

# “Smart City” Strategies For Local Governments: The Case Of Konya In Turkey

## Yerel Yönetimler İçin “Akıllı Şehir” Stratejileri: Konya Türkiye Örneği

Fatih MANGIR\*

### ÖZ

Büyükşehirler her dönem tüm vatandaşların ve yöneticilerin önemli derecede dikkatini çekmişlerdir. 21.yy da hem ekonomik hem siyasi açıdan tüm yerel yönetimler için daha çok dikkat ve daha iyi göç politikaları gerekmektedir. 21. Yy da değişen talebin karşılanması daha iyi yaşam için karşılaşılan temel sorundur. Bu ihtiyacı karşılamak için akıllı şehir projeleri ve regülasyonları oluşturmak, vatandaşların daha iyi yaşam sağlamaları ve yerel hükümet kararlarının teknoloji kullanarak alınmasına hizmet edecektir. Türkiye de Akıllı şehir projeleri Avrupa Birliği ve ABD den daha azdır. Bunun temel nedeni fon ve nitelikli beşeri sermaye eksikliğidir. Konya İç Anadolu bölgesinde 40.814 km<sup>2</sup> alana yerleşmiş ve 2,1 milyon nüfusu ile Türkiye nin en büyük 7. şehridir. Yıllardır Konya Büyükşehir Belediyesi bu eksikliği gidermek için teknolojiye ve dijital sistemlere yatırım yapmaktadır. Bu çalışmada, küreselleşmeye karşı daha iyi yönetim için yeni bir çözüm olan akıllı şehir kavramı tanımlanacak daha sonra Türkiye de akıllı şehir projeleri Konya özelinde detaylı olarak tartışılacaktır.

### ANAHTAR KELİMELELER

Küreselleşme, Akıllı şehir, Türkiye, Konya Büyükşehir

Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi Cilt:19 41.Yıl Özel Sayısı ss.17-36 **Makale Gönderim Tarihi:** 24/11/2016 - **Kabul Tarihi:** 20/12/2016

\* Assoc.Prof.Dr., Department of Economics, F.E.A.S, Selçuk University, Konya, Turkey, fmgir@selcuk.edu.tr

**ABSTRACT**

*Metropolitan cities have drawn enormous attention for all citizens and governors in every period. More attractions and better immigration policies are needed to be developed both politically and economically by all local governments in 21th century. The challenge to meet the change of demands successfully is the main necessity of the better life in the 21st century. Solutions of such necessity create the rise of smart city projects and regulations to serve citizens better life and local governments' decision-process by using technology. Smart City projects in Turkey are fewer in number than those in European countries and in the US. Barriers for this are mainly lack of funding and qualified human capital. Konya, the largest city in Turkey with a surface area of 40.814 km<sup>2</sup> and seventh largest city with approximately 2.1 million metropolitan populations, is situated in "Middle Anatolia". For several years, Konya Metropolitan Municipality has been tried to invest technology and digital systems to fulfill this gap.*

*In this article, we define the concept of smart city as a new solution for a better management towards globalization. And then, the development process of smart city and detailed analysis of the projects in Turkey and particularly Konya will be discussed.*

•

**KEYWORDS**

*Globalization, Smart City, Turkey, Konya Metropolitan*

## INTRODUCTION

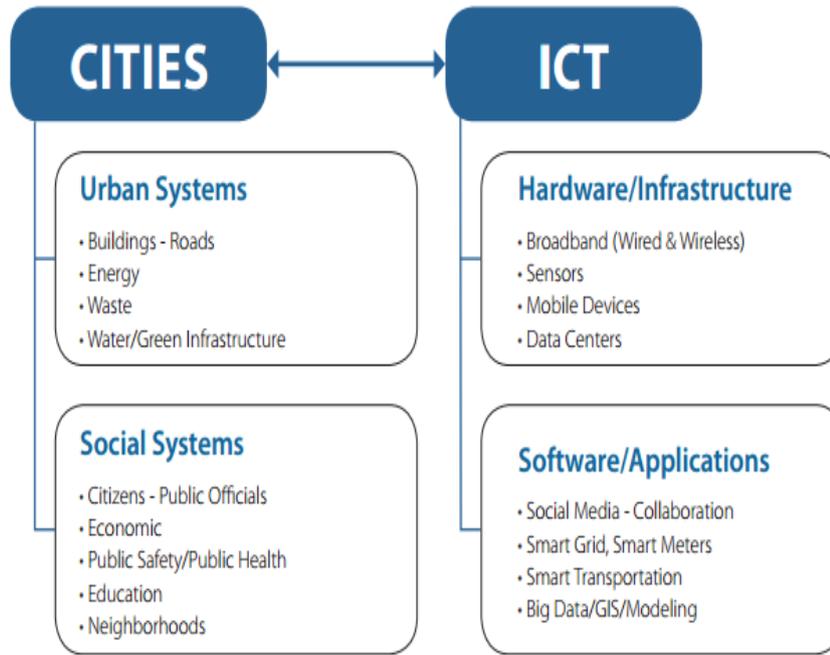
Globalization not only changes the ownership of the means of production and mode of production, but also leads to the rapidly growing urbanization and the migration problem depending on new capitalist mode of productions. Such a transformation has forced many governments to develop new strategy to meet the growing demands of society living in cities.

