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Critical and practical views of the  
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Together with the unprecedented rate of urbanisation, new practices and trends have sought to manage the complex challenges of urban systems. A prominent example is the “smart city” concept, which is present and widely discussed in literature and international policies. Although there is a lack of definitional accuracy, interpretation, and application, in addition to its underlying self-promotional inclinations; in recent decades the smart city concept has been one of the most influential trends and has tried to shape projects and cities relative to their efficiency and sustainability. Worldwide, the implementation of the smart city concept seems to have a fragmented record, using atomistic approaches. Nonetheless, some cities have managed to successfully operate in a smarter way to solve some of the urban challenges of the 21st century. In this issue of IGLUS Quarterly, we take a more critical view of smart cities by exploring the multi-scale applications of the concept in different contexts around the world through six articles that together, highlight potential successes and misconceptions of the smart city approach.

In the first article, Matthias Finger explores the “hype” behind the smart city concept and the actors responsible, essentially determining some of the confusion around it. Finger also conveys his views on the potential and future dimensions of its application; integrating services and generating significant efficiency gains across all infrastructures. In the following article, Renard Teipelke explains how the current use of smart urban data has not lived up to the expectations regarding urban planning and management tools, particularly in a developing context. The paper discusses the risk of not adequately positioning “smart city promises” within a particular setting and municipal capacities. In the third article, Oriol Estela takes us through the evolution of the “*The Strategic Metropolitan Plan of Barcelona*” (PEMB) and the importance of substantial reform in

order to keep up with today’s daunting urban challenges. The paper focuses on the ability of the Strategic Plan to continually adapt to upcoming challenges, to form new alliances, and to foster citizens’ involvement to achieve shared goals. The next article, by Alokandana Nath, takes a critical view of India’s urban governance systems through the Smart Cities Mission project. The paper explains India’s unique view towards implementing the smart city concept, which has a focus on people and infrastructure instead of technology. In unison, it’s explained how the project also has an ill-conceived approach to its implementation that hinders governance networks. In a similar regard, Thejaswini Jagannath explores India’s Smart Cities Mission, but from a different perspective. The author dives into the impact and importance of a well-planned city regarding the adaptation of the smart city approach, particularly the importance of public space. In the final contribution, Çağrı Kızıldaş and Umut Alkım Tuncer touch on a more traditional application of the smart city approach while commenting on the importance of implementing intelligent transportation systems (ITS) to improve the city’s efficiency and road safety. At the same time, they also denote the importance of stronger regulatory reform and inter and multi-departmental collaboration to gain substantial improvements..

We hope you enjoy these six articles and invite you to join the discussion at [iglus.org](http://iglus.org). If you feel that there are innovative practices underway in your city/region and you would like to contribute to an upcoming edition of *IGLUS Quarterly*, we encourage you to contact us at [diego.giron@iglus.org](mailto:diego.giron@iglus.org) and [umut.tuncer@iglus.org](mailto:umut.tuncer@iglus.org).

Diego Giron



# Smart City – Hype and/or Reality?

Matthias Finger\*

**Abstract:** In this article, I discuss the recent enthusiasm for the concept of “smart city”. In particular, I investigate whether this concept has any substance and, if it has, what it is exactly. Ultimately, I am aiming to determine whether the concept of smart city can be of any use, and, if so, for whom. If not, what would be required in order for “smart city” to become a useful concept.

## Introduction

I start by looking at the hype – and the related confusion – surrounding the concept of smart cities. I then try to identify the actors behind the concept of smart city, which makes it possible to examine, in a second part, whether the concept is capable of providing some useful substance. In the third part, I offer my own analysis of what smart cities are all about and what would be needed for them to become a useful reality.

## Hype and confusion

Publications about smart cities started to explode in 2012, as Figure 1 shows.

Figure 1: Exponential growth of smart city literature

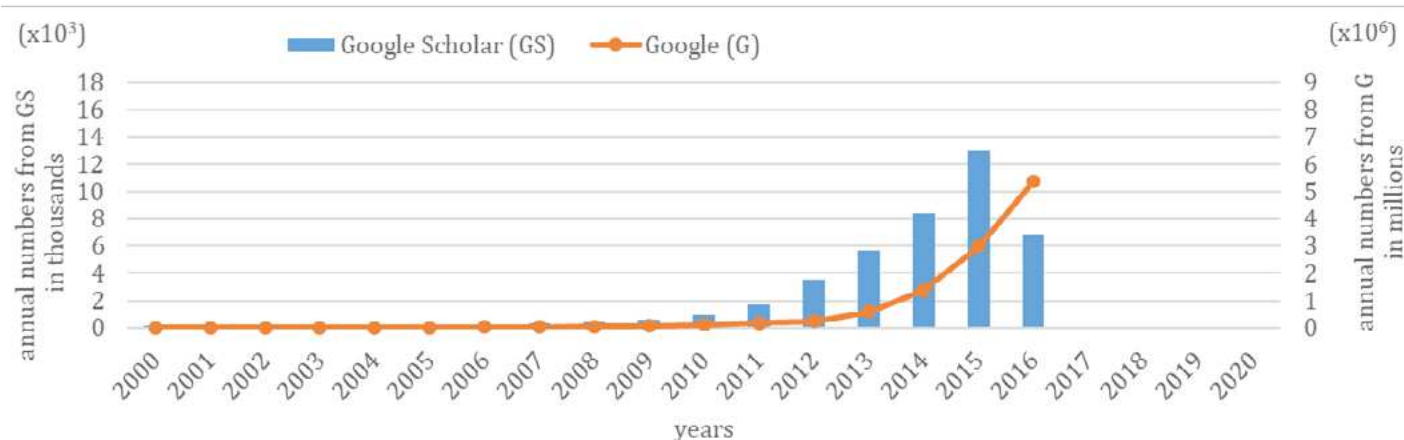
This exponential growth in the number of articles and books about smart cities, in both academia and the trade literature, points to the hype surrounding this topic. This is even more notable if one looks at the content of this literature, noting that most of it is not only identical – that is, copied from one another – but also mostly promotional, celebrating the beneficial virtues of smart cities, not only for cities (obviously), but also for economic growth, environmental protection, human wellbeing and humanity more generally (Hollands Taylor and Ltd 2008). Unsurprisingly, critical article about smart cities are very hard to come by.

This logically leads to confusion, fuelled by a proliferation of related concepts (Cocchia 2014). Some of this

## Numbers of Work on "Smart City"

Searching results within certain periods (annual)

from GS (including patents and citations) and G with the keyword "smart city" OR "smart cities" OR "smart urban" OR "smart urbanization"



Source: Jiayun Shen, EPFL

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conceptual innovation is simply due to the fact that authors feel the need to come up with new ways to differentiate themselves in this increasingly crowded semantic space. But a more profound reason has to do with the fact that authors of such articles come from different disciplinary backgrounds and therefore seek to highlight different features of what they think smart cities are. Table 1 gives an overview of the various perspectives on smart cities and corresponding conceptual innovations.

Table .1: disciplinary perspectives on smart cities and related concepts

Disciplinary perspectives on smart cities	Related concepts
<u>Engineers'</u> perspective: Omnipresence of network infrastructures, in particular digital infrastructures and digital technologies more generally	Digital city Ubiquitous city Wired city
<u>Economists'</u> perspective: Business-led urban economic development, mainly due to (private) entrepreneurship and business intelligence	Entrepreneurial city Intelligent city
<u>Innovation economists'</u> perspective: Urban development focused on high-tech and creative (art and design) industries (smart specialization; that is, specialization in smart technologies)	Innovative city Smart growth city Creative city
<u>Public managers'</u> perspective: Innovation in the way cities are governed, namely thanks to the ICTs (e.g., e-government)	Learning city Knowledge city
<u>Sociologists'</u> (and, to a certain degree, architects') perspective: Community-building (and sharing) thanks to the ICTs	Sharing cities
<u>Human ecologists'</u> perspective: Cities as a place of collective living based on human and ecological values, somewhat enhanced thanks to the ICTs	Humane city Sustainable city

Source: author's own compilation

As the table shows, there is clearly a confusion of concepts, not to mention the promotional dimension of these concepts, as all of them have positive connotations. There is currently no clear definition of what a

smart city is. This confusion is due to the fact that authors from various disciplines have tried to jump on the smart city bandwagon without really understanding the underlying technological evolution that has made a certain "smartness" possible (Albino et al. 2015).

### Reality of smart cities

Smart city is not just a concept; there are indeed some practices associated with it, even though these practices are far from what the concept – and its different variation (see Table 1 above) – promises (Cocchia 2014). We can now identify the following practices, all of which come under the "smart city" label (Caragliu et al. 2011; Batty et al. 2012; Hollands Taylor and Ltd 2008):

- Smart transportation covers a series of smart city practices or rather applications, such as integrated electronic timetables or (more or less integrated) electronic ticketing.
- Smart environment typically pertains to the monitoring of urban environmental conditions, thanks to sensors and other measuring devices.
- Smart energy mainly refers to smart meters and the monitoring of electricity consumption, although smart streetlights could also be mentioned in this context.
- Smart water basically means the same in the area of water and sometimes wastewater.
- Smart building encompasses both above (smart water and smart energy) to designate buildings that monitor their own state along a set of parameters (consumption, states, etc.).
- Smart safety and security designate basically surveillance devices (notably cameras) that monitor people and movement throughout a city.
- Smart health care, sometimes also called e-health, pertains to the digitalization of health care services, such as diagnostics via the internet, but also a more efficient management of the highly fragmented health care systems.
- Smart government/city-services, also called e-government, refers to the digitalization of the traditional paper-based government services, ultimately aiming at a purely digitalized interaction between the citizens and the public authorities.
- Smart participation is broader than simply e-voting (which would be one of the smart government services), as it encompasses more innovative interactions between the citizens and the various public,

but also private entities.

