CrossMark

The Operationalizing Aspects of Smart Cities: the Case of Turkey's Smart Strategies

Ebru Tekin Bilbil[1]

Abstract Recent efforts to design conceptual maps and models that best outline the definition, typologies, and dimensions of cities that use Information and Communication Technologies (ICTs) for greater advancement have focused on the term "smart city." To approach this subject beyond a strategical level only, this paper focused on the operationalizing aspects of becoming smarter in order to identify the weaknesses, contradictions, and limitations of smart city projects and action plans prescribed by the policy reports in order to understand how smart city projects work in reality. This paper utilized the case study of Turkey's initiative beginning in the 2000s of transitioning into an information society as well as its smart city initiatives beginning in the 2010s. The process contains ever changing dynamics that create, transform, and design new reconfigurations in complex socio-technical platforms. By examining diverse local institutional design, context, and differential aspects of smart solution experiences, this paper identified the processes of achieving smart projects by comparing smart city policy reports in order to create a roadmap for other related nationwide projects. Smart projects create policy areas performed by various and multi-dimensional socio-technical reconfigurations which emerge and interact to create and institutionalize new urban solutions. Analyzing the process of becoming smarter reveals three elements of smart city projects: infrastructural dimensions (legal basis, technology, and the coordination between institutions); policy areas and scope; as well as critical performance indicators to evaluate the success and progress of smart city projects.

Keywords Smart city · Policy making · Institutions · ICT · Socio-technical configuration · Political technology

✉ Ebru Tekin Bilbil
   ebrutekin@hotmail.com; ebru.tekin@boun.edu.tr

[1] Boğaziçi University, Bebek, Istanbul, Turkey

Ⓐ Springer

Introduction

The term "smart city" has been the focus of the recent discussion on attempts to create conceptual maps and models that would best define a smart city as well as its dimensions and typologies. Despite the differences in contributions and suggestions of relevant studies, they all agree that smart city projects are derived from ICTs (Castelnovo et al. 2015; Hollands 2008; Komninos 2002; Allwinkle and Cruickshank 2011; Lee and Lee 2014; Weisi and Ping 2014; Navigant Research 4Q 2014; Neirotti et al. 2014; Paroutis et al. 2014; Popescu 2015; Dameri and Ricciardi 2015; Schaffers, et al. 2011, 2012; Scholl and Scholl 2014; Caragliu et al. 2011; Viitanen and Kingston 2014; Walravens 2015a; Walters 2011).

This paper utilized the case analysis of Turkey's initiative of smart projects that aim to "enable Turkey to benefit from ICTs effectively and to identify the middle- and long-term strategies and targets for the realization of transformation" (ISS 2006-10 2006: 2). Turkey's advancement towards becoming smarter is a continuum process initiated by ICTs. I analyzed two policy documents titled Information Society Strategy of Turkey initiated in 2006 and 2014, respectively. Based on these strategy documents, the continuum process of becoming smarter in Turkey starts with ICT infrastructure. The process, however, contains ever changing dynamics that create, transform, and design new reconfigurations in complex socio-technical platforms. Therefore, considering diverse local institutional design, context, and different aspects of smart solutions experiences, one might say that it is not possible to identify a one-fits-all definition of a smart city. As a result, this paper revealed that the processes of implementing successful smart projects create policy areas performed by various and multi-dimensional socio-technical reconfigurations. These areas emerge and interact to create and institutionalize new urban solutions.

Examining the problem areas of smart city projects reveals the contradictions, limitations, and gaps in smart city projects, as well as institutional differences at the local level. Therefore, this paper identified the weaknesses of smart city projects and action plans prescribed by the policy reports in order to understand how a smart city projects actually work on the ground. Therefore, the main focus of the paper was to address the question: what are the contradictions and limitations of the socio-technical reconfigurations of smart city projects? How have the reconfigurations played out in past projects and how should they be institutionalized? In order to address these questions, this paper analyzed how these projects are operationalized and implemented on the ground.

Based on the document analysis, I studied the case of the Information Society Strategy of Turkey 2006–2010 and 2015–2018 in order to identify the gaps and problems in creating smart city projects. Each action plan was examined by defining the progression of achieving the level of smart as an operationalizing concept in order to discover the gaps towards becoming smarter and adequate approaches to close these gaps. As such, it was of equal importance to identify and examine the new actors of these socio-technical reconfigurations. This paper set out to explore the problem areas and challenges in order to suggest new dimensions and solutions to overcome identified challenges.

Literature Review

This section of the paper grouped different definitions and perspectives on smart cities into two groups: the design of smart cities and the implementation of smart cities. The first group which analyzed the concept of a smart city and the following new designs of cities focuses heavily on definitions, dimensions and typologies of the smart city. This group furthermore examined different perspectives of smart city designs to identify the relevant actors and their roles in the creation and design of a smart city. The second group went beyond defining smart city as a concept and attempts to examine the operational aspects and implementation practicalities. The societal and political impacts on society and politics thereof were analyzed.

Designing Smart Cities

Three approaches exist in defining the design of smart cities in an attempt to define them: top-down, bottom-up and combined. First, the top-down approach indicates the presence of technology (Walravens 2015a, 2015b) and critical infrastructure such as roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, and even major buildings (Hall 2000: 1) in designing, planning and building smart cities from scratch (Walravens 2015a). As such, IBM defines A Smarter City[1] as the city that "delivers continuous improvements in quality of life for all its citizens. It operates efficiently and sustainably, collaborating between all of its stakeholders and harnessing technology to achieve its objectives" (IBM 2013).[2] This approach is as such a formal, supply-based, dominant approach to analyze smart urbanism (Luque-Ayala and Marvin 2015). This is a technology push force that offers new solutions or products of advanced science and technology to the mass market regardless of the expressed need of society for such solutions and products (Angelidou 2015).