The strategy should manage the allocation of the resources of cities efficiently and produce strong the linkage among human, technology, services and innovation. In order to execute this strategy, the governors need to create a network that will allow cities to become smart and sustainable and should have specific plans to run this network.

This plan should assess cities as a dynamic and transformable living organization and create its perception towards connection to the cities' demand. This perception leads to develop the "smart city" definition. "Smart" metaphor refers to the technological capacities of local governments in supporting to use resources more efficient and make cities a more attractive destination.

The definition of Smart City has been progressively developed its meaning in in various areas from politics to economy since 1990`s. The core elements of these definitions include residents, allocation of public services and usage of information and communication tools supporting city systems. The use of information and technology throughout the city will lead to increasing the cost- efficiency, strengthening of infrastructure and improving urban system.

Smart city refers to the information and technological network to accelerate the economic development and to integrate its outcomes to environmental sustainability and covers to the social and human dimensions of the technology.

**Figure 1. City and Technology Relations**

**Sources:** APA, 2015

However, defining smart city system with only these aspects limits its component. At the same time, this system is required technological investments in order to produce the desired results. Smart cities should have become an organization that is dynamic and capable of producing innovations and also adaptive to change. These cities have also community-based decision-making process and mechanism to resolve conflicts with the neighbors. They have also carried out sustainable environment and policies to perform effective public services. These all mentioned features represent the key characteristics of smart cities. Members of European Union have progressively produced smart city projects to achieve 2020 targets on employment, innovation, climate change, and energy and poverty topics. For this reason, Turkey should carry forward her agenda of smart cities and sustainable growth aimed at satisfying the conditions for membership in a process of European integration.

The purpose of this paper is to highlight the importance of the smart cities in context of sustainable development and to analyze initiatives to make a city smart focusing on the province of Konya in Turkey.

## **1.URBANIZATION AND LIVABLE CITIES FOR THE 21ST CENTURY**

Urbanization is accepted as one of the most important and powerful disruptive four trends affecting the global economy in our century. The other three disruptive forces are globalization, technological developments and data, human capital, finance and trade (Dobbs et al, 2015: 5).

These mentioned disruptive forces are accepted as tools of national economies that radically change the socio-economic structures of society. There is a common belief that we are feeling every day chaotic affects of these trends from the beginning of the Industrial Revolution to today. Besides chaotic affects, these trends bring also opportunity for national economies as well. Therefore, it is important for decision makers in cities to consider these trends as a policy option and adapt domestic economies to these trends that are impossible for cities to ignore.

Apart from these three trends, we need to define urbanization as a population shift from rural to urban areas to contribute the growth in urban population. Urbanization has integrative power combining the industrial infrastructure, labor force, living environment and socio-economic opportunities (Dobbs et al, 2015: 8).According to recent indicators, the urbanization process has positive effects on income per capita. So, there are vital effects of urbanization from economics point of view. Today the city has become a powerful engine of economic growth. Urbanization brings all actor together. One would expect economies of scale, specialization of labor, trade and the productivity to be a natural concomitant of increased urbanization in developing countries. (Dobbs et al, 2015: 22).

Cities are becoming the new investment environment, together with social and economic interaction. It is generally accepted in economic theories that urban infrastructure such as a smart city projects, roads, streets, parks and bridges have indirect positive externalities (Brynjolfsson ve McAfee, 2014: 220). Between the years 1990-2025 there will be approximately 3 billion consumer class in the world and most of them will live in emerging market economies such as Turkey (Dobbs et al, 2015: 21-22).

Therefore, in our today`s life, the cities welcome more “consumer-citizenships” than previous decades and decision makers in cities are enforced

to perform more innovative services such as bicycle rental applications to improve the living standards of these consumer class. Through adoption of integrated approach, the cities can meet the expectations of these new type of citizens with only efficient and effective city management policies. The average population change is currently estimated at around 65 million per year during last 30 years that is nearly equal to Turkey population. It is expected that nearly half of the global output will be produced from 440 cities belonging to emerging markets between the years 2010-2025 (Dobbs, et al. 2015: 5). Despite these developments, many cities in the world today, faced with the economic recessions and is trying to solve their economic problems. This challenge can be seen as a recent example in Detroit previous the leading center of automobile production of the US.

Detroit has lost 58% of her population (Glaeser, 2011: 41) and her citizens have lived in economic indicators remaining well below the national average, the city is challenging poverty and struggling with high unemployment and life safety issues. % 58 of the population loss in Detroit City was realized due to the poor economic indicators with high unemployment ratios in last five years (Glaeser, 2011: 4).