- Connectivity is often mentioned in the context of smart cities, but basically means equipping cities with (tele-)communications infrastructures, whether they are wired or wireless.

All of these practices are introduced in a very piecemeal fashion, owing to the fact that they are generally promoted by some of the city's administrative units without coordination with other units. Additionally, there is typically no coordination among the different promoters and vendors of the various smart city technologies, let alone standards that would allow for an integrated approach to smart cities (Goodspeed 2015). There is generally also a problem of metropolitan governance, given that metropolitan areas are composed of several cities, which are political entities of their own and typically do not coordinate among themselves, whether in matters of smart city or in any other matter.

In short, the introduction of smart city practices and corresponding applications is generally driven by vendors who are themselves specialized in certain technologies and solutions (Cocchia 2014). The most widespread of such vendors come from the device producers in the areas of sensors and meters, as well as smartphones, among others. In the smart city arena one can also find telecom operators, for whom smart cities constitute an opportunity to install connectivity. Finally, the third type of vendors in the smart city arena are data integrators, data management firms, and data analytics firms, which typically offer more integrated services and solutions to citizens, but mostly to city governments.

Therefore, given the vendor-driven nature of smart city solutions, it is only that the concept is primarily a promotional one. This leads to the fact that even the smallest application – such as smart street-lighting – is now equated with a city having become smart. City governments and mayors go along with this because such urban labelling contributes to the city's self-promotion (Hollands Taylor and Ltd 2008).

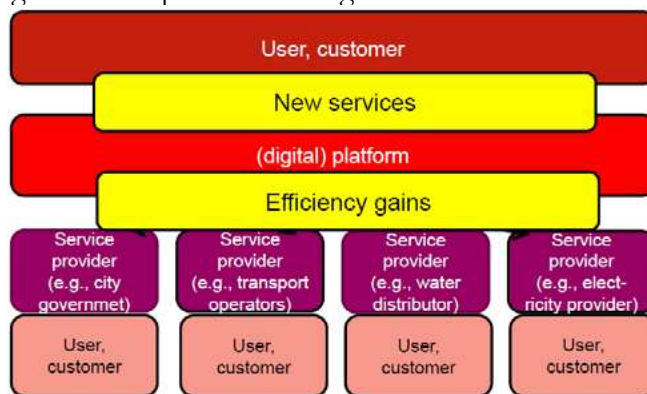
In conclusion, we may say that many cities around the world have bits and pieces of smart city practices, but these rarely warrant a city to be labelled a smart city, and even less so to be a smart city.

## Analysis

Nevertheless, these practices, albeit piecemeal and un-coordinated, are real. As such, they point to an underlying movement of growing digitalization of the cities (Cocchia 2014). Yet, such digitalization requires at least three elements in order to lead to smartness. First, the generation of data (from all sorts of devices), secondly, the interconnection and exchange of these data (thanks to telecommunications infrastructures and the internet) and, thirdly, the analysis of the generated and interconnected data (thanks to ever more sophisticated algorithms). However, vendors generally only provide one of these elements, and then often only for one of the sectors, such as energy or transport (Goodspeed 2015).

However, if combined intelligently in so-called “digital platforms”, these three dimensions of digitalization, integrating the different sectors, would enable smart cities to have huge potential, as illustrated by Figure 2 below (Cocchia 2014).

Figure 2: The potential of digitalization for cities



Source: author's own compilation

In particular, digital platforms (that is, smart cities) have two main potentials.

- First, smart cities clearly have the potential to create huge efficiency gains in and even across the various infrastructures. These gains are basically due to much more efficient coordination among the various actors involved in the provision of the respective services, in transportation, health care, energy, etc. This leads to reduced costs, as well as to less waste and therefore also to more efficient use of resources, something that can be seen as a contribution to sustainability.
- Secondly, smart cities – particularly thanks to digital platforms – also have the potential to develop much

more integrated services tailored to (individual) customers' needs. This precisely results from the power of these digital platforms, which are capable to much better match supply and demand. On the other hand, such digital platforms also display a strong tendency, thanks to their indirect network effects, towards monopolization.

In other words, digitalization does have a huge potential for efficiency and improved services, and this is what, realistically, smart cities could be about (Glasmeier and Christopherson 2015; Lazaroïu and Roscia 2012). However, in order for this potential to be unlocked, several institutional conditions need to be created, something which the technology- and especially vendor-driven discourse about smart cities ignores or at least downplays (Nam and Pardo 2011). On one hand, many of the technologically possible efficiency gains can only be brought to fruition if data is made available and exchanged, standards are defined and enforced, and privacy and data security is guaranteed, all of which requires strong regulations and thus political will, vision and leadership, not to mention political coordination at the metropolitan level and beyond (Batty et al. 2012; McHugh 2013). However, the danger of digital platforms becoming powerful monopolies that are interested in making money rather than in serving the urban public good is very real. This also requires strong regulatory institutions and therefore, again, political will, vision, and leadership at all levels. To conclude, there is indeed a huge potential for digitalization to create smart cities, but the road to harnessing this potential is still long.

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# Urban Planning Realities of Smart Urban Data Applications

Renard Teipelke\*

**Abstract:** *Smart urban data applications have not yet lived up to the promises made in glossy smart-city brochures. This article investigates key constraints that have inhibited urban planning and management tools and systems from effectively realizing their benefits in local government processes, particularly in developing contexts. The article discusses the main risks involved in correctly positioning “smart city promises” within the bigger picture of data, technology, and politics. It concludes with perspectives to advance the cross-disciplinary research on smart urban data applications and to outline practical pathways toward improved urban planning and management with the help of such smart tools and systems.*

## Introduction

A variety of smart urban data applications have enabled significant advancements in how cities are planned and managed. Different information and communication technologies are being developed in and across the various urban sectors of water, energy, waste, transport, and buildings. These developments, combined with the seemingly limitless availability of data through operations and interactions in urban spaces, opens up new opportunities to capture data, describe processes, explain developments, predict urban futures, and even to prescribe related solutions (Batty et al. 2012; UNCTAD 2016).

However, this article challenges the glossy smart-city brochures that are found at so many conferences these days, such as the World Cities Summit, and present a different perspective of the current diverse urban planning realities of smart urban data applications. In this regard, “smart urban data applications” are used as a term for those tools and systems that have been developed to inform current and future urban planning and management (decisions) of local governments, often as part of smart city initiatives and campaigns. This term subsumes applications that are based on quantitative and, to a lesser degree, qualitative data input for spatial analysis and modeling.

While the world’s largest and most developed cities (in terms of infrastructure) are often depicted as representing cutting-edge leadership in advanced urban planning solutions, it is the medium-sized and small towns that predominantly characterize the main playing field for

stagnation or innovation in sustainable urban development – and are therefore the main reference of this article (see also Robinson 2006).

Crucial aspects will be investigated that influence the reach and impact of smart urban data applications in urban planning and management practice. Firstly, three major **constraints** will be discussed that inhibit smart urban data applications from effectively realizing their benefits in local government processes, particularly in developing contexts. This will be followed by an analysis of four key **risks**, which helps to correctly position “smart city promises” in the bigger picture of data, technology, and politics. By pulling together the constraints and risks, concluding **perspectives** will be offered to advance the cross-disciplinary research on smart urban data applications and to outline practical pathways toward improved urban planning and management with the help of such applications. As examples, URL links to existing applications and initiatives will be given in [square brackets].

## Constraints

### 1. Knowledge Sharing Culture

Centralized monitoring and decision-support systems in urban planning have a laudable objective: They aim to enable city planners to coordinate urban planning and management functions across different sectoral departments. However, smart urban data applications do not function in a vacuum; they are embedded in an institutional setting of local governments. In most cases, local government departments work in sectoral silos. As

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a result, the premise of planning and managing across sectors stands in contrast to the divided institutional features of city administrations, where the flow of information, both between and even within departments, is most often not working effectively (Chourabi et al. 2012). Even without the introduction of a smart urban data application, local governments face the challenge of encouraging their sectoral experts to work across departmental boundaries in order to increase the efficiency with which scarce resources are invested in cities. The soft introduction of cross-sectoral planning tools (for instance in only some departments) can provide valuable learning ground to slowly change the knowledge sharing culture in institutions [[www.iclci.org/urban-nexus.html](http://www.iclci.org/urban-nexus.html)], not least through “leadership by example” (Serrat 2017). Nevertheless, local decision makers will not transform an institutional culture simply by introducing a technological solution, although such a solution can facilitate change (Geertman and Stillwell 2009) [[www.smartnation.sg](http://www.smartnation.sg)].

## 2. Data Literacy

Even in local governments where departments collaborate across sectors, the application of urban planning and management tools faces the significant hurdle of data literacy (Tomer and Shivaram 2017). Data literacy in local governments can concern the very simple aspect of staff not being properly trained in using computers and various programs (software). On a more intricate level, data literacy is inhibited by the mismatch of potential end-users’ capabilities and the training background that developers of smart urban data applications have (Geertman and Stillwell 2009). A common example concerns the use of maps. Nearly all urban planning applications use map views for their system’s interface, making it the main information and communication channel [<https://carto.com>, [www.mapbox.com](http://www.mapbox.com)]. However, the (critically reflected) use of maps is much less common than a specialized planner or data app developer may assume. What likely appears as a rather simple task of visualizing spatial information onto maps or similar imagery requires a significant “translation” skill from users (Goodchild and Janelle 2010). Therefore, depending on the geographic or cultural contexts, the localized adjustment or adaptation of smart urban data applications is a prerequisite for ensuring their usability in different local governments in combination with extended training for potential users (Estevez et al. 2016; UNCTAD 2016; Geertman and Stillwell 2009) [<http://www.urbandashboard.org/iadb/index.html>].

