Smart Cities and Intellectual Capital for Urban Innovation and Future

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Abstract: Cities are constructing a wealthy future, adopting a smart view in order to support urban development and strengthen the intellectual capital for better quality of life within urban communities. Smart city and intellectual capital help shape cities as engines of innovation. The study aims to elucidate how cities adopt a smart city view to shape a sustainable future, enabling all the components of intellectual capital, driving the city as a smart innovative community. Advancing intellectual capital perspectives helps address a management-oriented view to smart city community. Sustainable urban future and innovation rely on smart cities and smart communities. Intellectual capital is a driver of sustainable urban growth and competitiveness. A smart city enables citizen participation and collaborative spaces for innovation. The study elucidates how smart cities contribute to urban development and intellectual capital as a strategic asset for urban innovation. As engines of innovation, cities evolve as smart, collaborative and sustainable communities.

Keywords: smart cities and communities, urban innovation, intellectual capital

1. Introduction

Cities of tomorrow will be smart and inclusive communities, using technologies to drive innovation-led and sustainable urban growth, improving the quality of life and sustainable socio-economic systems, for a wealthy future (Nam and Pardo, 2011; Martinez, Mikkelsen and Phillips, 2021). Cities drive a continuous change, shaping a community, developing a sustainable urban future by technologies (Yigitcanlar, 2021), promoting multi-actor innovation through civil society-research-companies-public authority collaboration (Hartley, Sørensen and Törfing, 2013; Meijer and Thaens, 2018; Sørensen and Törfing, 2018). Cities become smart innovative urban communities, developing the potential of information technology to support urban competitiveness and improve the quality of life within communities in long-term (Caragliu and Del Bo, 2019). Smart cities as communities drive sustainable-inclusive growth, empowering the citizens as co-producers of services and policies (Paskaleva, 2011; Martin, Evans and Karvonen, 2018). A smart city helps shape the city of the future where technology serves for quality of life improvement (Lazariou and Roscia, 2012). City is net action and space of innovation (Czarniawska, 2002). Smart communities enable cities as smart innovative, collaborative and sustainable communities relying on citizen involvement, companies and public authorities (Lindskog, 2004; Eger, 2005; Lara, Da Costa, Furlan and Yigitcanlar, 2016). Digital technologies help support a collaborative framework and enable cities to develop a smart urban innovation ecosystem (Appio, Lima and Paroutis, 2019; Paskaleva, 2011; Zygiaris, 2013).

The research question refers to how cities are rethinking the urban future, designing a smart community as an engine of urban innovation. The aim of this study is to elucidate how cities adopt a smart city a view in order to build a wealthy future, enabling all components of IC, and shaping a smart, sustainable and innovative community. Cities are developing a smart community as a driver of collaborative innovation.

Intellectual capital (IC) plays a key role for urban competitiveness, quality of life and sustainability. It helps drive sustainable smart urban development of communities (Rodríguez-Nuñez and Periáñez-Cañadillas, 2017). In the knowledge economy intangible assets and IC drive future urban development (Viedma, 2004). Smart city and IC framework help shape knowledge-based, project-oriented and network-led cities strengthening competitiveness, sustainability and quality of life. Advancing IC perspectives helps address a management-oriented view to smart city community (Dameri and Ricciardi, 2015). Cities are managing intellectual shaping a more sustainable and balanced society to improve quality of life. The study elucidates how smart and sustainable cities contribute to knowledge-based urban development and IC as a strategic asset for urban sustainable growth and innovation. Sustainable urban future relies on smart cities as communities developing IC as a driver for sustainable growth and innovation, collaborative networking and social interaction (Secundo, Ndou, Del Vecchio and Pascale, 2020).

Cities are rethinking a smart-driven urban future to drive the city as a smart and innovative community. The study is structured as follows. After introduction and methodology, in the third paragraph, the case studies

related to smart city planning of Paris, Wien and Florence are reported and described. In the fourth paragraph the relationship between cities and IC within smart cities is analysed. In the fifth paragraph, cities as smart, sustainable and innovative communities are elucidated. Finally, findings and conclusions are outlined.

