The Studies Through Smart Cities Model: The Case of Istanbul

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Abstract

Rapid urbanization and the advances in Information and Communication Technology have changed the definition of "city" all over the world. In the beginning, the concept emerged as Digital Cities and gradually changed to Smart Cities bringing criteria along. It is inevitable that, in future the concept will change and develop new criteria. There are many components in the smart city, with the knowledge of the idea of "information and communication technologies", which is the focus of smart cities and the cities of the future. The ability to define cities as smart is possible through the development of balanced applications around these applications. In this study, the Istanbul city will be evaluated in the context of smart city studies while it is presented with components of smart city concept.

Introduction

Smart cities have come to the fore over the world with the development of information and communication technologies. Especially since 1980's, various definitions have been done for smart cities. In order to solve urban problems and to implement urban applications via technology are essential in smart cities. Over time, the factors, components and indicators of smart cities are defined. Smart city applications are expected to be implemented around these components.

Istanbul has covered a distance in becoming a smart city with the applications it has implemented in recent years. Especially after 2015, a specific plan and road map has been determined. Istanbul is ranked top in the world smart city rankings every year.

In this study, smart city studies in Istanbul Metropolitan Municipality are examined as well as existing studies are analyzed. As a result, suggestions for Istanbul are put forward in the context of smart city components.

Literature Review

The detailed description of 'smart cities' concept is very critical issue for this article. It is necessary to know which definitions were made for the cities in this scope in order to create smart cities and develop them since the 1980s, when the concept of smart city first emerged.

(Cocchia, 2014), gives the definitions which are important to know over time, there has been a shift from digital cities to Smart Cities. They are, "virtual cities"; in general "digital city", "information city", "cyber areas", "learning city" and many other names like these.

The basic approach for smart city is derived from information and communication technologies which are centralized in future city applications. (Batty, et al., 2012) and as well as (Cushman and Wakefield, 2015) argued that with information and communication technologies, studies have been performed on how city managements can be activated, how efficiency can be enhanced and how competitiveness can be developed In smart cities. They also claim about local government authorities must be accountable, transparent and duly empowered in order to manage smart cities.

On the other hand, Giffinger and Cohen explained smart cities more detail and in context of their qualities, citizens' assets, activities, decision making and high awareness. In addition, they continue to list qualifications of smart cities such as effective resources saving cost and energy, improving service delivery and quality of life, reducing environmental pollution and reducing carbon emissions. In a similar way, United Cities Local Governments (UCLG, 2012) defines smart Cities as a new city model are more livable, functional, competitive, using new technologies, innovative and manageable cities.

In another study, in 2016, Williams mentioned smart city qualifications more clearly and in detail: strengthening and improving economic vitality, security, carbon footprint, quality of life or other important factors within or outside the boundaries; responding quickly and efficiently to the changing needs of the public; providing public conscious understanding and approval of the implemented practices; cities that collaborate with other communities when needed are defined as smart.

Because it is a new concept and can be updated at any time, some web sites state good references for evaluating studies related with smart cities such as www.wien.gv.at and www.smart-cities.eu.

Smart City rankings are very important and give an idea about world cities about their situation. At different times, cities are ranked by conducting various researches, Body Cohen is one of them. In 2012 and 2014 Cohen ranked the top 10 smart cities. Also, some institutions ranks smart cities for example Economist Intelligence Unit (Economist Intelligence Unit, 2009, p.10) and AT Kearney (AT Kearney, 2016).

This study surveys the city of Istanbul in the context of smart cities. Unfortunately, not much work has been done on Istanbul until now. In 2013, Çelikyay evaluated Istanbul governance dynamics as a metropolitan city with smart city components. According to this study, if the smart city applications are being used in all areas of governance, it will make Istanbul a focus city on the globe and will lead to global competitive

leadership. And also Çelikyay (2016), examines the smart city studies of Istanbul city through international congress and exhibitions.

Recent smart city studies on Istanbul cover a significant part of this work. Istanbul metropolitan municipality recently undertook a prominent role in smart city studies via The Smart Cities Directorate and also with Smart City Istanbul Project (ibb.gov.tr). In addition, Istanbul Bilişim ve Akıllı Kent Teknolojileri A.Ş. (Istanbul Information and Smart City Technologies Co., Inc.) (ISBAK) (http://isbak.istanbul) which is a subsidiary of the Istanbul Metropolitan Municipality, works on smart city projects of Istanbul city.