## 3. “40 Percent Solutions”

Localized smart urban data applications often require more than the adjustment to users’ cultural background and skill level. Most often, they also need to be scaled in their complexity to the conditions on the ground (Estevez et al. 2016). This could be labeled as a “40 percent solution”, implying the step of taking a well-developed urban planning tool (a “100 percent solution”) and adjusting it to much more limited conditions in the field [<https://geothings.tw/en>]. For instance, geography and infrastructure may challenge an application’s easy use due to positioning problems, lack of internet connectivity or speed, electricity supply, or the hardware capacities within an urban planning office. A more basic data application would also reflect the skills and capabilities of its users by possibly limiting the grade of details or the multitude of functions to a smaller set of essential tasks, which can later be upgraded as the users’ capabilities improve (McCall and Dunn 2012). Currently, the main constraint with regard to the “40 percent solution” is not a technical one. Adjusting, down-scaling, or simplifying a smart urban data application is usually feasible. Instead, a major problem lies in the missing link or feedback loop between developers and end-users, as well as their intermediating actors, such as urban development experts from specialized planning firms or international development organizations (Russo et al. 2015) [<https://puma.worldbank.org/tool>].

While the above-outlined constraints can be addressed quite effectively through a longer-term strategic approach, the following discussion underscores how the application and impact of smart urban data applications is embedded in a broader context of risks that question “smart city promises”.

## Risks

### 1. An Unequal Playing Field

Concerns about data ownership and data surveillance in the digitized 21<sup>st</sup> century have been widely discussed (Kasdan 2017; Thakuriah et al. 2017; Tomer and Shivaram 2017). There have also been important contributions to issues regarding the good governance of data and smart cities more generally (Estevez et al. 2016; UNCTAD 2016; Chourabi et al. 2012). However, another feature of great importance must also be underscored: “data” has become a multi-billion-dollar industry, which has made the playing field very unequal (although it is debatable whether it ever was more

equal). Few large corporations in the information and communication technology sector have a stronghold on collecting, owning, controlling, and/or hosting big data (Columbus 2016; Tomer and Shivaram 2017). Local governments do not yet sufficiently use the opportunity of wider data harnessing. Also, not-for-profit, open-data, and open-source initiatives are trying to counter-balance widespread commercialization tendencies in the field of (urban) data [[www.citysdk.eu](http://www.citysdk.eu), <https://getdkan.org>, [www.openstreetmap.org](http://www.openstreetmap.org)]. Still, data availability is increasingly a question about trading data points, files, and analytics rather than of local governments' or other entities' ability to capture the data (Nielsen 2015).

## 2. Digital Divide

The above-discussed knowledge sharing culture and data literacy constraints, combined with the stark differences in resources available to cities of different development trajectories, sizes, and locations, paint the picture of different "classes" of data-smart cities (Estevez et al. 2016) [<https://opendata.cityofnewyork.us>, <http://musrenbang.jakarta.go.id>]. The fascination with highly advanced smart cities has encouraged a storyline about "best practices" and other cities having the unique opportunity to leapfrog development by using smart urban data tools and systems. However, those city cases have yet to move from "the ashes to the sky" (Hoornweg 2011). Instead, different places may have very unequal resources to avail of the opportunities to improve urban planning and management capabilities through smart urban data applications, thereby aggravating a digital divide (also see Ayanso et al. 2014), with more advanced and well-endowed cities, primarily in industrialized countries, standing in contrast to the large majority of laggard cities and towns that struggle with the sheer lack of computers and general digitization.

## 3. Limited Use(ability)

Private firms and international development organizations increasingly target the large group of these cities that lack "smart-citiness" and try to convince them to invest time and money into smart urban data applications to modernize their urban planning and management processes [[www.cisco.com/c/en/us/solutions/industries/smart-connected-communities.html](http://www.cisco.com/c/en/us/solutions/industries/smart-connected-communities.html), <http://open.dataforcities.org>]. Based on experiences with corporate solutions and development assistance projects, the track record of such applications is often quite different from their original objectives. Typically, such projects are designed to change the everyday work of a planning department or even the whole city adminis-

tration. The introduction of decision-support systems or spatial planning tools often comes with significant upfront investments, which could be justified by corresponding efficiency gains in their later application [[www.linz.govt.nz](http://www.linz.govt.nz)]. Currently, many smart urban data applications perform a useful role in raising awareness among local decision makers and planning practitioners through workshops and trainings, where the applications are used to exemplify interlinkages of, for instance, transport infrastructure, workforce location, and economic opportunities in metropolitan regions [<https://www.espon.eu>]. What is usually still missing is the actual integration of such tools in daily planning practice due to the above-mentioned constraints (Chourabi 2012). This point is not intended to downgrade the role of such applications in capacity development, but it does shed critical light on the question of how well cities utilize their scarce budgets.

## 4. The Politics of Planning

The fourth risk to smart urban data applications is all-encompassing. It concerns the discrepancy between a developer's logic of rational cause-effect thinking in designing a smart urban data application and a user's very different logic of weighing outcomes according to a multitude of criteria that may go beyond or even contradict technical reasoning ([www.urbansim.com](http://www.urbansim.com)). Put bluntly: Many urban planning applications can be understood and correspondingly manipulated by its users in order to arrive at their preferred results. It is a general prerequisite that the data input – into spatial models, for instance – is based on a thorough and integral work of its users in order to produce well-founded results. This assumption can be at odds with the conflicts found in urban planning processes (Thompson 2012). Even if the process of using a smart urban data application functions by the textbook, it still might not have an impact on urban planning and management, as there is at least one additional step between an application's results and their utilization in the decision-making process (Todes 2012, Magni 2013). Smart urban data applications are confronted with the fact that planning is inherently political. This not only needs to bear negative results, but it can also ensure that technically rational outcomes from urban planning tools and systems are scrutinized for the many other criteria that influence how urban areas are designed and developed (Thompson 2012) [[https://joburg.org.za/index.php?option=com\\_content&id=561&Itemid=9](https://joburg.org.za/index.php?option=com_content&id=561&Itemid=9)].

## Perspectives

### 1. Engaging across Disciplines

The above-mentioned constraints and risks allow for a reflection on the research on smart urban data applications. This research is characterized by an unsatisfactory silence about the interdependencies of social, political, and institutional aspects, on one hand, and spatial, technological, and engineering aspects, on the other. The latter is best represented by the research field of urban informatics (Batty 2008). Urban informatics' more recent advancements have neither sufficiently informed techno-deterministic approaches in its research, nor opened it up more widely to other debates around a critical analysis of traditional planning disciplines and their analytical neglect for political and economic forces impacting on urban development (see, for instance, Hao et al. 2015 or Rathore 2016). On the other hand, urban studies and related research fields have been extremely wary of, if not hostile towards the smart cities debate (Vanolo 2016). Their vilification of urban informatics and the smart city helps in delineating different research trenches, but it does little in terms of critically analyzing the opportunities, challenges, and risks of smart urban data applications (Krivy 2016). The discussion of "smart cities" could benefit from a less dramatic (urban studies) and a more reflected (urban informatics) analysis of smart urban data applications and their practical usage (Thakuriah et al. 2017) [[www.fcl.ethz.ch](http://www.fcl.ethz.ch)].

### 2. Knowing the Actual Usage

The previous perspective neatly links up with the need for more extended empirical research, as well as monitoring and evaluating the actual usage of smart urban data applications. Due to their comparatively recent emergence and innovative features, a good longer-term overview is missing on the development and design, introduction, implementation, and operation of urban planning tools and systems in a sufficient number of cases (Russo et al. 2015) [<http://eu-smartcities.eu>]. Such analysis should not only be concerned with the practical question about spending money wisely; it can also inform the understanding of how individuals and organizations manage a change in their knowledge sharing culture and data literacy as a foundation for smart urban data applications to really have a positive impact. It will also illuminate how far such applications assist in daily urban planning and management tasks instead of the more heated existentialist question of how smart urban data applications can, do, or should predict and

prescribe urban development decisions.

### 3. Diverting from Leapfrogging Arguments

The findings on applications' actual usage can also clarify the smart cities picture, which is currently obscured by marketing campaigns, product leaflets, advertising brochures, and paid-for news articles. It is completely up to the developers and sellers of smart urban data applications to lure in potential customers through glossy presentations and big promises. However, urban planning practitioners face the challenge of making best use of planning and management tools while convincing decision makers and the general public that these tools can indeed improve urban development and justify their investments. Too many set-backs with large-scale, short-sighted, and un-localized smart city projects will be detrimental to the financing and development of applications. Nevertheless, such tools and systems can improve the understanding and planning of cities if effectively introduced and incrementally adjusted to a dynamic urban planning context (Estevez et al. 2016) [<http://ajuntament.barcelona.cat/digital/ca>, <https://amsterdamsmartcity.com>].

### 4. Sharing "40-Percent-Solution" Good Practices

The focus should be less on critically analyzing smart city projects by their original design descriptions and more on having comparative research on the actual application of smart urban planning and management tools and systems in their corresponding localities (see also Robinson 2006). This will help to share not "best practices" but "good practices" that are most likely scaled-down, less advanced, and less detailed than the catalogue solutions (Estevez et al. 2016), but more applicable to decision makers and planners in small and medium-sized towns that share similar challenges in moving their local government institutions toward a "smarter" urban future, which enables improved efficiencies and effectiveness in planning sustainable cities together with all stakeholders.