2. Methodological section

The study analyses the city as smart and sustainable community driving urban innovation and development. The study is qualitative, exploratory and descriptive. Methodology relies on case studies' analysis (Yin, 2009). The study relies on considering three case studies (Paris, Florence and Wien) that refer to cities redesigning its urban development planning by adopting a smart strategy as a vision for driving the city to be a sustainable urban community. Smart city planning of Paris, Florence and Wien are data reported, considered and analysed. The study is also theoretical and relies on a review of contributions that refer to understanding the concept of inclusive city, smart city and smart community as drivers of urban innovation, inclusive and sustainable community. Smartness, sustainability and community help drive urban innovation and development. Referred journal articles were selected from *Google Scholar* as the main web source and database. The reported articles were selected with regard to the concepts of smart and sustainable city, smart community and smart innovation by using technology within urban context. The selected contributions are analysed and interpreted in a narrative synthesis (Joss *et al.*, 2019) in order to accommodate the differences between questions, research design and the context. They will also contribute to elucidating new perspectives and advancing theoretical frameworks on emerging issues (Denyer and Tranfield, 2006; Dixon-Woods, Agarwall, Young, Jones and Sutton, 2004).

3. Towards smart cities as smart innovative communities

The smart city plans and visions of three European cities (Paris, Wien and Florence) are considered and analysed. The reported documents relate to: Paris Smart and Sustainable. Looking ahead to 2020 and beyond (2015); Firenze Smart City Plan (2015); Smart City Strategy Vienna (2022). Cities are rethinking a smart-driven urban future in order to drive the city of the future as a smart and innovative community. Technology helps support information and participation as sources that enable collaborative processes that open up to innovation.

3.1 Paris Smart and Sustainable. Looking ahead to 2020 and beyond

The role of a city becoming smart and sustainable using technology to contribute to improve the quality of life within urban communities. Smartness is a means to drive the city to proceed towards a sustainable future related to quality of life improvement. Smart and sustainable city acts as a platform that is open, resolutely future driven and eager for experimentation, disruption and the development of new services that put technology, data, interoperability and interconnected networks front and centre. Developing the city of the future means to bring together social, technological and organizational dimension for driving a smart and sustainable that relies on three pillars: the *connected city* stresses the importance of technological infrastructures such as communication networks, connected devices and sensors, continually integrating technological advances; the *open city* supports citizen participation and collaborative projects, promoting public innovation ecosystem; collaborative processes involve academia, research and public administration; the *sustainable city* is a goal. It is a place where technology supports social inclusion and helps people to contribute to creating public services and policy decision-making processes. Smart cities enable people to play a proactive role in building the urban future. In particular, a smart city helps include people in the city life, bridging the gap between new public services and policymaking.

3.2 Smart City Strategy Vienna

The *Smart City Strategy Vienna* relies on some key concepts to be developed and implemented in actions: quality of living, sustainability, prosperity, opportunities for education and workplaces. The role of information technology is to simplify the life of people. Promoting smartness is viewed as a change process. A city going to the future and becoming smart should: not let anybody down; integrate the social component in the development process; let people have access to the same degree of participation. The goal is to ensure top-level quality of living focusing on social participation and inclusion, safety and security, leisure quality and culture, openness, diversity of gender roles, and an equally high degree of social participation as key factors that enable urban development. Promoting a smart and sustainable city strategy relies on rethinking urban governance models strengthening co-ordination and cooperation as ways for constructing shared collaborative and governance processes that involve all the stakeholders within the urban community. In particular, it is necessary to strengthen the cooperation on Vienna smart city issues with universities and research centres and institutions in order to stimulate social innovation vision and engender opportunities for experimenting new opportunities

for urban value creation. Developing a smart strategy relies on strengthening the participation possibilities of citizens and experts promoting co-determination and management go together via technology's potential. Wien smart city also means social inclusion, meeting the needs of many different population groups, recognising this diversity, maintaining high levels of social security and high standards of public services, strengthening co-determination and participation to ensure democratically modes of governance for urban development, stimulating social innovations, through technological developments strongly inspired by the needs of citizens, and taking particular account of the individuals-organizations interaction.

3.3 Planning Firenze as a Smart City

In the *Firenze Smart City Plan*, cities put people first and support urban transformation leading to intelligent urban communities. The proactive role of citizens is to identify the pathway of urban development to improve the quality of life for each and every citizen living in urban environments. In particular, planning a smart urban vision helps the city as a community of people which is able to create meanings, produce culture, creativity, and thinking by enabling the people as the first driver and contributor of human and civil progress. Promoting smartness implies always using technology to make cities more intelligent, sustainable, capable to drive innovation, and reinforcing social relationships within the urban community.

