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The smart city as a vector for sustainable development: technology for the service of citizens

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Abstract

In this article we show what bond unites the concept of intelligent city and the concept of sustainable development. Specifically, how the smart city can be a vector for sustainable development.

People migrating to urban areas came with the hope of finding a better job and improve their standard of living. But the growth of this phenomenon causes bottlenecks, increasing pressure on scarce resources (such as energy and water), and detonated the demand for sanitation, health care and education.

The concept of intelligent city was founded there more than ten years, and since then a number of cities have taken the bandwagon and have qualified for "smart city" in one way or another. Rapid urbanization and the pressing need to develop a sustainable model for the long term to cope with the expected increase of the urban population has led the ITU (the UN specialized agency for technologies information and communication (ICT)) to create the expression "smart and sustainable cities", to focus on concerns related to resources and integrate both ecological and technological dimensions.

This study demonstrates how the smart city can be mobilized as a vehicle of sustainable development. To answer this main objective, specific objectives are defined in the following lines. It is therefore issue to confront the concept of intelligent city and the concept of sustainable development in order to bring out the hybridized and contrasts.

Keywords : Smart city, Sustainable development, new technologies of information and communications, urban dynamics.

1-Introduction

A city is a living space in constant change that evolves over time. The shape of cities changes too, especially in North America aware of half of the last century with the increased concentration of population in cities. To meet the new challenges of urban cities, thinkers and environment professionals have imagined and designed various models and concepts of cities through the years. The new technologies of information and communication (ICT) are the element that inspired the concept of smart city. This term was adopted in 2005 by several companies in the mid-computing technologies. IT giants, including Siemens, Cisco and several other collaborators are working to

develop information and communication technologies and computer applications. Beyond the open databases, advanced technologies and applications that enable to change the city, we must address the challenges of the concept of sustainable development for the city [Harrison and Donelly 2011].

The objectives of the smart city are in line with those of the sustainable city, and will have the essential characteristics: Answering a sobriety objective in the use of resources, put the user at the heart of the devices and enable a systemic approach for the city. But what exactly is a smart and sustainable city? Do the smart cities could meet the challenges of sustainable development? Is the sustainable development approach could influence the concept of smart city?

2-The concept of the smart city: Technical innovation in urban areas

There is no unequivocal and agreed definition of the concept of "smart city". The operationalization and implementation of this Anglo-Saxon concept are variable depending on the country, territory, the environment and territorial issues.

In general, the concept of smart city applied to planning and urban policy refers to how the new technologies of information and communication are used in public management to improve the current situation of a city in different spheres and set various urban problems. A smart city is one that has integrated large-scale ICT in different sectors to improve the daily lives of users and citizens. Moreover, ICT engaging behavior changes among citizens, but also in the administration and in business towards a more sustainable growth. [Chambre de commerce Canada, 2012].

Various smart city models are presented in the literature. The model [Rudolf Giffinger] - an expert In analytical research of urban and regional development at the Technological University of Vienna- has six levers to consider to become a smart city, which are : Smart Governance, Smart Citizen, Smart Economy, Smart Mobility , smart and Intelligent Living Environment.

☐ Limits of smart city concept:

The concept of smart city and its implementation meet different types of limitation depending on the objectives and scope of the implementation project. Information infrastructure and physical infrastructure needs are quite significant and the costs are proportionately higher. Management costs, operation and maintenance can be high also. The rapid evolution of technology can lead to obsolescence creating a new need and associated costs.

Involve citizens in the process of change and get his acceptance also remains a challenge. The social acceptability of the project and the respect for private life remains a social aspect to consider in the implementation of the concept and represent a significant limitation given that the citizen is at the heart of it. [CRE-Montréal, 2014] The digital divide is the gap created between those who have access and those who do not have access to digital tools, whether access to the Internet, access to equipment, such as computers or software, access to the understanding or the use of technology. This fracture can be created by geographic, socioeconomic and generational factors. [Goulet and others, 2014] If we want to involve many participants, we must find other ways to gather the pulse of citizens, including talks by bringing together small groups of residents per district.

3. The concept of sustainable development

Sustainable development is a general concept, but adaptable to its context. It is based on three interlocking spheres that are economic, environmental and social.

