure the participation of stakeholders in planning and decision-making processes (Ruhlandt, 2018, p. 7). Public authorities need to act in a supportive role by making



Source: Pereira *et al.* (2018) : 153

Figure 1.
Smart city governance model

necessary institutional and legal arrangements for connecting stakeholders related to city management to smart governance structures (Nesti and Graziano, 2019, pp. 650-667). At this point, the concept of smart management that brings creative solutions in terms of both internal structure and technological knowledge and hardware of public organizations regarding smart city governance by Meijer and Bolívar (2016, p. 400) comes to the fore.

Cases from Europe and Turkey

In this section, smart city governance models of Barcelona, Amsterdam, Kocaeli and Ankara will be examined. These cities were selected according to the smart city index published in 2020 by the Management Development Institute (IMD), an independent academic institution. While it is included in the relevant index with Amsterdam (A), Barcelona (BB) and Ankara (B) scores, Kocaeli, which received the best smart city technology award in 2016, constitutes the last part of the sample based on the purpose of the study (Kocaeli Metropolitan Municipality, 2020b; IMD, 2020, pp. 8-9). Amsterdam and Barcelona are the countries that are primarily examined in the literature in smart city initiatives. Ankara, on the other hand, is a city with important projects in which strategic planning and applications related to smart cities are initiated. Kocaeli Metropolitan Municipality has a population of approximately 2 million from Turkey. The main rationale for choosing this city as an example for our case study is attempts to transform a traditional city into a smart city. In addition, new applications have motivated us. For example, the said metropolitan municipality is already on the way to become a smart city and creates a special distinction for this purpose (Kocaeli Metropolitan Municipality, 2020a). It was also awarded by a public platform in 2016 as a successful example of the use of smart city technologies (Kocaeli Metropolitan Municipality, 2020b).

Barcelona

Considered among the best smart cities in Europe and even in the world, Barcelona received the European Capital of Innovation award in 2014 (European Commission, 2014). The city of Barcelona, which handles the concept of smart urbanism with objectives such as improving commercial processes and service provision through ICTs and ensuring accessibility to management, bases the projects they develop on five pillars (Silva *et al.*, 2018, p. 708). These are open data, sustainable growth, social innovation, infrastructure based on ICT and development of smart services and finally, research centers, universities and relationships based on public and private partnerships (Capdevila and Zarlenga, 2015, p. 269). Barcelona's smart city mission is based on the idea that it is a city of people. It aims to promote economic progress as well as improving the well-being and QoL. Creating an innovation ecosystem with the participation of the private sector and citizens forms the basis of the urban strategy. For this purpose, the necessary legal framework has been prepared for the development of public-private partnerships (Kumar, *et al.*, 2020, p. 8). Smart city internal government services provide services to improve the daily lives of citizens and services from citizens to citizens. Internal government services enable municipal councilors to make better decisions and design policies with the information provided by public employees. The model developed public services, accessibility to information, infrastructure plan and highly creative business opportunities (Silva *et al.*, 2018, p. 710).

In this context, Barcelona, which wants to catch the smart city standards, implemented the 22@Barcelona project in the early 2000s to increase the economic, scientific, technological and green infrastructure and life quality of the regions (Bakıcı *et al.*, 2013, pp. 137-148). 22@Barcelona Region is a representative example of large-scale urban

regeneration projects. Based on the principle of openness, it is a project equipped with an advanced technology infrastructure that attracts businesses and other organizations based on innovation (Kumar, *et al.*, 2020, p. 8). The project offers an augmented reality service to facilitate the decisions of the suburbs, such as finding the closest bus stops, subway stations, trams and trains (Appio *et al.*, 2019, p. 4). Owing to the fragmented structure and coordination requirement that emerged in the execution of the project, a new flat called "Habitat Urba" was established in 2011. Working in cooperation with many local actors such as Barcelona Institute of Technology, "Barcelona Activa," "Catalan Research Center İ2cat" in the execution of regional projects, an important governance network has been established by acting within the framework of the public and private partnership (Bakıcı *et al.*, 2013, pp. 137-148; Nesti and Graziano, 2019, pp. 650-667; Nesti, 2020, pp. 24-25).