A smart city refers to a city that is changing and constructing new social, urban, and economic responses to environmental and historical pressures. The smart city plan is an open space for debate, confrontation, exchange of information, and knowledge among all urban stakeholders interested in contributing to urban, social, and economic development. A smart city master plan helps the city to drive continuous urban innovation, improve the quality of life within community and to develop urban sustainable planning that relies on clear and strong distributed and collective leadership and vision. A smart city implies that all the elements of the city are interrelated and connected. A smart city relies on promoting collaboration among all the involved stakeholders (public administration, research centres, cultural institutions, businesses, associations, groups, citizens) along the urban value chain. A smart city strategy develops by promoting an open innovation view to ensure the stakeholders' involvement by embracing the four *Is*: the *integration* of all possible aspects and sectors in charge of a municipality's competences; the *innovation* for developing new services and approaches, and relying on digital and interactive information technology; the *involvement* as a means to urge stakeholders to identify, plan, share, and implement strategic, long-terms vision and goals more ambitious than the present situation; and the *information,* as related to the use of information technology as a way to reinforce and consolidate the relationships between municipality and citizens to monitor the implementation of urban smart strategy. Technologies emerge as a critical successful factor and facilitators of all the initiatives indicated in the smart city plan.

4. Cities and Intellectual Capital within smart communities

IC plays a key role for improving urban competitiveness, quality of life and sustainability. It helps drive sustainable smart urban development of communities (Rodríguez-Nuñez and Periáñez-Cañadillas, 2017). In the knowledge economy, intangible assets and IC help drive future urban development (Viedma, 2004). Smart city and IC framework help shape knowledge-based, project-oriented and network-led cities, strengthening competitiveness, sustainability and quality of life. Advancing IC perspectives helps address a management-oriented view to smart city community (Ricciardi and Dameri, 2015). Managing structural capital helps support smart city competitiveness and sustainability (Matos, Vairinhos, Dameri and Durst, 2017). As stated by Dumay (2013) while the third stage of IC focuses on strong organizations, «the fourth stage concentrates on building strong economic, social and environmental ecosystems» (p. 8) that enable organizations to evolve and survive in a sustainable way. Following the third stage of IC the value incorporates worth and importance of services for stakeholders (Dumay, 2009) while the fourth stage of IC focuses on ecosystems for value creation (Dumay, 2013). The knowledge created by communities develops within social ecosystems (Dumay and Garanina, 2013). The fourth stage of IC «combines human, relational and structural capital into a new vision that considers the social aspect of IC» (Secundo, Del Vecchio, Dumay and Passiante, 2017, p. 8). An IC view for regions and cities helps to advance a community perspective that strengthens the collective action within and around organizations (Bounfour and Edvinsson, 2012). Investing in knowledge assets to drive value creation processes helps to restore the social relationships' value and develop knowledge capital of communities and collective intelligence emerging within social systems, fostering intangible resources. Managing IC is a means to develop social growth and cohesion of communities, leading to social and economic growth of cities and communities (Bounfour and Edvinsson, 2012). Managing IC of cities helps to drive urban value creation and enable the importance of intangible assets within urban spaces (Viedma, 2004). IC is viewed as a driver of sustainability and

urban competitiveness (Matos and Vairinhos, 2017; Ståhle and Bounfour, 2008). IC plays a key role in advancing sustainable development (Secundo, Ndou, Del Vecchio and Pascale, 2020). IC plays a key role for local competitiveness and urban sustainability. In the IC framework for cities by Uziene (2013), human capital refers to individual and collective competences, and community social values. Relational capital concerns community and organizations' networking, and urban connections in terms of city partnership and image. Structural capital refers to organizational resources, processes and innovation. An IC view helps to advance towards sustainable development and clarify the relationships between sustainability of cities and citizens' quality of life (Lòpez-Ruiz, Alfaro-Navarro and Nevado Pena, 2019).

