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Big Data and Knowledge-based Urban System in Tehran

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1 ABSTRACT

Data, information and knowledge are essential sources of decision- making and policy- making processes in urban and regional planning and are considered to be an essential source to achieve urban planning goals. Big data is defined generally with respect to its size but this paper is focused mainly on urban and regional data, that is, data streamed from cities and regions which are regularly related to space and time. Big data has benefits of providing a detailed view of the activity patterns for multiplicity of urban populations, how cities function and can be managed, rather than a general feature by traditional statistics. In this context, application of big data has been rapid expansion in urban and regional studies and planning to cope with uncertainty and provide information requirement of decision- making processes. Appling big data in urban studies and planning processes and the practice of urban planning has been introduced as potential to more effective urban planning a more conscious decision- making.

Metropolitan planning of Tehran faces known and unknown contingencies which could affect the anticipated outcome of the planning system. This shows the necessity of availability to new sources of data in order to cope with inherent uncertainties and constrains posed upon this city's planning practice. The main questions presented by this paper are first, to explore the resources and potential of creating and appling big data –- as a knowledge resource -- in the planning and management system of Tehran, and second, how the applyication of big data affect and facilitate the function of urban planning and management in Tehran? A descriptive-analytic process has been adopted to answer this twofold question: first) tracing the creation and application of big data in urban planning around the world through systematic literature review, and second) analysis the creation and applicability of big data in Tehran planning and management system. This paper is to discuss potentials and challenges of creation, development and application of big data in the planning and management processes with a positive impact to improve urban policy- making in coping with known and unknown contingencies and uncertaitities throuh networking this type of date to other type of information and knowledge to establish a knowledge-based urban system as part of a knowledge management framework.

Keywords: urban planning, Tehran, urban system, knowlegde-based system, big data

2 INTRODUCTION

Urban planning systems are subject to uncertainties that might disrupt their functions and reduce their effectiveness. Such uncertainties may deactivate planning measures in short or long term and extend the challenge of planning in an uncertain world. In metropolises, being the socio-cultural, political, economic, and investment hubs with a multiplicity of planning problems, this challenge is even more intense. Regarding these challenges of providing suitable, complete, available and accurate data and information for planning systems, increasingly large application of big data in planning studies and practices is seen an opportunity for understanding how cities work and how we could manage them more efficient.

Big data is defined mainly with respect to its size and this paper we will focus on "urban and regional" big data, which means data driven from urban and regions and have spatial-temporal dimensions, which in comparison with traditional statistics reveals individual and people-oriented features continually, while traditional ones disclose general features in a specific time intervals.

The necessity of the discussion in this paper is to provide a research background for Tehran urban planning system in its path toward an intelligent city, which is part of its vision for 1404 according to "Tehran Structural-Strategic Plan" (2006). This plan also states that Tehran should provide necessary infrastructures to enhance its livability and global role through becoming a smart, global knowledge-bas city an increasing the ratio of knowledge economy.

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The key questions presented by this paper are first, to discover the resources and potentials of creating and applying big data –- as a knowledge resource -- in the planning and management system of Tehran, and second, how the application of big data affect and facilitate the function of urban planning and management in Tehran.

3 LINKING INFORMATION AND KNOWLEDGE WITH URBAN PLANNING AND MANAGEMENT

There are varying -- though in some instances contradictory -- viewpoints about the linkage of information and knowledge and urban management and planning: First is that planning uses knowledge to increase its perception of the object under planning; while the result of such understanding is a greater ability to achieve society's objectives (Harris, 1987); and, second is that planning refers to those activities which lead to the production of information that is produced and then analysed to support decisions made by decision-makers (Hopkins and Schaeffer, 1985). An inference about linking the two is that information plays a central role in planning (Nijkamp& Rietveld, 1989: 232).

4 CONCEPTUAL FRAMEWORK OF BIG DATA IN URBAN MANAGEMENT AND PLANNING

The main areas of discussion of this paper are definition of urban big data, urban planning theory in big data era and resources, roles and applications of big data in urban management and planning. These main areas made conceptual framework of this paper.

4.1 Urban 'big data'

There are many definitions of 'big data' but one of the best is 'any data that cannot fit into an Excel spreadsheet'. This immediately gives one some idea of size. This definition also suggests that big data must be defined in relation to the standard tools that enable it to be processed to some purpose (Batty, 2013 :274). Traditional structured data sets can be thought of as a large cube. big data sets can consist of a large number of rows (or observations) that are described by a large number of fields (or variables). Many big data sets add a third temporal dimension that includes recurring observations over time. Many of these data sets can be joined to variables in other structured data sets using some common identifier. Since many of these records are tagged with geolocation or a time stamp, and sometimes both, time or location can often be used to join otherwise unrelated data sets (French et al, 2015: 194-2).