## Conclusion

In conclusion, this article is meant to trigger a more application-oriented debate on smart urban data applications. It shed light on key constraints that have inhibited urban planning and management tools and systems from effectively realizing their benefits in local government processes, particularly in developing contexts; namely, issues around the knowledge sharing culture in local government administrations, shortfalls in app users' data literacy, and the need for resource-light, less over-designed, and more user-friendly tools and



systems. These constraints of smart urban data applications were then embedded in the broader smart cities context. Key risks were identified in the unequal playing field for data capturing, management, and utilization; in the concerning digital divide between and within local governments in effectively realizing the benefits of various tools and systems; regarding questions around the limited use(ability) of smart urban data applications; and the discussion about urban planning being inherently political, and thus possibly at odds with the rational cause-effect logic of smart urban planning tools. The article offered four concluding perspectives to advance the cross-disciplinary research on smart urban data applications and to outline practical pathways toward improved urban planning and management with the help of such smart tools and systems. These perspectives related to an engagement across research disciplines; enhanced understanding of the actual usage of smart urban data applications; a critical investigation of and diversion from smart city leapfrogging arguments; and the promotion of knowledge sharing on “40 percent-solution” good practices with relevance to the large number of small and medium towns, particularly in the developing context. All of these perspectives are required for improved efficiencies and effectiveness in sustainable urban planning.

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# Case Study: A New Stage for the Strategic Metropolitan Plan of Barcelona

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**Abstract:** *The Pla Estratègic Metropolità de Barcelona (PEMB) (Strategic Metropolitan Plan of Barcelona – PEMB) is a non-profit public–private organisation that brings together 30 years of strategic urban planning experience in the city of Barcelona. This instrument, which was highly successful in boosting the development and international standing of the city by taking advantage of the 1992 Olympic Games, now needs significant reform in order to adapt and take on the urban challenges of the 21st century. The ability to forge alliances, coordinate projects and channel citizens' energies and creativity is essential to this reform.*

## Introduction

In 1988, Barcelona City Council promoted the creation of the association Pla Estratègic Barcelona 2000 (PEB2000). Two years earlier, Barcelona had been selected to organise and hold the Games of the XXV Olympiad in 1992. And just one year before that, the institution that ran the metropolitan administration had been dissolved by the regional government.

In this context, the mayor of Barcelona at the time, Pasqual Maragall, decided to promote a non-profit organisation with public and private participation that would help the city tackle important challenges in a concerted way whilst getting the most out of organising the Olympic Games. These challenges included:

- The economic model's transition to that of a post-industrial city. The painful crisis of the 1980s had the dual effect of destroying much of the industrial fabric and causing businesses to move from the city centre to the periphery, leaving many unused and degraded spaces behind.
- The consolidation of the urban transformation that had been drawn up in the existing urban development plan, the General Metropolitan Plan of 1976, which anticipated opening the city to the sea and reweaving the urban fabric with the first metropolitan area whilst seeking to alleviate the deficiencies inherited from the dictatorship.
- The improvement of basic infrastructures, which had also been affected by the lack of state investment, including the port, the airport, ring roads, railway lines and more, as well as facilities and services in the most neglected neighbourhoods during the

period of unplanned urban growth that started in the 1950s and ended in the 1980s.

- The culmination of the city's historical yearning to raise its international standing and to become more relevant amongst cities where globalisation is fully underway.

The Olympic Games made it possible to catalyse the investments and projects necessary to face these challenges. PEB2000 was where the necessary agreements were reached to achieve this, moving towards the city envisaged by the year 2000.

This led to the First Economic and Social Strategic Plan of Barcelona, which covered the period 1990–1993 and was used to plan urban renewal linked to organising the Olympics. This was followed by a second plan (1994–1998) designed to consolidate the city's international stature, and a third plan (1999–2003) that added a vision of Barcelona as a city of knowledge to the previous plan once the immediate rewards of successfully holding the Olympics had been reaped (PEB2000, 2000).

In 2000, however, there was an observable need to change the scale and address the metropolitan situation. The association changed its name to Pla Estratègic Metropolità de Barcelona and a new plan was promoted (2003–2007). This new plan was revised in 2007 and renewed in 2010 in the form of Barcelona Vision 2020, which is currently in force.

Due to the context of the global financial crisis and the new commitments made by cities as part of strategies like Europe 2020 and COP 21, among other reasons,

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the strategic plan has been undergoing review and reformulation since 2014 in order to set up a new strategy by the year 2030.

### Change in the conditions for strategic planning

Reformulating the strategic metropolitan plan is not simple. Throughout the existence of the PEMB and especially in recent years, a series of factors have forced us to reconsider the nature and procedures of the association (which has remained largely unchanged since it became metropolitan) so it may serve as a useful instrument for current metropolitan governance. These factors include the following:

- The nature of the future challenges to be faced. The global nature of challenges such as climate change and the ability to regulate the activity of transnational economic operators make cooperation between metropolitan areas vital. Urban strategic planning, as it had been applied thus far, focused on competition between cities, not on cooperation. Furthermore, these challenges are increasingly complex and difficult to address from a sectoral approach such as the one that is traditionally taken. This forces us to adopt a more comprehensive vision, both in analysis and in the prescriptions to apply.
- The spectrum of relevant partners for each field of action is much broader and more diverse. In the planning done in the 1980s and 1990s, the most relevant stakeholders were very clearly identifiable and relatively limited, even more so considering the planning's focus on economic and infrastructure-related aspects. The more holistic approach to planning today, with a core that includes environmental and social aspects, has led to much broader and diverse indices of participation, despite the segmentation of urban problems and the policies applied to them, as well as greater activation of the associative network in many areas.
- When strategic planning began – at least in Barcelona – the association of urban stakeholders largely responded to the need to exert greater pressure on the higher levels of government (regional, state and later European) in order to commit or speed up certain investments indispensable for Barcelona's competitive positioning, such as airport modernisation and port expansion. Today, with infrastructure that is mostly suitable for the 21st century, the association should shift its focus to coordinating and establishing more efficient management formulas than

are currently available.

- The metropolitan dimension of planning also involves greater complexity in at least two ways. Firstly, there is a logical reduction in the number of projects that are considered strategic, since it is harder to put together projects that generate transformations on this scale. Secondly, it is harder to reach agreement, simply because different municipalities need to agree on all aspects of the planning, even if there is a metropolitan government body in place, as is the case with Barcelona. This has become more noticeable in recent years, as the diversity of political options governing the metropolitan municipalities has grown since 2000, when the plan officially became metropolitan in scale.

### Strategic planning in metropolitan governance in Barcelona

Since 2010, there has been a metropolitan government body called the Metropolitan Area of Barcelona (MAB), which covers 36 municipalities and 3.2 million inhabitants and is mainly responsible for coordinating and networking amongst the municipalities that compose it. Its main areas of operation include urban planning, environmental and mobility management (including public transport) and, incipiently, economic development.

The MAB has a strategic planning department that tries to coordinate the vision and action of the other departments. The political management of this department is aligned with the political management of the executive body of the PEMB. Moreover, the mayor of Barcelona is president of both the MAB and the PEMB.

Despite the proximity between the strategic planning department of the MAB and the PEMB, each occupies its own space. In particular, the key aspects that make the PEMB a unique body in the metropolitan governance scheme include:

- Dialogue, consensus and collaboration among stakeholders. As a public–private organisation, the PEMB must be the benchmark space where public, private and third-sector institutions and organisations and citizens in general from the Metropolitan Area of Barcelona can meet on an equal footing, discuss issues and reach agreement and contrast their visions, interests and future projects.
- Variable metropolitan dimension. The PEMB must be a space that is not shaped by administrative boundaries or institutional domains, so that metro-



politan issues can be addressed with the variable geometry that each subject requires. Thus, the point of reference beyond the MAB would be the real metropolitan city, made up of more than 100 municipalities and nearly 4.5 million inhabitants.

- **Future vision.** The PEMB must be a space that focuses on the long term, beyond electoral periods. It must anticipate trends and identify the key challenges that will need to be faced collectively in the future, integrating the capacity for action of all its members and providing them with a shared guide for action today.

### The development of the vision and mission of the PEMB

In this new stage, the following vision has been defined: the PEMB is where future issues of the Metropolitan Area of Barcelona are brought to the table, debated and agreed upon, and where institutional and citizen involvement is fostered to achieve the shared goals arising from them.

This means that the role of the association is not limited to the development, promotion and periodic renewal of a strategic metropolitan plan. Instead, the strategic plan is another result of the work done in this context of dialogue and consensus. In this regard, the mission of the PEMB is defined as follows:

- Promote agreements, pacts and consensus on the metropolitan scale.
- Provide foresight analysis on the main identified future challenges.
- Integrate and inspire the strategies of the different metropolitan stakeholders.
- Foster open urban innovation.

In this way, PEMB pursues its mission in two large blocks: (1) by promoting agreements, pacts and consensus on the metropolitan scale, and (2) by creating and promoting the strategic metropolitan plan, which includes providing foresight analysis, integrating and inspiring strategies, and fostering open urban innovation. There are four basic formulas with which to approach the work of the PEMB association in the first block; that is, in terms of concertation on the metropolitan scale:

1. **Scaling:** The member organisations raise a subject, issue or specific project so it may be addressed within the association, incorporating the metropolitan perspective. For example, a sectoral strategic plan of

the city of Barcelona could be expanded to the metropolitan scale. The same could apply for a project being developed by any business organisation that is part of the PEMB.

2. **Lobbying:** The association brings together and channels metropolitan demands. A paradigmatic case is railway infrastructures, for which the association must continue working intensively on the commitments made by the state government.
3. **Coordination:** The association is provided as a space for coordinating initiatives, concertation platforms and metropolitan projects. Thus, for example, there are several territorial projects linked to reactivating industrial estates that currently operate separately and do not coordinate aspects such as the attraction of investment or the creation of a census of the companies located there.
4. **Generation:** The association acts as the driving force and articulator of debates about future challenges and certain new metropolitan policies. Examples include reflections on the impact of digitalisation on the future of work or the promotion of the new vision that food policies provide regarding how city development is managed.

