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# **Grand challenges: companies and universities working for a better society**

## **Full Papers**

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# Torino City Lab, an open innovation participatory ecosystem. The city works with entrepreneurial universities in shaping the smart city ecosystem<sup>♦</sup>

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## Abstract

**Objectives.** *Our work introduces an open innovation participatory system by a holistic case study of one of the most innovative Italian city, that is Turin.*

**Methodology.** *The present work employs a holistic, qualitative case study methodology due to the new, recent phenomenon of smart cities. The case of Turin city lab (TCL) allows to enlarge the existing literature on smart cities with a specific focus on the role exerted by entrepreneurial universities. Basically, this work aims to provide an outlook how a city creates a synergic network among different sectors and generating the public value in partnerships with local universities*

**Findings.** *The project known ‘Turin city lab’ is narrated to describe the involvement of different actors and mainly the active commitment of entrepreneurial universities. Hence, the concept of the ‘city meets entrepreneurial universities’ has brought up a new shape of smart city, letting them to be an experimental lab where citizens are demanding to co-create innovations.*

**Research limits.** *The main limitation is certainly the use of a single-case design through documentary analysis. This influences the ability to generalize the results. The second limitation is the lack of empirical development, which makes it difficult to extend the results to other industries and contexts. This so encourage further research.*

**Practical implications.** *In this scenario, entrepreneurial universities foster new skilled people so as to satisfy smart city’s needs. This study shows a positive model to be replaced by other cities and it draws the attention on policymakers and other institutional bodies in developing smart cities in a collaborative way.*

**Originality of the study.** *The originality of the article employs a new vision of the smart city converging the meaning of smart cities from ‘urban technological utopias’ to urban innovation labs.*

**Keywords:** *smart city; entrepreneurial universities; open innovation; ecosystem, Torino City Lab*

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## 1. Introduction

The present research aims to explore how government along with entrepreneurial universities are shaping a new wave of *Smart City Ecosystems*. Especially, it offers a holistic, empirical case study of one of the most innovative Italian cities, that is Turin. Since 2018 Turin has developed a project known Turin City Lab (TCL) which seeks to provide a new perspective of a smart city. TCL represents an active city which connects a diverse set of actors such as public and private investors, banks, foundations, and R&D centers. The originality of the article employs a new vision of the smart city converging the meaning of smart cities from “urban technological utopias” to urban innovation labs (Glasmeier and Christopherson, 2015). This so creates a synergy among different actors forging an open innovation participatory ecosystem.

In this context, an open innovation participatory ecosystem plays a huge role in facilitating this balance, encompassing the distance from the stakeholders at the bottom (i.e. civil society) to the top level (i.e. government), sustaining a circular flow of ideas, information, knowledge, and technology solutions, and fostering relationships with financial investors. In this regard, smart environments can qualify as a positive and favorable business crossroads, a place of meetings for policy making, technology exchange, and for firms and institutions to interact directly and reciprocally with citizens as urban users in order to sustain the diffusion of a fresh innovation climate for knowledge (Dezi, Pisano, Pironti, and Papa, 2018).

According to Service Dominant Logic, ecosystem perspective can be seen as a model through which explain value co-creation (Mars, Bronstein and Lusch, 2012). Several authors analyzed smart cities in the light of value co-creation practices (Pellicano *et al.*, 2019). Smart cities could improve deeply human conditions. In this line, the participation and collaboration among the various social actors is an important prerequisite. The creation of value can be considered as the central purpose of exchange between actors (Vargo, Maglio and Akaka, 2008; Baden-Fuller and Morgan, 2010). Such engagement could support in developing continuous relationships with relevant stakeholders and in fostering value creation (Baden-Fuller and Morgan, 2010). According to Moeen and Agarwal (2017), the more actors adopt open innovation practices, the greater is the impact on the ecosystem on value creation and value capture. In this perspective, linear value chain is transformed into the value network: a flexible set up of value chain, externally oriented (Romero and Molina, 2011).

In this line, the openness of smart city projects can be explained in terms of propensity to collaborate and intensity of collaborations between firms and local external partners (Lee, Bakici, Almirall and Wareham, 2011; Scuotto *et al.*, 2017). These forms of collaborations are explicated in the triple helix model which involves “universities-industry-government”. Especially, universities can contribute as potential driver for change in different ways: the creation of new knowledge, its transmission through education, its dissemination through information and communication technologies, and its adoption in new industrial processes or services (Carayannis and Campbell, 2012; Carayannis *et al.*, 2017; Etzkowitz and Leydesdorff, 2000). For example, through their academic programs, universities provide graduates with knowledge and skills to contribute to growth of new and existing companies. In addition, universities can foster and support the creation of new ideas, innovation and commercialization. They also have an important role to provide research into entrepreneurship and growth of small to medium enterprises (SMEs).