According to the United Nations [UN, 1987] Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet theirs. Two concepts are inherent to this notion: the concept of "needs", and in particular the essential needs of the poor, who should be given the highest priority, and the idea of limitations imposed by the state of technology and our social organization on the ability of the environment to meet present and future needs.

☐ From sustainable development to sustainable city:

The implementation of a sustainable development approach and the completion of some projects may convert the city into so-called sustainable city. Generally the sustainable city is one that integrates the three interrelated dimensions of sustainable development and the dimension of governance. Become a sustainable city is not just having neighborhoods and eco green buildings, but it is a change of urban thought linked to a global and concerted public policy [Charlot, 2012].

The objectives and action areas of the sustainable city revolve around the three dimensions of sustainable development concept. On the environment, the sustainable city is one that preserves and sustainably manages the natural resources that are water, air, soil, energy, climate and biodiversity. It also seeks to ensure the quality of the local environment, including food safety, pollution reduction and management and risk reduction. As for the social aspect, the sustainable city aims to improve social equity by enhancing accessibility to jobs, housing, education, health and health services and facilities. Finally, on the economy, the sustainable city is based on efficiency and attractiveness of the economic fabric, by business and labor. [Suden,s.d]

When we speak of a sustainable city, we often refer to the concept of ecological footprint. It is therefore a matter of finding the right projects and strategies to reduce the ecological footprint and ensure a sustainable future for cities.

The sustainable city is also involved in the field of air quality. Greenhouse gas emissions are harmful to ecosystems and the health of residents.

Buildings and houses emit much of the atmospheric C02. We must thus promote the recovery of energy reduce using it. It is also possible to finance green buildings and energy recovery mechanisms. This is a chance for cities to develop new green technology field of housing.

Transport and mobility are the master key to sustainable development. This is to propose and implement a transition of automobile dependency and sprawl to sustainable and efficient modes of transport to meet users and citizen’s needs.

☐ Limit of the concept:

As mentioned above, a sustainable city is not only to have green areas and sustainable buildings, but also a change of mentality. In addition, becoming a sustainable city is a process that is based on several fields of action, requiring a global and multidimensional vision. One of the challenges to become a sustainable city is to integrate all the issues of this concept with the legislation. For example, the social dimension of sustainable development which includes social inequality is not material to law.

4. Smart city for sustainable development: the interaction between the two concepts

The table 4.1 is a comparison chart of the concept of Smart City and Sustainable Development previously exposed. This brings out the similarities and differences of the two concepts, particularly as regards their definition, their goals and their mechanisms and municipal approach.

	Smart city	Sustainable development
Definition	A City that innove by new information technologies and communications to improve various urban problems	A development that meets the needs of the present without compromising the ability of future generations to meet their own.
Goal	To improve life quality of citizens	Consolidate the social and economic development with environmental protection.
Process	• Implementing a strategy • Developing an action plan • Implementing actions • Monitoring • All ICT	Integrated sustainable development approach. • Developing a plan / policy • Developing an action plan • Monitoring
Gait	Participatory: involving citizens, businesses and organization in the process of preparing and implementing the project.	Collaborative: working in partnership with public and private organizations and companies.

Table 4.1: Comparison between the two concepts

As seen above, the concept of sustainable development is based on three inseparable dimensions which are the environment, the economy and society. While the concept of smart city has six dimensions o that are smart economic, smart citizen, smart governance, smart mobility, smart environment and smart housing.

Beside the dimensions of both concepts presented above, it is possible to make connections. Indeed, the two concepts address economic, social and environmental concepts.

Initially, the concept of sustainable development remains very broad and applicable to various sectors. There are many types of integrated approaches to sustainable development; each has a function and a clean application. However, there is no fixed framework or guidance for the implementation of actions, whether in transport, employment, sustainable neighborhood development, climate change or in the management of 'water.

Secondly, the concept of intelligent city is relatively new and currently little box. Contrary to sustainable development where several approaches are possible, when talking about smart city one is in the absence of an operational framework. However, the smart city is very focused on the use of new technologies. This is notably the incorporation of the latter in the majority of services, infrastructure and equipment that makes the city smart.

Finally if you want to classify the levers of smart city according to sustainable development dimensions, we will be faced with the relevant elements that ensure the success of the smart city. Indeed, nothing would be possible without these elements: governance, citizen participation, stakeholder management, management of sustainable development and of course access to open data.