Urban big data is a massive amount of dynamic and static data generated from the subjects and objects including various urban facilities, organizations, and individuals, which have been being collected and collated by city governments, public institutions, enterprises, and individuals using a new generation information technology. Big data can be shared, integrated, analyzed, and mined to give people a deeper understanding of the status of urban operations and help them make more informed decisions on urban administration with a more scientific approach, thereby optimizing the allocation of urban resources, reducing the operating costs of the urban system, and promoting the safe, efficient, green, harmonious, and intelligent development of the cities as a whole (Pan et al., 2016:172).

4.2 Big data and urban planning theory

contradictory, discussions about the importance of "theory" in the application of big data in urban planning research have been raised: Anderson (2008) has posed the "death of theory" and argued that with the opportunity that of big data offer, we can easily detect the arrangements and correlations amongst different factors in the city and there is no need to figure and use explanatory models. He believes that with the application of big data, planners could put aside the tradition of " developing hypotheses, constructing models, collecting data to test those models" because now they know what people and systems do, without using explanatory theories: "with enough data, the numbers speak for themselves." Others who have tracked this idea that in the era of availability of real data, building model of that system does not make sense.

Other researches are opposed to this idea with the sense that theory could be replaced by the data itself, just when concerning with the short term management of urban systems in which planners could "observe the key parameters and optimize the performance of the system by replying to real time data feeds" (French et al, 2015: 7). Then while explanatory function of big data is beneficial for short-term management, it is inadequate to plan for an uncertain future (Klosterman, 2013). Researches in this line of thinking believe that

"big data requires big theory" (west, 2013); data minus theory is worthless. As data become bigger, the amount of fake correlations rises exponentially (Taleb, 2013). Then what we realize from big data must be controlled through the lens of theory (Batty, 2013) which explains how different systems are linked to each other and how they are influenced by exogenous parameters (Batty, 2013). Big data could be used as an assistant in developing and testing theories about how the urban systems mechanisms, but not as an foundation required to plan for an uncertain future (French et al, 2015).

4.3 Urban big data types and acquisition

Urban big data describes the real-time status of various urban elements, including buildings, streets, pipelines, environments, enterprises, finance, commerce, products, markets, logistics, medicine, culture, education, traffic, public order, and population (Pan et al., 2016:172). Urban big data can be categorized into five types: sensor data on urban infrastructure and moving objects, user data on society and humans, governmental administration data, customer and transaction record data, and arts and humanities data (table 1).

Type	Example
Sensor data on urban infrastructure and moving objects	internet of Things; sensor system for managing environments, water, traffic, fuel gas, and buildings; mobile phone; monitoring camera
User data on society and humans	Participatory sensing system, social media, network use, global positioning system (GPS), and online social network
Governmental administration data	Public administration data on transactions, taxes and revenues, payment and registration; basic public data on population, traffic, lands, housing, and geography; confidential micro-data on personal employment, medical treatment, welfare, and education
Customer and transaction record data	Storage card and business records; fleet management system; customer data; data on public utilities and financial institutions; product purchase and service agreement
Arts and humanities data	Text, image, audio, video, language data, artistic and material culture, digital object, and other media

Table 1: type and Examples of urban big data. Source: Pan et al., 2016: 173

The big data can be typically categorized using the three methods below (Pan et al., 2016: 173):

- Supply side of urban functions: Urban big data is categorized in terms of the urban administration systems—that is, the clustering systems of existing urban hierarchy data. This categorization method promotes organizational development.
- Demand side of municipal services: Urban big data is categorized in terms of the stakeholders (e.g., residents, enterprises, non-profit institutions, and governmental organs). Urban big data can be further categorized, thus deriving various urban application service systems. This categorization method serves to promote applications.
- According to the reason for urban data generation: For example, urban big data may be categorized into sensor data based on the urban physical system, data from the economic activities of urban actors, data on the social activities of urban individuals and organizations, data on the scientific and educational activities of urban populations and actors, and data on urban life.

Urban big data can be categorized into five types in data acquisition perspective: GPS Log Data from Handheld GPS Devices, Mobile Phone Data (MPD), Smart Card Data (SCD), GPS Data from Floating Cars (Taxis), Volunteered Geographic Information (VGI).