The alternative bottom-up approach is characterized as informal and demand-based (Luque-Ayala and Marvin 2015). The emphasis is placed on the needs and lives of consumers and users as opposed to concentrating largely on technology or infrastructure (Burnes and Towers 2016). Hence, the demand to change and improve the city comes from the people of the city. This approach also points out to companies' involvement into this interaction and connection via mobile apps as the tools that enable people to interact with the city (Walrevens 2015b).

Combining both top-down and bottom-up approaches which encompasses a balanced intersect of technology, institutions and people removed the dichotomy of top-down and bottom-up approaches (Letaifa 2015). As such, smart cities have also been analyzed as conceptual urban development models that utilize human, collective, and technological capital for urban development (Angelidou 2015). Broader definitions include all aspects that constitute the city; comprised of smart economy, smart people,

---

[1] On 4 November 2011, the trademark "smarter cities" was officially registered as belonging to IBM (Söderström et al. 2014), for further details please visit: https://www.trademarks411.com/marks/79077782-smarter-cities.

[2] In this paper, as the term "citizen" limits the scope of participants of a smart city, the term "people" was used as it comprised people living in, residing in or making use of spaces within cities (Thomas, et al., 2016).

smart governance, smart mobility, smart environment and smart living (Giffinger and Pichler-Milanović 2007). Therefore, the key elements of a smart city include utilization of networked infrastructure, business-led development as well as soft infrastructure that includes more humanist aspects such as knowledge networks, voluntary organizations, social capital, ordinary people and communities; also, social and environmental sustainability. Creating more progressive smart cities starts by equalizing the use of ICT among business, government, communities and ordinary people and also by balancing economic growth with sustainability (Hollands 2008). Further definitions include the implications of smart city such as its sustainability and urban performance, physical infrastructure as well as human and social capital.

Smarter as a Strategy

Most notably during the 2000s, smart cities have been designed as strategies of firms and around economic growth to overcome the effects of economic recession (Paroutis et al. 2014; Shelton et al. 2015).

> ...in the 21st century, cities compete globally to attract both citizens and businesses. A city's attractiveness is directly related to its ability to offer the basic services that support growth opportunities, build economic value and create competitive differentiation. Potential inhabitants, of both the commercial and residential variety, are a discriminating lot, and they are looking for cities that operate efficiently and purposefully. They are looking for smarter cities. (IBM Smarter Cities 2012)

Creating and designing smart cities to overcome the effects of economic crises and to achieve economic growth through generating new employment opportunities lead policy designers and private companies to focus on competitiveness, efficiency and quality aspects of smart cities. From this point of view, smart city is "a city in which the city dwellers may access smart services regardless of time or place and where city managers may enhance the city's competitiveness and citizens' quality of life via providing these smart city services" (Lee and Lee 2014: 594). For instance, in Turkey, one smart city solution, the National Transportation Portal, identified the reason of its design "to be easily used by all individuals in the society and to maintain additional commercial software which may be needed by the user at the minimum level possible" (Ulasim.gov.tr 2016).

Therefore, from a strategic point of view, the smart city concept is a multi-dimensional urban development strategy by which people enable the city and are empowered through the utilization of technology. Schaffers et al. (2012) defines it as an urban laboratory, an urban ecosystem, a living lab, an agent of change. In terms of policy design, a variety of strategies for smart city development is identified as follows: national versus local; new versus existing cities; and hard versus soft infrastructure oriented strategies (Angelidou 2014).

As supposed to such a strategy perspective, there are studies that criticize and analyze this perspective as discourse (Luque-Ayala and Marvin 2015). Similarly, Vanolo (2013) discusses how the concept of smart city of which has been imported from the USA to other world cities is in reality used by its proponents

to support their own agendas.[3] Moreover, the smart city has been conceptualized in urban political discourse as an urban political technology or a political device (Pollio 2016) in relation to benchmarking techniques and also neoliberal urban development. For instance, city rankings utilize a set of statistical indicators and evaluate and benchmark smart cities based on a single number (Vanolo 2013). This benchmarking strategy disregards the ways to address urban inequalities but serves to promote the city and "sell" it (Wiig 2015).

Furthermore, the critical discourse analysis of smart city strategies includes smart city strategies utilized by corporations. For instance, IBM's strategy on "the smarter city" introduced the concept as newly developed essential assets of cities. Söderström et al. (2014) examined this strategy as a discourse pushing people to consider cities as the tools to promote new means of urban creation. As such, neo-liberal framing of smart city (Shelton et al. 2015) criticizes the corporate push (Galdon-Clavell 2013) and how this corporate discourse frames urban affairs as an apolitical matter (Söderström et al. 2014). This perspective suggests to bring government pull in order to emphasize the legal, social, and ethical aspects of smart environments (Galdon-Clavell 2013). Moreover, strategizing the concept does not ensure that the strategies will be implemented as planned and designed. Therefore, beyond smart city strategies, its operationalizing aspects need to be focused in order to identify the problems and challenges in implementing smart city projects on the ground.

Operationalizing Smart Cities

This paper focused on how the smart city is operationalized and how it works on the ground to understand the "actually existing smart city" (Shelton, et al. 2015: 16). The terms smart city and achieving smartness are operationalized with the analyses of government web sites (Anttiroiko, et al. 2014), technical assistance, web geeks, city experts, grants and municipalities (Shelton, et al. 2015: 16); their visibility, popularity, availability online, and their central role in informing government practitioners working within and with cities around the world (Gil-Garcia, et al. 2015); as well as network characteristics of city governments (ties with global actors/cities) (Wall and Stavropoulos 2016).

