Small Town vs. Big City: A Comparative Study on the Role of Public Libraries in the Development of Smart Communities

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Abstract: Smart city initiatives aim to facilitate sustainable urbanization, promote economic development, and improve quality of life. Due to their socio-technical complexity, some reseachers argued for an integrative view in which multiple dismensions should be considered. In addition, researchers showed that the unique context of each city/community matters for the implementation of smart city initiatives. One important aspect of this context is the collaborations with diverse community partners such as public libraries. However, previous literature on the contribution of these partners to smart commnities often only presents conceptual models and lacks empirical data. This paper provides a comparative study on the smart city/community development in Ignacio, Colorado and Chicago, Illinois with a focus on the role of public libraries on the development of specific dimensions of smartness: (1) technology deployment, (2) innovation, (3) citizen participation, and (4) community stakeholder engagement. We also argue that context is very important when discussing the role of public libraries in building smart cities/communities.

Keywords: smart city, smart community, dimensions of smartness, public library, anchor institution, community institution.

1. Introduction

In the process of urbanization, cities have encountered complex issues and challenges that cannot be resolved using traditional process and tehcniques. The development of information and communication technology (ICT) makes it possible for cities to adopt innovative strategies to achieve

sustainable development, improve the quality of life of their residents, and, overall, make the city smarter (Anthopoulos, 2015). Over the last two decades, researchers have been discussing what makes a city smart and how to do it. Most of the early definitions emphasize technology as one of the main drivers of smart cities (Alawadhi et al., 2012), whereas the later ones focus on the development of social aspects: such as quality of life, citizen participation and engagement, etc. (Gasco-Hernandez, 2016; Giffinger et al., 2007). Smart City has been viewed by many researchers as a multidimensional concept (Nam & Pardo, 2011a, Gil-Carcia et al., 2015, 2016). Even though there is not a universally accepted definition (Chourabi et al., 2012; Gil-Carcia et al., 2015), a common view could be derived from previous research: a smart city is a city that adopts a comprehensive view of the city and integrates a double perspective; technology and human development, to pursue a triple goal (Gasco-Hernandez, 2016): 1) improvement in the efficiency of urban operations, 2) improvement in citizens' quality of life and 3) development of the local economy while maintaining the environmental sustainability.

Smartness development is not limited to the urban environment. Back to the late 1990s, the Smart Communities movement had already started. Research about smart city and smart community development, both recognized the usefulness of technology and the importance of collaborative efforts between governments, private sector companies, academic institutions, and civil society (Mora et al., 2019a, 2019b). However, there is limited knowledge about what the roles of other stakeholders are. For example, public libraries, one of the most popular community institutions, have been largely left out of the discussion about building smart cities and communities (Burke et al., 2014). This research is guided by the following question: How do public libraries contribute to the different dimensions of smart city/community development in different contexts?

This ongoing research paper aims to start addressing the question above through a comparative case study of Ignacio Community Library (ICL) and the Chicago Public Library (CPL). We will explore the programs and services currently offered in these two public libraries and discuss how they contribute to different dimensions of smart cities/communities in two very different contexts. The paper is organized into five sections, including the foregoing introduction. In section two, we briefly discuss previous literature on smart city development, the dimensions of smartness, and the role of public libraries in the development of these dimensions. Section three describes the research design and methods used in this study. Section four presents preliminary results from the case studies and section five provides some final comments and next steps for this research.

2. Dimensions of Smartness and Public Libraries

2.1. Dimensions of Smartness

The topic of smart cities/communities has been studied in different disciplines, such as urban geography, information science, and, more recently, public management. Many researchers have adopted multidimensional frameworks to capture and evaluate the different aspects or elements of smartness (Chourabi et al., 2012; Giffinger et al., 2007; Gil-Garcia et al., 2015; Nam & Pardo, 2011a). Based on a review of previous frameworks, we propose the following dimensions of smartness to

guide our analysis of the public libraries' contribution to smart city/community development: (1) technology, (2) innovation, (3) citizen participation, and (4) stakeholder engagement.

Technology as a dimension of smartness. A smart city/community uses data and technology in different areas: traffic, waste management, transportation, health, etc. (Nam & Pardo, 2011b). Depending on the context, data and technology may differ and may be deployed in different ways: sensor technology, smart computing, ICT infrastructure, data analytics, etc. (Kuk, 2011).

Innovation as a dimension of smartness. Smart city was adopted as a strategy to deal with complex problems and challenges in urban development that cannot be addressed using traditional approaches (Nam & Pardo, 2011b). It requires innovation, often technological innovation, to create better and more effective products, processes, services, and ideas that are accepted by markets, governments, and society (Johnston & Hansen, 2011).