The advantage of this type of data in comparison with traditional data is that, instead of providing a general statistic of the population in a geographical area, they continuously provide a variety of information about the patterns of individual behavior of a large number of urban and rural residents. Big data category in data acquisition has been described as follows (Hao et al, 2015: 96-100).

4.3.1 GPS Log Data from Handheld GPS Devices

The early application of GPS log data mainly revolved in transport parameter estimation and model calibration. It has advantages of high spatio-temporal precision and collected in realtime.

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4.3.2 Mobile Phone Data (MPD)

MPD is the most common type of LBS (location-based services) data, Mobile phone data has advantages of high spatio-temporal precision and no extra equipments, with disadvantages of failing to obtain individual attributes and information bias. Due to large sample size, MPD could well identify urban spatio-temporal charateristics at micro scale as well as meso and macro scale, laying foundation for further spatial analysis and planning practices.

4.3.3 Smart Card Data (SCD)

SCD is traced from public transport, like buses, subways, public bicycles, etc. SCD is a kind of frequently used data with advantages of consistency, mass coverage, complete information and realtime update. Originally, SCD was deployed for bus line optimization, public transport site selection and public transport operation & management. Moreover, it is widely used in analysis of travel spatial distribution, travel distance, travel time, traffic flow and traffic community structure.

4.3.4 GPS Data from Floating Cars (Taxis)

GPS Data from Floating Cars is traced from vehicles equipped with GPS, and stored in text type, covering latitude & longitude, driving period, speed, and direction, etc. In China, floating cars trajectory data is mainly traced from taxis. Due to floating cars having high consistency with roads, GPS Data from Floating Cars (Taxis) has a wide application in analysis of transportation structure, travel pattern and traffic volumn simulation.

4.3.5 Volunteered Geographic Information (VGI)

VGI generates from emergence of online service platform providing geographical location, and it is mainly mined from check-in data from micro blog, search engine, platform for urban services. Since in these platforms, the geographic location of users along with preference, emotion, motivation and satisfaction of individuals has been stored, it is well applied to facilities site selection and evaluation.

Advantages and disadvantages of various types of big data are shown in table 2.

type of data	Advantages	Disadvantages
GPS Log Data from Handheld GPS Devices	(1) High spatio-temporal precision (2) Collected in realtime (3) Missing individual attributes may be partly supplemented by questionnaires and face-toface interviews (4) Overall trips could be obtained	(1) Failing to obtain information of individual attributes (2) Handheld equipments have to be distributed to individuals surveyed (3) Relatively hard to apply to general survey based on large sample size
Mobile Phone Data (MPD)	(1) High spatio-temporal precision (2) No extra equipments (3) Large sample size (4) Overall trips could be obtained	(1) Failing to obtain individual attributes (2) Information bias (3) Missing information may not be compensated
Smart Card Data (SCD)	(1) Consistency (2) Mass coverage (3) Complete information (4) Realtime update	(1) Relatively smaller sample size than MPD (2) Bias between real jobs-housing places and public transportation stations (3) Overall trips fail to be obtained, failing to reveal characteristics of individuals taking other kinds of non-public transportation such as walking and cycling (4) Relatively hard to extend study achievements to all cities (5) Failing to contain individual attributive information
GPS Data from Floating Cars (Taxis)	(1) Collected in realtime (2) Smaller bias between real jobs-housing places and sites of getting on the car and getting off the car than SCD	(1) Lacking high precision (2) Instability (3) Smaller sample size (4) Overall trips fail to be obtained
Volunteered Geographic Information (VGI)	(1) Realize refinement of individual attributive data (2) Well applied to facilities site selection and evaluation	(1) Smaller sample size (2) Information bias

Table 2: Type, advantages and disadvantages of various types of big data. Source: (Hao et al, 2015: 102)

4.4 Application of big data in urban management and planning

Application of urban big data in urban management and planning could be presented in the following categories:

4.4.1 Behavior data acquisition & analysis to recognize travel behavior

Individual behavior and its temporal-spatial changes are one of the main topics of urban planning modelling: Individual behavior data in different spatial time scales could be translated into spatial data. Researches using traditional spatial data, generally emphasizes on static ones, and ignores temporal variations, dynamic continuation, interpolation, and overlapping of temporal data. In these traditional ways, urban planning institutions regularly conduct travel surveys to update their regional "travel demand models". These surveys help them understanding travel behavior in their area and track its changes over time. However, the costs of these surveys, their low response rates, and the time required to perform them, limits their range and frequency. With the use of big data, new mechanisms for collecting travel behavior data can be designed and reinterpreted. Travel behavior is a key component of long-range transport planning, and also these new mechanisms affects planners' ability to predict land use changes (French et al, 2015: 8-9).