Model and Methodology

Smart Cities began to be defined by the development of information and communication technologies since the 1980s. Smart cities have taken place in the conceptual framework by taking information and communication technologies as a focus point in the solution of urban problems and using the information technologies in urban applications.

Smart city studies are still limited. Smart city definitions have been found in various forms and places in the academic literature since the emergence of the smart cities. Also the components of smart cities are defined and as well their indicators. Cities that want to be "smart", should shape their studies around these smart city components. The studies are handled according to the characteristics of each city.

In this study, firstly smart cities were studied in concept of framework. smart city components are described around what criteria a city must have in order to be defined as a smart city. Istanbul metropolitan municipality studies and their outputs have been examined as a field of study.

The purpose of this study is to evaluate the work done within the framework of smart city components and to present suggestions on topics that need to be completed. The basic assumption of the study is that a city cannot be defined as a smart city unless it covers all of components of smart cities.

As a result, smart city studies of the city of Istanbul have been put forward and the existing studies compared with components. Attention has been drawn to the studies that have not yet been carried out. Furthermore, it is proposed to complete the studies within this scope.

Smart City Concept

With the spreading of applications, development of information and communication technologies in cities, with time, smart cities were mentioned with different names. Initially, smart cities were called "virtual cities"; in general "digital city", "information city", "cyber areas", "learning city" , "intelligent city" and many other names were used (Cocchia, 2014, pp. 13-19). Over time, there has been a shift from digital cities to Smart Cities.

In order to provide information management in cities, information transfer and use of technology in urban services, internet sites and projects for information technology pages, telecommunication applications, metropolitan area networks, fiber optic cabling and management applications (such as automation budgeting, automation registration system, e-mail applications, multi-media advertisements, environmental information automation, personnel management, social security systems, search engines, thematic database, agenda and listing information, digital presentations for historical city areas, presentation of cultural heritage areas, internet based city addresses, etc.) have been developed. All of these applications reflect many faces of smart cities. The basic idea is that information and communication technologies are centralized in future city applications. With information and communication technologies, studies can be performed on how city managements can be activated, how efficiency can be enhanced and how competitiveness can be developed (Batty, et al., 2012, p. 483).

Although it is not possible to describe smart cities with a single definition, it may be possible to define them with some specific qualities. A smart city ideally should offer perfect mobility, 24-hours access to the city services, quality of health, education and job opportunities, access to affordable housing. Smart cities are aimed at reducing the expected complexities and adversities that accompany future urbanization. Therefore, the integration of Information and Communication Technology (ICT), which is the backbone of smart cities, is supported with energy efficiency and sustainability. In smart cities, local government authorities must be accountable, transparent and duly empowered. In general, smart cities offer a sustainable quality of life for future generations (Cushman and Wakefield, 2015, p.1).

The Smart City is a city that predominates as a city with its own unique qualities that are based on technologically based practices of citizens' assets and activities with independent decision making and high awareness (Giffinger, 2007). In smart cities, resources are used effectively and smarter, saving cost and energy, improving service delivery and quality of life, reducing environmental pollution and reducing carbon emissions (Cohen, 2012b). A smart city is defined by its use of information and communication technologies, regardless of the geographical area it covers:

> 1) Strengthening and improving economic vitality, security, carbon footprint, quality of life or other important factors within or outside the boundaries;

> 2) Responding quickly and efficiently to the changing needs of the public;

> 3) Providing public conscious understanding and approval of the implemented practices;

> 4) Cities that collaborate with other communities when needed are defined as smart (Williams, 2016).

According to United Cities Local Governments (UCLG, 2012), Smart Cities as a new city model are more livable, functional, competitive, are using new technologies, are innovative and manageable cities. Smart cities are a synthesis of the combination of information communication and social infrastructure with technological infrastructure. This synthesis is an important decisive factor for competing cities (Batty, et al., 2012, p. 486).

Definitions based on the use of user-friendly information and communication technologies developed in urban areas for local services have been expanded in relation to the future and development of cities (www.wien.gv.at).

With the economic and technological changes caused by the globalization and integration process, cities must compete simultaneously with other cities and sustainable urban development. In order to cope with this challenge, it is envisaged that smart city applications will increase the quality of urban services offered in areas such as housing, local development, economy, culture, arts and social policies (www.smart-cities.eu, 2015). The main purpose is the better use of public resources, increase the quality of services provided to citizens and reduce service costs. (Zanella et al., 2014, p. 22).