Citizen participation as a dimension of smartness. Smart cities/communities should be developed for, by, and with citizens (Mora et al., 2017). Civil society was added as the fourth helix of the quadruple helix model, which emphasizes the importance of citizens in building smart cities/communities (Deakin et al., 2018). As a result, citizen participation processes through different channels, as well as investments in human and social capital, constitute a very important dimension of a smart city/community (Myeong et al., 2018).

Community and stakeholder engagement as a dimension of smartness. In the process of becoming smarter, cities and communities are facing challenges that have surpassed the capabilities of their traditional institutions and methods of governance, therefore calling for increased collaboration between the government and other stakeholders (Mora et al., 2019b; Nam & Pardo, 2011a). Aligned with a quadruple helix model of smart cities/communities, this perspective emphasizes the importance of pursuing social and economic development through the collaboration among governments, universities and research centers, businesses, and civil society (Selada, 2017).

2.2.   The Role of Public Library in the Dimensions of Smartness

Due to the strong legitimacy in the eyes of citizens and their role in digital inclusion and civic engagement, researchers have started to explore the role of public libraries in building smart cities/communities (Mersand et al., 2019). In previous research, public libraries are viewed as community anchors institutions that play a very important role in digital inclusion (Bertot et al., 2016). They provide patrons with free and easy access to information and technology, which are not available for them at home, especially in rural areas and low-income neighborhoods (Goodman, 2014). Beyond access to technology, public libraries also offer technological training to help improve residents' digital literacy (Goodman, 2014), and provide space and support that enable patrons to experiment with different technologies for their own purposes, such as business development, civic innovation, etc. (Vilariño et al., 2018).

Public libraries also have been recognized for their role in civic engagement (Hildreth, 2012). As a safe and neutral space within the community, they are open to the public with the goal to understand and support community needs (Hildreth, 2012). Public libraries have created a welcome environment that allow the public to access different resources, participate in activities, and interact

with each other (Lenstra, 2017). However, even though researchers have previously discussed public library's role in digital inclusion and civic engagement, very limited studies have directly analyzed public library's contribution to smart city/community development.

3. Research Design and Methods

3.1. Data Collection

In order to have a better understanding of what strategies, programs and services that public libraries in different cities/communities have adopted to facilitate the development of smart cities and smart communities, we first conducted an online environment scan of public libraries in the United States. This effort identified that Ignacio Community Library (ICL) has been creating smart spaces for residents and that the Chicago Public Library (CPL) have been participating in a wide range of smart city initiatives. They were chosen for this study to represent small-size public libraries in rural towns and big-size public libraries in big cities, respectively. Then, taking a comparative case analysis approach, we focus on investigating how these two public lirbaries have contributed to different dimensions of smart city/community development in these two very different contexts. We first reviewed the library's official website and searched for related news articles to get a preliminary understanding of these two public libraries. In December 2018, we visited the ICL and the CPL, and conducted semi-structured interviews with library staff, government officials, and external stakeholders (12 interviews for the case of ICL and 6 interviews for the case of CPL). All interviews were recorded using a digital recorder with the permission of the interviewees and then were transcribed manually for further analysis.

3.2. Brief Description of the Cases

Ignacio is a small and rural town with roughly 800 residents and sits in the southwest corner of La Plata County, Colorado. Another feature of the town is that it is situated in the middle of the Southern Ute Indian Tribe Reservation. The tribal council and the Ignacio Town Board represent two equal governmental bodies that provide separate and overlapping services to the community. Although the Town of Ignacio does not have a formal smart community plan or strategy, it has made some limited yet important investments in making their community smarter. Ignacio has deployed technology in the form of broadband Internet although in a limited way and not available to all households and businesses in the town. At the time of our case study, there was little evidence of technological innovation, but Ignacio is clearly investing in increased collaboration among key community stakeholders to help address town problems and issues.

Quite different from Ignacio, the City of Chicago is the third largest city in the United States, with a population of nearly three million people living in 77 community areas. Chicago does have a formal smart city strategy that is best captured in its 2013 City Technology Plan, which contains five broader strategic areas: 1) Establishing next-generation infrastructure; 2) Creating smart communities; 3) Ensuring efficient, effective, and open government; 4) Working with innovators to develop solutions to city challenges; 5) Encouraging Chicago's technology sector. In the past few years, beyond broadband internet infrastructure, Chicago has deployed a number of smart

technologies throughout the city. In the deployment of these technologies, Chicago has used both stakeholder engagement and citizen participation in an effort to increase the success and sustainability of these technologies within the community and increase the positive impact on the residents.