Hence, universities are assuming a strategic role in entrepreneurial ecosystem framework acting as catalysts through their three core functions of education, research and economic development (Isenberg, 2011). Universities are becoming more enterprising nurturing new entrepreneurs and so contributing to the economic growth of “innovation leader” and “strong innovator” countries. Entrepreneurial university aiming to connect the solution seekers with solution providers in order to generate co-innovations (European Commission, 2019).

The leading role of entrepreneurship in the context of education is reasonably well-grounded in the literature (Foss and Gibson, 2015). However, considering that existing managerial studies focus mainly on entrepreneurial education (Matlay, 2008), as far as we know there is still a lack of knowledge about how universities could embrace entrepreneurship as a part of their institutional

mission. Yet, despite the significance of such challenges, very little is known on how business processes in universities should be innovated for engaging external actors and citizens as problem-solvers and co-creators of the public value. More specifically, how universities could effectively manage business processes in order to create as much value as possible from the relationships with stakeholders is still largely unexplored.

Most of the management literature on business processes has focused on private companies (Del Giudice, 2016; Scuotto *et al.*, 2016), while only limited attention has been paid to universities. The recent paradigm shifts which have characterized the public sector have led also universities to a greater openness to collaborations with external actors, especially citizens, as knowledge and value co-creators (Bryson *et al.*, 2014; Caputo *et al.*, 2019).

This purpose can be reached by going beyond the logic of linearity, which usually characterizes business processes in public administrations, and adopting system thinking approach.

The paper contributes to tackle these issues by exploring an open innovation participatory ecosystem where the ‘city’ as a public institution works with entrepreneurial universities in giving a new shape to the modern smart city - shifting the meaning of smart cities from ‘urban technological utopias’ to urban innovation labs. We present a holistic case study on the Turin city known Turin City Lab (TCL). In particular, we show how the city engages with entrepreneurial universities to generate a public value.

The remainder of this paper is structured as follows. Section 2 offers an overview of the theoretical background on smart cities and entrepreneurial universities along with the development of propositions. Section 3 justifies the methodology and describes the holistic case study, that is TCL. Section 4 discusses the case study in line with the theoretical background. Finally, the paper concludes with Section 5, which provides implications, limitations, and related possible avenues for further studies.

## 2. Theoretical background and propositions development

Smart Cities initiatives are spreading all around the world very quickly. Their main objective is to increase the competitiveness of communities through innovation and to improve wellbeing for citizens through better public services (Appio, Lima and Paroutis, 2019). Smart cities can be considered as an open platform of external codified knowledge (Del Giudice, Della Peruta, and Maggioni, 2013).

Smart city projects suggest new forms of interactions and collaborations, boosting new innovation models and processes coming contemporaneously from different market-based partners, such as competitors, suppliers, urban society, and universities (Carayannis *et al.*, 1999; Santoro *et al.*, 2016; Wang *et al.*, 2015). This is recognized also by Caragliu *et al.* (2011).

The scientific literature on innovation allows to integrate the dimensions of smart cities into a holistic conceptual model that relates the themes of green cities, connected life, smart communities, innovative ecosystems and environmental and social sustainability with urban growth. Smart City refers to an interconnected and intelligent city. However, the most significant dimensions can be summarized as follows: 1) the technological innovation; 2) the policy innovation; 3) and the management innovation (Kehoe *et al.*, 2011).

The smart city is a complex ecosystem of people, processes, policies, technology and other enabling factors working together to deliver a set of outcomes.

The smart city is not managed exclusively by the city. Successful and sustainable smart cities adopt a strategic approach to engage stakeholders across the ecosystem.

Consistently with stakeholder theory, interaction with both market and non-market players is shown to affect performances (Freeman, 1984). For example, relationships with stakeholders increase trust and social capital, thereby reducing transaction costs (Greenwood *et al.*, 2010). In this way, ability to manage relationship with stakeholders for value creation, known as *stakeholder-*

*related capability*, is assuming increasing relevance also in smart ecosystems debate (Jones *et al.*, 2018). Stakeholder engagement allows organizations to acquire information from other stakeholders (Sharma, 2005), and this supports the development of individual and organisational knowledge (Nelson and Zadek, 2000; Katsoulakos and Katsoulacos, 2007).

In the smart city ecosystem, stakeholders take an active role: private sector participation is strategic in project sustainability; citizens can interact directly to institutions and provide useful information; and governments foster the collaboration of different actors.

The emerging collaboration between public and private organizations, therefore, offers the potential for new ways to co-innovate goods and services of collective interest. However, this potential largely depends on the willingness and ability of organizations to plan participatory governance and implement activities together.

According to Albino, Berardi and Dangelico (2015) “the smart city should have a strong governance-oriented approach which emphasizes the role of social capital and relations in urban development” (p.1).

