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Review Article

DESIGNING SMART CITIES

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ABSTRACT
Traditionally, in previous eras, urban lifestyle has implied on the time, position, size, shape and function of the internal organization of cities; but along with the development of cities, the increase in population in large cities, the emergence of various and complex social- economic issues within the cities and entering major cities of the third world cities to world economic system, urban geography has achieved new dimensions and makes a detailed analysis of the social and political conditions in the territory of urban lifestyle. Today, most cities in the world to use the maximum potential of their urban life are planning to achieve goals of smart city; the city has the highest rate of performance in the area of urban life. To achieve this goal, cities need to comprehensive mobilization in different scientific and research areas. In this regard, in urban design, smart design should be applied. Making urban design smart doesn't mean make all urban processes electronics but means use of all available contexts in order to enhance the quality of urban life. Information technology can be used as one of the factors that accelerate the city goals and its smart design.

Keywords: *Smart City, Urban Design, Smart Design, Design, ICT*

INTRODUCTION
Today, when cities have developed and have problems in terms of urban design, it is clear that in this context, urban geography must also find new realms and dimensions so that an appropriate urban environment provides for city residents. In this regard, creating a smart city strategy and its design can be noted. Smart cities will be achieved of the involvement of technical - technological systems with human social life. Many of the world's major cities now have no ability to meet their citizens' needs. Therefore, the efficiency of cities should be added and all the required factors including energy "communication" transport and basic needs to be properly exploited. For sustainability and sustainable urban design, a city needs continuous and effective communication of citizens with each other as well as citizen with municipal authorities. Smart city is an example of a modern city where communication and information exchange act as critical arteries of social life. The main feature of the smart city are people (citizens) that distinct this concept from other issues of urban management. People are the most important features distinguishing smart cities from digital cities in today world. The key strategies to achieve the goal of smart city are planning and design in order to coordinate activities with different cultures and the needs of different people of society. Otherwise, people will confront with this kind of changes. In addition, idea styles and different cultures in urban life area in different parts of the world should be consider in order to obtain more efficient in this area of studies and accelerate this major goal. Culture and lifestyle are the most important elements in make cities smart, because if it is not accurate enough, even the best and most complete program to make cities smart will not achieve to desired results. This indicates that in plans of making cities smart, lack of coordination of existing equipment with the lifestyle and culture of the people is the main reason for reduced effectiveness and in some cases these plans will fail. Smart city designing can help improve the quality of urban life in various areas so that using the minimum amount of investment in make cities smart, we have the maximum efficiency by participation of the public in different levels of community to improve the urban life. Therefore, today urban design should be in line with smart city and its goals.

Urban Design
The term remains a relatively new concept of urban design and urban design maturity up to as late as 1960 the large-scale design projects actually funded and built by the state, reflecting a correct assumption,

it was still the preferred terminology. Since then, the only consistent thing about the urban design by anyone wishing to stake a claim ownership of discipline, use, and there has been confusion over the definition of 'Urban Design in conjuncture or spatial relationships between elements of the coordinated through the design, production machinery is related to the urban context. In this capitalist society, it usually dominates the production of meaning is very important for reinforcing ways, capital accumulation, social reproduction and has supported the legitimacy of change, it is claimed. His influence indecision (eg, in terms of interests), the system 'degeneration', and social system 'against any fundamental transformation has helped (King, 1986) Urban design is the art of making places for people. This is how they appear to work in places and on issues such as community safety, include both. These people and places, movement and urban form, nature and pertain to the link between building fabric and successful villages, towns and cities to ensure processes (DETR, 2000).

Therefore importance of integrated urban design science-related theories is that they (1) the city 'is' to unite and' ought '(and' how') Aspects; (2) therefore, in accordance; applied disciplines of scientific knowledge beyond; yet (3) they are not just artistic or normative political manifestos, but is supported by scientific knowledge or assumptions least How about the fact that the world (often hidden) works; This scientific knowledge or the assumptions However, it can be only a slight intact (Marshall, 2012).

Key Aspects of Design

Places for People

To be well-used and well-loved places, they are safe, comfortable, varied and should be attractive. They also need to be different, and we offer a variety of options and entertainment. Live destinations, to meet people playing in the street and offer the opportunity to watch the world go by (Llewelyn, 2011).