Detroit's economic and social transformation offers lessons for many other cities that they focus to implement their innovative and smart city policies. Cities transform their location with more integrated into world and offers new opportunities for investors and entrepreneurs despite all economic pressures. In this context, the city also has required to implement policies towards the new city paradigm. Cities with strong physical and social infrastructure provide more attraction for the entrepreneurs.

Today, the lack of investment and business environments create a problem not only for the individual but also for the whole community.

The key factor driving the socio-economic problems in the city is the lack of investment and business environment. Universities are one of the most important structures in the cities that contribute to the pool of capacity.

Konya is accepted as “student city” hosting five universities and many faculties, research centers, techno-parks, colleges and vocational schools located in the city center, provide an important contribution to Konya`s talent pool. Strong human capital infrastructure in the city leads to less costly and more productive physical infrastructure and public services and also is an

important contribution to the development of investment and business environment.

Smart cities with better infrastructure, innovation, talent and economic diversity contribute to productivity growth of domestic economy. Low-income families are often attracted to cities, where they can get more job opportunities and better living conditions offered by the cities.

However, these low skilled migrants would have contributed cities' prosperity down and increased unemployment. Migrants have also the feelings of excluding from fully participating in all aspects of life of the society due to the economic disintegration (Glaeser, 2011: 70).

In the context of economical and social benefits, the concept of the 'smart city' has recently been considered as popular idea for solving the problem of city planning. Smart cities bring together economical and social transformation for both individual and society.

In 2025, it is expected we will have around 26 global Smart Cities which will dealt with energy, technology, infrastructure, mobility, building, healthcare and education parameters.

Firstly, smart cities develop an innovative research culture by attracting talented individuals. Without sufficient infrastructure it is not possible to create successful cities.

Education is necessary but not sufficient indicators of infrastructure of society; the real determinant feature of infrastructure is based on the training strategy of city.

For example, compared to Brazilian workers working in the United States, the ones who have received the same education in the Brazil, seems to be twice times less efficient (Pisano ve Shih, 2012). It proves that hands on experience and training contribute to economic growth and productivity more than formal education.

Finally, planning the living and business dimension of cities` government should be considered separately (Jacobs, 1992: 20). Cities should have strong economic structure to improve welfare level and also standard of living of their citizens. Today's distance among cities has been lost. So, the new idea and innovation in one city, spreads rapidly to the other cities. This rapid transformation of information is very important feature of all smart cities.

## 2. SMART CITIES PROJECTS IN TURKEY

The population of Turkey has become 78 million 665 thousand in 2015 and more than 70% of this population lives in the urban areas. Even though several projects aimed to increase the quality of life of city-dwellers have been implemented through technological innovations, e-government application, smart transportations social cohesions agendas, city transformation in Turkey, İstanbul the largest city according to population in Turkey, is still out of the list of first 20 smart cities under 'Global Smart Cities Index '.

R & D and innovation regarding of the Smart Cities innovation among project objectives are very important. Among innovation, R & D, also qualified human resources and innovative factors to avoid middle income traps in smart city projects play an important and supporting role in building rapid growth. So, with the aim of overcoming middle income trap problem and achieving the 2023 Agenda for economic transformation, Turkey needs to adopt core smart city projects.

**Table 1. Top global cities of today and rising cities of tomorrow**

| Global Cities Index |      |      |      |      | Emerging Cities Outlook |                |    |
|---------------------|------|------|------|------|-------------------------|----------------|----|
| City                | Rank | 2014 | 2012 | 2010 | 2008                    | Rank           |    |
| New York            | 1    | 1    | 1    | 1    | 1                       | Jakarta        | 1  |
| London              | 2    | 2    | 2    | 2    | 2                       | Manila         | 2  |
| Paris               | 3    | 3    | 3    | 4    | 3                       | Addis Ababa    | 3  |
| Tokyo               | 4    | 4    | 4    | 3    | 4                       | São Paulo      | 4  |
| Hong Kong           | 5    | 5    | 5    | 5    | 5                       | New Delhi      | 5  |
| Los Angeles         | 6    | 6    | 6    | 7    | 6                       | Rio de Janeiro | 6  |
| Chicago             | 7    | 7    | 7    | 6    | 8                       | Bogotá         | 7  |
| Beijing             | 8    | 14   | 14   | 15   | 12                      | Mumbai         | 8  |
| Singapore           | 9    | 11   | 11   | 8    | 7                       | Nairobi        | 9  |
| Washington          | 10   | 10   | 10   | 13   | 11                      | Kuala Lumpur   | 10 |
| Brussels            | 11   | 9    | 9    | 11   | 13                      | Bangalore      | 11 |
| Seoul               | 12   | 8    | 8    | 10   | 9                       | Beijing        | 12 |
| Toronto             | 13   | 16   | 16   | 14   | 10                      | Johannesburg   | 13 |
| Sydney              | 14   | 12   | 12   | 9    | 16                      | Kolkata        | 14 |
| Madrid              | 15   | 18   | 18   | 17   | 14                      | Istanbul       | 15 |
| Vienna              | 16   | 13   | 13   | 18   | 18                      | Cape Town      | 16 |
| Moscow              | 17   | 19   | 19   | 25   | 19                      | Chennai        | 17 |
| Shanghai            | 18   | 21   | 21   | 21   | 20                      | Tunis          | 18 |
| Berlin              | 19   | 20   | 20   | 16   | 17                      | Dhaka          | 19 |
| Buenos Aires        | 20   | 22   | 22   | 22   | 33                      | Caracas        | 20 |