As mentioned before, Barcelona, which was awarded by the European Commission in 2014 with its smart urbanism concept, has set its focus on citizen participation by aiming to create a transparent, honest and democratic city as of 2015 (Drapalova and Wegrich, 2020, pp. 675-676). In this context, the online citizen participation platform "Decidim" (Decision) has been developed. With Decidim, smart city construction has undergone a shift from government and private interests to citizens and communities, civic movements and social innovation practices. Attention has been paid to the fact that the smart city includes the basic elements of harmony and justice at the communal level from a collective and view (Cardullo and Kitchin, 2019, p. 826; Decidim, 2020; Drapalova and Wegrich, 2020, p. 676).

The "Ethical Mailbox" application, which was put into use in 2017, enables citizens to share bad management practices with the municipality's "Office for Transparency and Good Practice," without their identity information. The office sends the incoming reports to the relevant units and an investigation is initiated by the parliamentary commissions. "Open Data BCN," which opens the management's resources such as statistical data, analysis, information on public services and visual materials to the public. With the application, it is aimed to develop transparent management, improve the services to be offered to the citizens and make governance effective (Ajuntament de, 2020a, 2020b). The smart city vision of the city is to create high capacity human capital by developing the knowledge economy with technology and efficiency-oriented goals. The city has a futuristic smart image in terms of advanced technology and design and promotes the region as a place of cooperation and information exchange between the people and businesses of the city (Angelidou, 2015, p. 102). The city has developed 79 smart city projects in the fields of public and social services, environment, mobility, research and innovation, business, communications, infrastructures, tourism and citizen cooperation by 2015 (Nesti, 2020, p. 25). The city is a blueprint for neoliberal smart urbanism, has formed partnerships with multinational companies such as CISCO, adopted the concept of technological sovereignty as a new form of citizenship and has appointed a commissioner for technology and digital innovation (Cardullo and Kitchin, 2019, p. 825).

Amsterdam

Amsterdam, which has an important past and experience in terms of smart city innovations, was awarded the World Smart City Awards in 2012 and was selected as the European Capital of Innovation in 2016 and 2017 (Sancino and Ve Hudson, 2020, p. 706). The Smart City initiative is based on a transformation based on the themes of living, working, urban mobility, public facilities open data, creating a unique partnership between businesses, research institutions and the people of Amsterdam. Amsterdam Smart City is a partnership between businesses. It consists of authorities, research institutions and the people of Amsterdam, as well as more than 70 business partners, including CISCO and IBM. It is

based on 32 area-based projects across Amsterdam that focus on energy transition and open connectivity. Projects focus on the most effective implementation of citizens' private consumption. One of the most famous projects is the use of smart and energy-saving technology, which was implemented from 2009 to 2011 in the popular shopping street Utrechtsestraat. Another project is the West Orange project. An energy management system aimed at monitoring and controlling the energy consumption of 400 households was introduced in this project (Kumar *et al.*, 2020, p. 7).

The process of realizing the smart city concept of Amsterdam is examined in two stages (Capra, 2016, p. 26): The first phase, which started with the Amsterdam Smart City project in 2009 and is expressed as the programming phase, continued until 2014. This period is a period in which large-scale projects such as reducing carbon emissions and improving the telecommunication infrastructure are implemented and therefore stakeholders participate in the process in a limited way according to their areas of expertise. So much so that there are 155 partners of 54 projects implemented in this process and 100 of these project partners are large telecommunication companies such as Amsterdam Innovation Motor, Liander and Koninklijke PTT Nederland NV. Owing to the financial resources and technical expertise they provide to the projects, private sector organizations are effective actors in Amsterdam smart city projects. Looking at the distribution of other actors based on numerical terms, public institutions, universities and non-governmental organizations come after private sector organizations (Capra, 2016, pp. 26-29; Nesti, 2020, pp. 23-24). In this phase, the Amsterdam Economic Board was established to develop projects related to smart urbanism and sustainable urban development (Van Winden *et al.*, 2016, p. 17). The board includes representatives of other city administrators, especially the mayor of Amsterdam, private sector organizations and local universities (Nesti and Graziano, 2019, pp. 9-10). The Board is an online community called the Amsterdam Smart City Platform (ASCP) that offers solutions to urban problems and develops innovations in 2014 within the framework of the smart city strategy (City of Amsterdam, 2020). The ultimate goal of the platform is the adoption of a sustainable economy, efficient use of natural resources and promotion of a better quality of life for citizens (Nesti, 2020, p. 24).