4.4.2 Urban disaster management

Traditional urban planning studies and theories mostly have emphasized long-term horizons: In the long run, months and years, what happens to cities. The concept of smart cities, with a focus on understanding the functioning of urban systems in the short-term horizons, has created a significant turning point in this emphasis: the rapid response of the contingency planning system in a very short term horizon. These applications can range from addressing urban transport system disruptions to housing market issues, social services and other services that were previously driven by trial and error practices. For example, the potential of this type of data in crisis management in urban transport systems can be noted: by tracking data from public transit smartcards, a large number of records are available, covering all those who pay for the use of the public transportation system (including buses, subways and trams) using a special type of smart card. This records include the stations that people log in to or from the transit system, and can be recorded in one-day, monthly, multi-month, or annual periods. Although, due to the fact that not all users use these types of cards, the comprehensiveness of the data set decreases, and it is questioned who does not use these cards (for example, tourists, casual users, those who do not afford paying for these cards, etc.), but the data available is very significant in terms of where usually users are logged in and where they leave the transportation system. Such data are potentially useful for detecting systemic disruptions of the system or selecting alternative paths at the time of any disruption in a part of the system (Batty, 2013: 227).

4.4.3 Spatial analysis

Using big data can directly describe the flow of space in cities and between cities and draw a complete, dynamic picture of urban and regional spatial structure. Researchers can represent the economic and social links between cities using mobile data and volunteer geographic data. Traditional methods of data collection on urban form and structure are mainly based on qualitative methods such as image interpretation, land use analysis and visualization, and questionnaire surveys. These methods are not capable of responding to the challenge of increasing uncertainty urban spaces. Using big data can support a dynamic urban space research and map out the complexity, mobility, and ambiguity of these spaces (Hao et al, 2015: 111-112).

4.4.4 Better Understanding of urban activity systems

Urban systems consist of more than just their infrastructure and transportation networks. Instead, these systems are comprised of a complex combination of land uses which changes over time, but at a slower rate of infrastructure and transportation patterns. For this reason, determining the land use patterns over time is more complicated from managing the flows on a transportation network and needs a theoretical foundation of how several systems are linked to each other and how they are influenced by exogenous parameters. (Batty, 2013).

Chapin and his associates (1979) theory of urban activity systems could be an option for this foundation: this theory describes how d urban landscape shapes the behavior of urban occupants. A household locates itself in to meet those needs and also regarding its budget constraints. Similarly, firms locate their offices to balance their needs to access to raw materials on one hand, and to workers and customers on the other hand.

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In the short time these actors work within a fixed pattern of land uses and infrastructure. But, over time the urban areas size, shape and form will change and the urban planners and policy makers system could form the urban landscape to make it easier for actors to meet their needs; they could make it “more user friendly” over time through infrastructure investments and changes in the land use pattern. Urban big data could be the suitable means to collect the data essential to comprehend these complex patterns.

Traditionally urban management systems have made planning decisions using partial data and basic understanding of how several parameters interact. Such decisions but it also unwanted consequences, like the social isolation, increased energy use, and other environmental impacts. (Duany and Plater-Zyberg, 2001). But applying urban big data offers the chance to realize these systems by details and to find correlation and causality that was simply not possible with occasional sampling through small surveys. Using big data can provide a precise view of how households, companies and institutions use urban space and quickly identify their patterns of behavior that define an urban area (French et al, 2015: 8).

5 IMPORTANT CONSIDERATIONS IN APPLICATION OF BIG DATA IN URBAN MANAGEMENT AND PLANNING

Big data offer many new opportunities for research and practice of urban planning. Whether these developments in data acquisition will be to our collective advantage or there is a dark side to these developments? In response to such questions, the following points has been considered.

5.1 Privacy and confidentiality

Big data can reveal the most personal aspects of our behavior from where we go, to who we visit and what we buy. Thus one of the most important challenges of big data in urban planning is privacy and confidentiality (Batty, 2013: 277). Aggregating data to larger geographic areas, like census tracts may be the solution in some cases, but part of the power of big data is that it is highly disaggregated. Significant attention needs to be paid to finding the proper balance between generating and sharing detailed data that may compromise the privacy of individuals and aggregating that data into groups too general to provide an enhanced understanding of the urban system and how individuals interact with it (French et al, 2015: 13).