**Kaynak:** AT Kearney Global Cities Index and Emerging Cities Outlook

Projects of smart city should be analyzed based on the objective of Turkey's EU candidate status in the process of EU accession "information society". In order to fulfill, the requirements for EU membership, accession of political, health, education and municipal services have been accelerated through the use of technology and internet services for citizens. However, the term of the smart city not only consists of citizen participation in localized decision making through internet technology but also in broad sense of the smart city is the development of democratic governance, accountability and the rational use of common-sense to build a bigger and stronger society.

Two of the most important projects developed by local governments about Turkey's transition of electronic media are namely "YerelNET" and "Yerelbilgi.com" portals (Şahin, 2007: 175).

"Yerelbilgi.com" project was prepared by Public Administration Institute for Turkey and the Middle East (TODAIE) in 2001 (Şahin, 2007: 175). This platform gathers data about municipalities, settlement of institutions and enterprises, the staff information in local governments, budget accounts, funds, constructions, public services (water, supply, waste), affiliated institution, revolving funds, machinery equipments (Kaygısız ve Girginer, 2011:321; Şahin, 2014: 144-145).

YerelNet website also shares information about 2951 municipalities, 81 provincial administrations, about 500` the company and its enterprises, more than 35,000 villages, 892 districts, more than 1000 local government associations and other local government agencies. With this network, local governments can also directly exchange information and experiences (Şahin, 2014: 144; www.yerelnet.org.tr). Turkey Ministry of Environment and Urban Planning prepare master plan for the years of 2013-2017 to ensure the environment vision and city branding. One of these plans is the city information system that delivering the verbal and spatial demand of Citizens for services and defining all of the local business process is planned to be carried out electronically (TBD, 2013:4). The cloud information system is also standard in master plan consisting of metadata, map, spatial processing, data managements services (Güney vd.2013.) The Cloud City Information System by using of information technology in municipalities aims to over 400 million pounds savings are being realized in the context of smart city.

The 97 per cent of the country's environmental plan and 98 percent of shoreline has been completed with this plan. Country spatial planning and integrated coastal zone strategy plan studies has been also conducted.

"Land Registry and Cadastral Information System Project" (TAKBİS) has been also completed for easy real estate inquiry.

Aims of TAKBİS Project are (<http://www.tkgm.gov.tr/en/page/land-registry-and-cadastre-information-system-takbis>, Şahin, 2014: 132);

a. providing valid and reliable land information necessary for land and all kinds of activities and decision-makers, reflecting the current situation; updating land records and maps; transferring all the data to the computer environment; keeping data up to date and re-evaluating them within the scope of information systems technology and making them available,

b. converting land registration and cadastre studies and data into a multi-purpose land data system (TAKBİS) and keeping these data in a secure environment and to ensure safe access,

c. sound, fast, reliable and efficient planning, management and operation of TKGM services,

d. generating data provided to other organizations and institutions in such a way not to cause any double counting, and ensuring widespread utilization of up to date, reliable proprietary data,

e. reviewing operation structures of Land Registry and Cadastre Offices, analyzing jobs and ensuring standardization in practice, data entry and integration followed by performance of related to any kind of work related to land registry and cadastre in computer environment, developing applications that staff at all levels can easily use.

National Climate Change Master Plan (2011-2023) in the context of global warming is another project implemented by the same Ministry and covers all sectors in the fight against climate change by preparing road map that define middle and long-run target for Turkey.

Within the scope of combating climate change, Turkey's main objective is to contribute to the global efforts in line with the sustainable development policies on the basis of common but differentiated responsibilities and taking Turkey's special circumstances into account (ÇŞB, 2011:1).

According to the National Climate Change Action Plan, energy performance certificate and heat insulation will be regulated in all buildings that enable to save %20 energy consumption.