A number of studies argue that by focusing on a process of value co-creation with a range of stakeholders, organizations could gain positive financial returns (Albort-Morant, Leal-Millán and Cepeda-Carrión, 2016; Mehrpouya and Chowdhury, 2018). Such a process of the co-creation of value to be shared among different stakeholders and actors assumes that co-creatively leveraging all stakeholder capabilities can lead to better states of governance, infrastructure development and sustainability, with ‘win-win’ outcomes and the expansion of wealth, welfare and well-being (Ramaswamy and Ozcan, 2014). In turn, this results in increased competitiveness. From the perspective of stakeholder theory, stakeholder capabilities can be defined as the stakeholders’ effective opportunities to undertake actions and activities through which they choose to engage in the value creation process (Garriga, 2014).

In this line of research, scholars have emphasized the importance of governance in reference to the inward/outward exchanges with parties of the ecosystem (Matricano *et al.*, 2019; Natalicchio *et al.*, 2017).

Skidmore, Bound and Lownsborough (2006) identified three fundamental reasons for promoting participatory governance and co-innovation of public services:

1. It leads to better and closer services to citizens’ needs;
2. It addresses disengagement from politics and democracy, strengthening the sense of trust;
3. It increases intellectual capital and community cohesion, and strengthens individual relationships.

Regardless to say a smart city plan needs an orchestrator with executive and policy planning authority, such as the city’s council. Creating a smart city from scratch requires leadership to monitor the plan. This top-down approach in master planning smart cities must be balanced with the ability to constructively engage local stakeholders into a hybrid model that combines central city monitoring with bottom up community participation to contribute to solutions to social problems.

To this aim, universities are rich in resources that can be mobilized. Researchers have the technical skills to collect and evaluate empirical data, to address the development of sustainable and innovative solutions and to identify potential potholes in the implementation process. Moreover, universities can transmit information across sectors, through student training and partnerships with funding agencies, private investors, public policy regulators, and the communities themselves.

Unlike the first studies on partnerships and alliances focused primarily on transaction cost economisation, recent research focuses on how inter-organizational relationships can improve value creation towards citizens’ needs (Enkel and Gassmaan, 2010).

Given the growing need to acquire further knowledge and skills to foster innovation processes, studies on the creation and management of interorganizational relationships with citizens, customers, competitors, suppliers, public and private research institutions are increasingly growing (Hauser, Tellis and Griffin, 2006). As several studies highlighted, there are three main types of collaborative to create connections: contractual, reciprocal and proprietary. However, these



categories are not necessarily exclusive and some inter-organisational relationships are often hybrid and can cover more than one type of category (Howells, James, and Malik, 2003).

Therefore, the first proposition of this work is:

**P1.** A greater increment of Smart cities like laboratorial cities, more involve an open innovation participatory ecosystem approach

As highlighted in the discussion about open innovation, smart cities are required to adopt a collaborative approach in which chain partners and even competitors work together to develop new products/services and processes quickly and effectively (Chesbrough *et al.*, 2006; Santoro *et al.*, 2018). Chesbrough *et al.* (2014) clarified how during last years the concept of open innovation overlaps with user innovation. Both open and user innovation analyze the role of users in a distributed innovation process. The involvement of user knowledge in the innovation process requires companies to cooperate beyond their borders. User Innovation model supports a decentralization of innovation that changes the place of innovation from enterprises to users and leads to “democratization of innovation”. In the user innovation model (Von Hippel, 2005) knowledge is widely distributed and users represent a source of innovation. Innovation is based on a collaborative and co-creative process, in which users share the activities and cost of developing innovative products and services. In other words, the motivation for innovation revolves around the concept of user utility rather than direct economic return. Von Hippel and Von Krogh (2003) define this innovation model as a “collective-private” model that contains elements of both private investment and collective action models.

In this vein, several scholars adopt the conceptual model of co-innovation as a social platform where new ideas or approaches from various internal and external sources are applied differently to create new value or experience for all stakeholders, including consumers (Von Hippel *et al.*, 2011). The core of co-innovation includes engagement, experience, and co-creation for value.

Interactions between actors could facilitate value co-creation. However, the effectiveness of the interaction process between actors depends on their openness as well as on the availability to share their resources in order to make value proposals (Frow *et al.*, 2014). Open innovation literature has demonstrated the full array of possibilities of both stages of value creation and value capture, including both inbound and outbound directions (Kavadias *et al.*, 2016). Through the knowledge inflow, outside-in or inbound innovation, organizations could source and acquire knowledge and expertise from outside (Chesbrough and Bogers, 2014). The knowledge outflow, inside-out or outbound innovation, is focused to internally identify under-utilized resources to be shared and valorized with an external partner (Ferraris *et al.*, 2017).

Kujala (2003) has identified among the main benefits related to the involvement of users a higher quality of services, a better adaptation between services and users’ needs, and a better satisfaction of users or customers. Alam (2002) similarly identified among the benefits of user involvement the development of new personalized services with exclusive benefits and better value for users, reduction of development time, training of users (about the use, attributes and specifications of a new service), a better understanding of the market, improvement of public relations, as well as better long-term relationships between service providers and customers.