4. Preliminary Findings

In this section, we present some preliminary findings about how the ICL and the CPL are contributing to the different dimensions of smartness.

4.1. Technology Deployment

In Chicago, broadband Internet infrastructure and different sensors are deployed throughout the city. As of 2013, The CPL made free Wi-Fi available in 80 branches that span every neighborhood across the city, Wi-Fi hotspot lending program is also available at select CPL branches (13 libraries as of 2016), which allows residents to borrow devices for internet access to use at their homes. By doing this, the CPL is directly supporting Chicago's Smart City's plan : to make free Wi-Fi available in public places (initiative 6th) and to increase options for low-cost broadband (iniatiative 7th). Unlike Chicago, there is a limited deployment of broadband Internet in the town of Ignacio, and it is not available to all households or businesses in the community. Therefore, the ICL plays a crucial role in helping Ignacio residents access and use broadband Internet and other technologies. Besides access to technologies, both the ICL and the CPL offers computer classes at different levels and one on one assistance that help enhance patron's digital skills to effectively use a range of technologies. The CPL also collaborate with community partners to fulfill its role in implementing the city's Smart City's plan: to educate and engage young people in technology and offer digital training and hands-on technology experience to increase all residents' digital literacy (initative 8th, 9th).

4.2. Innovation

In the CPL, different makerspace are designed for different audiences to explore new technologies and use them for creation and innovation. The Maker Lab, initially set up in 2013, provides Chicago residents with the opportunity to learn how to use digital production and manufacturing tools. The other well-known makerspace is called the YOUmedia. It is a space for middle school and high school students that is currently available in 12 libraries throughout Chicago. It allows students to obtain project based learning with a variety of media, technology, and digital tools. In Ignacio, even though there was little evidence of technological innovation, the ICL has designed some programs that allow patrons to get hands on experience with new technology, which prepares them to innovate in the future. For example, with funding support from WebJunction's Small Libraries Create Smart Spaces grant program, the ICL built their Idea Lab, which is based on the library's high-speed Internet access and incorporating modern equipment and staff expertise to create a makerspace for all of Ignacio's patrons to use.

4.3.   Citizen Participation

In Chicago, public library branchs has been used by implementers of the smart city plan to inform citizens and gather feedback from them about the deveploment of smart technologies in their neighborhoods. This has been the case when the Chicago Tech Collaborative planned to deploy the first sensor in the Pilsen neighborhood, and when the city worked on improving its 311 services. In Ignacio, due to the limitation in policy and technology infrastructure, there is no opportunity for citizens to participate in smart community development. However, through access to internet, digital skills training and the makerspace that provides hands on experience on advanced technologies, the ICL is taking advantage of all the available resources to educate and prepare their patrons to be ready for the future participation in building a smart community.

4.4.   Stakeholder Engagement

Chicago has a well-documented smart city strategy which specifies the role of each stakeholder. The CPL is identified as directly supporting eight of the 15 initiatives. The active participation of numerous and diverse partners is a key characteristic of this stratregy. For example, guided by the strategy, the CPL has joined with other community organizations to form a "digital skills building ecosystem". In Ignacio, due to lack of formal a smart community strategy and the limited technology deployed in the community, there is no opportunity for stakeholder engagement in smart community initiatives. However, the ICL has been working on building new partnerships with other organizations to better serve the community. While at this point, the collaborations with other community stakeholders do not involve the deployment of or use of smart technologies, the established partnerships could be used in that way in the near future.

5. Final Comments and Next Steps

Our preliminary results clearly show how public libraries are contributing to smartness and how the specific activities, programs and services vary in different contexts. For instance, due to the lack of a formal smart community strategy and the limited technology infrastructure in Ignacio, even though the ICL has fully taken advantage of the available resources to make the community smarter, its contribution to the dimensions of smartness is mostly related to aspect of technology access and use. Whereas in Chicago, the CPL has been a formal and active partner in the city's smart city strategy from the beginning. It is playing an important role in smart city initiatives and contributing to multiple dimensions of smart city development.

   As a next step we will continue analyzing the transcripts of the interviews and provide a more detailed account of how public libraries are contributing to the different dimensions of smartness in different cities/communities. We also plan to elaborate on the role of context in smart city/community development and how different public libraries are contributing or can contribute to the dimensions of smartness in different ways. More cases will also be added to have a more comprehensive study in the near future.

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