The most important arrangement about energy efficiency in smart city is the Energy Efficiency Act of 1995. This law has have imposed new energy efficiency standards for industrial sector. And then some regulations about "Thermal insulation in buildings" and "Building Heat Requirement of Identity Document" have been issued in 2000. Many issues has been addressed technically and standardized under the regulation " Motor vehicle green house emission and fuel disclosure" enacted in 2000 and " Hot water production in new or existing non-industrial building, performance of Heat generator for space heating performance and Hot Water Distribution and Heat isolation" was enacted in 2003.

“Integrated Urban Development Strategy and Action Plan” (KENTGES) has been adopted under the authority of the Ministry of Environment and Urbanization and also supported by the Scientific and Technological Research Council of Turkey with participatory process among 13 separate state units.

The main strategies of KENTGES are grouped under three main axes mentioned below (KENTGES, 2013:7):

- a. Restructuring the Spatial Planning System,
- b. Improving Quality of Space and Life Settlements,
- c. Strengthening the Economic and Social Structures of Settlements,
- d. Various studies focused on municipalities also to increase the brand value of cities are carried out with the public institutions in several cities.

Turkey’s first smart city project, Akıllı Kent, has been launched by the Turk Telekom Group in the city of Karaman. It provides the sensors, Internet of Things components, infrastructure, kiosks, touch screens, data centre and operations centre. The applications developed by the Turk Telekom Group, of which Innova is a member, were carefully integrated with each other in order to offer a comprehensive city management solution. Throughout the project, Innova took care of the overall management of all the systems and applications implemented in the project, including setting up the systems architecture, developing an Internet of Things platform, installing the necessary management and monitoring screens, establishing an operation centre, and providing kiosk and digital signage applications

Another important example is "Canal Istanbul Project" about the relation of Turkey's performance and smart city applications.

It is expected that the Canal Istanbul Project will cost about 15 million dollars, where two small cities will be constructed along the banks of the canal, which will connect Marmara Sea and the Black Sea, in parallel to the Bosphorus strait. It is expected also that the new city would have a population of 500.000 people.

The Istanbul canal length would be over that 40 km and 400 m width and 35 m deep. And the building around the canal wouldn't be over 5 floors high. The new city will be planned as to represent the new modern face of Turkey, as it would have also a conference room, touristic places, public parks, and shopping centers. The architect of this city will be driven from the historic Turkish heritage, to be similar to the old buildings of Istanbul.

**Table 2.** Selected Municipality Projects of Smart Cities in Turkey

| Municipality | Framework of Projects      | Sources of Projects | Development process of projects  |
|--------------|----------------------------|---------------------|--|
| Yalova       | e-municipality, Smart City | Local Sources       | Silicon Valley   |
| Fatih        | e-municipality, Smart City | Local Sources       | Geographical Information and numerical mapping system                          |
| Kadıköy      | e-municipality, Smart City | Local Sources       | Geographical Information and numerical mapping system                          |
| Beyoğlu      | e-municipality, Smart City | Local Sources       | Geographical Information, numerical mapping system E-municipality application. |
| İzmir        | e-municipality, Smart City | Local Sources       | Geographical Information, numerical mapping and 3-D system                     |
| Ankara       | e-municipality, Smart City | Local Sources       | Geographical Information and numerical mapping system                          |
| Bursa        | e-municipality, Smart City | Local Sources       | Geographical Information and numerical mapping system                          |

**Source:** <https://anahtar.sanayi.gov.tr/tr/news/kentlerin-e-donusumu-akilli-kentler/416>,  
(02.02.2016)

## **2.1. KONYA METROPOLITAN MUNICIPALITY IN THE FIELD OF SMART CITY PRACTICES**

Located in the southern part of the Middle Anatolian Region, Konya is the largest province in Turkey in terms of land area with a population close to 2, 1 million. Konya was the 4th city in the category of “the best large city for foreign direct investment strategy” (2010-2011) in FDI Magazine (<http://www.investinkonya.gov.tr/en/Default.asp>). Applied Smart city projects in Konya can be ranked in three categories:

The Environmental Management System,  
City Information  
Technology,

For the first category, Department of Environmental Protection and Control in Konya Metropolitan Municipality performed environmental management information systems to share information about the environmental challenges with citizens living in Konya. This Information Systems provides partnership for citizens for the City of Konya with technical infrastructure.

For the city information category, Konya City Information System was built on three fundamental units (<http://www.konya.bel.tr>):

Konya Metropolitan Municipality (the numeration, the collection of the social data, the integration of all data, to update the system),

Land Office (numerical land information)

Province Bank (the existing maps and orthographic images).

