

# Cities rethinking innovation by technology

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## **Abstract**

As social organisms cities continuously change to ensure high quality of life for citizens and to provide services to business driving social, cultural and economic development and growth within urban ecosystems. Rethinking cities as communities looking at the future implies to jointly consider sustainability, innovation and information technology as sources and issues of city design. The future and sustainability of cities relies on developing sources for technology-enabled innovation that helps cities to be attractive communities that acquire intellectual capital and foster knowledge-based processes. Sustainable cities tend to develop knowledge creation and innovation over time in order to improve and extend the wealth of people within community. As smart communities, cities should identify a path for sustainability adopting a smart approach to urban development. The aim of the study is to elucidate how cities consider innovation driven by information technology as a source that helps proceed towards sustainability. Cities promote and develop innovation in services, city design and city governance using information technology. The study is theoretical and relies on the analysis of literature that concerns the relationship between innovation and cities. Cities should select a path for sustainability promoting a smart approach in order to develop innovation by using information technology. The main contribution of this study is to elucidate how cities identify a path for sustainability investing organizational and strategic sources to develop innovation as a framework that drives processes of change and helps sustainability within urban ecosystems. Cities become communities oriented to promote sustainability developing smartness as a strategic orientation and approach for change, designing and implementing technology-enabled and citizen-centred services, constructing forms of governance that rely on engagement and participation of all urban stakeholders. As communities looking at the future, cities believe and invest in innovation as a source that ensures social and economic growth as a means for value creation in urban ecosystems.

Keywords: Urban development, smart communities, smart city, services, governance.

## **1. Introduction**

Today, rethinking cities as wealthy communities implies to jointly consider sustainability, innovation and information technology in order to orient urban design and future planning of cities. Cities as urban communities are becoming more and more a relevant issue for social and economic dynamics that affect growth and development within urban areas. Cities are an interesting theme of study and topic of investigation in many disciplines. Cities contribute to shaping geographical and social environments, help promote economic and social growth within global and regional ecosystems [1].

Today, as engines and drivers of social and economic change, cities should become communities that develop and implement continuous innovation as a source that helps both sustainable urban growth and competitiveness [2]. Cities should be not only entities and agglomerations of people sharing urban spaces and places but effective engines of social and economic development and innovation within urban service ecosystems that contribute to improving the quality of life within cities [3]. Within knowledge-based, learning-oriented and global society, cities should select a strategy oriented to achieve sustainability in order to support the wealth of local and urban communities, to create new values of civic convivence, to strengthen continuous urban innovation and development as a source for change. Sustainable cities support strong growth, are

inclusive communities that promote environmentally responsible behaviors [4], becoming ecosystems and smart urban communities that create value and develop open innovation [5], [6], [7] embracing a knowledge-based approach to local urban development [8]. Sustainable cities develop sources and planning for knowledge creation and innovation in order to improve and extend the wealth of people within community over time [9]. The sustainability of cities relies on developing sources for innovation that help cities to be attractive communities that acquire intellectual capital and foster knowledge-based processes and infrastructures [10],[11]. As smart communities, cities should identify a path for sustainability adopting a smart approach to make the city as a knowledge-based engine able to design and implement development in order to support the sustainability of social and economic urban ecosystems[3], [12], [13]. The aim of the study is to elucidate how cities identify a path for sustainability promoting innovation in services, city design and city governance and developing the potential of information technology. The study is theoretical and relies on the analysis of literature on the relationship between innovation, cities and sustainability as enabled by information technology. Cities should select a path for sustainability promoting smartness as strategic orientation for change, improving citizen-centered services and enhancing urban governance and participation. The paper is structured as follows. After the introduction, in the second section cities are presented as communities that develop innovation in order to achieve and aliment sustainability in urban environments. In the third section, it is elucidated how to promote sustainable urban innovation within cities through use of information technology. In particular, the analysis about the impact of technology on urban innovation relates to: smartness as concept focused on innovation sources and capabilities of cities; citizen and community-oriented services and platforms; governance and participation within urban communities. Finally, conclusions are outlined.