The approach to creating and promoting the strategic plan and its three fundamental elements (foresight analysis, strategy and open urban innovation) is as follows:

5. **Foresight analysis:** The PEMB is the space where visions about the main global metropolitan trends are shared and agreed upon and where future scenarios are sketched out; for example, how will we live/eat/get around/work/etc. in Barcelona in 2030? Although the current structure of the PEMB is not conducive to conducting many specific foresight processes, the PEMB must be in a position to collect, disseminate and transfer to the case of metropolitan Barcelona the foresight analysis performed by many other organisations around the world.
6. **Strategy:** The PEMB is the space where up to 12 key metropolitan challenges are defined and the role played by different urban stakeholders is proposed, including public administrations, institutions, businesses, social organisations and citizens. The challenges facing cities today are very clear and mostly known; these include climate change, demographic change, changes in the economic, mobility and governance models. Therefore, the strategy must be understood as management of the various transitions:

which ones are prioritised, how quickly progress is made on each and how trade-offs are made. Therefore, institutional and citizen participation must emphasise strategy rather than defining challenges.

7. **Open urban innovation:** The PEMB is the space where the different mechanisms of urban innovation in the Metropolitan Area of Barcelona are activated and coordinated to offer responses to the key metropolitan challenges and those of the cities of the future in general. This is the most decisive area of institutional and citizen participation: non-deliberative but active participation that contributes to the overall ability to overcome challenges. The city already has thousands of mechanisms where innovation is generated through participation: from various public facilities to SMEs and social economy companies; from the associative network to sectoral citizen councils linked to the public administration; and from co-working spaces and fab labs to schools and state secondary schools. The city doesn't need to create new spaces of participation; what it needs to do is apply the agenda of the challenges to existing mechanisms and stop the practice of answers and solutions being proposed only by citizens who organise themselves in multiple ways.

In brief, new strategic metropolitan planning in Barcelona must do more in terms of coordinating projects and facilitating processes than just conducting studies and managing indicators. It must work to practice active listening and channel citizen energies towards resolving or fulfilling specific challenges or missions (Mazzucato & Perez, 2015). It must also be able to make many points of view and interests compatible and deal with situations of dissent and conflict, because we must assume that Barcelona is primarily a place of complexity, interaction and conflict and we must know how to manage it conveniently in order to continue moving ahead.

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# Smart Cities Mission in India: Analysing The Implementation Mechanism and its Impact on Urban Governance

Alokananda Nath\*

**Abstract:** *Urban local governance in the Global South is a capacious affair, with stakeholders reimagining ways to manage and deliver basic services to the ever-increasing urban population. This article takes a critical look at how India's rapidly urbanizing cities are dealing with urban governance issues through the recently launched Smart Cities Mission.*

## Smart Cities Mission in India

Increasing urbanization globally has led to governments and professional rethinking urban practices and policies. The concept of Smart Cities is one path that many nations are taking by adapting smart solutions and technologies in order to deal with the changing urban landscape. The Smart City agenda has very quickly emerged as a potential riposte in order to tackle the myriad issues that urbanization is posing. India has moved in a similar direction and has launched an ambitious program to develop 100 Smart Cities by 2020 in order to deal with the challenges of urbanization. The program, termed as the 'Smart Cities Mission', involves core infrastructure development – sanitation, water supply, affordable housing, and urban mobility, and is expected to cost USD 30 billion. The 'smart' part of these projects refers to technology-based smart solutions in order to enhance service delivery and foster economic growth. Ninety-nine cities (Government of India, n.d.) have been selected and the implementation of some of the projects has begun in these cities. While announcing the launch of this mission, Prime Minister Narendra Modi said that this mission would end the top-down approach that the Indian cities have faced and would lead to people-centric urban development, where the city leadership would have the possibility to decide how their city should grow. However, on-ground realities suggest otherwise. Instead of laying a roadmap to empower local governments and incentivize state governments to support cities with increased capacity, faster decision-making processes, and increased autonomy, the Smart Cities Mission seems to have taken the easier way out.

## Implementing Smart Cities Mission

The mission is to be implemented by special purpose vehicles (SPVs) that would be constituted as separate companies for each city. The SPVs would be registered under the Companies Act 2013 and promoted by the State/UT and the ULB jointly, both having 50:50 equity shareholding (Government of India, 2015b; Naik, 2015: n.p.). The chief executive officers (CEO) of each SPV will be appointed (a bureaucrat from the administrative services in India) by the state government, with the approval of the Ministry of Urban Development (MoUD). The structure of the board of the SPV does not accord more vote share or weightage to municipal officials or elected representatives and the guidelines<sup>1</sup> are clear that the elected municipal body is expected to devolve its powers to the SPV in order to implement projects under this mission (Government of India, 2015b; Naik, 2015: n.p.). Obviously, the local governments seem to have been marginalized in terms of their role in the development of Smart Cities. Though the "Smart City" idea entails putting in place "smart" local government, the marginalized role of urban local bodies in the entire process of developing Smart Cities seems to be nothing less than a paradox.

The current urban governance scenario in India is extremely fragile. The institutional framework for the urban areas in India is complex.<sup>2</sup> The responsibility for urban governance is split into three levels. The central (union) government has a supervisory, facilitative role,

<sup>1</sup> Smart Cities Mission guidelines is available at: <http://smartcities.gov.in/content/innerpage/guidelines.php>, accessed on 13 May 2018.

<sup>2</sup> Knowledge gained by author through her professional engagement with the urban local bodies in India while supporting the implementation of various urban development programs at the city level.

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and supports policy making. The state governments have the primary role in urban governance, often bearing responsibility for providing basic amenities and services through state departments, state-level boards, statutory, and non-statutory bodies at the city level, and financial support in planning and implementing infrastructure projects. The local governments are responsible for the operation and maintenance of basic services and, in some cases, implementing ad-hoc infrastructure projects. The local bodies remain heavily dependent on the state governments for funding and permission for their own tasks (Agence Française de Développement, 2014). Thus, in reality, the cities are far from gaining autonomy and taking their own decisions. State governments have been reluctant to devolve powers to the ULBs, reinforcing the perception that ULBs are subordinate entities under day-to-day control of the state governments, obligated to them, not only for the development of the cities, but also often for their very survival (Sharma, 2014: 46). There has been political resistance to giving cities their due recognition, as they were considered anti-rural in the agrarian society (Tiwari et al., 2016: 39). Instead of being seen as an opportunity, urban areas were perceived as a burden, unruly, and chaotic (Mohan and Dasgupta, 2004: 13). This has resulted in sluggish urban infrastructure development – cities have failed to keep pace in providing basic services with the increasing population and economic activities.

In order to bypass this situation, the SPVs were structured and given the authority to raise financial capital from the market, collect taxes and surcharges, enter into joint ventures, and make all decisions related to the implementation of the Smart City Proposals (SCP) for the Smart Cities Mission. Along with the transfer of financial control, the SPV is also seen as a mechanism for transfer of political control. The mission guidelines state “delegating the rights and obligations of the municipal council with respect to the Smart City project to the SPV” as well as “delegating the decision-making powers available to the ULB under the municipal act/ Government rules to the Chief Executive Officer of the SPV” (Government of India, 2015b: 39) in order to ensure operational independence and autonomy in decision making and mission implementation. Thus, a city is to be run as a company with shareholders, provide services, and treat its citizens as anything other than sources of revenue (Sampath, 2016). The very premise of such ‘company-run’ urban governance model is not only precarious for democracy and decentralization, but

also problematic in the long-run for the Indian cities if they aspire to capitalize on the incentives that urbanization brings with it.

### **Is Smart City equal to Smart Urban Governance?**

The Smart Cities Mission prioritizes the issues that Indian cities are facing by focusing more on the infrastructure development rather than on technology, thus contextualizing the meaning of ‘smart city’ for India. The cities that have been selected for the mission are not typical mega-cities, but rather the important metropolises and medium-sized cities. This connects directly to the kind of urbanization that India is experiencing, where the newly emerged metropolises and medium-sized towns are growing faster and need matching infrastructure and investment. Next comes the important question of urban governance and whether or not smart cities would attempt to strengthen the local institutions. From the selection process to the implementation mechanism, the influence of the central government is quite eminent, reflecting a top-down approach. For implementing the projects, a separate institution, i.e. the SPVs, would take charge away from the ULBs, which could have an adverse impact on the local governance. There has been a mixed response to the establishment of SPVs as implementing agencies of the Smart Cities Mission. Some experts who were interviewed as part of this research were of the opinion that since the ULBs are not technically and institutionally capable of handling the planning and executing the projects, an independent body would be better equipped to handle the management of the mission at the city level. On the other hand, some of the experts were of opinion that constituting SPVs to implement projects seems to bypass the democratic processes of the local government. Bhanu Joshi (2016) wrote, “bypassing political chaos and employing participation shortcuts to produce aggrandizing structures of glass and steel, thinking that our cities would become inclusive and sustainable, is clearly not a very smart idea” (Joshi, 2016: n.p.).

Although the focus of this mission was to provide a comprehensive development through augmenting institutional, physical, social, and economic infrastructure (Government of India, 2015a), the approach to implementing this ambitious mission has been ill-conceived. When the focus should have been on building the cities and strengthening them to take on the challenges of urbanization, the mission conveniently took a short-cut



approach towards implementation by creating a parallel structure of SPV.

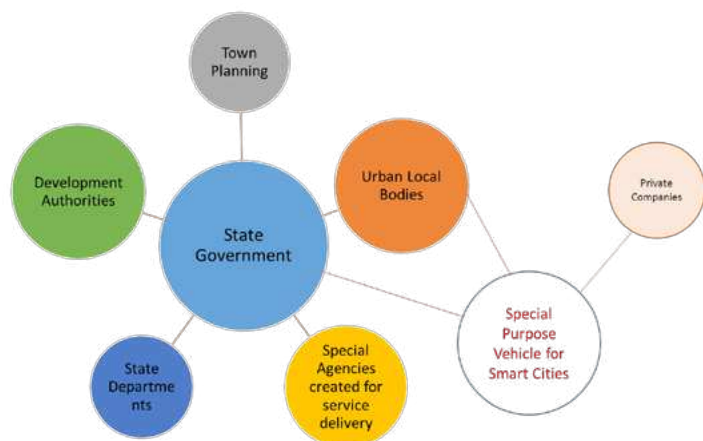


Figure 1: SPV as an added actor in the urban development sector of India  
Source: Author.