Smart city project of Konya information system consists of the following steps (<http://www.konya.bel.tr/sayfadetay.php?sayfaID=151>):

i. Maintaining and Updating data in several locations of Konya including Analysis and Design System,

ii. Providing the high resolution image about environment,

iii. Collecting information according to the State Statistic Institute standard, updating, digitalization and integration of information into City Information System, creating web design for sharing information.

iv. Digitalization of the entire Cadastral Information (standardization with Cadastral the General Directorate in Turkey)

v. Adopting the topological data structures into Master Plan of City and integrating into City Information System.

vi. Conducting field questionnaire studies (Social Structure Map) and integration results into City Information System,

vii. Designing web-based Server system connected to city environment information,

viii. Conducting Training Service

ix. Supporting system with software services and technical update programs

Collected data from this service is aimed to enable citizens' participation to in environmental decision plans. Air, waste, transportation, vehicle tracking, fuel and public management are essential components of this system and they all seek to increase the work efficiency. Based on several sub-modules such as air quality monitoring network, waste tracking system, noise monitoring, fuel control, vehicle tracking with knowledge-based data system, the environmental information system of municipality aims to improve sustainable environmental outcomes.

This project includes the following completed items:

Medical Waste Collection, transportation and sterilization plant was constructed and rent to private company during 10 years with the method of Build-Operate-Transfer.

The workplace opening and operating permit can be obtained from the Municipality via internet application

Recording headstone inscriptions by digital system and creating internet base map of the cemetery, parceling nomenclature and tabulated the cemetery land

Sharing information with Cemetery Information System (CIS) and geographic information system (GIS) and Information Interface Management system.

CIS one of the smart city products is a good example that Konya municipality has carried out successfully till 2008. This service helps finding the address of those who will visit the cemetery places. Interactive kiosks store

all data covering 109 cemeteries in the city center and post all information on its Web site.

GIS is one of the others information system to transform geographic data into society and have had several effects on infrastructure to municipality. It aims at evaluating the ground surveys of the buildings in the city and the quality of the constructions within the Geographical Information System, and helping the governors take precautions, ensuring that the building certificates and construction usage permissions are given under the control of Konya Municipality. Introducing the historical and registered buildings into the system and including the cultural inventory in the Geographical Information System.

For the technological category, the project for increasing the people's quality of life is the Noise activated warning system established in 10 different locations in Konya Center. This system activates while the noise exceeds a pre-set level.

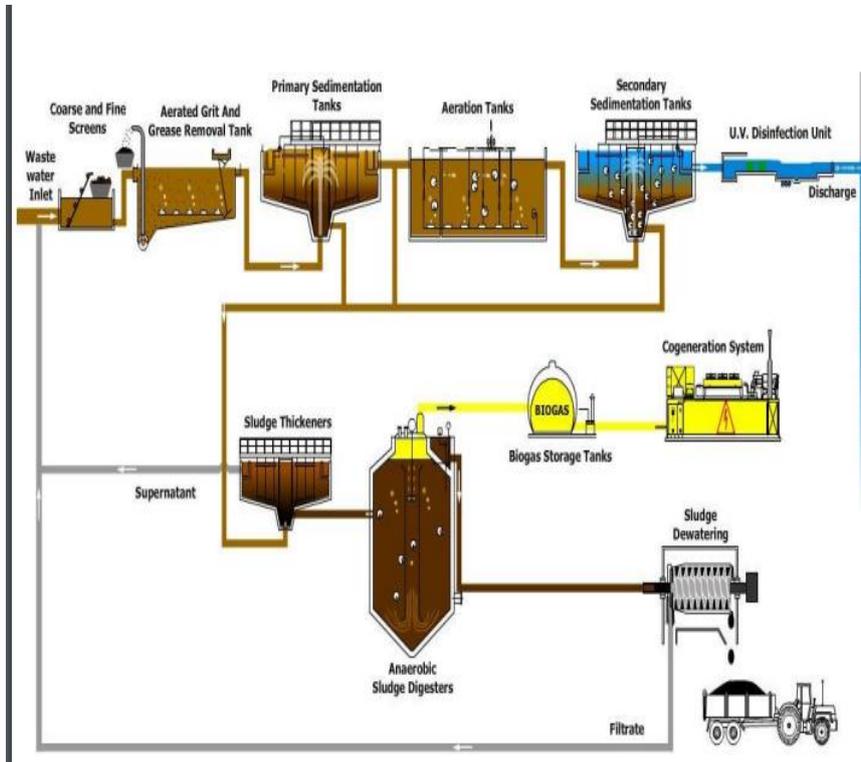
Energy production plant has been also established in 2003 to produce alternative electricity by processing the garbage dump consisting of waste. This plant meet the electricity demand of 26.000 house to burn hour 2850 m<sup>3</sup> of landfill gas.

Medical Waste Sterilization Plant with steam method has been also launched in 2008 to process medical waste generated from health institutions located in Konya.

By sterilization of medical waste, hazardous against the environment and human health are intended to be disposed. 13 thousand 54 tons of medical waste has been disinfected in this plant from 2008 to 2013 year.

Necessary documents and information about opening and operating business to citizens for even the holidays can be obtained via Internet e-Permit program. Thus, the duration of service about opening business to citizens is expected to be shortening. This project has also been applied for the first time in Turkey. Wastewater treatment plant (Purple Network) has been constructed in 2012 to remove carbon and partial from wastewater for irrigation.