While smart cities are showing prospective, progressive and resource efficiency, they must also ensure a high quality of life, secure economic competitiveness and quality of life for the urban population, support social and technological innovations, and link existing infrastructure (www.wien.gv.at). In addition to the use of information technology, it is also necessary for the public to adopt all these services and to participate in the management and to provide information society with a certain quality.

Components for smart cities have been defined, in order to implement all these in practice. Smart city components give an idea of what qualities a smart city should provide. In the framework of these

components, it is necessary to distribute the urban services in a balanced and equitable manner, and to distribute the services of each component equally.

Smart City: Factors, Components and Indicators

Smart cities are based on five basic factors: Power, Infrastructure, Financial Sources, Technology and Talented Human Resource (Cushman and Wakefield, 2015, pp. 4-5). On the other hand, the European Parliament has analyzed three key factors for smart cities in its analysis of smart cities across Europe: Technology, Institutional and Human factor. These factors are considered an upper classification for the components that will be mentioned below in the analysis and classification of smart cities (Manville et al., 2014).

Smart cities are essentially evaluated by six components:

1) Smart Economy

2) Smart Connections

3) Smart Environment

4) Smart People

5) Smart Living

6) Smart Governance

All components form the "holistic" vision of a smart city. Connectivity, economy, governance, environment, and quality of life constitute factors affecting the development of cities (Giffinger et al., 2007). The smart city is a city practicing six characteristics, built on an 'smart' combination of investments and activities by independent and conscious citizens, who are able to make their own decisions.

In smart cities, the synergy of city and people are important. It is expected that social balance and quality of life will come to the forefront. Delivering high quality of life by addressing sustainable local development in the areas of economy, transportation, accessibility, environment, people, life, and governance should be one of the goals of smart cities. All these objectives are achieved through strong human resources, social capital and information communication technologies.

It is expected that the world urban population will double in 2050 and 6 of every 10 people will live in a city by 2030. It is estimated that for 2050 this ratio will increase to 7 out of 10 people. Every year, the population in cities is increased by 60 million. Therefore, as the world becomes more urban, the need for cities to be smarter emerges as a necessity (Manville, Cochrane, Cave, Millard,Pederson, Thaarup,Liebe, Wissner,, Massink, Kooterink, 2014). Mapping Smart Cities in Europe, European Parliament, Directorate General For Internal Policies, 2014, pp. 29-30).

Cohen (2012b) states that each city must make its own decisions about which components to feature in the race to become a smart city and its indicators. Every city is expected to perform its services in the fields of components and indicators in the race to become a "smart" city. Table 1 lists smart city components and indicators.

Table 1: Smart City Components and Indicators

Smart People	Smart Connections	Smart Life	Smart Governance	Smart Environment	Smart Economy
21st Century education	Integrated access model	Health	Information and Communication Technologies and e-government applications	Green buildings	Entrepreneurship and innovation
A participatory model of society	Environment friendly and non-motorized transport options	Trust	Transparency and public open data	Green energy	Efficiency / Productivity /
Support of innovations	Integrated Information and Communication solutions	Energetic, cultural and happy	Effective supply and demand policies	Green city planning	Local and Global connections

Source: Smart city components and indicators, Cohen (2012b).

Each city that develops smart city applications needs to identify strategies by considering these 6 components and indicators. The scope of the components and their application headings are expressed as follows:

Smart People (21st Century Education, Participatory Society Model, Supporting Innovations)

1. Smart Cities can only sustain with the presence of smart people. No matter how efficient, effective, productive or even smart the applications and projects ignoring the human factor are, eventually it will be the people, who will adopt and make them sustainable.

2. Building of Information Society: Residents of the city should be able to easily receive basic education rights from the nearest institution and free of charge.

3. Information and technology should be easy accessible, open for innovation, able to be equipped with information that follows the developments.