Prior to the Smart Cities Mission, the ULBs managed similar programs (like JnNURM<sup>3</sup>) through the project management units (PMU) established within the municipal corporations. Although these PMUs were established through contractual arrangements with other consultants, all of the decisions regarding project planning and implementation would go through the ULB and the finances would be sanctioned by the state and the central governments. In the case of the Smart Cities Mission, the SPVs would be in charge of implementing the projects, thereby taking away the authority from the ULBs. Since the guidelines have been formulated by the central government, the state governments have to abide by them and get the approval of the central government regarding the appointment of the CEO and board members. Thus, there is a certain amount of control that the central government would have on the SPVs. Structurally, the SPVs are quite similar to the Urban Development Corporation (UDCs) of London (for example: London Docklands Development Corporation (LDDC)), where the central state wanted to restructure the governance mechanisms by reducing the power and influence of the elected local authorities (Thomas & Imrie, 1997). Since the objective of the Smart Cities mission is to improve the infrastructure levels in the cities in order to make them more investor-friendly, the

financing of the projects relies heavily on private capital. From the governance perspective, this arrangement is a mix of managerial and pro-growth models that Pierre (2011) explained.

### Taking a closer look at the SPV

Taking the essence of Bruno Latour's Actor-Network Theory (ANT) as a tool, various human and non-human actors involved in planning and implementing the mission and their inter-relationship could be analyzed ('Actor-Network Theory (ANT)', 2007). Analysis of the Smart City guidelines and translation of the same onto ANT makes it clear that the SPVs would undermine the importance of the ULBs, both politically as well as functionally, taking an agency of their own (Rydin, 2012). On a similar note, the Smart City guidelines, which is a non-human actor, also increases in importance as the entire mission is being carried on based on this policy document. This shows that policy documents have the ability to shape relationships within the networks and have the potential to govern at a distance. The actor-network also emphasizes that its impact depends on the detail of the wording within such documents and the precise words used (Rydin, 2012: 42). Moreover, the dominance of the state government as well as the central government on the human actors at the local level, such as the CEO and the board of directors, reveals that institutions (which are also non-human actors) could also influence how networks are formed and relationships develop.

For the 99 selected cities, the individual municipal corporations were in charge of preparing the Smart City proposals (SCP), but they will not have any involvement while implementing the same in most cities. With the exclusion of the municipal body for the implementation phase, there is no scope for the local political representatives or the citizens to participate in the decision-making processes for the projects under SCP. The city officials of such municipal corporations would not have any opportunity to at least understand how 'smart' projects are designed and implemented. Some cities have decided to put the city's mayor on the board of directors of the SPV, but they too have very limited authority. Most importantly, the design and implementation of the projects conceived under these SCPs would be implemented by external project management consultants (PMCs), companies that would be hired for the project duration and would be operating within the SPVs with their own team of experts. This means that the municipal officials

3 Jawaharlal Nehru National Urban Renewal Mission (JnNURM) was launched in India in 2005 with the objective of reforms driven and fast track development of 65 cities across the country, with focus on urban infrastructure, efficient service delivery mechanisms, community participation, and accountability of ULBs and Parastatal agencies towards citizens. More information is available here: <http://mohua.gov.in/cms/jnnurm-guidelines-management.php>, accessed on 22 May, 2018

who were part of preparing the SCPs have been excluded from the project implementation phase and would not be able to either learn more or contribute towards designing and planning smart projects. Hence, a golden opportunity to actually transform a city administration into a 'smart' one – which would have benefitted the city in the long run – seems to have been lost in the process of delivering 'smart' projects.

## Conclusion

The Smart Cities mission brought new anticipation and optimism towards achieving sustainable urban development. The Government of India defined smart cities in the context of India without giving undue importance to smart technologies and solutions. The focus was on providing a comprehensive development through augmenting institutional, physical, social, and economic infrastructure (Government of India, 2015a). Compared to the most used definitions world-wide, this definition appeared to be very people-centric and 'Indianized'. Even the SCPs did not over-emphasize the use of ICT or other technical solutions, but rather focused on infrastructure delivery and urban redevelopment/retrofitting, opting only for certain smart solutions for managing the service delivery at the city level. However, the approach for implementing this ambitious mission has been ill-conceived. When the focus should have been towards building the cities and strengthening them to take on the challenges of urbanization, the mission conveniently took a short-cut approach towards implementation by creating a parallel structure of SPV. Netra Shirke, a local politician and member of Navi Mumbai Municipal Corporation, expressed her apprehensions about the validity of the SPVs. She wrote that the formation of the SPV would mean that the ULB loses its control over the notified areas and this would be in violation of the 74<sup>th</sup> Constitutional Amendment Act<sup>4</sup> (CAA) (Shirke, 2016: n.p.). If we look into the implementing mechanism of the SPVs vis-à-vis the normative patterns of urban governance by using an institutional analysis framework as proposed by Pierre (2011), it would be clear that the nation state is propagating a mix of both managerial and pro-growth governance. SPVs, in their present form, promote a shift of power and control from the elected representatives to the city managers, giving them

more autonomy towards their managing role (Pierre, 2011). But this is not all: since one of the aspirations of the Smart Cities Mission in India is to drive economic growth, the SPVs also emulate the pro-growth governance structure, as explained by Pierre (2011). The administrative and fiscal strategies that have been provided to the SPVs are to facilitate growth and remove any possible political obstacles and seem to be promoting economic growth and prosperity at the expense of local democracy and accountability.

The Smart Cities Mission could have provided the guidelines for strengthening the financial resources of the local governments, but instead it advocated the formation of a parallel structure for implementing urban development projects. SPVs would have the power to raise taxes and charge user fees and enter into public-private partnership in order to raise equity from the market, with the possibility of having a negative impact on the city government in terms of finances. All these functions should have been delegated to the local governments after the passage of the decentralization act (74<sup>th</sup> CAA) in 1992, which is yet to be realized, even after 25 years. Thus, this mission in general and the SPVs in particular pose a threat to the institutional and financial strengthening of the ULBs. Hence, at the end, the Smart Cities Mission would contribute very little to constructing 'smart local government' in India.

4 74th Constitutional Amendment Act (CAA) was passed in 1992 in India which laid down the provisions for the devolution of funds, functions and functionaries to enable Urban Local Bodies (ULBs) to perform their duties. More information is available here: [http://mohua.gov.in/upload/uploadfiles/files/74th\\_CAA13.pdf](http://mohua.gov.in/upload/uploadfiles/files/74th_CAA13.pdf), accessed on 22 May, 2018

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# Public Space in Smart Cities: A Case Study of Chandigarh, India

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**Abstract:** *Chandigarh is considered one of the best-planned cities in India. Le Corbusier's influence has left a lasting impression on the city. The Smart City Project for Chandigarh seeks to improve the city's infrastructure in many aspects. An important component of the project for Chandigarh is the incorporation of public spaces and the promotion of car-free zones through walkable street. A few sites in Chandigarh including Capitol Complex were added to the UNESCO World Heritage List, which led the municipality to declare prominent public spaces as heritage sites. This is a positive recognition that will contribute to the preservation and use of public spaces for smart city concept. Public spaces such as the Capitol Complex of Chandigarh, which was designed and planned by Le Corbusier, have already initiated community engagement and place-making techniques. As one of the key aspects of the Smart City Project, community engagement needs to be promoted further in order to foster social cohesion and stewardship of public space.*

*"Let this new town be symbolic of the freedom of India unfettered by the traditions of the past ... an expression of the nation's faith in the future." - Jawaharlal Nehru on the conception of Chandigarh (Malhotra, 2013).*

## Introduction

The concept of smart cities is spreading across India and the Indian government has been working on proposals to improve the infrastructure and facilities of Indian cities with the Smart City Project (Government of India, 2016). The Smart City Project is an urban renewal project undertaken by the Government of India to develop 100 cities in India and make them more user-friendly, sustainable and resilient, thereby improving quality of life (Government of India, 2016). Chandigarh, the capital of the state of Punjab, is one of the major cities in which the government wants to implement the Smart City Project (Kapoor, 2016). Chandigarh was designed and planned by the famous French architect Charles Edouard Jeanneret, better known as Le Corbusier, whose contemporary urban vision and expression of intelligent urban planning still has a substantial impact on the city's planning structures (Curtis, 2015; Shah, 2018). For instance, the entire city is structured in a grid format, where the streets are in sector form, suggesting that each street has a particular sector number rather than street names (Malhotra, 2013). Le Corbusier wanted to transform Chandigarh by presenting a Utopian and Modernist vision for the city with low-to-medium-density planning, buildings with open patios for sunlight and the incorporation of many public spaces around the city (Bharne, 2011; Fitting, 2002;

Gill, 2017). Out of the 114 square kilometres that the original master plan covers, 70 sq. km. was designed and planned by Le Corbusier and his team (Shah, 2018; Bharne, 2011). (Rohataki, 2017; Townsend, 2013). The master plan has evolved due to the rapid growth in the city's population, which has now reached 10 million people (Chandigarh Administration, 2016). Chandigarh is one of the best-planned cities in India, with important iconic buildings such as the Capitol Complex, the High Court, and the Assembly, all of which have contributed to the city's inclusion in the UNESCO World Heritage List (WHL) (Chalana & Sprague, 2013; Rohtaki, 2017). As open spaces are one of the aspects for developing smart city in Chandigarh, these open spaces that are part of the WHL will provide better linkage and connectivity to the city center because the open spaces are in close proximity to neighbourhoods and transit areas (Kapoor, 2016).