5.2 Availability of big data to the public agencies

If big data is to serve the public interest, it needs to be made available to the public agencies entrusted with the long range planning function. But, to adequately engage the public, the whole set of stakeholders interested in setting the goals and policies to guide urban development needs

access to this data in some form. Obviously, most of these public agencies and certainly small citizen groups and non-profits need access to the data (French et al, 2015: 12).

5.3 New data analysis methods

Access to big data will also require better tools to visualize and analyze this information, especially when integrating data with new and existing urban models. Statistical methods that were useful for generalizing from small samples to larger populations are no longer appropriate tools. When you have all of the data describing a population or a system, the problem is not generalization, but data reduction and abstraction. Data analysis methods familiar to computer scientists have proven to be promising for generating understanding in a data-rich environment (French et al, 2015: 12).

6 PROPOSE AND APPLY A FRAMEWORK FOR TRACKING THE PRODUCTION AND APPLICATION OF BIG DATA IN TEHRAN URBAN MANAGEMENT AND PLANNING

In order to track the production and application of big data in Tehran urban management and planning system, a process including t steps has been used: firstly, to discuss the role of data in Tehran urban management and planning and the need for big data; second, to introduce the data sources in Tehran; third, to introduce the potential big data resources and also potential applications; and forth, to discuss opportunities and challenges of big data application in Tehran.

6.1 The role of data in Tehran urban management and planning

A fundamental source for setting-up any urban management and planning mechanism is knowledge and one major challenge and hindrance in urban policy-making processes is the lack of knowledge management framework encompassing accurate, potential, accessible and integrated information. Tehran has a multiplicity of decision-makers, policy-makers or participants who produces data and information but they do not share these data and information (Daneshpour, Mahmoudpour, and Ebrahimnia, 2013).

Urban big data as one of the most important sources of urban data continuously provides planners with a wealth of records about the patterns of behavior of the massive number of urban and rural residents, the functions of cities and how they could manage them.

The application of this type of data has expanded to meet the uncertainties and provide the needs of decision-making systems in urban and regional studies in the world. This means that access to new data sources is necessary to reduce the uncertainties and constraints in decision making in Tehran and can be used as an opportunity to strengthening its planning function. In addition, it could be consider as a tool to confront with the challenge of sharing data and information at inter-organizational, inter-sectional, and inter-regional levels, and between public and private sectors. (Daneshpour, Ebrahimnia, and Mahmoudpour, 2014). It can also be used to promote the use of information resources and to publicize data and intelligence and new information services. Also, by increasing the production, transfer and use of accurate information, the establishment of knowledge-based information systems in Tehran transition to smart city is facilitated.

6.2 Data and information production organizations in Tehran

Plan production process in Tehran can be introduced continuum of information production, information consumption and plan production as illustrated briefly in Table 3. Data and information production organizations collect and process the information they need and produce the necessary documents. These documents are available to consumer information organizations, and new documents and information are produced and delivered to planners.

The multiplicity, complexity of the relationships and interconnections between production and consumption organizations is evidence of the complexity of the data production and planning process, as well as the more complex implementation process of the plans. Because of such complexity, the need for the integration and coordination of the organizations involved in the production and consumption of information (the integrity of data, information and knowledge sources) becomes a more important.

Data and information production organizations	Data and information type	Planning Output
• Statistical Center of Iran (SCI) • Central Bank of Iran (CBI) • Tehran Municipality (TM) • Ministry of Roads and Urban Development (MRUD) • joint ventures of TM and MRUD • other government ministries • various research agencies/ researchers • private planning consultants • other information producers	• Population & their characteristic • physical characteristic of places and channels • activities and flows • other type of data	Policy documents Urban plans: • Tehran conurbation plan • Tehran structural-strategic plan • Tehran urban districts detailed plan (for 22

Table 3: Information production, information consumption and plan making processes in Tehran

data, information and knowledge have two main applications in Tehran urban planning process: first: data production, Processing and application to long term plan making and second: data production, Processing and application to short term urban management in organization such as municipality (operational management). One of the challenges of Tehran's urban management and planning in terms of production and application of data, in addition to the lack of available, correct and real-time urban data and information, urban data and information refers to data that product and process to use in urban plan making and management, is that there isn't belief in knowledge-based management systems among planners and decision makers. These challenges make urban organization's short to long decisions inefficient.