4. City Councils

Smart Connections (Integrated Solution Model, Integrated Access Model, Environment Friendly Non-Motorized Transport Solutions)

1. Should focus on to the rail system.

2. Integrated smart transportation systems have to spread throughout the city.

3. The journey must be fast, comfortable and easily accessible to the transfer points.

4. Low carbon emission.

Smart Life (Health, Security, Energetic - Cultural - Happy)

1. *Keeping life standards at a certain level*

2. *Provision* of health insurance to urban residents

3. Ensure training and security

4. Equal opportunities for all citizens, affordable housing,

5. Supporting the elderly population, offering special services for the elderly population,

6. Cultural studies,

7. Sports activities,

8. Coexistence of different cultures, openness to external cultures and lives

9. Preserve cultural heritage and urban memory

Smart Governance (Information and Communication Technology and e-government Applications, Transparency and Public Open Data, Effective Supply and Demand Policies)

1. Services such as transportation, infrastructure, water, waste management are accessible to all.

2. Adoption of open and transparent governance principle.

3. European Union Governance principles: transparency, participation, accountability, effectiveness and coherence.

4. Focusing on R & D and increasing resources in this area

Smart Environment (Green Buildings, Green Energy, Green City Planning)

1. Protection of city resources

2. When planning for the future of the city, it should be essential that the city's water and energy resources, green areas and natural surrounding is protected.

3. New residential buildings and especially public buildings should be green certified.

4. Work on sustainable energy should be done.

Smart Economy (Entrepreneurship, Innovation, Efficiency, Local and Global connections)

1. Offers high quality jobs with high salary payments.

2. Supporting local business resources in order to complete globalization.

3. Supporting innovative spirit and entrepreneurship, promoting productivity and leadership, providing an efficient and competitive environment.

4. Increasing the economic activities of the city.

5. Becoming a centre of attraction for the global sector.

In summary, smart cities are the cities in which the resources are used effectively and more intelligently, the efficiency of the urban services is increased while the cost of services is reduced, the people living smart cities take more effective and active role in the city administration and the projects aiming to protect the cultural heritage and cultural heritage and urban memory are aimed at reaching the next generations; residential policies with importance to the protection and enhancement of green fields, government principles adopting man-focused governance concepts.

People living in smart cities take more active and effective roles in urban management. In a smart city, local government services, transport and traffic management, energy, health, water and waste management must be implemented with smart city practices. The protection and enhancement of green areas should be prioritized while city planning policies. Delivering high quality of life by addressing sustainable local development in the areas of economy, transportation, accessibility, environment, people, life, and

governance should be one of the goals of smart cities. Being aware of the problems that may arise from rapid urbanization and expansion of the city, projects should be developed to protect the cultural heritage and it is expected that the cultural heritage and urban memory will be delivered to future generations.

In smart cities, the synergy of city and people are important. It adopts a human-oriented governance approach conducts urban management in accordance with the governance principles. In this context, it is important that city councils are established and operated effectively.

In Smart City applications, transparency should be fundamental. Smart applications are now evolving via open data. In order for a city to be smart, it is necessary to be able to access the instantaneous data in real time and use it in the right direction.

Istanbul as a Smart City

Istanbul City World Rankings

The foundations of Istanbul, dating back to 300 thousand years ago, were laid in the 7th Century BC. Istanbul, which had been the capital of the Roman and Byzantine Empire and the Ottoman Empire for about 16 centuries, played an importing role in shaping the world history. The city, which caused the collapse of the Middle Ages and the beginning of the New Age in 1453, continues to be one of the important cities of the world. Istanbul, which stands out with its strategic position at the crossroads of main roads to the sea on the transportation axes of Europe, Eurasia and the Middle East geography, is a cosmopolitan city which has to be handled in a multifaceted way in means of geography, history, memory, sociology, cultural heritage, economy, etc. but at the same time is a candidate city to become increasingly global metropolitan area (Çelikyay, 2013).

With these characteristic, the governance of Istanbul is important as well. The fact that smart city applications are being used in all areas of governance will make the city a focus city on the globe and will lead to global competitive leadership.

At different times, cities were ranked by conducting various researches taking into account the criteria of "Smart City". Cohen (2012a), the top 10 smart cities rank as follows:

1. Vienna
2. Toronto
3. Paris
4. New York
5. London
6. Tokyo
7. Berlin
8. Copenhagen
9. Hong Kong
10. Barcelona

A similar ranking has been made again by Cohen (2014) in the following years:

1. Barcelona
2. Copenhagen
3. Helsinki
4. Singapore
5. Vancouver

6. Vienna

7. Brisbane

8. Los Angeles

9. Montreal

10. Bogota

As you can see in both lists, the order of the cities varies. Barcelona, which was 10th in the first list, rose up to the top in the second listing. The cities have different values in different years according to the success, intensity and quality of their applications developed in the direction of smart city components. Istanbul is a city that has made progress in recent years.