With the establishment of ASCP, the second phase, which is called the project phase in the Amsterdam smart city strategy, is passed (Capra, 2016, p. 27). Through ASCP, public-private-non-governmental organizations come together without any hierarchy and negotiate problems, areas and solutions.

Kocaeli

Kocaeli Metropolitan Municipality, whose duty area became the entire provincial border in 2004, is one of the cities that need smart urbanism concept because it is an industrial city and contains culture, tourism and green areas. Kocaeli Metropolitan Municipality, which started to develop geographical information systems by establishing the Geographical Information Systems Branch Administration in the municipal organization in 2007, has built the foundations of today's smart city concept.

The Geographical Information Systems Branch Administration is turned into the Smart Cities and City Information Systems Branch Administration in 2019 (Kocaeli Metropolitan Municipality, 2020b), it has implemented that the address information system, infrastructure module, emergency module, environmental module, socio-cultural module, zoning and immovable module and transportation module such as digital management techniques (Demirci and Ve Tekel, 2009, pp. 2-4; Aydın, 2014, pp. 81-85).

The first project implemented in line with smart city studies is Kocaeli Bicycle Sharing System (KOBIS). With the project, a bicycle rental system called KOBIS was established to

create an alternative to public vehicles within the borders of Kocaeli and to encourage the use of a sustainable and environmental vehicle (Kocaeli Metropolitan Municipality, 2020a). After the KOBIS application, Smart Parking System, Earthwork Management Information System, Cemetery Information and Guidance System, Walking Trails Application, Eco-Mobile and Smart School Registration System have been implemented (Kocaeli Metropolitan Municipality, 2020b).

The take a photo-send application has been developed to establish governance networks and improve citizen participation. Take a photo-send, a mobile application developed to strengthen the communication between the citizens living in Kocaeli and the municipality is a smart city application where the citizens can transmit their demands, suggestions and complaints as well as follow them. In 2018, the "Smart City Application Project for Disaster Damage Reduction in Kocaeli Province" was developed and a pre-protocol was signed with Gebze Technical University Civil Engineering Department and Disaster and Emergency Management Department (Kocaeli Metropolitan Municipality, 2020b).

Ankara

Ankara and communication technologies have begun based on smart cities and informatics works in 2011 (Ankara Metropolitan Municipality, 2020a, 2020b, 2020c; Gürsoy, 2019, p. 169). There is no administrative unit related to the smart city concept such as the smart city, city information system or geographical information system in the organizational chart of the municipality.

When the unit regulations are examined; it is concluded that the Software and Management Branch Administration is the unit that deals with smart city applications (Ankara Metropolitan Municipality, 2020b). When the applications implemented within this scope are examined, it comes to the forefront that important studies have been carried out on smart transportation. With a fleet of 1,340 natural gas buses in 2013, Ankara was awarded the "Europe's Most Environmentally Friendly Bus Fleet Award" (Ankara Metropolitan Municipality, 2020c; Gürsoy, 2019, pp. 169-170).

Citizens can handle their transactions through mobile applications through the e-management systems of units such as ASKI and especially the effectiveness of tax systems in the electronic environment (Varol, 2017, p. 53). Considering the practices, as Varol (2017, p. 53) stated, not working together with the private sector and non-governmental organizations and not ensuring the necessary coordination suggest serious deficiencies.