Providing an operationalizing approach, the concept smart is analyzed as "a platform that fosters collective (local) intelligence of all affected stakeholders". As such, the constituting characteristics of smart city includes collaboration (working with all stakeholders), context (the data); and collectivity (overcoming societal challenges) (Walravens 2015a: 285). This platform signifies smooth information processes, facilitation mechanisms for creativity and innovativeness, as well as smart and sustainable service solutions (Anttiroiko, et al. 2014). As a result, the smoothness and facilitation become the criterion of smart as they are related to the embeddedness of technological platforms into social and governmental platforms on the ground. Similarly, in drawing attention to the innovation aspect of smart cities, Kuk and Janssen (2011: 39) focused on innovative services "that provide information (and transaction possibilities) to all

---

[3] One example of this agenda transfer could be the initiation of the EU's Lisbon Strategy due to the EU's perceived gap between the US and EU in the production of new technologies and the implementation of innovation within society (Europarl, 2011).

citizens and businesses about all aspects of city life via interactive, city-wide, Internet-based applications". Again, utilizing the operationalizing perspective, mobile applications might be identified as a critical aspect of smart cities that connect the city to its citizens (Walravens 2015a). Another example is living labs that are identified once again as platforms that engage stakeholders such as companies, researchers, users, and public organizations, in real-life contexts to test breakthrough concepts and assess their potential value for society as a whole (Open Living Labs 2016).

From this point of view, open innovation that links technology and communication with people, city and other cities (Paskaleva 2011) are the tools of making a smart city. The city is thus able to connect different networks between diverse stakeholder groups and city governments (Anttiroiko, et al. 2014). Therefore, identifying platform governance requires the examination of the operationalizing components and dynamics of the socio-technical processes in order to understand the challenges, gaps and constraints posed by this reconfiguration.

Socio-Technical Processes

As technology plays a significant role in social change, it cannot be excluded from social and political factors. Therefore, smart cities have been studied as socio-technical arrangements (Goodspeed 2014). Bulkeley and Castán Broto (2013): 361) address the socio-technical processes and how they create "new forms of political space … enacted through forms of technical intervention in infrastructure networks." (Quoted from Viitanen and Kingston 2014). Similarly, uncovering the city concept as varying operationalizing arenas where smart products are tested and developed, such studies analyze smart cities in relation to the restructuring of socio-technical urban governance that create new spaces for private investment and delegating responsibilities to urban citizens (McLean et al. 2015). The imaginaries of urban futures have been constructed through their socio-technical and political implications (Luque-Ayala and Marvin 2015).

The predominant weaknesses in the case study below towards operationalizing a smart city exist in the gaps in institutionalizing and coordinating diverse stakeholders that participate and interact in these socio-technical processes. This resulted in policy-makers creating smart city strategies which create new areas and configurations of power. This paper examined whether a smart city strategy may create unintended consequences that could increase coordination and implementation problems.

The Case of Turkey's Smart Initiative: from 2000s to 2010s

The concept of smart has only been recently included in policy framework and strategy documents created by the administrative authorities in Turkey. However, the term itself has been included in older policy frameworks dating back to the beginning of ICT strategies. Turkey is progressing along the continuum of becoming smarter beginning with designing ICT solutions (i.e., e-government, online systems) towards smarter solutions (i.e., smart grid systems, LED street

lighting, Intelligent Transportation System) (Export.gov 2014). To exemplify, in Turkey, the smart transportation applications include passenger information (i.e., National Transportation Portal, İBBTraffic), traffic management (i.e., traffic lights), mass transportation (i.e., smart city applications become mandatory for city government, MobİETT), e-payment (i.e., KGS, HGS, OGS), and personal safety (i.e., MOBESE) (Tufan 2014). There are also smart city projects initiated by the private sector and NGOs, such as Karaman Smart City Project of Turk Telecommunication Group, GIS system integration of Sampas to municipalities, energy saving smart city project of Turkcell in Gaziantep, Public Technology Platform and also the smart mobility projects of the IBM, Vodafone and Istanbul Municipality partnership.[4]

The smart city has been studied as a policy concept, for instance, within the EU framework, to mobilize all knowledge centers into innovation hubs in order to strengthen the socio-economic development (Kourtit, et al. 2012). From this EU insight, the Strategy was also adopted within the framework of policy initiatives introduced with the EU's Lisbon Strategy that aims to achieve more investments in knowledge and innovation, increasing business potential for small enterprises, increasing employment opportunities, and climate change and energy policy.[5] In Turkey, in relation to the concepts of smart cities, the country largely focused on the economic benefits of new technologies (Yılmaz 2012).

Turkey's "Information Society Strategy" Documents and Action Plans and 2006–2010 and 2015–2018

On July 28 2006, with the decision of the High Authority of Planning, the Information Society Strategy and its Action Plan were enacted (Rule 2006/38). The action plan targeted four main groups of actors which included the public sector, private sector, individuals, and ICT. The Strategy Document on Information Society 2006–2010 was prepared with international expert advice comprised of 111 action plans. The Strategy (2006–2010) based on the E-Transformation Turkey Project initiated in 2003 by the government was approved as a main policy document. The project was coordinated by the State Planning Organization with one board and one council. The State Minister and Deputy Prime Minister, Minister of Transportation, Ministry of Industry and Trade, top-level bureaucrats and NGOs comprised the e-Transformation Turkey Executive Board and public and private sectors and NGOs made up the Advisory Council. During this process, the e-Transformation Turkey Executive Board members had prepared and adopted "Turkey's Information Society Transformation Policy" with the involvement of other stakeholders. After the "successful" implementation

---

[4] Retrieved from the Web Links of projects:
  http://www.karamandan.com/Gundem-Akilli_Kent_nedir-h30955.html
  http://www.sehirlerakilllaniyor.com
  http://www.sampas.com.tr/akos-detay.asp?p=10&t=ornek-projeler.html
  http://blog.turkcell.com.tr/sehirlerin-turkcell-ile-donusum-hikayesi
  http://www.kamuteknolojiplatformu.org/details.php?id=6/PROJELER
  https://www-03.ibm.com/press/tr/tr/pressrelease/37964.wss.
[5] However, despite its achievement in employment and social fields, The Lisbon Strategy has been failed to be implemented at the national and local levels in many EU member states (Portal Europa, 2016).