For example: In a research project prepared by the Economist Intelligence Unit, "green cities" were sorted by a list. In this survey, which was performed in 2009 and was based on 120 cities all over the world, Istanbul ranks 25th among 30 cities in the European region (Economist Intelligence Unit, 2009, p.10).

Table 2: Comparison of Istanbul in the "Green City" index

	ISTANBUL	COPENHAGEN	KIEV
Sorting	25	1	30
CO_2 Emission	16	4	30
Energy	11	2	30
Residence	28	4	30
Transport	23	3	19
Water	23	5	22
Waste and land use	25	7	30
Quality of air	23	5	30
Environmental management	29	1	23

Source: Economist Intelligence Unit, 2009

In this list Copenhagen is ranking 1st, Kiev 30th. In a study conducted by the same organization in 2012, Istanbul ranked 12th among 30 cities in the European Green City Index (Economist Intelligence Unit, 2012, p.6). This ranking in the list was as follows: Amsterdam, Athens, Belgrade, Berlin, Bratislava, Brussels, Bucharest, Budapest, Copenhagen, Dublin, Helsinki, Istanbul, Kiev, Lisbon, Ljubljana, London, Madrid, Oslo, Paris, Prague, Riga, Rome, Sofia, Stockholm, Tallinn, Vienna, Vilnius, Warsaw, Zagreb and Zurich.

AT Kearney conducted a Global City Index research between 25 cities. According to this research, Istanbul was on rank 29 in 2015, 25 in 2016 and succeeded in being among the first 25. The scoring that made up the list was made in the fields of business activity, human resource, information transfer, cultural experience and political participation. The first four ranks in both lists were London, New York, Paris and Tokyo (AT Kearney, 2016).

The reason why Istanbul had a higher ranking in the attractiveness can be interpreted as high score in the "business activities". Cities that are the centre of attraction are moving towards being a smart city because of the clusters of qualified people and their expectations, demands from life make the cities they live in to smart cities.

Istanbul, as a developing and value gaining city is getting higher and higher in the smart city index. There are many qualified applications which are performed. It is expected that the fully and accurate data of these applications are forwarded to the world index and the city will receive the rightful ranking in the world rankings.

Istanbul Towards a Smart City

Istanbul's actions about smart city applications as based on a time before the year 2015. Some of these actions are the inclusion in a broad consortium with 22 partners all over Europe, the City SDK - Development of Toolkit and Smart City API for Service Developers. The inclusion in the City SDK - Development of Toolkits and Smart City API for Service Developers, the membership in the European Network of Living Labs (ENoLL - European Network of Living Labs) for the conclusion of the necessary works for the establishment of Smart City Living Labs, participation in many congresses and exhibition abroad, the support for Smart City Committees of UCLG and regional organizations and many more information based city applications and the development of smart transport systems are important works carried out in the previous years.

In order to realize the 2023 Focus City targets, the Smart Cities Special Commission was established in the Istanbul Metropolitan Municipality in April 2015. The Commission members are experts, Istanbul Metropolitan Municipality bureaucrats, managers of the respective municipal economic enterprises. The long-term target of the Commission, which started working in November 2015 and continued for eight months, was to implement smart city applications and thus to achieve the target.

During the Smart City Expo World Congress (SCEWC) held between November 14-14, 2015 in Barcelona, preparatory work was carried out to include the works of the Istanbul Metropolitan Municipality. In the Congress, the smart city studies of Istanbul were introduced; also, preliminary talks were realized for the smart city congress and exhibition to be held between June 1-3, 2016 in Istanbul.

The first of Smart City Congress and Exhibitions was organized by Fira Barcelona in 2011 with the theme "Smart society for innovative and sustainable cities". 6,160 participants from 50 countries were present during the first congress. After that year, smart city congresses and exhibitions were held regularly and known as the biggest organizations on this field. In 2012 with the theme "Smart thinking solutions" with 7,126 participants from 82 countries; in 2013 with the theme "Smart cities change the world" with 9,424 participants from 80 countries and in 2014 with the theme "Change the world" with 10,838 participants from 92 countries (Çelikyay, 2016).