**Figure 2.** Konya wastewater treatment plant flow diagram



Source: <http://www.koski.gov.tr/mAtiksuAritma/engplangenel.swf>, (02.06.2016)

Konya Wastewater Treatment Plant was built in recycling area to treat wastewater through 24 km purple network. With this project, Konya has the first city to have water supply consisting of irrigation water, fresh water, waste water, storm water and Mor network which means that central water and sewage service capacity reaches its 100 percent.

Thus, important amount of water has been saved by the method of treatment waste-water instead of the drinking water. Nearly 3 million 216 thousand square meters of green area has been irrigated with treated wastewater for each year. It is also produced biogas and energy by the method of sludge stability.

---

**2015 Year Data**

|                               |                                |
|-------------------------------|--------------------------------|
| Amount of purification sludge | 1.214 m <sup>3</sup> /per day  |
| Biogas Production             | 21.742 m <sup>3</sup> /per day |
| Electricity Consumption       | 49.142 kWh/per day             |
| Electricity Production        | 33.416 kWh/per day             |
| Electricity recycling rates   | 68 %                           |
| Electricity recycling rates   | 68 %                           |

**Sources:** Konya Metropolitan Municipality,

Another project focusing on smart city is Aslim electricity production plant where landfill gas conducted to achieve energy. Solid waste plant has been completed with the cooperation of European Union, Ministry of Environment and Konya Metropolitan Municipality. And good performance of ecological footprint has been succeeded with the low amount of Co2 by this project.

Intelligent Transportation System is another output of smart city process in Konya. These intelligent systems include all types of communications that can be used between vehicles such as car to car communication and between vehicles and specific location such as train to railway station (Yassein et al, 2015:122). According to Report of Konya Technokent (2013), the city of Konya has become a transport model and provides many alternatives in inner city travel and traffic problems encountered by other metropolitan cities are not experienced in the city. Streets and main roads in Konya were constructed wider and traffic flow is controlled with a minimum number of red lights to be a faster. For example, traffic flow is controlled by smart crossing systems to minimize the crowded in traffic routes. Konya is also leader of Turkey in terms of bike path with construction of a 120-kilometer path.

#### IV. CONCLUSION

In our increasingly global world, there is a large but imbalanced population mobility occurred between rural and urban areas. Today, more than 50% of the total population in the world lives in urban areas. Despite this huge demographic transformation, it is expected that approximately three billion people would not reach to world resources such as water, electricity, health care, and education. And also, with this transformation, citizens' demand has been also grown. Therefore, governors of cities need to notice these challenges and design their cities infrastructures more efficient for quality of citizens' life. They ought to ensure that infrastructure investments in cities are enough to accelerate the technological investments focusing on smart cities.

In this study, we tried to analyze smart cities initiatives implemented in Konya city of Turkey. Konya City Information System, Konya wastewater treatment plant, Aslm electricity production plant and Intelligent Transportation System are four main smart city projects

According to this study, it is recommended that local government of Konya may also integrate following technological city applications:

- Free Wi-Fi hotspot down the street
- Patient tracking tools to improve patient flow in hospitals
- Bulk SMS System for info messages to publics,
- Smart Home and Office Management System in public and private offices.
- Intelligent Parking System
- Disabled friendly infrastructure
- Public smart phones for the future demands of citizens (multimedia functions)
- Smart sprinkler control system for agricultural necessities
- Missing and Unidentified trace back their movements
- The intelligent waste collection stations