Table 1 Seven policy spheres of the strategy document 2006–2010

1. Social Transformation: Ensuring effective usage of ICT by citizens (with 14 action plans)

    i.e., creating ICT infrastructure in schools, creating Turkey Culture Portal, providing ICT training programs for adults, schools, and public institutions

2. ICT Adoption by Business: Increasing SME's e-commerce, computer ownership (with 12 action plans)

    i.e., creating e-government services for business such as e-commerce, online corporate operations, e-document, access to information

3. Citizen-focused service transformation: moving ICT to electronic channels (with 41 action plans)

    i.e., improving public services & e-citizenship, integrating public sector institutions' systems, creating online healtcare, education, transport & justice systems

4. Modernization in Public Administration: creating an effective e-government model (with 21 action plans)

    i.e., strenghtening institutional structure, improving e-state services, creating common e-services of public institutions, e-signature and e-aquisition systems

5. Global competitive IT sector: developing sector's competence by partnerships and projects (with 13 action plans)

    i.e., increasing the number of qualified human resources and competence in ICT in universities, business and public institutions

Source: ISS 2006-10 2006

of two action plans conducted in 2003–2004 and 2005, the preparation of the Strategy (2006–2010) was executed in 2006 (ISS 2006-10 2006).

The Strategy (2006–2010) identified 7 policy spheres with the main aim to disseminate ICT throughout society (Table 1). The objectives and actions proposed in the Strategy had been tracked with the Program Description Document, Measurement Document and 6 Assessment Reports. In 2010, at the end of the planned process of the Strategy, there lacked a new strategy document; therefore the existing action plans continued to be implemented. In2012, according to the final report, only 30 of the 111 action plans were finalized (E-Devlet 2016).

In 2014, a new Strategy Document on Information Society 2015–2018, was prepared by following the preparation steps listed below (ISS 2015-18 2015):

– Determined the conceptual framework including background studies and analyses conducted by a consultancy firm between November 2012 and October 2013 based on the interviews conducted with 301 institutions and 745 individuals;
– Conducted focus groups studies and workshops to gather the experiences, recommendations and comments of the representatives of public sector (48%), private sector (29%), NGOs (17%) and universities (6%),
– Completed further field research from various parties,
– Created a web portal called bilgitoplumustratejisi.gov.tr to publicly share all project documents,
– Prepared the draft document under the coordination of the Ministry of Development and received feedback from relevant parties on the draft document,
– Finalized and enacted the Strategy 2015–2018 on March 6 2015.

The Strategy 2015–2018's main target was achieving economic growth and employment with 8 policy spheres (Table 2).

Table 2 Eight policy spheres of the strategy document 2015–2018

1. Information Technologies Sector (with 9 action plans)

   i.e., creating IT sector infrastructure, developing cloud program for SMEs, establishing software working group, expanding IT companies internationally, supporting ITC sector

2. Broadband Infrastructure and Sectoral Competition (with 11 action plans)

   i.e., establishing fiber access program, reviewing regulatory framework, preparing national broadband strategy, promoting domestic 4G services, initiating 5G R&D process

3. Qualified Human Resources and Employment (with 9 action plans)

   i.e., updating ICT curriculum in universities and schools, implementing training programs, improving English proficiency in ICT sector

4. Diffusion of ICT into the Society (with 7 action plans)

   i.e., creating the Digital Divide Index, disseminating ICT servcices for disabled, disseminating Internet access

5. Information Security and User Trust (with 5 action plans)

   i.e., enacting Cyber Security law and legislation on privacy of personal data, preparing strategy and action plan for combating cyber crimes

6. ICT based Innovation Solutions (with 9 action plans)

   i.e., developing smart cities program, supporting smart application, developing living lab program, integrating e-health records, standardizing e-health, disseminating integrated care services, developing green ICT program, implementing Big Data pilot program, creating open access to digital cultural and scientific information

7. Internet Entrepreneurship and E-Commerce (with 7 action plans)

   i.e., completing e-commerce legislation, preparing e-export strategy, developing internet enterprenership and e-commerce

8. User-Centric and Effective Public Services (with 13 action plans)

   i.e., improving user-centric e-government services, developing city management information system, preparing ICT strategies by public institutions, regulating employment of public ICT workers, encouragin open access source software in public sector, building government claoud computing infrastructure

Source: & ISS 2015-18 2015

Previous research studied the challenges and problems posed during the implementation of smart city projects. According to the field study conducted by Turkey Informatics Foundation with the participation of large city's municipalities, district municipalities, energy, electric and water distribution institutions, the main problems include: financial insufficiencies, the lack of a roadmap and strategy, the lack of coordination between institutions, the lack of adaptation of the innovation concept by institutions, the lack of necessary expertise and human capital, the lack of adaptation of big data analytics, and the lack of infrastructural adaptation of Geographic Information System. The study also revealed unintended developments such as the reluctance of data sharing, bureaucratic obstacles and public bid processes, different information device protocols, and data mining problems (TBV 2016). Likewise, the problem areas of Turkey's integration to eEuropa + criteria included the lack of political will, budget constraints, educational and training difficulties, infrastructure problems relating to telecommunication, an internet access problem, lack of coordination, common strategy and standards (Aydın 2005). The following section analyzes the problem areas defined in the strategy document evaluation reports and how the project team members rate these problems areas.
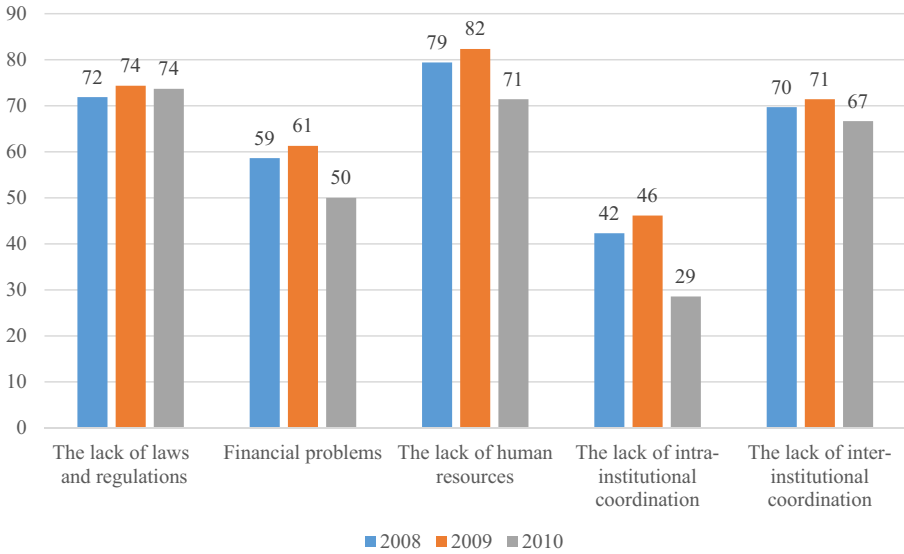
Fig. 1 Comparison of the weighted impacts based on the problem areas: years 2008 to 2010. Source: combined by the author based on the strategy document evaluation reports (2008–2009–2010)

