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Investigating social factors of sustainability in a smart city

Tannaz Monfaredzadeh^{a*}, Robert Krueger^b^a*Visiting PhD student, 100 Institute Road, Worcester 01609, MA, USA*^b*Associate Professor, 100 Institute Road, Worcester 01609, MA, USA*

Abstract

Sustainability is an established goal of future urban developments. More recently, the smart city concept has been employed to address issues associated with negative environmental externalities. Topics associated to people and communities, in the content of smart cities, have been neglected on the expense of a deeper understanding of the technological aspect of smart. This paper focuses on filling this gap by exploring its significance of sustainability and describing the interactions of these two concepts. This paper thus provides a particular conceptual focus on the potential of smart city strategies for improving the social sustainability of cities.

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1. Introduction

The proposed research addresses one of the emerging phenomena of the recent times the “Smart City” and investigates whether this new concept can improve the sustainability criteria of cities or not. Interventions like Smart City are, for the most part, a matter of incremental enhancement—of off-the-shelf products acquired through existing procurement channels, serviced via conventional contracts, tacked onto spatial and institutional arrangements that already exist. Hundreds of municipalities on the planet have embraced some kind of official smart-city scheme or initiative in the past few years, and their numbers grow with every passing month. Tens of millions of people are

* Corresponding author. Tel.: 7747193020
E-mail address: tmonfaredzadeh@wpi.edu

affected by such initiatives. Furthermore, an inconsiderable portion of the total available budgetary resources, hundreds of billions of dollars, are spent by cities annually on these initiatives. Finally, and perhaps most importantly of all, is the amount of human resources and energy that will be devoted to the effort to integrate networked information technology into the management of the cities over the next decade. And all of this activity will take place under the banner of the Smart City [1].

The idea of smart specialization of cities and regions is spreading fast and has successfully become a platform for community development. This research explores the concept of smart city through the lens of sustainability particularly on social issues. The driving questions is, then, do smart cities deliver on the broad goals of sustainability? And if not, how might they be deployed to extend these goals using smart city approaches? The final goal of the research is to investigate whether the increasingly popular concept of smart cities can truly be applied as an approach for improving sustainability criteria for communities.

Therefore the main objectives of this research are as follows:

- To understand the concept of social sustainability.
- To discover the potentials of smart technologies in improving social quality of life of population and approaching sustainability goals.

The methodology used in this paper is desk research. Through that, a variety of bibliographic materials was scanned and a limited number of documents have been reviewed and critiqued. The documents have been selected from varied urban disciplines- including urban design, urban planning, urban sociology and urban policy as among the articles.

2. Smart cities and the human dimension

According to [2] a city is smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. There are numerous definitions for the term “smart city” that each of them emphasize on a particular aspect more: intelligent city, information city, knowledge city or techno city and many more. However, the availability and quality of the IT infrastructure is not the only definition of smart city. The focus of this paper is on the social dimension of the smart city rather than finding a definition for the “smart city” term. Although addressing the topic of people and communities as part of smart cities is critical, it traditionally has been neglected on the expense of understanding more technological and policy aspects of smart cities [3]. Social infrastructure (intellectual capital and social capital) is indispensable endowment to smart cities. That infrastructure is about people and their relationship. Smart city is about a mix of education/training, culture/arts, and business/commerce [4]. A smart city is a humane city that has multiple opportunities to exploit its human potential and lead a creative life. The smart people concept comprises various factors like affinity to life-long learning, social and ethnic plurality, flexibility, creativity, cosmopolitanism or open-mindedness, and participation in public life. The label smart city therefore points to clever solutions by creative people. The human factors also includes social inclusion of various urban residents in public services, soft infrastructure (knowledge networks, voluntary organizations, crime-free environments), urban diversity and cultural mix, social/human/relational capital, and knowledge base such as educational institutions and R&D capacities ([5], [6]).