## **2. Cities as communities that develop innovation**

As smart communities, cities should adopt a smart approach and select a knowledge-based strategy in order to identify a path for sustainability that helps to design and implement urban development, social and economic growth within urban ecosystems[10],[3], [8], [12], [13]. Cities as social organisms proceed towards sustainability because they refer to land, people, services that are related to provide support for doing business, for working and for life as activities that foster human development of society over time. Sustainable cities «have strong economic growth, are socially inclusive in their growth, and are environmentally responsible» [4]. Cities of tomorrow should play a key role in sustaining the competitiveness of urban ecosystems [2]. Cities as places and spaces for innovation enable people, organizations and business to work and live in knowledge-based and global society. Cities should adopt a sustainability-oriented strategy to benefit people and business because «cities live and die. There are “ghost towns” or dead cities» [14]. Cities are sustainable ecosystems and engines of economic and social growth, social incubators of change and innovation within urban communities[5], [6]. Cities are learning and knowledge oriented systems that support creative and morphogenetic processes over time [15]. Cities should employ technological, knowledge, human and cultural resources in order to drive sustainable growth. Cities should be smart and sustainable communities [10], [16] *loci* of innovation and innovative milieus [17]. Cities should design sustainable urban forms that contribute

to both rediscovering the city as a community and shaping the urban ecosystem as open space and community-oriented environment [18]. Cities as actors of open innovation encourage and strengthen multi-level interaction between different stakeholders to co-design and co-implement solutions oriented to innovation [1]. Sustainable urban development relies on a change urban management as a dynamic process [19] where cities play a key role in developing the path for innovation as a source that benefits the urban community and enhances the opportunities for urban growth. Cities as smart communities proceed in a significant and positive way [13], [10] becoming spaces, places and platforms to rediscover the opportunities offered by strategic collaboration, dialogue and cooperation between all the stakeholders or *helices* of urban environment (government, industry, university and civil society) and develop collaborative organizational forms that benefit the urban services, business, economic and social ecosystems [11], [3], [20], [12]. Cities should identify a path for sustainability that helps improve and extend the wealth of community promoting social and technological change [9]. As measuring local urban sustainability, cities contribute to enforcing decision-making processes and improving the communication within urban community and society [21]. As evolving and social organisms, cities should design and aliment dynamic processes that involve the urban stakeholders relying on knowledge, values and ideals that contribute to make the city as sustainable community. Cities as knowledge-oriented and sustainable organizations should select a knowledge-based strategy in order to develop urban social and economic [8] and to achieve social, economic and environmental issues [22].

### **3. Promoting sustainable urban innovation within cities by information technology**

Promoting urban innovation as a source for social and economic sustainable growth in urban environment implies that cities can develop the potential of information technology and digital-interactive technologies in order to make the city as a smart community in order to ensure citizen-centred and citizen-oriented services and to construct participatory, democratic and governance mechanisms that help people to live and enter in processes of change and innovation that enable value and knowledge creation as issues and inputs within cities that follow a path for sustainability. Sustainable cities adopt a demand-driven approach meeting the needs of people and promoting a smart city vision that relies on information technology as a source to support urban futures, knowledge and innovation economy [23]. Technology should contribute to empowering communities and addressing a community vision to meet human needs [5].

Promoting urban innovation by information technology helps reinvent the city as a community that can rediscover values, meanings and symbols of urban membership as a source to construct new urban identities and citizenships. Cities of tomorrow should be smart, sustainable and wealthy communities that work to support innovation [10], [16]. ICTs contribute to enhancing the sustainability of cities by improving physical environments to make smart the urban community and sustain participatory democracy too.

Information technology helps cities to construct a path for innovation by involving all the urban stakeholders that contribute to sustaining social and economic development and

growth in urban environments[24].Promoting innovation leads to sustainable urban development and requires that citizens, municipal governments, business, industry, other stakeholders and no profit institutions have to pay attention about how to engender and stimulate opportunities to drive innovation and knowledge. While sustainable development relies on preservation, innovation implies the intervention for a radical recombination of resources. Thereby, it is possible that urban innovation management can integrate sustainability [19]. Cities as spaces and contexts of innovation offer opportunities for sustaining innovation and employ information technology to enable the collection of knowledge in order to improve services and sustain value creation. Information technology helps urban innovation processes driving cities to become smart communities in designing a path to construct spaces of innovation in management, governance and policy options [25].Cities should act as key actors that sustain the dialogue and search for cooperation among university, industry and government in shaping the urban, regional and international development in order to support and govern sustainability-oriented processes of innovation and new knowledge creation [10].