Defined Problems Areas of the Strategy (2006–2010)

The problem faced during the implementation of the Strategy 2006–2010 projects are evaluated into five groups: (1) Legal problems, (2) Financial Problems, (3) Human resource problems, (4) Intra-institutional problems, and (5) Inter-institutional problems. The following figure analyzes and compares graphically, the weighted impacts of the identified problems, based on the Strategy Assessment Documents published in May 2008, March 2009 and March 2010, and ranked by project participants. The problems are rated from 1 to 5 with 1—weighted very low; 2—weighted low; 3—weighted; 4—quite weighted; 5—significantly weighted). Figure 1 summarized and compared the weighted impacts of the problems areas from 2008 to 2010.[6]

The problem area weighted highest in ranking was the lack of human resources to implement the projects. Although its weighted impact has decreased from 2008 to 2010, this was identified as the most problematic area. The second most weighted impact was the problems related to laws and regulations, which included the lack of required laws and regulations. Surprisingly, from 2008 to 2010, the weighted impact was in an increasing trend rather than a decreasing one. This may signify that the problems based on the lack of required laws and regulations had been resolved by introducing new laws and regulations such as e-trade law, laws on personal data protection, e-communication, developing competence on e-state, internet security. The third highly weighted problem area was the lack of coordination between institutions.

The comments and explanations can be grouped into two main problem areas: the lack of legal basis, proper organization and planning and the lack of coordination, willingness and care of the institutions and participants (Table 3). Relationally, the latter one is also related to the lack of binding rules to coordinate the participants and their

---

[6] The data has been converted to weighted percentages by counting each data manually by the author.

Table 3 Problem areas identified in comments and explanations

The Lack of Legal Basis, Proper Organization and Planning

    The continuation of infrastructural preparations and not being ready for implementation

    The difficulty in accessing the necessary law which is the basis of related rules and regulations

    Difficulties to develop new software based on complex laws and regulations

    The lack of on-time implementation of some of the project tasks

    The privatization of public services and the involvement of new private actors

    The lack of infrastructural adjustments between institutions

    The project creation process involves experts but this involvement has not continued in the implementation process

    The lack of laws on mandatory e-state application access

    The lack of laws lead to uncertainties in human resources salaries and working conditions

The Lack of Coordination, Willingness, and Care

    To be able to complete the legal basis, the council needs to get started

    The lack of harmony in working hours of people working in project institutions

    The lack of active participation of some institutions in implementation group meetings

    The lack of information and the need for information sharing with institutions regarding strategy aims, actions and projects

    There is a need to include each institution and their readiness for both infrastructure and implementation

    The lack of consensus to share the Police Department's data with other institutions

    The lack of coordination among institutions

    The early periods of the project results in lack of coordination among institutions

    The lack of consciousness of public institutions to develop common projects and tasks

    The reluctance of institutions

    The project remain within the limits of IT departments but not spillover to other departments

    The participation of people who have high work load; the appointment of the same personnel for other projects

Source: combined by the author based on the strategy document evaluation reports (2008–2009–2010)

motivation. The participants elaborated the problem areas as follows: "the lack of qualified employee"; "overlapping duties of people participated in the projects"; "the failure to achieve required efficiency due to human resources and coordination problems"; and "the gap between program's objectives and possible outcomes". Likewise, the intra-institutional problems within technical councils are stated as follows: "the different level of information among council members"; "different levels of experience"; "differences in terminology"; "workloads in their home institution"; "the involvement of members in more than one project"; "the insufficient participation in council meetings".

Rethinking Smart City Dimensions

The smart city projects are identified within the continuum (Gil-Garcia, et al. 2015; Anttiroiko, et al. 2014) and also with the degree of smartness varies within the boundaries of a city due to circumstances such as privileges of select cities, people and activities over

others (Shelton et al. 2015); and on country-specific variables in relation to its economic, technological and green improvements (Popescu 2015). Further parameters have been identified, for instance, governance or leadership parameters, such as bottom-up (private sector) or top-down (public sector) approaches (adopted from Letaifa 2015). Lee and Lee (2014) suggested four dimensions of smart city, which are mode of technology, service purpose, service authority, and delivery mode. First, considering the mode of technology, categories are shaped in relation to how ICT changes the shape of services, such as automative, informative or transformative. Second, the purposes and benefits of services can be hedonic or utilitarian. Third, in terms of service authority, the participation and involvement of citizens in using smart city services are categorized as voluntary or mandatory. Fourth, the delivery mode is categorized as passive or interactive.

However, the case study analyzed in this paper revealed the need for further understanding of how to institutionalize and coordinate smart city components. Therefore, it reveals the significance of the legal basis to implement and operationalize a given smart city action plan. Rather than just identifying the smart city parameters, this paper asked whether these dimensions can work on the ground by probing not only actors, priorities, resources and policies but also content management tools, collaboration tools, approach, stakeholders and their objectives.