Projects of smart cities have an impact on the quality of life of citizens and aim to foster more informed, educated, and participatory citizens. Smart cities initiatives allow members of the city to participate in the governance and management of the city and become active users. An individual must be able to connect in order to achieve enhancement of social and cultural capital as well as achieve mass economic gains in productivity. If they are key players they may have the opportunity to engage with the initiatives to the extent that they can influence the effort to be a success or a failure [3].

Along with the inflow of smart people, new creative culture driven by them is a drive to urban development. Švob-Đokia [7] lauded the outcome of creative culture that extends beyond diversity and creativity to economic performance and social tolerance. People are smart in terms of their skill and educational levels, as well as the quality of social interaction in terms of integration and public life and their ability to open to the "outside" world.

Towards more progressive smart cities, cities should start with people from the human capital side, rather than blindly believing that IT itself can automatically transform and improve cities [5]. A smart city is also a learning city, which improves the competitiveness of urban contexts in the global knowledge economy [8]. Learning cities are actively involved in building a skilled information economy workforce [9].

Conclusively, social capital is considered as an important component to a smart city. This paper intends to focus on the strategies and policies that a smart city can implement in order to use its potentials to improve the sustainability criteria of the society. In the next sections, the concept of social sustainability and its significance will be discussed.

3. Sustainability and the social dimension

Since the publication of the Brundtland Report in 1987, the concept of sustainable development has become central in mainstream policy thinking all over the world. It was first highlighted in the report that provided the initial definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [10].

A continuation of current development trends would erode the basis for a balanced development. Urban sustainable policies are to be developed at the dynamic edge of various—sometimes conflicting—objectives on the city and its population. An illustration of the multidimensional complexity of such sustainability policies can be found in Figure 1. A major challenge to modern cities is the need to ensure economic, social and ecological sustainability now and in the medium- and long term future [11].

During the recent decade, scholars from different disciplines have discussed social sustainability within urban studies from both academic and policy perspectives. But yet, scholars believe that regarding the social aspect of sustainability, there are still uncertainties in definition, criteria and measurement system until now [12, 13]. Human is the main focus in the definition of sustainability concept, but still less attention has been given to the definition of social sustainability in built environment disciplines [14].

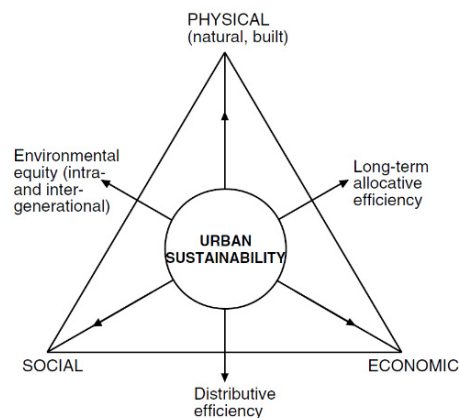


Figure 1. The urban locus of sustainability principles and policies according to [11].

Social sustainability has received far less attention in respect to the conceptual framework and the practical reporting. It was first highlighted in the Brundtland report that provided the initial definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [10]. The report suggested that social sustainability is aiming to preserve the

environment through economic development and poverty alleviation, but it did not recommend any practical perspective [13]. However, when talking about sustainability, various ideas and definitions are involved that make the concept of sustainability overly broad and unspecific. Therefore, this research observes a limited number of sustainability criteria and tries to focus on the most important attributes of sustainability by studying the main literature in this field.

Recently, defining social sustainability concept is emphasized and acknowledged frequently in urban literature and researchers are naturally keen to know precisely what social sustainability means [17]. As social sustainability is context dependent [14], various definitions of this concept have been provided and applied related to urban debates in different contexts. They aim to study and provide the conditions for the achievement of social sustainability and try to protect the term's misapplication [18]. Current discussions on the social sustainability definitions either portray the conditions or define the principles and measurement framework [17].

3.1. Definitions of Conditions

In the first group, the definitions focused more on the conditions. They usually describe social sustainability as either a currently existing positive condition, or as a goal that remains to be achieved [17]. [19, 20] stated that policies contributing to social sustainability must try to cause cohesion of the whole through bringing people together and increasing the accessibility to public services, employment and social interactions.