Available Enrich

New development should enrich the qualities of existing urban areas. This means nature and its setting different reaction to completion, cities, towns, and streets in the neighborhood - This is true at every scale (DETR, 2000).

Make Connections

Things get together and have physically and visually easy to integrate their environment. This foot, bike, requires attention to how people get around transport and car - and in that order. Landscaping work with a balance between natural and artificial environment places. To maximize energy conservation and amenity - climate, landform, landscape and ecology - Every site uses internal resources.

Mix of use and Forms

Stimulating, enjoyable and comfortable places to meet a variety of demands users activity and the widest possible range of social groups. They also use the different building forms, tenures and densities weave.

Investment Manager

Projects must be improved and economically well cared for, well managed and maintained. This market thinking developers and local authorities to understand the long-term commitment to ensure that the appropriate delivery mechanism to define and see themselves as part of the design process is.

Design for Change

New developments, future changes in use must be flexible enough to respond to lifestyle and demographics. This energy and resource efficient means to engineer; flexibility in the use of the property, creating public spaces and services, and transportation infrastructure, traffic management and parking introducing new approaches to (Llewelyn, 2011).

Smart City

Today the major cities in terms of the major problems facing the housing, transportation, climate, infrastructure, even for cities become more difficult goals, and in many cities in decline is the economic crisis, together with the aging population, freedom, creativity, opportunity and prosperity vision: a promise represents . The world's population is now urban and projects in 2050 about 70% against, in this

context, the Internet "technology-oriented vision represents the innovation as a medium city, they have choices and the decisions they make, through their in shaping the future of other stakeholders. Difficulty of change and transformation will focus on change towards shaping a better and more participants, imagine an ideal future vision (Schaffers, *et al.*, 2012).

The term "smart city" in recent years a lot of attention çekti.1990 'in the late since many cities smart city initiatives In the European commission gigital Agenda, cities such as health, environment, participation and work in areas such as innovation as drivers are accepted. The concept of smart cities captures different meanings and pure city marketing purposes period we need to look beyond a superficial use. We specifically define the role of the internet and user-driven innovation, focusing on smart cities, we aim to shed more light on this concept. To start with a useful definition search for a city "smart" "human and social capital and traditional (transport) and modern (ICT-based) infrastructure fuel sustainable economic growth and a smart management and a high quality of life, investments of natural resources, participatory government through "(Caraglia, *et al.*, 2009). Noting that the label smart city is a concept and is used in ways that are not always consistent (Hollands, 2008). In Harrison *et al.*, study 2010, called a Smart City an instrumented are connected, and intelligent city. Instrumentation enables the capture and integration of live real-world data through the use of sensors, kiosks, meters, personal devices, appliances, cameras, smart phones, implanted medical devices, the web, and other similar data-acquisition systems, including social networks as networks of human sensors. Interconnection means the integration of those data into an enterprise computing platform and the communication of such information among the various city services. Intelligence refers to the inclusion of complex analytics, modeling, optimization, and visualization in the operational business processes to make better operational decisions (Harrison, *et al.*, 2010).

Figure 1: Smart City

Smart City Design

Design science produces in general and rated artifacts, ideas, practices, technical capabilities, and products through which the analysis, design, implementation and use of information systems can be effectively achieved, to be defined. Our goal was to create to assist achieve a design tool for smart city policy makers and practitioners in making decisions about the various aspects of Smart city initiatives, a set of goals or desired results in the form of an artifact. The practical relevance of the tool to charge their goals of supporting the knowledge and decision making needs of the Smart city decision- makers in governments city for the planning of Smart City initiatives together. We summarize in Table 1, the DSR-profile for the SCID-frame design.

Table 1: Design Profile for the Study (Ojo, *et al.*, 2014)