In addition, Kristensson, Magnusson and Matthing (2003) conducted various experiments in which they invited users to generate ideas for innovative services in ICT sector. They found that “users” can generate ideas that are useful inputs for service innovation, their ideas are more innovative (“originality”) and respond more to user needs (“user value”) than the ideas generated from professional developers, although the ideas of professional developers “are more technologically feasible (“productability”) than the ideas of “users “ (Magnusson and Matthing, 2010).

Several authors from the United Kingdom recently dealt with co-innovation (Cottam and Leadbeater, 2004), services co-design (Parker and Heapy, 2006) and design transformation (Burns,

Cottanello, Vanstone, and Winhall, 2006), with particular attention to the innovation of public services in health sector. Cottanello and Leadbeater (2004), for instance, stated that “the key to successful doctor-patient partnerships is to recognize that patients are more” experts “of their life experiences than professionals and that are necessary both types of knowledge in co-design”.

The result is a shift of attention from the product to the customer-consumer, or rather to the use that the latter makes of the first.

The European smart and sustainable city paradigm offers a very useful framework for understanding how to co-innovate in order to design better public services.

Caragliu, Del Bo and Nijkamp (2011) stated that smart cities are characterized by one or more of the following attributes: smart economy; smart mobility; smart environment; smart people; smart living; and, finally, smart governance. Other authors outlined the growing demand for a more efficient, sustainable, and livable model in urban development, highlighting the conception of “sustainable cities”, by setting the environmental and social sustainability as the clear vision of smart cities (Toppeta, 2010; Greenburg, 2015)

Hence, the second proposition of this work is:

**P2.** Improving user innovation tools and system thinking approach will result in better public services

The recognition of the contribution of universities to societal and economic well-being makes it crucial to consider how to support entrepreneurs and public entities in order to enable them to make the desired and much-needed contributions. Rice *et al.* (2014) highlighted several key success factors that allow universities to achieve a sustainable and high-impact entrepreneurial ecosystem. The types of support needed include: a) assistance in recognizing and exploiting opportunities consistent with needs and capabilities of a city; b) guidance and support for growing the capacity of an entrepreneurial team through talent acquisition and talent development; c) networking to enable entrepreneurs to access expertise not resident within the entrepreneurial firm; d) advising and networking to support the acquisition of financial resources needed to support the development of the firm until it achieves self-sustainability; e) support for developing, protecting and accessing intellectual property that can be a source of innovation; f) providing a dynamic and integrated network of interlocking providers of entrepreneurial support to fill gaps in the resources and capabilities of entrepreneurial firms.

With the pressures coping universities, and encouraging them to become more entrepreneurial, most of these institutions have adopted a number of strategic approaches useful to set up an *entrepreneurial culture*.

Daniel Isenberg (2011) summarizes entrepreneurial domain on the following elements: politics, finance, culture, support, human capital, and market. Culture is one of the essential parts of entrepreneurial ecosystem. The values, norms, attitudes, risk tolerance of a society can be crucial determinants of entrepreneurial activity within a country. Some research discussed and highlighted the importance of cultural determinants on entrepreneurial activities (Castaño, Méndez, and Galindo, 2015; Dubina and Ramos, 2016; Siqueira and Honig, 2019).

According to OECD (2012), to set up an *entrepreneurial culture*, universities should activate themselves in the following seven areas: a) *Leadership and governance*; b) *Organizational capacity, people and incentives*; c) *Entrepreneurship development in teaching and learning* in order to stimulate and support the development of entrepreneurial mindsets and skills; d) *Pathways for entrepreneurs* to ensure entrepreneurs are adequately prepared for creating start-ups through their education; e) *University - business/external relationships for knowledge exchange* with industry, society and the public sector; g) *Entrepreneurial University as an internationalized institution*; h) *Measuring the impact of the Entrepreneurial University* monitoring and evaluating entrepreneurial teaching and learning across the institution as well as the impact of start-up support.

From an organizational perspective, questions arose on how universities could enhance entrepreneurial culture.

According to OECD (2012), in order to develop an entrepreneurial culture, strong leadership and good governance are essential. Since universities include “entrepreneurship” in their mission statements, they should see themselves as entrepreneurial organizations. In order to develop as an entrepreneurial organization with an entrepreneurial culture the entrepreneurial activities should be included in the strategy. From an organizational perspective, universities can build and encourage an entrepreneurial culture by recruiting staff that have a strong entrepreneurship background. However, to improve social and economic impact, institution should use entrepreneurial attitudes and experience as criteria in the recruitment process. People from outside academic environment, such as entrepreneurs, guest lecturers, can also bring important skills to academic institutions; they carry an external viewpoint as well as skills and abilities which are not available internally.

The U.S. scientific literature has highlighted before the European one the drivers and barriers to improve the university’s capacity to create connections with entrepreneurial ecosystem.