3.2. Definitions of Measurement Framework

In the second group, definitions utilize measurement frameworks. These definitions present main principles and dimensions and often involve a series of indicators. Providing a working definition of social sustainability, [21] emphasized on “social equity (access to services, facilities and opportunities)” and “sustainability of the community” as the two main urban social sustainability overarching concepts. On the other hand, [12] also highlighted the recent shift from almost statistics-based indicators to hybrid sets which mix qualitative and quantitative data. Furthermore, regarding [22] and [23], attention to the equitable distribution of opportunities and acknowledging cultural and community diversity are the main features and the key themes encompassed by the Concept of social sustainability.

3.3. Attributes of Social Sustainability Definitions

Future focus and process are the two most imperative attributes in preciseness and usefulness of urban social sustainability discussions [18]. Future focus refers to the improvement of a just society for current and future generations. [24] considered this characteristic and declared that “social sustainability can be defined as ensuring the well-being of current and future generations, by recognizing every person’s right to belong to and participate as a valued member of his or her community” [24].

[22, 23] contend that the broadly accepted common ingredients of social sustainability include empowering people to participate on decision making. Similarly, [17] considered the future aspect (time concern) in relation to considering “equity” and “transmitting awareness” for future generation and the process through emphasizing “a system of cultural relations”, “participation of citizens”, “a system for transmitting awareness” and “maintaining that system of transmission”.

4. How Smart City address social sustainability

In this section the interaction of two concepts of smart city and social sustainability will be discussed. For this purpose, the potentials of ICTs and emerging technologies which can influence the social sustainability in its definition, conditions or its principles and measurement framework will be observed and studied.

4.1. *Smart city and the conditions of social sustainability*

According to [19, 20], an environment for human interaction, communication and cultural development with improvements in the quality of life, creates a condition for social sustainability. Cities have always been to facilitate human gatherings [25]. [26] Argues that “cities are actually social search engines that help like-minded people find each other and do stuff. People who live in cities can connect with a broader range of friends whose interests are well matched with their own”. Smart cities structurally have the potential to impact or improve the mentioned qualities: Information and communication technologies help people to connect, collaborate and share. Social networks are very popular means for bridging online and offline lives to facilitate the congregation of people to share interest and hobbies.

Agyeman [27] suggests that the ‘Sharing Cities’ concept should become the guiding purpose of the politics, planning and policymaking for the future city as it prioritizes social justice and increases trust and collaboration. Adopting the ‘sharing paradigm’ offers cities the opportunity to lead the transition to just sustainability.

Townsend [25] believes that in megacities which host millions of people, urban sociability is experiencing a new scale. New technologies are vital to helping people navigate the vast sea of opportunities for social interaction. Interactive platforms for citizen engagement amplify urban sociability. However digital cities developed by various organizations have different characteristics problems. In any case, it is not easy to design and maintain digital cities that benefit all participants. Those started from a grass-roots activity depend on volunteers and often face financial and management problems. The non-profit associations yield regional information spaces at relatively low cost, but there is difficulty in maintaining adequate leadership and social responsibility. On the other hand, digital cities assisted by public administrations can utilize their funds and facilities, but a strong bias toward regional economic development or bureaucratic improvement, can hinder more active social participation. In the case of Private Finance Initiative, the initial investment can be effectively reduced. In the case of Public-Private Partnership, fund raising is rather easy in the initial stages, but difficulty exists in establishing a sustainable budget structure [28].

4.2. *Smart city and Measurement Framework of social sustainability*

Regarding [21], social equity (access to services, facilities and opportunities) is one of the qualities of social sustainability. In 1998 [29] asserted that the information age has been widely acclaimed as a great benefit for humanity, but the massive global change it is producing brings new ethical dilemmas. In agreement, Luciano Floridi stated that “the information society...poses fundamental ethical problems whose complexity and global dimensions are rapidly evolving” [30]. He argues that how information and communication technologies can contribute to the sustainable development of an equitable society is one of the most crucial global issues of our time [31]. Floridi points to the digital divide in particular as the source of many of the ethical problems emerging from the evolution of the information society. The digital divide disempowers, discriminates and generates dependency. It can engender new forms of colonialism and apartheid that must be prevented, opposed and ultimately eradicated [30]. On a global scale the issues of health, education and the acceptance of elementary human rights should be among humanities foremost priorities, however, Floridi argues that “that underestimating the importance of the [digital divide], and hence letting it widen, means exacerbating these problems as well” [30]. He concludes by announcing that “our challenge is to build an information society for all, and this is a “historical opportunity we cannot afford to miss” [30].