Guideline	Description	SCID Framework Instance
G1: Design as an Artifact	DSR must produce a viable artifact in the form of a construct, a model, method or an instantiation	We developed a Conceptual Model for Smart Cities Initiatives and a concrete Framework as a design support tool. The framework also serves as a Knowledge Map as it maintains references to origin of design options in the cases.
G2: Problem Relevance	The objective of DSR is to develop technology-based solutions to important and relevant business problems	The SCID framework directly addresses the need of policymakers with the need to know decision options for different aspects of the design of Smart City initiatives
G3: Design Evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via a well-executed evaluation method	The framework has been reviewed by the targeted users - Smart City policymakers with positive feedbacks on its usefulness. Additional field studies are planned for evaluating the tool with practitioners in different Cities
G4: Research Contributions	Effective DSR must provide clear and verifiable contributions in the areas of design artifact, design foundations and/or design methodologies	The major constructs and relationships in the SCID framework constitute a research contribution in the Smart Cities domain. The SCID Framework contributes to the Smart Cities literature.
G5: Research Rigour	DSR relies upon the application of a rigorous method in both the construction and evaluation of the design artifact.	The SCID framework is grounded in findings from the analysis of ten concrete cases of mature Smart City initiatives. The analysis of the cases is based on the clearly defined conceptual model. Policy domains discovered in smart cities literature are used to map or streamline initiatives identified in the cases.
G6: Design as a research process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.	Each major element of the framework was iteratively developed based on the analysis of each of the ten case studies. Subsequent iterations sought to refine the contents of the framework.
G7: Communication of the research	DSR must be presented effectively both to technology-oriented as well as management-oriented audiences.	The SCID framework has been communicated to the target policymaker users in the form of a toolkit. This paper is one of the attempts to communicate the framework to the technology and research community.
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Smart City Service

Different portfolios of electronic services can be offered in a modern smart city (Anthopoulos and Tougoutzoglou, 2012):

• Public complaints of e-government services refer to the administrative procedures locally and nationally, job search and procurement.

• Services of e-democracy perform dialogue, consultation, and voting on ballot issues of common interest in the area of the city.

• E-Business support installation business, while allowing digital markets and tourist guides.

• E-health and tele-assistance Services. Service remote support to particular groups of citizens such as the elderly, Civilians diseases etc.

• E-learning offer distance learning opportunities and training materials for inhabitants.

• E-safety services support public safety through amber alert notifications, monitoring of school natural hazards management, etc.

• Environmental services contain public information about recycling while support households and businesses / energy / wastewater management. On the other hand, delivering data to States for monitoring and decision making on the environment conditions such as microclimate, pollution, noise, traffic, etc. (in Ubiquitous and Eco-city approaches).

• Intelligent Transportation supports improved quality of life in the city, while offering tools for traffic monitoring, measurement and optimization.

• Communication services such as broadband connectivity, digital television, etc. The smart city deals with supranational planning policies - such as the European Cohesion Policy (European Committee, 2012) - influencing national policy planning and prioritizing transportation sustainable networks and accessibility, entrepreneurship, education and training, and growth. These priorities affect all four dimensions of planning, while the smart with smart city transportation services, e-commerce services, e-learning services, and environmental services that aligns each respectively. The following subsections highlight this relationship in detail.

Smart City Key Success Factors

The five best practice areas, and the key success factors within each, that need to be addressed in order to make the Smart City concept fully operational. (Table 2) details nontechnology success factors like vision, leadership, innovation, and citizen engagement as well as technology success factors like infrastructure, architecture, and the use of data.

Table 2: Smart City Key Success Factors

Category	Best Practice Areas	Key Success Factors
Nontechnology	Strategy	-Vision: Specific social, economic, and environmental goals and objectives defined by city leaders based on citizen and business needs - Leadership: High-level city leaders who drive the implementation of the vision - Business case: The financial rationale for the vision
	Culture	- Innovation: How well a city experiments and innovates with new ideas and technologies -Citizen engagement: How well a city uses citizens and stakeholders as resources (Open data is a foundation of engagement)
	Process	Governance: The structure for implementing change at the city level(organization, budgeting, performance measures) Partnerships: Levels and types of partnerships
Technology	Technology	Architecture: Design of technology assets to be leveraged across city verticals Adoption: Penetration of broadband infrastructure and data capture devices like sensors, cameras, and so forth
	Nontechnology	Use: Analysis and display of data for use for improved services and decision making Access: How data is shared and accessed by workers and citizens

Infrastructure Smart City

The role that ICT will play in creating the foundation for Smart Cities very important (Belissent, 2010). The availability and quality of the ICT infrastructure are important for smart cities (Giffinger, 2007). Indeed, smart object networks play a crucial role in making smart cities a reality (Vasseur, 2010). ICT infrastructure includes wireless infrastructure (fiber optic channels, Wi-Fi networks, wireless hotspots, kiosks) (Hader, 2009, Hader *et al.*, 2009), service-oriented information systems (Anthopoulos, & Fitsilis, 2010).The implementation of an ICT infrastructure is fundamental to a smart city's development and depends on some factors related to its availability and performance. There is a little literature that focuses on ICT infrastructure barriers of smart cities initiatives. As done in the managerial and organizational section, we will refer to e-government technological barriers since smart cities' initiatives are similar to e-government initiatives in their use of ICT. Ebrahimi and Irani (2005) presented a set of factors related to the implementation of ICT. Table 3 presents a set of IT challenges grouped in three dimensions; IT infrastructure, security and privacy, and operational cost (Chourabi, 2014).