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6.3 Application of big data in Tehran urban planning and managment

Big data is certainly enriching our experiences of urban planning and management, and it is offering many new opportunities for more informed urban decision-making and planning (Batty, 2013: 277). In the city of Tehran, big data as one of the data resource -along with other types of data- can help to shaping and development of knowledge-based planning and management system. Big data production in Tehran has begun in some governmental and nongovernmental organizations by development of new information technologies. The big data can be used to acquisition and analyze behavioral data to determining the travel behavior, especially for managing urban transport and traffic, improving land use patterns, and distributing services and managing crisis in Tehran. Table 4 shows the various types of big data produced in Tehran, along with the acquisition sources and organizations that produce such data and their application status in the planning and management of Tehran.

Big data type	Data Generation/ formation Resource	organizations in charge of formation in Tehran	The application in urban management and planning	Statues of application in Tehran
Sensor data on urban infrastructure	sensor system for managing environments (air quality monitoring sensors)	Tehran Department of environment	Urban Plan making	No/low
	mobile phone (Online Services Platforms)	Online Services Platforms such as: Online urban taxi application (sanp, tap30, . . .) Online Foods, goods and services request applications Other online services	Behavior data acquisition and analysis Spatial analysis	No/low
	monitoring camera	traffic violation registration system of Tehtan Police Information and control centre of Tehran Police	Spatial analysis	No/low
User data on society and humans	Participatory sensing system	Tehran Municipality (TM)	Spatial analysis Public participation	Somewhat
	global positioning system (GPS)	National cartographic centre	Behavior data acquisition and analysis	No/low
	online social network	Iran national map and geocoding service (parsimap)		No/low
Governmental administration data	Public administration data on transactions, taxes and revenues, payment and registration	Public and private banks Iranian National Tax Admission Organization Tehran orovince directorate of registration of documents and real estate of	National and provincial plan making	Yes/ in macro economic analysis
	basic public data on population, traffic, lands, housing, and geography	Statistical Center of Iran (SCI) Central Bank of Iran (CBI) Tehran Municipality (TM) Ministry of Roads and Urban Development Ministry of Health and Medical Education Iran Social Security Organization	Urban Plan making National plan making Spatial analysis	Yes/ Somewhat
Customer and transaction record data	customer data; data on public utilities and financial institutions	Tehran Smart Card	Behavior data acquisition and analysis	No/low
Arts and humanities data	Text, image, audio, video, language data	National search engine motors	Urban Analysis	No/low

Table 4: big data type in Tehran urban planning and management

6.4 Opportunities and challenges of big data application in Tehran

The production and application of big data in Tehran management and planning and system is not considered as one of the main sources of data production, and the generated data is not stored, processed or used, and despite the existence of new tools and systems for producing this data, data generated, is not used by Tehran urban management planning system. This means that the big data with a sensor and technology-based smart tool sources is not considered as an important source of data generation. However, this data could play an important role in improving the status of the two major problems in Tehran; traffic congestion and crisis management.

The big data produced in Tehran public institutions are not urban, integrated and compatible with the urban management and planning needs. Therefore, the challenges of producing and applying big data in Tehran management and planning system are summarized below:

- Ungenerality of production and application of big data in Tehran management and planning system.
- Not being processed and converted into practical knowledge in order to be used in Tehran management and planning system.
- Not being integrated with the other existing sources of data production in Tehran management and planning system.

Therefore, in order to capitalize on the advantages of application of big data in Tehran management and planning system, it is essential to first) strengthen the big data production infrastructure; second), create and strengthen big data processing and analysing tools for transforming them into the knowledge required for planning; third) strengthen and promoted the application of big data for decision making in Tehran management and planning system and improvement of the quality of urban services delivery; and forth) integrate the big and other needed urban data production.

If the above suggestions are used in Tehran management and planning system, it is possible to exploit the great advantages of big data and transforming this city into a smart, knowledge-based one would be facilitated.

7 CONCLUSION

A review of the resources related to the main question of this research, the tracing of big data applications in Tehran's management and planning, showed that some of the big data types were produced in Tehran. However, this kind of data is often not produced to facilitate urban planners' studies, then they are not processed and transformed into applicable knowledgeable in Tehran urban management and planning system. In addition, the problems associated with the lack of data integrative tools and procedures is the main challenge of urban management planning system which get worse with the lack of a supporting system to coordinate and unify the generated information and knowledge, the lack of a mechanism for measuring the credibility and accuracy of generated data, and the lack of a binding legal framework for knowledge sharingConclusion

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