As a result, based on the case analysis of Turkey, three elements of smart city projects are critical to evaluate (Fig. 2):

1. Infrastructure (legal basis, ICT basis and coordination): The infrastructural dimensions in strategic planning, laws and regulation; ICT regulation and the coordination between institutions comprise the highest number of action plans as most rated. The action plans in the strategy documents mostly have infrastructural work
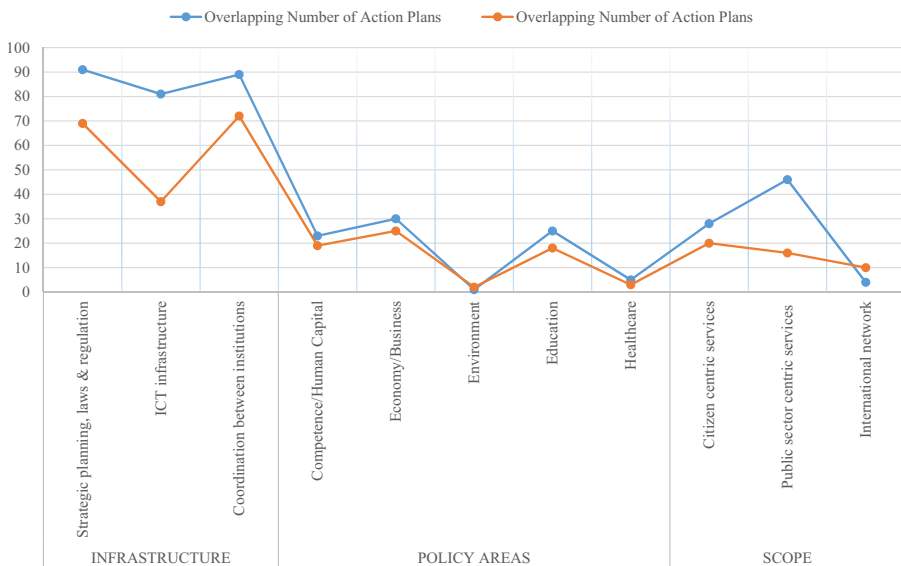

Fig. 2 Elements and dimensions of smart projects. Source: combined by the author based on the strategy document evaluation reports (2008–2009–2010)

on creating strategic planning, enacting required laws and regulations; providing ICT infrastructure; and ensuring the coordination between institutions.

2. Policy areas: The strategy documents include the policy areas where the degree of smartness is planned to improve, such as in competence with human capital, economy/business, environment, education, and/or health. From a comparative perspective, the environment and health sectors comprised the lowest number of actions plans. This signifies the low degree of smartness in Turkey as its smartness projects include low numbers of environmental and sustainability considerations as well as the health sector.

3. Scope: The scope of implementation might be classified into three areas, which are citizen centric, public sector centric and/or international.

The projects contributed to becoming smarter are the projects of socio-technical governance, based on the legal and technological infrastructure under the coordination of public institutions to be implemented in the different sectors within different scopes. In light of this framework, this paper outlined three infrastructural dimensions of becoming smarter based on the analysis of the Strategy document action plans of 2006–2010 and 2015–2018. These infrastructural dimensions are as follows (Fig. 2):

1. Strategic planning, laws and regulations: In the Strategy document action plans of 2006–2010 (published in 2004), 90 out of 111 (81%) action plans included the implementation steps of creating a strategic plan and new institutions (i.e., councils, committees, and/or working groups) and initiation of new laws and regulations. This number was 69 out of 72 (96%) action plans in the Strategy document action plans of 2015–2018 (published in 2008).

2. The coordination between institutions: Although in the Strategy document action plans of 2006–2010 89 out of 111 (80%) action plans required coordination between institutions, in the Strategy document action plans of 2015–2018, every action plan (100%) proposed such coordination.

3. ICT infrastructure: In the Strategy document action plans of 2006-2010, 81 out of 111 (73%) action plans required the creation of new technology and ICT
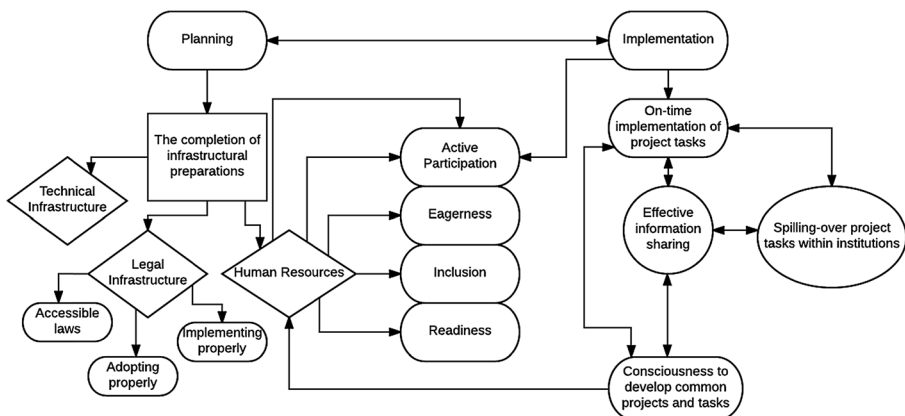

Fig. 3 Critical performance indicators (gathered by the author)

infrastructure in order to implement the action plan. In the Strategy document action plans of 2015–2018, this indicator was 37 out of 72 (51%) action plans.

Critical Performance Indicators: Managerial Implications

Based on the problems areas identified above, several critical performance indicators as well as their relational positions might be identified during the evaluation of the success or progress of smart city projects. Figure 3 depicted the performance indicators during the planning and implementation smart city project based on the defined problem areas in the evaluation report of strategy reports published for the Turkey's smart city initiatives.

Considering the smart city projects as a continuum process whereby each project component is interrelated to each other, the processes of planning and implementation need to be conducted in coordination with one another. The planning process includes first the completion of infrastructural preparations embracing three main sub-components. These components are technical infrastructure (i.e., ICT), legal infrastructure and human resources. Legal infrastructural components require to be accessible, adoptable and properly implemented by project team members. In this regard, the implementation process becomes visible with human resource performance indicators, which are active participation, eagerness, inclusion and readiness of each project team member and institutional representative. As such, a further indicator, the consciousness to develop common projects and tasks, appear in relation to both human resources and effective information sharing. The last two indicators emerge based on the communication and coordination problems during the implementation stage of smart city projects. These indicators are on-time implementation of project tasks and thus spilling-over project tasks within institutions.