5. Cities as smart, innovative and sustainable urban communities

Following the *UN 2030 Agenda for Sustainable Development* and the *New Urban Agenda* (United Nations, 2017) cities will be inclusive, safe, resilient, and sustainable urban communities. Cities develop the potential of technologies to identify smart and sustainable solutions in order to improve the quality of life, promoting smartness as a human-centred vision to urban development and innovation in management, governance and policy options, shaping smart urban communities as better places for life, work and play (Lara, Da Costa, Furlan and Yigitcanlar, 2016; Nam and Pardo, 2011). Sustainable urban development relies on a smart city as engine of public value creation (Pardo, Gil-Garcia, Gascó-Hernández, Cook and Choi, 2021), «using a healthy mixture of smart people, policies and technologies» (Yigitcanlar *et al.*, 2019, p. 360). Smart cities develop open innovation (Paskaleva, 2011), empowering the citizen as a proactive co-producer of inclusive and sustainable urban growth, innovation and policies (Martin, Evans and Karvonen, 2018). The smart city concept enhances human, social and institutional components of the city as urban community (Nam and Pardo, 2011). A smart city supports a smart community (Yigitcanlar *et al.*, 2019), and fosters community development (Stratigeia, 2012). A smart city refers to «a continuum in which local government officials, citizens, and other stakeholders could think about the initiatives that attempt to make the city a better place to live» (Gil-Garcia, Pard, and Nam, 2016, p. 5). Cities advance as *loci* of innovation and innovative milieus (Shearmur, 2012). The future of urban development relies on smart cities and communities driving sustainable, smart and inclusive urban growth and supporting collaborative innovation, enabling multi-level, multi-sector interactions between different stakeholders (European Commission, 2012; European Commission, 2017). As spaces for collaborative innovations, cities support the active participation of all urban stakeholders (private, public, nonprofit sectors, citizens) in interactive arenas that develop new solutions to improve the city in significant and positive ways (Hartley, Sørensen and Törfing, 2013; Lindskog, 2004; Eger, 2005), fostering a mutual-constructive interaction for collaborative innovation and design (Andreani, Kalchschmidt, Pinto and Sayegh, 2019). Cities drive smart urban innovation through stakeholder collaboration for community development (Meijer and Thaens, 2018; Nilssen, 2019). A smart city vision supports community entrepreneurship and enables citizens to promote innovations and technological advancements (Kummitha and Crutzen, 2017).

6. Findings and conclusions

Smart cities help cities to identify a potential pathway for urban innovation and development in order to improve the quality of life. European cities are rethinking the urban future by adopting a smart city vision to urban development and shaping an innovative and collaborative urban community. Paris sustainable city vision stresses the connected city as a tool, the open city as method and sustainable city as a goal. Wien smart vision relies on the use of technology as a means to enhance co-participation, co-decision-making and inclusion as strategic views to sustainable urban development. Florence's smart city planning focuses on bringing together integration, innovation, involvement, and information. The case studies analysed elucidate that smart city vision and smart community enable all the components of IC and help cities to support technology-led and collaboration-driven urban innovation that relies on strengthening people, community and collaboration. Common elements emerge from the analysis. The role of information technology is to serve for collaborative processes that support innovation. Several approaches are identified. In the Paris smart city vision the focus is on: information technology, participation and collaboration; social inclusion for innovation and policy making. The smart city is viewed as a technology-enabled, collaborative and inclusive community able to drive social innovation. Florence's smart city planning focuses on using information technology as a means for better coordination among all the components of urban community. Technology helps support better information and contribute to citizen involvement to drive innovation. The smart strategy of Wien helps shape the city as an inclusive and innovative community. The smart city is a smart collaborative and innovative community where co-determination and participation support value creation processes. Technology enables citizen and community participation and engagement to promote continuous innovation as a driver of urban sustainability.

As engines of innovation, cities evolve as smart, collaborative and sustainable communities. As following an information-driven approach, the use of information technology helps support the development of a smart city and smart community along a continuum from a technology-enabled view to a community-oriented view. While a smart city helps enhance services innovation, a smart community enables the urban stakeholders to engenders collaborative processes driven by technology. As following a knowledge-oriented view to urban development, the smart city view supports the urban community as a collaborative space and engine for continuous technological, organizational and social innovation. European Cities are following a smart city vision and smart community view in order to make the city as an effective engine of innovation and collaborative urban community. Smart urban communities contribute to innovation and value creation by strengthening participative, cooperative and collaborative processes by adopting a human- and community- centred view to urban development. Smart city and smart community help enhance the IC of a city. The smart city view helps develop the city as innovation-driven, socially inclusive, open and knowledge-oriented community. Participatory, collaborative and cooperative processes are the main issues of smart-driven and community-oriented cities as engines of urban innovation. There are some limitations in this study. Some illustrative case studies are considered and analysed. Future research perspectives imply to further develop the relationship between smart city development, IC and the city as a smart innovative community.

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