## Background of Chandigarh

The city of Chandigarh was a consequence of India's independence from Great Britain in 1947 (Fitting, 2002; Curtis, 2015). During the partition of India and Pakistan in 1947, the northern state of Punjab was left without a capital as Lahore became part of Pakistan (Bharne, 2011). The first prime minister of India, Jawaharlal Nehru, saw this as an opportunity to create a new capital for

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Punjab (Curtis, 2015). As Chalana and Sprague (2013) stated, “As a modern secular city, Chandigarh would – through its architecture and urban form – reflect the ideals of modernity and embody a faith in the citizens to rise above religious and political differences.” Open spaces and parks were also among the most important architectural forms of modernist ideals that were encouraged in Chandigarh (Shah, 2018; Rohtaki, 2017). However, in the present day, Chandigarh has grown in population, engulfing multiple villages that are growing organically without the means of modernist town planning (Shah, 2018; Curtis, 2015). The Smart City Project of Chandigarh is trying to expand the facilities and smart urban planning ideologies to the entire city and neighbouring municipalities, offering features such as more efficient transit and walkability connections in high-demand areas (Kapoor, 2016).

### **Towards a Smart City of Public Spaces**

Public spaces are an important factor for Smart Cities because they provide a space for social cohesion (Gehl, 2010). The Smart City Project intends to facilitate the use of parks and public spaces through better public transport connectivity (Townsend, 2013; Song et al., 2017). In 2016 Chandigarh was added to the WHL, including some iconic buildings and what is known as Le Corbusier’s expression of intelligent urban planning (Shah, 2018). Even though Chandigarh is not as technologically savvy as a city like Singapore, the rich French influence in the city’s smart urban structure, along with the architecture and cultural heritage, make it a unique Smart City (Rohtaki, 2017). The expression implanted by Le Corbusier as an intelligent planned city has not only left an indelible mark but has also set the foundation for its future development. Within the context of new urban innovative trends, well planned cities gain an advantage because of the ease of implementing the new ideas and infrastructure, including technological advancements as proposed by the Smart City Project. The Smart City Project has started development in sectors 17, 22, 35, and 43 and will continue the project through all the sectors, which incorporate approximately 60 percent of the city (Malhotra, 2013). There are three Smart City proposals for Sector 17, which are related to open spaces and include pedestrian plazas with new paving, landscaping, and infrastructure around the plazas. There is also a Subway Transit system that connects Sector 17 to the Rose Garden (Shah, 2018; Rohtaki, 2017). One of the main aspects of the Smart City Project is to provide

wide public spaces for people, so that the city continues developing on a human scale (Townsend, 2013). Therefore, to enhance public open space and citizen interaction, there will be a new 60-acre park (Shah, 2018).

Theorists such as William H. Whyte, Edward T. Hall, and Jane Jacobs have promoted the idea of creating more humanised public spaces (McNeill, 2011; Gehl, 2010; Gehl, 2011). These theories can be attributed to Smart City because the underlying gains for public spaces are related to the function and form of the city (Song et al., 2017). The Smart City concept for public spaces relies on the idea that there need to be pedestrianised streets and sufficient facilities available that improve the overall health and well-being of the people (Townsend, 2013; Song et al., 2017). These concepts and ideas focus on cities built for human convenience, indicating that the use of cars and other motor vehicles should not be the main purpose of cities (Bramley, 2014). With the inclusion of pedestrianised streets in the Smart City Project, the Government of India is initiating these concepts in Chandigarh. Data for the Chandigarh’s Smart City Project are being collected through observation study and surveys that calculate the efficiency and use of the public spaces (Shah, 2018; Townsend, 2013).

Chandigarh’s urban structure already enables the use of green public spaces, which has benefited the population tremendously (Rohtaki, 2017). According to Chandigarh Administration (2016), “Chandigarh, is perhaps one of the few cities of the world of the 20th century, whose original layout plan has a meticulously planned, hierarchy of open spaces, landscaped areas, recreational areas and tree-lined roads, avenues and gardens spread all over the city.” The Smart City Project of Chandigarh will make use of these parks and open spaces, improving their conditions and connectivity by building better facilities for people to enjoy leisure and respite activities (Shah, 2018). In order to safeguard the open public space for future generations, and because of the its heritage status and the positive impacts it has on the city and its citizens, Chandigarh local government has declared all open public space as “inviolable land use” (Chandigarh Administration, 2016). The city’s heritage status also contributes and incentivises the administration to provide better maintenance and integrated development of public spaces, especially in their incorporation to The Smart City Project, giving the city a higher recognition and serving as an example in the inclusion

of urban open space in its evolution towards a smart city (Gill, 2017).

### Improving Walkability

Given the city's background, public spaces including sidewalks and urban mobility were sufficiently planned. Its urban morphology provides wide and green boulevards (Curtis, 2015; Kapoor, 2016). These aspects of the city are known to increase well-being, health, and safety among its residents (Shah, 2018). In many parts of India, especially the lesser planned informal cities, the streets are not organised and the pavements and bicycle paths are poorly maintained. Additionally, there are no pedestrian facilities (Townsend, 2013). Poorly planned urban mobility and a lack of bicycle paths and sidewalks creates dependency on motor vehicles, contributing to traffic and vehicular congestion in the cities (Gehl, 2010). Designated car-free zones, expansion of green spaces and bicycle paths are part of Chandigarh's Smart City Project, which will follow the concept of pedestrianised streets throughout the sectors (Montgomery, 2013). Enforcing these advanced walkability features in Chandigarh will take many years because the city does not yet have these facilities.

There are many examples worldwide of car-free zones in cities that are taking a stand against congested cities and reinforcing the smart city concept. As Hidalgo (2014) indicated, the Danish motorization commuting trend was transformed by "creating extensive 'car-free zones,' including Strøget, the world's longest pedestrian street. Since the 1970's, 18 parking lots have been converted into public spaces, while 7,500 café seats now provide ample room for people to mingle." The commitment of the current mayor of Bogota, Enrique Peñalosa, to a happy city has led to a car-free zones where a network of over 200 miles of exclusive bicycle paths serves Bogotá (Montgomery, 2013). These are exemplary cases where the facilitation of alternative means of transportation has generated immense benefits for the city and its citizens (Spek, 2012). The cases reinforce the inclusion of walkability and the amenities needed for walkable public spaces (Kapoor, 2016). Sector 7, or Central Street, in Chandigarh is a popular walkable shopping street that has already proven to be a success and is planned to be further developed by the Smart City Project (Rohtaki, 2017).

### Place-making Initiatives for Smart City

Place-making is a people-centered approach that encourages community engagement and involvement in public spaces (Shah, 2018). The Smart Cities concept considers using place-making approaches to enhance cities by bringing people together and motivating them to participate in various social activities (Song et al., 2017). Place-making promotes engagement within neighbourhoods and allows people to take ownership of their streets. In Chandigarh, this type of approach is being proposed in Sector 17 and Sector 1 to create social cohesion, community involvement, and safer public spaces (Rohtaki, 2017). Other public spaces around the city are already been used for place-making initiatives and have proven to be a quintessential measure to manage public space (Shah, 2018). The Capitol Complex is considered a symbol of place-making activities, such as the celebration of Yoga Day on June 21, 2016, which involved thousands of people gathering in the Capital Complex to perform yoga (Shah, 2018). Recently, on March 25, 2018, the Urban Festival 2018 with social events took place in the Capital Complex (Kaur, 2018), which was dotted with lights and provided a celebratory and inclusive public space for Chandigarh. Events such as these promote place-making opportunities in the city (Shah, 2018; Kaur, 2018; Rohtaki, 2017). In order to create this type of approach, high-quality urban public space is needed. Nevertheless, the creation of the public space can also be an opportunity to engage with citizens and involve them in the process of upgrading and customising it for their needs, thus creating greater public participation.

### Conclusion

In conclusion, Le Corbusier's concept for Chandigarh has provided many benefits for the city. One of his major influences was on the city's development of public spaces and greeneries, which has left an indelible mark on the city and helped facilitate the transition into a smart city (Shah, 2018; Bharne, 2011; Malhotra, 2013). The Smart City project for Chandigarh seeks to improve the public spaces and provide more place-making opportunities for Chandigarh's community to get involved in the city's development, generating stronger ties and ownership (Shah, 2018). Some public spaces in Chandigarh are already fostering community engagement and cohesion (Fitting, 2002; Chalana & Sprague, 2013). Providing good pedestrian facilities such as safe sidewalks and car-free zones will have positive ripple effects on

the city's public open spaces (Montgomery, 2013). The integration of future technological solution comes more naturally in a well-planned city. Therefore, for the Smart City Project to become successful, Chandigarh needs to invest, maintain, and promote public spaces in the city.

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# The Significance of Intelligent Transportation Systems in an Urban Context: A Case Study of Istanbul, Turkey

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**Abstract:** *Transportation has an important effect on the economic development and welfare of a country. By facilitating easier access to markets, businesses, and investments, effective transportation systems create socioeconomic opportunities and benefits. Transportation is changing rapidly in parallel to globalization and glocalization, which creates a complex and inconsistent structure. In Turkey, as in most countries, the demand for road transportation and the number of motor vehicles is constantly increasing. Irregular traffic flows increase the risk of accidents and failure to ensure effective and continuous monitoring makes it easier to break the rules. Turkey has the lowest highway traffic safety levels out of all the European Union countries. This situation exemplifies the need for stronger regulations and enforcement measures as well as the implementation of intelligent transportation systems (ITS), particularly those relating to in-vehicle safety systems, traffic management and supervision. The interacting and bilateral relationship between transportation and urbanization is clear and emphasizes the significance of multidisciplinary planning approaches. All of these methods are indispensable parts of a holistic approach.*

## Introduction

Technological developments in the 21st century have revealed a wide range of needs and uses for each transport mode. It also implies new opportunities for system integration and decreasing negative effects of urban mobility. A negative effect of a rapid population growth and the increasing number of vehicles is an increase in the number of traffic accidents. Irregular traffic flows increase the risk of accidents and not ensuring effective and continuous monitoring makes it easier to break the rules. Therefore, from a political view, traffic rules must be strengthened, and the implementation process must be supported by a multidisciplinary coordination. In Turkey, as in most developing countries, the socioeconomic cost of traffic accidents is on the rise. Approximately 1.3 million people across the world die every year due to traffic accidents and 50 million people are injured (Mustafa, 2013). A child dies in a traffic accident every three minutes (Mustafa, 2013). Turkey has the highest number of accidents and the lowest annual rate of accident reduction in all the European Union countries (Mustafa, 2013).