The Smart City Expo World Congress held in 2015 with 14,288 participants and 421 speakers was described as the world's leading event for smart cities. Because of this feature, it was decided to hold the congress in Istanbul within this organization. As a matter of fact, 4,500 participants from 22 and 119 speakers participated in the Smart City Congress in Istanbul in June 1-3, 2016 (http://www.smartcityexpo.com/tr/istanbul). After that event, the works of Istanbul Metropolitan Municipality related to smart cities accelerated.

During the 4th assembly of the city council of the Istanbul Metropolitan Municipality on December 17, 2014, it was resolved to establish a "Smart City Directorate". As a reason for the establishment of the Directorate, it is said that "the establishment of the Smart City Branch Directorate is proposed in order to carry out works and transactions carried out by the department heads in a more active and effective way" (ibb.gov.tr). In the institutional structure, the Smart Cities Directorate has been established in accordance with the Information Technology Department. Together with the Smart Cities Directorate, the Information Technologies Directorate, Electronic Systems Directorate and Geographic Information Directorate are located under the same Department.

The Smart Cities Directorate started working on the Smart City Istanbul Project. For the project they are working together with the Istanbul Bilişim ve Akıllı Kent Teknolojileri A.Ş. (Istanbul Information and Smart City Technologies Co., Inc.) (ISBAK) which is a subsidiary of the Istanbul Metropolitan Municipality. The work areas of ISBAK in connection with smart cities are shown in Table 2.

Table 3: Istanbul City Smart City Workshops

Water Management	Security	Economy
Social Integration	Management	Disaster and Emergency
Health	Energy	Environment
Accommodation	Mobility	Tourism

Source: http://isbak.istanbul

The studies aimed to achieve the following conclusions:

1. Participatory Management
2. Safe Society
3. Clean Environment
4. Carbon Footprint Reduction
5. Use of Renewable Energy
6. Traceable/Measurable City
7. Uninterrupted Communication
8. Effective Disaster Management
9. Protective/Preventive Health Applications
10. Reduction of Traffic Jam
11. Effective Education and Development Management
12. Secure Networks
13. Social Integration
14. Effective Data Analysis
15. On-site Waste Separation
16. Efficient Resource Utilization

Transportation is handled separately. Smart Transportation Systems are mainly smart urban components. The Istanbul Metropolitan Municipality is conducting a special study for smart transportation systems. Fully Adaptive Traffic Management System (İ-SİM ISBAK Simulation), Traffic Control Centre (Mobile Traffic, Traffic Density Map), Traffic Signalization Systems, Electronic Monitoring Systems, Camera Systems, Traffic Measurement Systems, Variable Message Systems, Communications Systems are system, developed by ISBAK (http://isbak.istanbul).

Istanbul Project in the Smart City Context

The Smart City Istanbul Project has been put forward within the context of Istanbul Metropolitan Municipality 2023 focus city target. Within the scope of the project, first the Smart City Project Office was established. The office, where experts are employed, started working in May 2016 in order to implement the concept of "Smart City" Istanbul. The main tasks of the office and project phases are as follows:

1. Literature Survey

2. Current Situation Analysis

3. Smart City Vision

4. Strategic Plan and Roadmap

A number of workshops have been carried out within the context of smart city project studies. The theme of each of these workshops was different and the themes were chosen within the framework of smart city components.

The focus of the workshops was chosen for the basic components of smart cities. As is known, smart city components are: Smart Economy, Smart Connections, Smart Environment, Smart People, Smart Life and Smart Governance. The workshops were organized with focus on these components; the current situation of the city has been revealed.

The theme of the first workshop was determined as "environment". Istanbul Smart City Project Environmental Focus Area Workshop was held on December 29, 2016 with the participation of representatives from NGOs and universities, including heads of Istanbul Metropolitan Municipality (IMM) departments, senior representatives of the Ministry of Environment and Urbanization, as well as Environmental Protection and Packaging Waste Protection Foundation (ÇEVKO).

After analyzing the current situation and collecting data for 3 months, Istanbul's smart city environment focus has been revealed. Compared to some of the leading smart cities, Istanbul was evaluated as more successful and that there are areas to be improved, such as the environment sub-areas.

On January 3, 2017, the Focus on Information Technology Workshop was held, followed by the Energy Focus Field Workshop on January 5th. During the Workshop on Economy and Governance Focus on January 18, findings and index studies in the field of smart economy, scale economics, digitalization, financing models, new industry, productivity, entrepreneurship, labor market and city image were evaluated. In the focus area of smart governance, the "open data" findings that shaped the governance movement, administrative services, e-government applications, digital communication, public relations, strategic planning, organizational processes and the main element of this area are discussed.