Results and discussion

The concept of smart management corresponds to the capacity of public institutions and organizations to create governance networks both structurally and to the extent that technology allows, in the light of developments related to smart urbanization (Meijer and Bolívar, 2016, p. 400). When the smart city model of Barcelona is examined, it comes to the fore to establish a new administrative unit called "Habitat Urba" to carry out the 22@Barcelona project successfully. The necessary coordination has been achieved in smart city projects through the newly established unit (Bakıcı *et al.*, 2013, pp. 137-148). The unit, which performs a basic management function in the management of the smart urbanism concept, also works in partnership with private organizations and research centers such as Barcelona Technology Institute, Barcelona Activa, Catalan Research Center i2cat. (Bakıcı *et al.*, 2013, pp. 137-148; Nesti and Graziano, 2019, pp. 650-667; Nesti, 2020, pp. 24-25). It is seen that Barcelona is at an advanced level in all smart city categories (smart economy, smart people, smart management, smart transportation and smart life).

Similarly, in the Amsterdam case, the Amsterdam Economic Board was established to develop and follow up projects related to sustainable urban development and smart urbanism (Van Winden *et al.*, 2016, p. 17). The board, which includes the mayor of Amsterdam, other city administrators, private sector organizations and representatives of local universities (Nesti and Graziano, 2019, pp. 648-650), includes public-private partnerships and local initiatives such as universities, like Barcelona. Amsterdam has chosen to develop on open data and energy. Political and moral balance has been seen as an important success factor for the development of smart cities. Stakeholder participation in the production of morally balanced, socially conscious smart city strategies is vital (Angelidou, 2014, p. 9).

Considering the Kocaeli model, the administration, which has changed its internal structure, has formed the Smart Cities and City Information Systems Branch Administration (Kocaeli Metropolitan Municipality, 2020b). Kocaeli Metropolitan Municipality acts on a project basis rather than cooperating with the newly formed units and stakeholders such as private institutions and universities, as seen like Amsterdam and Barcelona. The "Smart City Application Project for Disaster Damage Reduction in Kocaeli Province" (Kocaeli Metropolitan Municipality, 2020b) developed with the Disaster and Emergency Management Presidency and Gebze Technical University Civil Engineering Department can be considered as an example. When looking at the Ankara Metropolitan Municipality, it is seen that a structurally new unit has not been established. Also, not working with the private sector and non-governmental organizations and lack of coordination seems to be problems that need to be eliminated (Varol, 2017, p. 53). Kocaeli and Ankara Metropolitan municipalities are at the beginning level in qualitative coding for smart cities. They do not have smart governance practices.

Based on citizen engagement, the Barcelona smart city model is quite successful. Thanks to the "Decidim" platform, the participation of city residents in the city administration is taken into consideration and mismanagement practices are tried to be prevented with "Ethical Mailbox" and "Open Data BCN." In the case of Amsterdam, a participation mechanism is established through the ASCP. It is emphasized that the system, which includes public, private sector organizations, city residents and universities, private sector organizations have strong governance networks, so citizen participation should be strengthened (Capra, 2016, pp. 22-38; Van Winden *et al.*, 2016).

Similarly, the "Amsterdam Economic Board," which was established to carry out the smart city projects of the city of Amsterdam, gathers universities under its roof, as well as public and private sector representatives and develops partnerships and cooperation in various projects. Regarding citizen participation, the "ASCP" performs a similar task to the "Decidim" application. At this point, suggestions that the platform should strengthen citizen participation should not be overlooked (Capra, 2016, pp. 23-38; Van Winden *et al.*, 2016). Smart governance models of Kocaeli and Ankara cities are open to improvement compared to Barcelona and Amsterdam. The smart city studies structured within the "Smart Cities and Urban Information Systems Branch Administration" in Kocaeli apply to the cooperation and partnership of economic and social stakeholders project-oriented. The administration, which has developed the "Take a photo-Send" application at the point of citizen engagement, can thus access the demands, suggestions and complaints of the citizens regarding public services. For this reason, the city of Kocaeli is in a better position with its smart governance mechanisms and management style compared to Ankara. When the Amsterdam and Barcelona cases are examined, it can be concluded that both the structure of citizen participation platforms and the mobilization of other political, social and economic actors are stronger and advanced (Table 2).