Istanbul, Turkey's most populous city and economic capital, is going through a range of rapid changes with regard to its socio-economic and demographical structures and the evolution of its transportation systems. The city is currently facing a growing need for transportation infrastructure; this has been aggravated because

of the rapid population growth and migration, which in turn has brought an increase in the number of motor vehicles. All of these factors, in addition to low income and questionable education levels, have a cumulative effect and cause complex problems in a wide range of areas including the transportation systems. One of the prominent reasons for these problems is that the infrastructure capacity does not have the same growth trend as in the parameters mentioned before. As in many developing countries, the lack of alignment between the infrastructure capacity and other economic or demographic parameters can amplify the complexities and generate more problems.

Additionally, gaining momentum in infrastructure development requires technical know-how, innovative approaches, production of necessary tools, and coordination. Technical developments and innovation can hinder new problems, eradicate existing ones, or contain them at acceptable levels. Transport safety and traffic congestion problems are usually important items on the city administrations' agenda in major Turkish cities. It is also observed that intelligent transport systems have become effective and efficient tools to solve these problems by helping city administrations monitor in real time.

## Areas of use for Intelligent Transportation Systems

Intelligent transportation systems (ITS) can provide all kinds of communication and information transfer

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within vehicles and between vehicles and fixed control centers relating to infrastructure, security, safety, performance, and quality. ITS are also helpful for minimizing the impact that transportation has on the environment and maximizing both the economic expectations for maintenance and the benefits for passengers and drivers (Mustafa, 2013). Key features such as multi-directional data transfer among humans, vehicles, infrastructure, and control centers, as well as improving traffic safety, the use of roads in accordance with their capacity, increasing mobility, and reducing harm to the environment by achieving energy efficiency have been generally accepted to be among the purposes of ITS and have become standardized. ITS systems are constantly undergoing R&D, so it should be taken into account that the benefits expected from these systems may vary in time or may focus on more specific areas. Within the scope of ITS, advanced information and communication technologies (ICT) can be used to create solutions for important transportation problems (Bloomfield, 2006). Through coordination between different modes of transportation by using ITS applications, ideal traffic conditions can be established and the efficiency and speed of services relating to passenger and freight movement can be increased.

Although not all applications can be clearly categorized, some of the most recognized classification of ITS are:

1. Passenger information systems
2. Traffic management systems
3. Mass transit systems
4. Electronic payment systems
5. Freight and fleet management systems
6. Driver support and security systems
7. Accident and emergency situation systems (Mustafa, 2013)

ITS systems require new approaches for infrastructure development. Hence, it is important to determine and understand the functions and areas of use. Within this scope, it should be noted that public administrations now face the need for technological renewal, which requires financial and human resources. Therefore, it is crucial to make an assessment of the current transport system and traffic status.

### **Istanbul Case**

The population of Istanbul as of the end of 2015 was

14,657,434 (Mustafa, 2013) and from 2009 to 2015 it had an average growth rate of 21 percent per year. The rate of car ownership in Turkey and the use of road transport is also quite high and the use of public transportation is not yet at the desired level. In this context, policies such as increasing the extent of railway networks and the use of different energy sources, especially for buses in public transport, have become popular. Nevertheless, it can be said that current investments in urban transport systems will not be sufficient to achieve a balanced modal share and to reduce private car ownership rates. In general, the highway mode of transport has been dominant in Istanbul and the use of private vehicles will be enhanced by new bridges and tunnels over and under the Bosphorus Strait. Even though one third of the Bosphorus Bridge will be dedicated to a new railway line in an effort to balance the modal distribution, the overall network is still lacking the necessary infrastructure. Therefore, one can assume that, in the current state of affairs, new investments for road infrastructure will only have a negative effect in terms of providing a balanced distribution of transport options in Istanbul. Consequently, the increase in ownership of private cars can be attributed to the advantage that private vehicles have over road infrastructure. For example, the access share of cars by the Bosphorus Bridge reached 19.20 percent in 1996 and increased to 26.34 percent in 2006 (Gleave, 2006). Private automobiles, which are the most important factor in traffic jams on the bridge, account for only a very limited part of the passengers carried through the bridges (Mehmet Çağrı, 2013). In this context, it is clear that approaches to prioritize public transportation and smarter ways of regulating transport are needed. The aforementioned case exemplifies the current state not only in Istanbul but throughout Turkey.

Most of the ITS applications in Turkey stem from those carried out in Istanbul. It can be said that cities in Turkey have started to make good use of ITS and studies on these applications can be beneficial, not just for other Turkish cities but also other cities from around the world.

### **Intelligent Transportation Systems in Turkey**

Today, reducing the negative effects of traffic congestion in the short term is not possible by only implementing solutions that improve traditional infrastructure, through such capacity-increasing solutions as adding new lanes and constructing multi-level junctions. High-

er capacity transportation systems can only be achieved at a higher cost and through long-term planning and long term balanced solutions. For example, from 1995 to 2018, only 120 kilometers of railway was constructed in Istanbul. Many of the railway systems in the world have also reached their capacity and have started to strain due to overwhelming demand. An alternate mid-term solution to achieve an increased capacity of these systems could be achieved by using intelligent transportation systems that integrate information management and communication technologies (Mehmet Çağrı, 2013).

Starting in 2006, the Istanbul Metropolitan Municipality Traffic Department installed electronic monitoring systems (EMS) in order to make city traffic safer for drivers, passengers and pedestrians; thus, as in many other areas, it has proven to be an exemplary municipality for Turkey. By reaching an agreement with the Turkish National Police (EGM) that has the authority to issue sanctions against vehicles that commit infractions, a system is being developed that will allow police officers to issue sanctions against traffic infringements determined by EMS.

Additionally, since there is no transfer of information between the EGM's information system (POLNET) and the EMS system, police officers must manually query all license plates (TR 10<sup>th</sup> Government Plan Transportation and Traffic Safety, 2012). As the central administration has not set aside a budget for local administrations for the establishment and maintenance of these systems, problems are encountered in the efficient development of these systems. The Istanbul Metropolitan Municipality has presented a proposal to the directorate general of the Parliamentary Committee on Planning and Budget that proposes amendments to some articles of the Highway Traffic Law numbered 2918; this amendment proposal has been accepted by the commission and the resulting document has become a law, that is denominated Article 60 of (omnibus) Law numbered 6111 (Wang, 2002). These new laws support the common usage of EMS by various municipalities nationwide. It provides a framework regarding the regulatory, financial, and acquisitions elements with an overview of the appropriate use of these systems on the context of monitoring and enforcing transit laws. These regulations also provide an examination of the economic source distributions between government and municipalities.

## Conclusion

In cities, even if a large part of the road capacity is used by automobiles, most of the journeys are carried out by means of public transport, which uses only a fraction of the road capacity. Therefore, in order to increase the efficiency of public transport, regulations must be put in place to ensure reliable, efficient and time-saving transport, including the necessary ITS applications. For the purpose of increasing the commercial speed, especially at peak hours, express bus routes should be implemented and high-speed bus routes should be planned in the main arteries. An integrated planning approach should also consider the ITS applications to optimize the operation and ensure traffic safety whilst reducing accidents. Some of the efforts that have move these issues forward are the acceptance of the additional Article 16 included in Article 60 of Law numbered 6111 led the way for the targets of increased use of EMS across Turkey. EMS's play an important role in increasing traffic safety and reducing the number of accidents by advancing the capabilities of monitoring transit (Lobb et al, 2003).

Some technical provisions to consider in the conception of new regulations are:

- The technical capacities and qualities of the EMS systems should be clearly stated and should be updated in accordance with developing technology. Support in the matter could come from relevant university departments and/or transportation experts in accordance with highway standards.
- The general criteria should be established for the locations where EMS monitoring will be conducted.
- Electronic receipt systems should be adopted.
- A bilateral transfer of information between EMS and ITS systems should be established (Mehmet Çağrı, 2015)

There is currently no organization that can supervise, maintain or calibrate EMS systems. Therefore, it is recommended to create an organization by partnering with universities with the necessary technical capabilities to overtake this responsibility.

Urbanization, economy, and transportation are different disciplines but have a dependent relationship. The actions of one can have significant impacts on the other. Because of this, a robust structure must be established to tackle this kind of issues and this structure should rely on holistic planning. Turkey needs to un-

dergo a restructuring phase to adopt an efficient governance approach and cement the relationship with the transportation industry.

Such a transition also requires innovation, technological improvement, and knowledge in order to solve traffic congestion problems and strengthen intelligent transportation systems.

Moreover, the modal share of highway transport mode in Istanbul is very high, although the unparallel use of private vehicle overwhelms all other transport modes. This results in capacity overloads on highway traffic, leading to conditions that threaten road traffic safety and increase of accidents. It forces all Istanbul people to constantly waive parameters such as comfort, security, and punctuality (Congalton et al, 2008). In this sense, the implementation of technological solutions, the incentivization of investments, the development strategies and the improvement of transportation systems should revolve around a “human-oriented” perspective (Mehmet Çağrı, 2014).

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