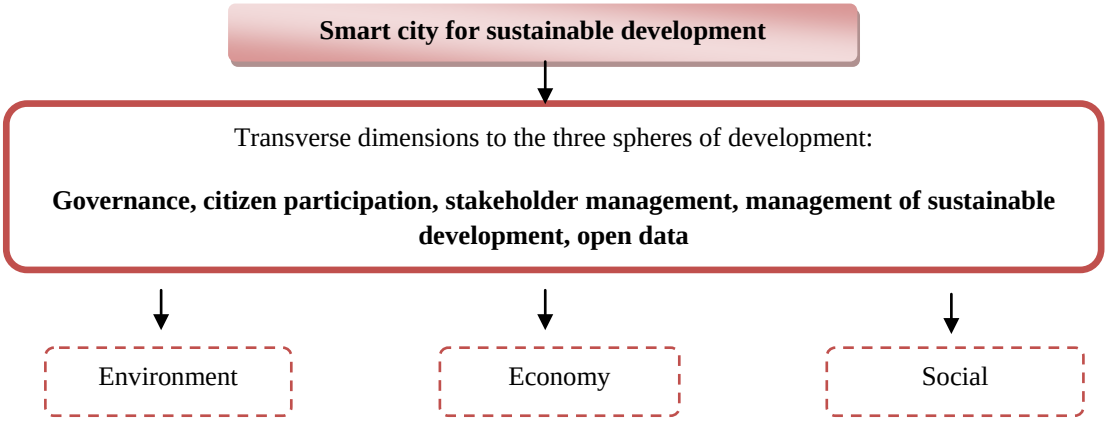

Fig 1.Classification of the smart city components according to the dimensions of sustainable development (Inspired from: Doran, 2014, p.23-24)

5. Examples of initiatives at the international

Many cities and regions have already started experimenting with the concept of smart cities and were able to develop projects that highlight the wide range of possibilities.

For example, Minneapolis and Shanghai have joined the **Floating Car Data**. This technology allows to estimate in real time the situation of automobile traffic using cell phone networks. Each movable in function in a vehicle acts as a probe traffic. Anonymised data collected enable a precise mapping of traffic on an area without having to install expensive systems with cameras or sensors embedded in the For its part, Helsinki has developed **City Wall**, a new urban communication media, service and exchange between residents and city visitors roadway. The application takes the form of a large interactive touch screen installed in public spaces and can be activated by several people at once in a coordinated or independently. Users can find out about events, obtain real-time information on the life of a neighborhood , locate, share information or an opinion, seek service or administration, find the "good plans "or leave a trace of his passage. It's an open medium that disseminates information even permanently when it is not activated by a user. It strengthens social ties and open the city to more urban or visitor. The use of mobile networks also can map the city and population movements to make better live.

In France, **Urban Mobs** provides a visual representation of the activity of the urban population using data from their mobile phone. It also can reveal, in real time, the emotional charge of the population and putting forth the happiness generated by large popular events.

In San Francisco, **Citysense** allows reconstruction of the "hot spots" frequented by the population. Also, the United States, **CityScan** aims to collect the most data about the city, in real time, to achieve offer new representations and modeling of complex urban systems.

6.Conclusion:

Obviously, setting up a Smart City is an initiative carried out with the aim of making the city always healthier, safer, smarter, more prosperous and more attractive to people or businesses who would settle for as much as those who inhabit it.

Indeed, we recall, the integration effort must cover everything that contributes to a city a great place to live, beginning with its organizational structure and the way this one is planned and administered.

Just over 50% of the world population lives today in mega cities and other urban centers. By 2050, according to United Nations projections, this proportion will reach 70%, hence the urgent need for more to make smarter cities, sustainable, attractive and livable. The adoption of a more open approach to technology and management appears inevitable. The design, operation and efficient management of the city of tomorrow will not only be a matter of technology, but also strategies, people and processes.

The concept of smart city is not an extension of the concept of sustainable development, but rather a tool for the realization and implementation of a sustainability-oriented community. The factors of success of such an approach based in particular on a specific transparent and collaborative governance in which the importance of citizen participation is central. Indeed, a smart city is above all made by and for citizens

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