### ***3.1. Cities as communities that promote smartness as a source for urban innovation***

Cities can select a smart approach to rethinking city design and planning. Cities promote smartness as a vision that enables the city to modernize urban services and infrastructures employing information communication technologies (ICTs). «Smart City is furthermore used to discuss the use of modern technology in everyday urban life» [26].Digital and telecommunication technologies contribute to making more efficient traditional networks and services that help benefit citizens and business within smart cities [27]. Developing a smart approach leads to innovation in urban areas and helps develop smart cities as knowledge base of the regional innovation systems [12] to improve urban environment, economy, mobility, living, governance and education developing the potential of information technology[26].«Increasingly cities are seeking to become ‘smarter’ in how they are managed and developed in order to become more sustainable» [4]. As promoting smartness cities tend to become smart communities that have to solve the dilemma between embracing a change orientation and reproducing the *status quo*[28]. Cities should adopt a smart orientation to improve urban services and enhance urban values, cohesion and innovation because smart city comprise: land, technology, citizens and government. Technology helps businesses, public bodies and citizens to develop and improve services and infrastructures to drive the urban development in geographical areas [29].Smart cities as communities achieve long-term issues using information technology in order to promote and extend high quality of life in urban environments strengthening the connections between productivity, economic growth and human capital, enhancing service systems and capabilities in an urban network and ecosystem [30], [31].

Promoting the smart city concept is an example of current and modern urban innovation that exerts influence on the capacity of cities to design services and improveurban competitiveness, business facilities and support the quality of life for people and communities. «A smart city is ICT-enabled public sector innovation made in urban settings. It supports longstanding practices for improving the operational and managerial efficiency and the quality of life by building on advances in ICTs and infrastructures» [25].Cities should adopt a smart strategy to support continuous and sustainable urban development over time. As following a smart strategy, cities construct a virtuous path to

support urban innovation within metropolitan areas and communities. Smart cities contribute to creating social and economic value for innovation and growth in urban and regional areas leading communities to develop benefits and improve the quality of life within society. In particular, smart cities become nodes for open innovation and foster co-production of services and policies [7]. The use of information technology helps cities to become smart and leads all the actors and stakeholders of urban environment to rediscover the city as a space and place where to build and make the community as a social entity oriented to create public value. «Smart cities are built upon the involvement of all relevant stakeholders for an interactive, participatory and information based urban environment» [17]. The concept of smart city is related to the role of innovation within urban environments. Thereby, it is necessary to elucidate the relationship between the use of technology and cities as social and human organisms and entities. Technological and social aspects shape the smartness within urban environments. Technology is a necessary but not enough element to make a city more smart. Technology enables cities to become smart urban communities bringing together technological, human, organizational, knowledge and social aspects. «A city needs to be *digital*, *wired* and *intelligent* in order to become *smart*, although being *digital*, *wired* and *intelligent* does not automatically imply that the city will become *smart* by itself [32].

### **3.2. Promoting service innovation within cities**

Information technology helps support urban innovation in services ecosystems. The sustainability of cities relies on developing innovative services that benefit citizens and enhance the quality of life. Smart, mature and innovative technologies, and platforms contribute to improving efficient services [33]. Thereby, cities should select a strategic choice moving in transition from using technology to modernize services and applications to adopting the potential of digital-interactive technology as an input to drive urban communities towards sustainable, social and economic growth. Promoting service innovation helps the sustainability of urban service ecosystems that contribute to improving the quality of life within cities [3]. Cities as social organisms live in urban services ecosystems that help reconnect the city to natural and service infrastructures in order to improve the quality of life in urban environments. ICTs enable cities to provide services to citizens and business in order to improve urban competitiveness and quality of life shaping economic and social systems. Cities contribute to designing social, cultural and economic development and driving urban and regional growth within services ecosystems. ICTs contribute to designing e-services and online platforms involving citizens to offer an input and cooperate becoming active co-producers of public services and providing knowledge to engender public and social value creation. Sustaining urban innovation relies on developing service innovation and helps the citizen to play a key role as service user and co-producer of services for urban value co-creation. As planning urban service innovation, policy-makers should design and implement citizen-centered services that stress the citizen-centricity and considering the actual and precise needs of citizens as users, customers and coproducers of services they benefit [34] ICTs enable citizens to be or not autonomous actors and play an active role in managing and using the services. ICTs contribute to shaping services in terms of mechanization, complexity, divergence, routinization, knowledge, innovation and nature of service provision [34].