## REFERENCES

- Alcatel Akıllı Kent piyasa Analizi (2012), [http://www2.alcatel-lucent.com/knowledge-center/admin/mci-files/1a2c3f/ma/Smart\\_Cities\\_Market\\_opportunity\\_MarketAnalysis.pdf](http://www2.alcatel-lucent.com/knowledge-center/admin/mci-files/1a2c3f/ma/Smart_Cities_Market_opportunity_MarketAnalysis.pdf), (09.09.2015)
- American Planning Association, APA, (2/015), “*Smart Cities And Sustainability Initiative*”, <https://www.planning.org/>, (06.01.2016)
- Angelidou , M., (2014) “*Smart city policies: A spatial approach,*” *Cities* , 41, S3-S11
- Balkin, J.M. (1999), “*How mass media simulate political transparency*”, *Cultural Values*, 3(4), 393-413.
- Bansal, Neha, Shrivastava, Vineet, Singh, Jagdish (2015), “*Smart Urbanization – Key to Sustainable Cities*”, Real Corp , Tagungsband 5-7 May 2015,Ghent, Belgium.
- Brynjolfsson, E. Ve McAfee, A. (2014), *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, W. W. Norton & Company, New York.
- Çevre ve Şehircilik Bakanlığı (2011), “*Türkiye'nin İklim Değişikliği Uyum Stratejisi Ve Eylem Planı Türkiye'nin İklim Değişikliği Uyum Stratejisi ve Eylem Planı*”, [https://www.csb.gov.tr/db/iklim/editordosya/uyum\\_stratejisi\\_eylem\\_plani\\_TR.pdf](https://www.csb.gov.tr/db/iklim/editordosya/uyum_stratejisi_eylem_plani_TR.pdf), (07.02.2016)
- Dobbs, R., Manyika, J. Ve Woetzel, J. (2015), *No Ordinary Disruption: The Four Global Forces Breaking All The Trends*, Public Affairs, New York.
- Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N. ve Meijers, E. (2007), “*Smart Cities – Ranking of European Medium-Sized Cities*”, Research Report,
- Glaeser, E. (2011), *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*, The Penguin Press, New York.
- Güney, Caner, Doğru, A. Özgür, Başaraner, Melih, Çelik, Rahmi Nurhan , Uluğtekin, Necla (2013), “*Tucbs'ye Giden Yolun Neresindeyiz? Türkiye Ulusal Mekansal Veri Altyapı İsi İçin Nasıl Devam Etmeliyiz?*”, TMMOB Coğrafi Bilgi Sistemleri Kongresi, 11 -13 Kasım, Ankara
- İpekten, B.O. (2006), “*Risk Sermayesi Finansman Modeli*”, Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 7(1): 385-408
- Jacobs, J. (1992), *The Death and Life of Great American Cities*, Vintage Books, New York.
- Kaygısız, Z. Ve Girginer, N. (2011), “*Maliyet Etkinlik Analizi: Türkiye'deki Büyükşehir Belediyelerinde Uygulama*”, Eskişehir Osman Gazi Üniversitesi İİBF Dergisi, 6(2): 309 - 342

- KENTGES (2010- 2023), “*Bütünleşik Kentsel Gelişme Stratejisi ve Eylem Planı*”, [http://www.kentges.gov.tr/\\_dosyalar/kentges\\_2013\\_faaliyet\\_raporu.pdf](http://www.kentges.gov.tr/_dosyalar/kentges_2013_faaliyet_raporu.pdf), (01.01.2016)
- KENTGES, 2013. <http://www.kentges.gov.tr> , (02.02.2016)
- Lepuschitz, Katrin ve Pisano, Umberto (2014), “*Mapping Urban Sustainable Development in Europe and Beyond*”, ESDN Case Study No:15
- Pisano, G.P. ve Shih, W. C. (2012), *Producing Prosperity: Why America Needs Manufacturing Renaissance*, Harvard Business Review Press, Boston.
- Şahin, Ali (2007), “*Türkiye’de E-Belediye Uygulamaları ve Konya Örneği*”, Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, Sayı: 29, Kayseri, 16-189
- Şahin, Ali (2014), *Türk Kamu Yönetiminde Yapısal Dönüşüm ve E- Devlet*, 2. Baskı, Atlas Akademi Yayınları, Konya
- TMOMB (2008), “*Dünyada Ve Türkiye’de Enerji Verimliliği Oda Raporu*”, [http://www.mmo.org.tr/resimler/dosya\\_ekler/a551829d50f1400\\_ek.pdf](http://www.mmo.org.tr/resimler/dosya_ekler/a551829d50f1400_ek.pdf), (06.02.2016)
- Türkiye Bilişim Derneği (2013), “*Bilişim Kentleri Klavuzu*”, [http://www.tbd.org.tr/usr\\_img/raporlar/BK-KILAVUZ-SON.pdf](http://www.tbd.org.tr/usr_img/raporlar/BK-KILAVUZ-SON.pdf), (02.02.2016)
- Vienna University of Technology, Vienna, Austria, [http://www.smart-cities.eu/download/smart\\_cities\\_final\\_report.pdf](http://www.smart-cities.eu/download/smart_cities_final_report.pdf), (01.03.2016)
- Voula Mega and Jørn Pedersen (1998) “*Urban Sustainability Indicators , European Foundation For The Improvement Of Living And Working Conditions*”, <http://eurofound.europa.eu/pubdocs/1998/07/en/1/ef9807en.pdf>, (07.02.2016)
- Yassein, Muneer Banı, Al-Maolegı Mohammed, Yaser Khamayseh, Krstic Dragana, Aljawarneh Shadı (2015), “*Intelligent Transportation System for Crowded Streets Using Short Range Wireless Technologies*”, <http://www.wseas.us/e-library/conferences/2015/Konya/ACS/ACS-16.pdf>, (01.02.2016)
- [http://www.konyateknokent.com.tr/d/f/hizmet\\_yatirimkilavuzu\\_ing.pdf](http://www.konyateknokent.com.tr/d/f/hizmet_yatirimkilavuzu_ing.pdf), (01.02.2016)/
- <http://www.yerelnet.org.tr>, (05.07.2015)