Table 3: Factors of built infrastructure

Dimension	Challenges
IT infrastructure	-Lack of integration across government systems -Existing internal systems have restrictions regarding their integrating capabilities -Lack of knowledge regarding interoperability -Availability and compatibility of software, systems and applications
Security and privacy	- Threats from hackers and intruders - Threats from viruses, worms and Trojans -Privacy of personal data - High cost of security applications and solutions -Accessibility
Operational cost	- High cost of IT professionals and consultancies - High cost of IT Cost of installation, operation and maintenance of information systems - Cost of training

A Smart city is described as one that "uses information and communications technologies to make the critical infrastructure components and services of a city -administration, education, healthcare, public safety, real estate, transportation and utilities — more aware, interactive and efficient. According to this approach, frequent in research reports, several key ICT technologies can be identified for their benefits on different city "systems" (Hernández-Muñoz *et al.*, 2011):

• *Transportation:* sensors can be used to manage the mobility needs with an appropriate Intelligent Transport System (ITS) that takes care of congestion, predicts the arrival of trains, buses or other public transportation options; managing parking space availability, expired meters, reserved lanes, etc.

• *ICT Can Be Also Used For Environmental and Energy Monitoring:* sensors that detect when trash pick-ups are needed, or notify authorities about landfill toxicity; energy consumption and emissions monitoring across sectors to improve accountability in the use of energy and carbon, etc.

• *Building Management:* smart meters and monitoring devices can help monitor and manage water consumption, heating, air-conditioning, lighting and physical security. This can allow the development of smart utilities grids with bidirectional flow in a distributed generation scheme requiring real-time exchange of information.

• *Healthcare***:** telemedicine, electronic records, and health information exchanges in remote assistance and medical surveillance for disabled or elderly people.

• *Public Safety and Security***:** sensor-activated video surveillance systems; location aware enhanced security systems; estimation and risk prevention systems (e.g. sensitivity to pollution, extreme summer heating).

• *Remote Working and e-commerce Services for Businesses, Entertainment and Communications for Individuals*. Advanced location based services, social networking and collaborative crowd-sourcing collecting citizens' generated data.

Smart City Application

The graphic below gives an overview of the types of smart city projects and services that have been deployed in selected cities in Europe, North America and Asia. The services in these cities fall broadly into the following categories:

- Transport, including public transport, intelligent transport systems and parking;
- Environment/Energy, including energy-efficient buildings;
- Municipal projects, including waste management, modernisation of water systems, smart lighting systems, public safety and city resilience programmes;
- Economic stimulus and open data projects.(GSMA, 2013)

CONCLUSIONS

Cities and urban environments are facing challenges to maintain and upgrade the required infrastructure and establish efficient, effective, open and participative innovation processes to jointly create the innovative applications and services that meet the demands of their citizens. In this context, cities and urban areas represent a critical mass when it comes to shaping the demand for advanced Internet -based services and experimentation in a large scale open and user driven innovation environments. Cities without comprehensive strategies to manage their built environments will not be able to take full advantage of what these products have to offer. Therefore develop a solid theoretical foundation for Smart Cities and to develop understanding of how these technical methods can help to achieve the pressing goals of existing and new cities. The real smart city design - in fact - will have to learn how to reconcile individual and collective needs, in other words to channel individual aspirations towards the creation of value for society at large through the attainment of economic, social and environmental objectives. Smart cities are equitable cities. We will develop infrastructures that are accessible to a wider range of interests and groups with die ring levels of expertise and activism so that all are involved. We believe that many of the methods that we will design will be based on notions about how groups compete and cooperate and we consider that the sort of infrastructure, expertise and data that will characterise the smart city will enable equity to be easily established and such cities to improve the quality of urban life.

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