Numerous studies have analyzed the barriers to the commercialization of university research, including poor economic incentives, the lack of a commercialization infrastructure within universities, restrictive regulations and policies, the lack of commercialization capacity and entrepreneurial mindset among professors, and the need to establish stronger interactions with industry representatives (Vanderford, *et al.*, 2013). The main conclusion reached by the different authors is that the linear model of technology transfer is inadequate to capture the complexities of an ecosystem (Ostergaard, 2009).

Based on that, the third proposition is :

**P3.** The greater the university’s capacity to create connections with local communities, profit and not-for-profit organizations, and public institutions, the greater its ability to improve the entrepreneurial ecosystem orientation towards citizens’ needs.

### 3. Research context and design

#### 3.1 Methodology

The present work employs a holistic, qualitative case study methodology due to the new, recent phenomenon of smart cities (Van den Bergh and Viaene, 2016; Flyvbjerg, 2006; Scholl and AlAwadhi, 2016; Ruddin, 2006; Wiles *et al.*, 2011). The case of Turin city lab (TCL) allows to enlarge the existing literature on smart cities with a specific focus on the role exerted by entrepreneurial universities. Basically, this work aims to provide an outlook how a city creates a synergic network among different sectors and generating the public value in partnerships with local universities. Turin is selected as one of the most innovative cities in Italy even in Europe. Indeed, Torino is ranked the 3rd Italian city in terms of GDP, with about 900,000 citizens, 75,000 companies (80% SMEs), 350 start-ups and more than 100,000 students among the two university campuses: University of Turin (with a more humanistic and economic focus) and Polytechnic of Turin (with a more tech and engineering focus) (Camcom, 2017).

We present TCL case study in a narrative way thanks to the co-authorship with the main players of this project: the current Ministry of technological Innovation and digitalisation, the Deputy Mayor in Innovation, and advisor of the Deputy Mayor in Innovation. Therefore, thanks to their active role in this project, we have collected all crucial information by interviews to the main partners (such as Reale Mutua, Iren, and Cirfood) and secondary data to build up the single case on the city of Turin. A narrative approach shows a case by stories (Riessman, 1993) offering ‘thick description’ (Geertz, 1993) and construct new concepts (Berger and Luckmann, 1966; Boje, 2002). This analysis lasted two years, commencing in 2018.

In a nutshell, this methodology has allowed us to structure an explicative scenario on the evolvement of a smart city into an experimental lab, suggesting an open innovation participatory ecosystem approach (Shaffers *et al.*, 2011). Alongside, this analysis has allowed us to shift the common brand image of Turin city - from a “Fordist one-company town” (Vanolo, 2015) to one of the most innovative smart city.

### 3.2 Turin City Lab: A usecase of a smart city evolving in a City lab

In 2018, the project ‘Turin city lab’ was founded with the scope of develop the first sustainable, successful smart city in Italy as well as in Europe. By interconnecting ‘intelligent’ tools of technologies along with national and international players, TCL is considered an innovative urban policy paradigm. It combines benefits stem from green cities, connected life, intelligent communities, innovation ecosystems, and environmental and social sustainability along with urban growth (Kehoe *et al.*, 2011). The broad concept of a city looking to adopt digitalization and technology to become more futuristic and smarter, connecting urban infrastructures with human capital and social behaviour of those inhabitants of the city, has been brought to the “interpolation of smart cities within the same city”.

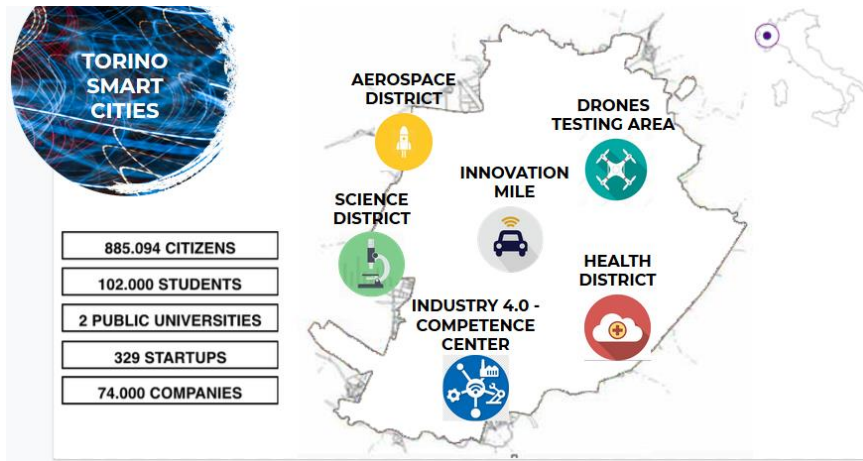
Indeed, the mission and the vision of TCL concern giving a new shape of Turin, shifting from the classic, general concept of smart city to a participative, active city like an experimental laboratory which involves several local actors such as public and private investors, banks, foundations, and R&D centers. All together aiming to improve city’s quality life and making a social impact. Turin is so elected to be *the city partner of innovation*.