Therefore, from one hand free and ubiquitous Internet access is not yet available everywhere and there is no infrastructure that covers all regions and social areas. This doesn’t apply only to developing or poor countries. Even this coverage merely exists in advanced countries like Germany or Italy. On the other hand, there is the issue of knowledge to use new technologies that is not equal among different demographic aspects such as age, sex, income or education. The key question, then, is clear and stark: “can we generalize and democratize the opportunities that come with the high-tech urban revolution? Can we found more equitable ways of developing cities and settlements in an electronically mediated age?” [32].

4.3. Smart city and Attributes of Social Sustainability

According to [22] and [23] empowering people to participate in influencing choices for development and in decision-making is one of the criteria of a society being sustainable.

Online participation enables residents to comment on and evaluate suggestions and schemes within administration and politics. In addition, they provide citizens with the opportunity to make their own suggestions and add their knowledge and experience to the possible plans and strategic goals. Apart from these opportunities for the exchange information between residents, local administration, and politics online processes also lead to increased legitimization: actions can generally be better justified if the affected citizens were consulted beforehand. This is specially the case for the decisions that are unpopular but necessary. Therefore these online consultations indirectly are democratic processes that do not question the decision-making authority of politics. This form of participation provides the participants with a new opportunity to make their concerns and suggestion the subject of parliamentary debate. In any case, there is a shifting of boundaries: the political- administrative process becomes more accessible through e-participation, increasing the pressure on politics [33].

However, smart interventions can only become the tools for a better satisfaction of citizens' needs and helpful interaction among them if they are based on the application of citizen-centric and participatory approaches to the co-design. Accordingly, development and production of services should balance the technical proficiency of infrastructure with softer features such as social engagement, social empowerment and people interaction in physical and virtual settings. In this context, technology can play crucial roles in social and political processes that can propose scenarios of a better efficiency of functional performance of city services and also give people the possibility of imagining new approaches and solutions for collaboration and empower them to create opportunities to co-design and co-production.

Smart technologies can create platforms in which people in a society can interact and communicate with their authorities and administrations. A smart city has definitely the potential to become a permanent platform used by all different groups such as the community, public authorities, activists, hackers, designers and companies to interact, communicate and discuss challenges and find solutions in a co-create process. However creating such a platform is not a straight forward job and the essentials for that are strongly contextual that differ from one city to another. But overall, the followings are the actors to be involved in order to initiate engagement and co-design process:

- The local community of citizens and non ICT businesses, including the third sector.
- Municipal government and the various public agencies and administrations that play a role in policy making and service provision.
- Available physical and technological infrastructures.

5. Conclusion

This paper investigates the social factor of smart city and the new opportunities that smart city can bring to improve the quality of life for citizens. The paper emphasizes on the fact that a city will be smart not to covering ultra-wideband but for responding the needs of the population. Considering the real needs of the society is a starting point to choose tools and appropriate operational actions. But even recognition of the needs of a community and designing an appropriate action to address that, do not guarantee of being it productive and efficient. First of all, a very important step is recovering development strategies that improve technological malfunctions sector, but in a broader context, in which the smart city becomes an opportunity to rethink the city as a whole and redefine politics. Therefore, it is necessary that the public actors redefines its coordinating role and pilotage and strengthen, especially compared to the big private players (the big players in the field of ICT for example). This step is essential to ensure a return of plans and projects in terms of smart enhancement of human and socio-spatial justice and inclusion (and not only of technological innovation and economic efficiency), both to ensure the participation of all the local players (not only the stronger ones). The latter can be an important field for the future researches in this topic.

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