General Directorate of Highways, Istanbul Electric Tramway and Tunnel (IETT) Company, Private Sector Organizations, NGOs and Universities were invited to the Mobility Focus Area Workshop held on 1 February 2017. In addition to these, the IMM Transportation Department was also represented at the workshop. Subjects like Accessibility, Logistics, Road Information, Vehicles, Broadcasters, Transit Systems, Vehicle Sharing, Intersection Management, Passage Modes, Driver-Passenger Information were discussed (http://isbak.istanbul).

From April 2015 onwards, the studies carried out within the context of IMM Smart City Project in order to realize the 2023 focus city targets of Istanbul city can be shown chronologically in Table 4as follows:

Table 4: Istanbul Smart City Project Workshops

Date	Name of Project	Type of Project	Smart City Component
December 2016	Workshop focusing on Istanbul Smart City Project Environment	Workshop	Smart Environment
January 3, 2017	Workshop focusing on Information Communication Technologies	Workshop	Smart Governance
January 5, 2017	Workshop focusing on Energy	Workshop	Smart Environment
January 18, 2017	Workshop focusing on Economy	Workshop	Smart Economy
January 18, 2017	Workshop focusing on Governance	Workshop	Smart Governance
February 2017	Workshop focusing on Mobility	Workshop	Smart Connections

As can be seen in Table 3, the studies have mainly been carried out in the areas of "Smart Environment", "Smart Connections", "Smart Governance" and "Smart Economy" of smart city components. Work has not been completed yet. After that, it is expected to work on the Smart People and Smart Life components in the perspective of smart city holistic approach.

Conclusion

The Smart Cities Istanbul Project, which is put into practice for the city of Istanbul, aims to be among the important smart cities of the world. The project works which started as of 2015 are continuing within the determined plan.

Smart Cities have components. These are Smart Economy, Smart Connections, Smart Environment, Smart People, Smart Living and Smart Governance. Each component has also sub-indicators. The smart qualities are measured by the world smart city authorities with the data coming from these indicators and assessed by subjecting them to special formulation.

The definition of a city as a "smart city" is possible through the work covering all these six components. Otherwise, the city is not integrated, but one-sided success has been caught in the work carried out on only one component field. For example, a city that has developed very good practices in transportation systems and has come to the forefront, is in a good position in the "Smart Connections" component but if there is no work done in the "Smart Environment" subject, this component will be weak. On the other hand, if a city for example established "Smart People" component with elderly care patient, operates city councils effectively or conducts lifelong education activities, is strong with this component but it this city does not work on "Smart Connections", they will have neglected the transportation systems that people would use.

When we look at the work done for Istanbul in 2015, the environment and governance are seen to be weighted, but applications have been realized in the areas of "Smart Environment", "Smart Connections", "Smart Governance" and "Smart Economy". In addition, it is recommended to work in the areas of "Smart People" and "Smart Life".

For example, work should be concentrated within the city, such as the availability of equally accessible educational opportunities for all age groups, facilitation of management involvement with supporting institutions such as city councils, creation of living spaces supporting the elderly population and life support. Applications should be developed so that people can be equipped with the necessary information to follow open and developed innovations in technology-based innovations.

The developed applications and project may be as useful, effective, efficient, or even "smart" as they are, it is the people who will adopt them and make them sustainable. It is necessary to develop smart applications to ensure that urban practices, that are realized around them are easily adaptable to the practice give them a possibility to be part of the solution process.

In the field of Smart Living, it is expected that the work will be far from purely technology-based approaches and the holistic approach will be adopted. It includes work on providing equal opportunities for city dwellers, social housing facilities, support for elderly population and inclusion in city life, presentation of culture and arts and sport activities for all age groups, integration studies with different cultures, protection of cultural heritage and urban memory and transfer to future generations.

As is well known, since Smart Cities are the starting point of Information and Communication Technologies, their work is mostly oriented towards technological applications. What is essential in Smart City applications is that technology is not a goal but a tool; i.e. the use of technology for the development of applications in all component areas is set as a goal. Otherwise, the city's smart city claim will not be more than a "technological city".

Most of the works that are supported by all the components are carried out different units of the IMM. What is important here is that these studies are included and developed in the Smart City Project. Sharing the obtained data will put Istanbul in the rightful deserved ranking.

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