Conclusion

An analysis of smart city projects as a continuum enables us to understand the transformation process. In Turkey, the process started with an information society transformation process in the 2000s and progressed into a smart concept in the 2010s. The term smart is clearly not a new concept for Turkey but its operationalization and adaptation are new, which signify the policy shift from the national level to the local level with the adoption of smart city strategies by city governments, citizens, and implemented into everyday life. For instance, the Strategy Document 2006–2010 used the term smart only once; the 2015–2018 Strategy Document on Information Society analyzed in this paper used the term "smart" (137 times). These occurrences include references to smart city, smart city applications used by municipalities, smart services, smart devices, smart phones, smart and sustainable, smart cards, smart networks, smart transportation, smart buildings, smart blackboards, smart electric meter, smart electric network, smart electric water metric, smart park meters and payments, smart solutions. The main problems faced within the Strategy 2006–2010 have been addressed by initiating (in 2015–2018) new policy spheres such as qualified human resources and employment.

The design and conceptual configuration of becoming smarter in Turkey might be understood along with the following definition: "smart cities are all urban settlements

that make a conscious effort to capitalize on the new ICT landscape in a strategic way, seeking to achieve prosperity, effectiveness and competitiveness on multiple socio-economic levels" (Angelidou 2014: S3). However, this definition disregards the governance aspects without considering socio-technical processes. Therefore, the city could be identified as smart "when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" (Caragliu et al. 2011: 50). Analyzing this process reveals the lack of private sector's active involvement in policy implementation. Despite the comments and suggestions of the private sector representatives during the strategy design process, the policy implementation process lacks their active contribution and participation. In order to overcome the problems during the project implementation phase and to ensure the involvement of each stakeholder within the smart city creation process, the private sector's presence must be equally included in implementation. While the financial and human resource issues faced by the smart city projects are significant, the real detriment lies in the lack of laws and regulations which hinder the implementation of the projects. Therefore, this paper proposed to prioritize the legal basis, ICT infrastructure and the inter-institutional coordination. Based on the problems identified during in the implementation of these projects, this article defined critical performance indicators in order to enable project planners and implementers to evaluate the success and progress of smart city projects.

Limitations and Future Research

This article based on, the document analysis, is limited to the evaluation reports of the Strategy Document (2006–2010); the new strategy's evaluation reports might open new discussions and research topics to understand how smart city projects are operationalized. Moreover, future research may contribute to analyze how each performance indicator might be measurable and quantifiable as well as how the factors change in different projects or country cases.

References

Allwinkle, S., & Cruickshank, P. (2011). Creating smart-er cities: an overview. *Journal of Urban Technology, 18*(2), 1–16.

Angelidou, M. (2014). Smart city policies: a spatial approach. *Cities, 41*, S3–S11.

Angelidou, M. (2015). Smart cities: a conjuncture of four forces. *Cities, 47*, 95–106.

Anttiroiko, A. V., Valkama, P., & Bailey, S. J. (2014). Smart cities in the new service economy: building platforms for smart services. *AI & Society, 29*(3), 323–334.

Bulkeley, H., & Castán Broto, V. (2013). Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers, 38*(3), 361–375.

Burnes, B., & Towers, N. (2016). Consumers, clothing retailers and production planning and control in the smart city. *Production Planning & Control, 27*(6), 490–499.

Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). Smart cities in Europe. *Journal of Urban Technology, 18*(2), 65–82.

Castelnovo, W., Misuraca, G., & Savoldelli, A. (2015). Smart cities governance: the need for a holistic approach to assessing urban participatory policy making. *Social Science Computer Review.*

Dameri, R. P., & Ricciardi, F. (2015). Smart city intellectual capital: an emerging view of territorial systems innovation management. *Journal of Intellectual Capital, 16*(4), 860–887.

E-Devlet. (2016). 2006–2010 Bilgi Toplumu Stratejisi ve Eylem Planı. Retrieved from http://www.edevlet. gov.tr/2015/10/13/2006-2010-bilgi-toplumu-stratejisi-ve-eylem-plani/, June 12, 2016.

Europarl. (2011). The Lisbon Strategy 2000-2010 An analysis and evaluation of the methods used and results achieved. Retrieved from http://www.europarl.europa.eu/document/activities/cont/201107/20110718 ATT24270/20110718ATT24270EN.pdf, June 19, 2016.

Export.gov. (2014). Smart cities in Turkey. Retrieved from http://www.export.gov/europe/& http://www. export.gov/turkey, June 15, 2016.

Galdon-Clavell, G. (2013). (Not so) smart cities?: the drivers, impact and risks of surveillance-enabled smart environments. *Science and Public Policy, 40*(6), 717–723.

Giffinger, R., & Pichler-Milanović, N. (2007). Smart cities: ranking of European medium-sized cities. Centre of Regional Science, Vienna University of Technology.

Gil-Garcia, J. R., Pardo, T. A., & Nam, T. (2015). What makes a city smart? Identifying core components and proposing an integrative and comprehensive conceptualization. *Information Polity, 20*(1), 61–87.

Goodspeed, R. (2014). Smart cities: moving beyond urban cybernetics to tackle wicked problems. Cambridge Journal of Regions, *Economy and Society*, rsu013.

Hall, R.E. (2000).The vision of a smart city. In Proceedings of the 2nd international life extension technology workshop (6 pp.), Paris, France, September 28.

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City, 12*(3), 303–320.

IBM Smarter Cities. (2012). Smarter, more competitive cities. Retrieved from https://www.ibm. com/smarterplanet/global/files/smarter_more_competitive_cities.pdf, June 05, 2016.