According to the information mentioned above, the transformational effect of smart city governance is shown in Table 3. In addition, smart cities must develop a dynamic, demand-based pricing model to influence citizens' behavior and use of services. The use of intelligent technologies can quickly detect and be advantageous for various spatial and unusual events. Transportation, public safety, crime reduction, health, education, urban development, tourism and entertainment services can be designed and delivered with adequate planning and the development of physical infrastructure (Kumar *et al.*, 2020, p. 9).

Martin *et al.* (2018, p. 275) analyzed 32 academic papers and made various recommendations on the development processes of smart cities. The first piece of advice is to explain the role smart cities will play in economic growth with alternative concepts. The second recommendation is that municipalities and technology companies also go beyond initiatives such as data platforms and Life Labs to promote social equality in the smart city. The third recommendation is to consider the role of digital technologies in ensuring the development, maintenance and use of green infrastructure. Macke *et al.* (2018, p. 724) Research found that success in intelligent living is related to socio-structural relationships, environmental well-being, material well-being and community integration. Based on research results, it has been found that the principles of transparency, cooperation, participation and partnership, communication, accountability in smart cities positively affect the QoL. It is accepted that quality of life is influenced by elements of intelligent governance. Gil *et al.* (2020, p. 33) developed by IESE Business School, the grass is based on the value of 73 similarities and differences in a European city in the economy, human capital, technology, environment, international impact, social cohesion, mobility and transportation and smart city by creating differentiated three groups analyzed in terms of

	Citizen participation and cooperation between stakeholders			Smart administration			Governance mechanisms		
Cities	*Strong*	*Medium*	*Weak*	*Strong*	*Medium*	*Weak*	*Strong*	*Medium*	*Weak*
Barcelona	X			X			X		
Amsterdam	X			X			X		
Kocaeli		X			X			X	
Ankara			X			X			X

Table 2. Process-based analysis of smart city governance models of Barcelona, Amsterdam, Kocaeli and Ankara

Cities	Smart city governance	Transformational impact
Barcelona Advanced level	"Decidim" application	Democratic rule
	"Ethical Mailbox" application	Good management principle
	"Open Data BCN" application	Transparent management and accountability principle
Amsterdam Advanced level	"Amsterdam Smart City Platform" (ASCP)	Democratic rule Improving service quality Ensuring sustainable urban development Transparent management and accountability principle
Kocaeli Beginner level	"Take a photo-Send" application	Democratic administration and the principle of accountability
Ankara Beginner level	e-Government, Smart Transportation	Transparency

Table 3. Transformational impact of smart city governance

the level and the geographical location of the cities of the gender of the managers found evidence indicating that it is associated with. Joss *et al.* (2019, pp. 12-23) labeled each of the 100 common settlements as unclassified to 10 Smart City sizes. Of all 100 peers, governance (10.1%) was the most dominant size, whereas environment (1.9%) and sustainability (0.9%) were the smallest categories. Although governance makes suggestions to encourage technical capacity in certain areas, such as infrastructure, international factors, digital technology (8.3%) was not the most dominant dimension as expected. As a result of the study, smart cities are positioned as a center for a global intelligent society. It has emerged that smart cities are not driven by corporate interests in new uses for the technology. Accordingly, smart cities are driven by social concerns and the public interest in which appropriate technology is mobilized. The analysis revealed a vast network of discourses, including 27 capitals and world cities in Asia, Europe and North America. Silva *et al.* (2018, pp. 700-702) found that citizens' awareness, responsibility and commitment play an important role in the popularization of smart cities. Although smart cities use well-organized advanced technologies and are equipped with sophisticated equipment, it has become clear that sustainability cannot be guaranteed without social awareness. In smart cities, the technical infrastructure is classified as data management layer and application layer. The data management layer consists of data fusion, data analysis, data processing, data storage and event and decision management processes. The application layer mediates between urban citizens and the data management layer, affecting user point of view and satisfaction as the application layer's performance directly interacts with citizens. Data privacy is an important feature of the smart cities structure. In addition to managing privacy issues, it is necessary to explore big data analysis and integrate it into smart cities.