The logic behind this payoff is to generate a propensity to collaborate and intense collaborations with all players. According to Vanolo (2015), synergies between local economic cultures and practices could lead to evolutionary patterns and foster the capability of coping external challenges. In this vein, author pointed out that urban resilience is a central characteristics of smart cities (Vanolo, 2015). Again, Colombini and Vanolo (2017) describes such resilience of Turin arguing the evolution\revolution of the “local urban heritage”. In fact, Turin can be considered an ongoing innovative city, driven by four main actors: ‘universities-industry-government- civil society’ (Carayannis and Campbell, 2012).

The city of Turin acts as a facilitator in spurring innovations and inducing new tests of pre-commercial products, services, and technologies. This scenario calls for an intertwining process which scouts new technologies and innovation models - from single innovators to start-ups, and to well established small, medium and/or international big enterprises. Besides, it has attracted the attention of European funds, increasing the degree of partners’ engagement and international collaboration exploitation approach. Yet, the innovation team of TCL promotes the partnerships, regular meetings, participation to international contexts, and adoption of leading positions in innovative, sustainable ideas.

As showed in the image below (figure 1), TCL has adopted an open innovation participatory ecosystem approach where each dot represents a single smart town. A smart town operates in one of the innovation areas such as manufacturing 4.0, aerospace, healthcare, mobility, and urban air mobility allocated within the city of Turin. Those dots also form an accelerator space stimulating new research and development projects.

Fig. 1: Smart towns in Turin



Source: our elaboration

Torino City Lab has collected almost fifty experimentation proposals with an effective launch of three real cases and involving more than fifty partners.

The chance to propose an innovative idea occurs by an online platform [www.torinocitylab.com](http://www.torinocitylab.com) where the submission window is available throughout the year. The reviewing process lasts six weeks where a special commission is formed to judge the proposals. Those judges come from the municipality, university, and industry who have to evaluate the desirability, feasibility, and viability of a project (Murray and Scutto, 2016). If the proposal is accepted, the accelerator process is granted to the team so as to put in reality their innovative idea. This process offers mainly the access to national and international key players (figure 2).

Fig. 2: Some key players of TCL

## Torino City Lab Partners



## Smart Road Partners



Source: our elaboration

The involvement of several, different actors - local and international corporates, research organizations, venture capitalists, and innovators - is one of the crucial success keys of TCL.

### 3.3 TCL and entrepreneurial universities

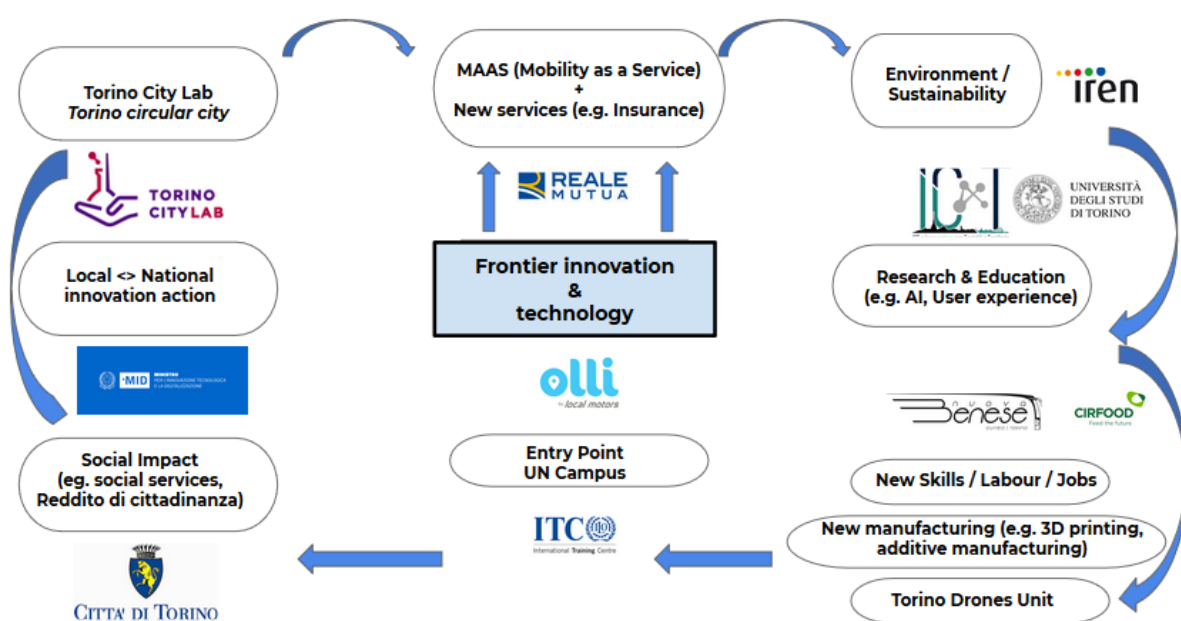
In this context, entrepreneurial universities play a central role in TCL partner network, with a key involvement in many innovation projects and events. The public-private partnership approach of TCL is a good example of a way to manage innovation proactively by a City.