Cities should provide services ICTs-enabled infrastructures and digital platforms in order to support business and facilitate public life, and to enable citizens to offer knowledge and experience in services infrastructures design to improve quality of life [35]. Developing digital platforms helps enable citizens as members of their community and service users to utilize the user profile interacting with public agencies, developing public sector resources and strengthening the communication and knowledge exchange citizen-to-citizen and community networks coherently with an user democracy perspective [36].

### ***3.3. Sustaining innovation in governance and participation***

Sustainability within urban communities will proceed through cities that develop and implement innovation in mechanisms of governance, fostering participation of citizens and all the stakeholders of urban community. Designing a smart government relies on shaping a mix of emerging technology and potential of innovation[37]. Cities should rethink how to develop innovation through the opportunities offered by the use of information technology in shaping forms and modes of governance. ICTs contribute to reinforcing the democratic capital within urban communities. In particular, it seems mature the time in which «local governments are called to be key actors to create an interactive-, participatory- and information-based urban environment with the ultimate aim at producing increasing wealth and public value, achieving higher quality of life for citizens» [38]. Cities as communities should select and build models of urban governance that make city governments and urban policies as socially accepted and legitimized by citizenry. Thereby, city governments should use information technology to model sustainable forms of governance coherently with situational and specific urban context [24]. Smart city governance tends to be both social and technological issue as a result of institutional change [39]. As communities that have to self-govern, cities should understand and appreciate the potential of ICTs to develop and implement smart and sustainable solutions opening to mechanisms of governance as peculiar input to urban innovation. ICTs help redefine tasks and competencies of municipal government and drive cities to proceed by innovation in governance and identify a path for smart and sustainable growth [40]. ICTs contribute to shaping participatory models of governance that enable people to be involved in urban policy, to debate and exert influence on the quality of life in urban communities [41]. As following an evolutionary path by using information technology, city governments should modify the nature of the relationship with citizens moving towards user-oriented and learning-oriented approaches in order to enable the citizens to play a proactive role in urban governance design and framework[42], promoting collaboration through services, information exchange and knowledge [43]. Constructing a path for innovation within cities of the future relies on building a shared governance that involves all the stakeholders of the urban ecosystem and relies on participation, dialogue and debate for urban policy options [10]. Participatory innovation platforms contribute to shaping the city and driving local development and value creation [44].

## **4. Conclusions**

Rethinking a path for sustainable urban development relies on reconsidering the strategic role of cities within knowledge-based, learning-oriented and urbanized societies. In this scenario, constructing opportunities for innovation within cities is a source that helps

drive social and economic sustainability within cities as communities that contribute to improving the quality of life and competitiveness in urban, local and global environments. Increasingly, cities become incubators and spaces of social and economic innovation. The main contribution of this study is to elucidate how cities identify a path for sustainability investing organizational and strategic sources to develop innovation as a framework that drives processes of continuous change and helps sustainability within urban ecosystems. Cities as communities promote sustainability developing smartness as a strategic orientation and approach for change designing and implementing new technology-enabled and citizen-centred services, constructing forms of governance that rely on engagement and participation of urban stakeholders. As following a path for the future, cities should believe and invest in innovation as a source that ensures urban growth and development. As communities looking at the future, cities consider sustainability as a condition that guides urban communities to assume behaviors and plan initiatives in urban planning to develop an innovation-oriented path embracing a strategic approach for continuous change, strengthening the opportunities that open to knowledge and values as sources to support urban growth. The rise of cities as sustainable urban communities relies on cities able to stimulate innovation and support processes of knowledge and value creation involving all the urban stakeholders to continuously follow a change-oriented and innovation-driven strategic view. Smart, services and governance innovation ICTs and technology-enabled are the main features of cities that plan the future and drive an enduring development oriented towards sustainability. Designing a path for sustainability within urban spaces and communities relies on cities that select a smart city vision in order to drive sustainable urban development and support innovation in services, infrastructures and networks to ensure participatory and democratic governance within urban environments. There are managerial, organizational and social implications. Cities should develop innovation sources fostering citizens' engagement and participation and enable public local institutions to design smart governance that relies on involving the stakeholders of urban community in order to co-support innovation and promote sustainable growth in urban ecosystems. In this study there are some limits. The study is only theoretical and does not provide any empirical analysis. Future research perspectives imply to consider how cities use information technology to develop innovation in services, knowledge creation and governance as drivers of value creation within Italian local governments.

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