The smart city discourse is based on the transformational systemic change that ignores the emergence of the smart city through gradual changes. Accordingly, the smart city partly includes links in different areas of urban management and service delivery. There are potential asymmetries in the interests of the supply-demand side of smart city technologies, as well as possible conflicts between supply and demand actors, smart city initiatives require leadership, stakeholder engagement and ownership or coordination of key platforms (Buck and While, 2017, pp. 505-506). Impacts will change spatially when smart city measures are implemented. For this reason, cities should be able to address a wide geographic diversity by using smart mapping tools. It optimizes the smart city supply chain management based on location information, spatial analysis and real-time data, allowing the use of real-time updates. Data transparency will also strengthen citizens' participation in city government (Loo and Tang, 2019, pp. 134-139). Before adopting smart city initiatives, cities should evaluate the strengths and weaknesses of the socioeconomic, legal, political and institutional environments. Cities should carefully design governance mechanisms and related processes by which they will involve key stakeholders in creating and implementing smart city initiatives (Hu and Zheng, 2020, p. 17).

Practical contributions

The problems of the major cities of the world such as infrastructure, zoning, roads, water, sewerage and environmental pollution are increasing. This study suggests that citizens, company owners, public administrators and non-governmental organizations should shape the vision of the city by spreading technology-based applications with a common consensus.

Policy contributions

Nation states should strengthen their technological capacities with a participatory and decentralized approach to adapt to global technological and environmental living standards.

In addition to the technical infrastructure, those who do not have the right to benefit from smart living opportunities should be financially supported by local administrations.

Limitations and suggestions for future research

The research is based on literature review. It has adopted the qualitative research method and identified themes and categories according to smart city policies. Citizen satisfaction studies can be carried out future studies examined on cities, or a wide-ranging interview can be performed with city administrators regarding projections to be made and policies developed to solve existing problems. In this way, different themes or categories can be reached from the literature.

Conclusion

Smart city governance is considered as a process, while governance mechanisms are examined under the themes of smart governance and citizen participation and partnership of stakeholders. As a result of the comparative analysis, it is seen that smart city governance improves public-private partnerships with the support receives from ICTs. This study, which evaluates the smart cities based on scientific literature content analysis, classified the cities into beginner, intermediate and advanced categories.

As a result of the research, it is seen that the level of opportunities offered by smart cities increases, governance practices are provided perfectly in administrative development. Factors such as policy design, delivery of e-services and smart solutions should be considered to develop smart cities. Services should be created and designed with the participation of citizens. Citizens should be directly involved in the planning process. The development of technological solutions and the adaptive use of technology are also important. Culturally appropriate technologies should be selected from among global technologies (Kumar *et al.*, 2020, p. 10; Sepasgozar *et al.*, 2019, pp. 105-106). According to current statistics, the world population is expected to be 8.5 billion in 2030, 9.7 billion in 2050 and 11.2 billion in 2100, and urbanization is expected to reach 70% in 2050. To support this population growth, the services and infrastructures of cities need to be redesigned according to scalability, environmental impact and security (Appio *et al.*, 2019, p. 12). Smart cities expand and deepen the understanding of neoliberal citizenship. The smart city takes care of the interests of the citizen and serves the citizen. It contributes to making citizen participation inclusive and deliberative. It transforms into citizenship towards social, political and digital rights. It creates consensus for the public good. It acts with normative concerns such as justice, equality, democracy and social justice (Cardullo and Kitchin, 2019, p. 825). On the other hand, it is unclear whether new smart city governance models enable more effective decision-making or successful results. Policy tools that enable cooperation between actors may not be effectively implemented. It has dangers such as representation with a weak democratic legitimacy or sustainability in the long term (Nesti, 2020, p. 32). The factors that hinder the development of smart cities are listed as global lack of citizen participation and competitiveness, volatility in the global economy, political instability and low awareness in communities (Rana *et al.*, 2019, pp. 514-516). The study moves from four city cases. Follow-up studies can consider other smart cities as an object of study; they can evaluate the scope and nature of smart city governance by evaluating whether political, social, thought and economic actors have strong governance networks concerning city governments.

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Further reading

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