IBM. (2013). People for smarter cities. Retrieved from https://www.ibm.com/smarterplanet/global/files/uk__ none__smarter_cities__ibm_uk_paper_people_for_smarter_cities.pdf, June 14, 2016.

ISS 2006-10. (2006). Information Society Strategy 2006-2010. State Planning Organization, Retrieved from http://www.bilgitoplumu.gov.tr/Documents/5/Documents/060700_InformationSocietyStrategy.pdf, June 01, 2016.

ISS 2015-18. (2015). Information Society Strategy 2015-2018. State Planning Organization, Retrieved from http://www.bilgitoplumu.gov.tr/en/wp-content/uploads/2016/03/Information_Society_Strategy_and_ Action_Plan_2015-2018.pdf, June 01, 2016.

Komninos, N. (2002). Intelligent cities: innovation, knowledge systems, and digital spaces. Taylor & Francis.

Kourtit, K., Nijkamp, P., & Arribas, D. (2012). Smart cities in perspective—a comparative European study by means of self-organizing maps. *Innovation: The European Journal of Social Science Research, 25*(2), 229–246.

Kuk, G., & Janssen, M. (2011). The business models and information architectures of smart cities. *Journal of Urban Technology, 18*(2), 39–52.

Lee, J., & Lee, H. (2014). Developing and validating a citizen-centric typology for smart city services. *Government Information Quarterly, 31*, S93–S105.

Letaifa, S. B. (2015). How to strategize smart cities: revealing the SMART model. *Journal of Business Research, 68*(7), 1414–1419.

Luque-Ayala, A., & Marvin, S. (2015). Developing a critical understanding of smart urbanism? *Urban Studies, 52*(12), 2105–2116.

McLean, A., Bulkeley, H., & Crang, M. (2015). Negotiating the urban smart grid: socio-technical experimentation in the city of Austin. *Urban Studies*, 0042098015612984.

Navigant Research 4Q. (2014). *Smart city suppliers* (Navigant Research Report).

Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in smart city initiatives: some stylised facts. *Cities, 38*, 25–36.

Open Living Labs. (2016). What is a living lab?. Retrieved from http://www.openlivinglabs.eu/FAQ, June 18, 2016.

Paroutis, S., Bennett, M., & Heracleous, L. (2014). A strategic view on smart city technology: the case of IBM smarter cities during a recession. *Technological Forecasting and Social Change, 89*, 262–272.

Paskaleva, K. A. (2011). The smart city: a nexus for open innovation? *Intelligent Buildings International, 3*(3), 153–171.

Pollio, A. (2016). Technologies of austerity urbanism: the "smart city" agenda in Italy (2011–2013). *Urban Geography, 37*(4), 514–534. doi:10.1080/02723638.2015.1118991.

Popescu, G. H. (2015). The economic value of smart city technology. *Economics, Management, and Financial Markets, 10*(4), 76–82.

Portal Europa. (2016). The Lisbon Strategy in short. Retrieved from https://portal.cor.europa.eu/europe2020 /Profiles/Pages/TheLisbonStrategyinshort.aspx, June 15, 2016.

Schaffers, H., Komninos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011, May). Smart cities and the future internet: towards cooperation frameworks for open innovation. In The Future Internet Assembly (pp. 431-446). Springer Berlin Heidelberg.

Schaffers, H., Komninos, N., Pallot, M., Aguas, M., Almirall, E., Bakici, T., & Hielkema, H. (2012). *Smart cities as innovation ecosystems sustained by the future internet*.

Scholl, H. J., & Scholl, M. C. (2014). Smart governance: a roadmap for research and practice. iConference 2014 Proceedings.

Shelton, T., Zook, M., & Wiig, A. (2015). The 'actually existing smart city'. Cambridge Journal of Regions, Economy and Society, rsu026.

Söderström, O., Paasche, T., & Klauser, F. (2014). Smart cities as corporate storytelling. *City, 18*(3), 307–320.

Strategy Document Evaluation Reports (2008-2009-2010). Retrieved from http://www.bilgitoplumu.gov. tr/strateji-ve-eylem-planlari-2/2006-2010-bilgi-toplumu-stratejisi/, June 01, 2016.

TBV. (2016). Turkey Smart Cities Evaluation Report. March 2016.

Thomas, V., Wang, D., Mullagh, L., & Dunn, N. (2016). Where's Wally? In search of citizen perspectives on the smart city. *Sustainability, 8*(3), 207.

Tufan, H. (2014). Akilli Ulaşim Sistemleri Uygulamalari ve Türkiye için bir AUS Mimarisi Önerisi. Thesis.

Ulasim.gov.tr, 2016). https://www.ulasim.gov.tr/uphakkinda.xhtml#

Vanolo, A. (2013). Smartmentality: the smart city as disciplinary strategy. Urban Studies, 0042098013494427.

Viitanen, J., & Kingston, R. (2014). Smart cities and green growth: outsourcing democratic and environmental resilience to the global technology sector. *Environment and Planning A, 46*(4), 803–819.

Wall, R. S., & Stavropoulos, S. (2016). Smart cities within world city networks. *Applied Economics Letters, 23*(12), 875–879.

Walravens, N. (2015a). Mobile city applications for Brussels citizens: Smart City trends, challenges and a reality check. *Telematics and Informatics*, 32(2), 282-299.

Walravens, N. (2015b). Qualitative indicators for smart city business models: The case of mobile services and applications. *Telecommunications Policy*, 39(3), 218-240.

Walters, D. (2011). Smart cities, smart places, smart democracy: form-based codes, electronic governance and the role of place in making smart cities. *Intelligent Buildings International, 3*(3), 198–218.

Weisi, F. U., & Ping, P. E. N. G. (2014). A discussion on smart city management based on meta-synthesis method. *Management Science and Engineering, 8*(1), 73.

Wiig, A. (2015). The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia. *Urban Geography*, 1-19.

Yılmaz, Ö. (2012). Karayolu Ulaşımında Akıllı Ulaştırma Sistemleri, Uzmanlık Tezi.