TCL connects different dots. This has produced the first experimental lab in the smart road area. The Smart Road is an urban circuit of 35 km in which technology and mobility industry, and research players are developing the infrastructure towards the autonomous and connected driving. Torino Smart Road is a very important project because of it represents a crucial step in the transition of the City from an automotive-led economy to a smart-mobility new development opportunity. A number of top companies has been attracted by TCL mission, encouraging the other Italian cities to follow the smart innovative, automotive path.

For instance, recently TCL has launched the first autonomous shuttle service known as “OLLI” in Italy. This shuttle has been developed in collaboration with local universities, the international training center of International Labour Organization (ITC ILO), and other partners (such as Reale Mutua, Iren, and Cirfood).

The project “OLLI” represents a model of open innovation participatory ecosystem developed by TCL and its partners (figure 3). It has started by identifying the innovation experimentation opportunity (i.e. the possibility to be the first city in Italy to launch an autonomous shuttle service) and a suitable circuit compatible with the current Italian legislation (MIT, 2017), which does not allow to non-car makers to test autonomous driving. Hence, TCL team has been able to pull together the expertise and in-kind resources to run “OLLI” project thanks to a systemic work of multiple partners and an institutional endorsement by the Italian Ministry of Innovation and the Mayor of Turin.

Fig. 3: An example of open innovation participatory ecosystem



Source: our elaboration

The project “OLLI” calls for new talented skills and the entrepreneurial universities are so nurturing those talents in order to satisfy industry needs. It evokes a model of the intertwining of government- universities - industry.

Innovation means more jobs opportunity for the future of the city and the city of the future. With this claim Torino has just hosted a three-day workshop entitled “Torino skills city” along with global education specialists: some national bodies as the university of Turin and the Polytechnic of Turin alongside international bodies as European Training Foundation (ETF) and ITC ILO. The scope is to forge people with new skills - re-skilling of citizens and working class - according to a smart city’s needs.

As a result of the combination of know-how, skills and automotive history, Torino is recognized as one of the most dynamic European cities in terms of smart mobility innovation. In 2019 Turin hosted one of the most important global automotive annual conference, the 5GAA. Moreover, this year one of the top global start-up accelerator, id est *Techstars*, has selected Turin as the accelerator space for international smart mobility start-ups.

Moreover, TCL seeks to educate citizens to the use of new technologies, like drones. For instance, the increasing utilization of drones to monitor public security, traffic, and other environmental issues, has also induced a new use. Indeed, TCL has been employed drones to organize a big event in Turin, that is the annual St. John’s celebration, taking place on 24th of June. Differently to the past, fireworks are replaced with drones to produce technological, sustainable showcases. With this intent the organizers have shown about 300 drones in automatic flight mode, with a drone-lights performance show; some autonomous vehicles self-driving in the main square; 5G connectivity to enable the fast infrastructure for both vehicles autonomous driving and drones automatic flying.

The scope is, thus, to get closer citizens to the new technologies and so educate them in being more technological.

These projects also generate a social impact innovation by adopting a bottom -up approach. The main idea is to encourage innovations from citizens. In this scenario, TCL along with local entrepreneurial universities is fostering ‘edutech’ projects and new entrepreneurial ideas. This has induced a project called AxTO which is a local Living Lab by European programs. As emerged, circular innovation is becoming another hot topic in the modern society. Again, this project employs an open innovation participatory ecosystem which has generated twenty circular innovation projects in the past twelve months.

## 4. Discussion

### 4.1 Theoretical implications

Our holistic, single case study based on Turin city lab offers an outlook of the evolvement of the concept of smart city. TCL points out the relevance of creating an open innovation participatory ecosystem by employing a bottom -up approach (id est citizens - government) (Popa *et al.*, 2017).

Hence, the first assumption “P1. A greater increment of Smart cities like laboratorial cities, more involve an open innovation participatory ecosystem” can be explicated by TCL mission and vision. As state above, *“the broad concept of a city looking to adopt digitalization and technology to become more futuristic and smarter, connecting urban infrastructures with human capital and social behaviour of those inhabitants of the city, has been brought to the “interpolation of smart cities within the same city”. Indeed, the mission and the vision of TCL concerns giving a new shape of Turin, shifting from the classic, general concept of smart city to a participative, active city like a live laboratory which involves several local actors such as public and private investors, banks, foundations, and R&D centers. All together to improve city’s quality life and making a social impact. Turin is so elected to be the city partner of innovation.”*

According to Lee *et al.* (2012) the openness of smart city involves two forms of collaborations: propensity to collaborate and intensity of collaborations between firms and local external partners. Such collaborations evoke the quadruple helix model - ‘universities-industry-government- civil society’ so as to generate a collective, bottom-up innovations (Carayannis *et al.*, 2018; Carayannis



and Campbell, 2012; Leydesdorff and Deakin, 2011; Etzkowitz and Leydesdorff, 2000). Hence, a new knowledge is produced by trainings and new entrepreneurial programs. Specifically, TCL has introduced another projects “Torino skills city” which requires the commitment of national and international global education specialists: some national bodies as the university of Turin and the Polytechnic of Turin alongside international bodies as European Training Foundation (ETF) and ITCILO. A re-skilling program meets one of the criteria of the entrepreneurial culture (OECD, 2012), that is *university - business/external relationships for knowledge exchange*. University performs a collaborative knowledge acquisition approach in partnership with the City and the industry. Another example is the AxTO project which induces citizens’ idea generation in the context of the circular, sustainable economy.

Therefore, we can also support our assumption on **(P3.)** The greater the university’s capacity to create connections with local communities, profit and not-for-profit organizations, and public institutions, the greater its ability to improve the entrepreneurial ecosystem orientation towards citizens’ needs. This supports the quadruple helix model which introduce a democratic way of generating innovations (Carayannis and Campbell, 2012) where citizens are involved in such process. Smart cities become a source of competitive advantage at an urban and national market position.

#### 4.2 Managerial implications

According to European Union (2017), technological, socio-demographic and behavioral change are promoting multimodal transport - combining walking, cars, buses, bikes, kick scooter, trains, and other forms of shared transportation. Encouraged by the transition from “owning” to “using”, mobility as a service (MaaS) could enable multimodal mobility by providing user-centric information and travel services such as navigation, location, booking, payment and access that allow the use to consume mobility as a seamless service across all existing modes of transport.

In this context, innovation strategies and programs should design and deploy innovative but robust arrangements for public-private co-production of transport and mobility service.

Today, collective intelligence and crowdsourcing are possible through formal channels and/or social networks. While increasingly people use social technologies to get what they need from other individuals rather than from formal channels, such arrangements often lack compelling experience among the participants. The key element of co-innovation is to provide compelling experience with network effects for value creation. The first area is to leverage innovative ideas to introduce new products, services or even new ventures. This process requires collaborative efforts with internal and external partners so that a new blue ocean, where there is no competition, can be created (Kim and Mauborgne, 2005). New products or services may not be based on new technology or invention. They could also be results of new convergence or bundling with different complements or applications. New ventures can be based on a combination of intrapreneurship or interorganizational collaboration. The second area of value co-creation involves value chain innovation to make the architecture more efficient which in turn will cut the cost, improve quality, and/or increase the speed of the process. Many process innovations, such as Just-in-Time, TQM, Six Sigma, Lean Manufacturing, etc. are all intended to make the value chain architecture more efficient. The third area of value co-creation is reinventing the concept of customer value. This area is especially fruitful for value co-creation with customers for a shared value.

The fourth area is to expand the customer base. The final area where co- innovation can create value is new business models. Business models represent the approaches that the organization strategized to produce and deliver its goods or services to the customer. These new, innovative technologies can be represented in some of the TCL projects such as ILLO, the use of drones, and 5 G connectivity which are illustrative of our assumption based on **(P2.)** Improving user innovation tools and system thinking approach will result in better public services.

Looking into the TCL case, it has possible to show a successful project which can be replicable into other cities. Nowadays, the need of being smarter is getting pervasive and so this case offers an outlook of what a city can do if it works in a synergic way with all players of the local ecosystem.

We deem that more focus should be done to the concept of an open innovation participatory ecosystem. Especially, this can be a new ‘business model’ that policymakers can adopt to be technological efficient. Consequently, our smart model provides new insights into the current innovation and management literature. As aforementioned in the discussion section, this model supports previous studies and offers a new concept of smart city - which considered like an experimental lab.

## 5. Conclusions

This research has focused on the exploration of an open innovation participatory ecosystem where the ‘city’ as a public institution works with entrepreneurial universities. According to our results, this could give a new shape to the modern smart city shifting the meaning of smart cities from “urban technological utopias” to urban innovation labs. Considering the importance of comprehensive value creation this study highlights the relevance of interaction between stakeholders. Collaboration and resources sharing are directly related to a process of creating value (Frow *et al.*, 2014). The transfer and sharing of value can have themselves several implications. Shared value can generate competitive advantages deriving from the nature of the value activities and from the degree of openness of the firm to the outside. This process feeds the network between the actors that collaborate in the ecosystem (Santoro *et al.*, 2018). In this vein, the managerial implications underlying this paper would stimulate the managerial debate about how collaboration processes between organizations leads to value co-creation (Amit and Zott, 2010).

The study has some limitations due to its exploratory nature. The main limitation is certainly the use of a single-case design through documentary analysis. This influences the ability to generalize the results. The second limitation is the lack of empirical development, which makes it difficult to extend the results to other industries and contexts.

Starting from the results related to the proposed case, further insights could emerge regarding the segmentation of users, the analysis of the context of use, i.e. the methods of access and use of the service, how the size of firms could affect the ability to access advanced technical-scientific knowledge and generate new industrial technologies, how collaboration encourages the integration between different phases of the innovation cycle, i.e. between applied research, experimental development and engineering and industrialization.

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