

## **Inclusive and sustainable development of smart cities ecosystems in Italy**

### ***Sviluppo inclusivo e sostenibile degli ecosistemi delle smart cities in Italia***

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**Abstract.** The smart cities subject has been studied, implemented, measured, and developed for almost two decades. However, besides its known importance in promoting a better quality of life for citizens, many aspects require further investigation, particularly concerning the articulation between the diverse actors that, together with the public administrations, are committed to building a sustainable smart city. Knowing this, we conducted a quali-quantitative study to analyze the main challenges in implementing smart cities focused on sustainability and social inclusion in Italy. Results reveal that communication with citizens is paramount to pursuing the objective.

**Abstract.** *Il tema delle smart city è stato studiato, implementato, misurato e sviluppato per quasi due decenni. Oltre alla sua nota importanza nel promuovere una migliore qualità di vita dei cittadini, molti aspetti rimangono ancora da approfondire, in particolare in relazione al coordinamento tra i diversi attori che, insieme alle pubbliche amministrazioni sono impegnati nella costruzione di una città intelligente e sostenibile. In considerazione di ciò, abbiamo condotto uno studio quali-quantitativo per analizzare le principali sfide nell'implementazione di smart city incentrate sulla sostenibilità e sull'inclusione sociale in Italia. I risultati rivelano che la comunicazione con la cittadinanza è fondamentale per la transizione sostenibile ed inclusiva.*

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**Keywords:** Smart cities, Sustainability, Social inclusion, Italy, Quality of life

## 1. Introduction

The smart city theme is much debated and particularly topical in the contingency of the post-Covid world (Kim, 2021). The smart city concept is often associated with implementing smart technologies, mainly based on digital devices (Washburn *et al.*, 2010). However, the smart city should also be something else, and it is highly reductive to make the sustainable development of a city coincide with its digital infrastructure. Existing literature on smart cities development has found a relationship between new technology development and economic growth, well-being, and social inclusion. Currently, cities are interested in evolving from the classical notion of a smart city as a digital city to include the human and social side of urban planning (Kourtit and Nijkamp, 2012). To do so, participatory governance is paramount in the process of constructing this environment of economic growth and high quality of life in smart cities (Caragliu *et al.*, 2011)

Quality of life is intimacy-related with the positive externalities of sustainable practices. The pollution damages are many, from decreasing life quality, because of health problems, such as multiple sclerosis, to degradation of buildings and monuments because of rain acidification (Germinario *et al.*, 2017). Paradoxically regarding sustainable smart cities, among the top 10 most digital cities in Italy there are Florence, Milan, Cremona, Bergamo, and Rome (ICity Rank, 2022), which are also listed as the most polluting cities (SNPA, 2022). It seems that the presence of a high-technology infrastructure does not match the environment that allows a lifestyle oriented to protecting the health of its citizens and natural resources.

Knowing this scenario, this research aims to explore to what extent Italian municipalities meet the requirements of a sustainable and inclusive smart city. We consider problematics related to the challenges of public administration to implement and develop sustainable smart cities in diverse contexts, considering how small, medium, and large municipalities implement actions in the realm of the *Piano Nazionale di Ripresa e Resilienza* (PNRR) or National Recovery and Resilience Plan (NRRP). To do so, we analyzed the existing conceptualization of smart cities to understand the variety of scientific approaches to the topic and, in particular, to acknowledge which ones go beyond the investigation of the technological aspect. In addition to this, we also compared existing smart cities indexes to identify the attributes they consider. Finally, we report the results of a survey conducted to policymakers in charge of smart cities projects in Italy. We collected 83 responses from city managers about the main challenges of smart cities implementation. Our findings suggest some directions for decision-makers interested in transitioning to more sustainable and smart cities.



This first view is interesting to identify terms that are not so obvious in the context of smart cities, which are more often associated with technology and infrastructure only. Figure 1 shows that the terms citizen, service, quality, and life are the most frequent. Life and quality are desegregated because some authors use “life quality” and others “quality of life”, which in this case means the same thing. This representation of smart cities aligns with studies proposed by Florida (2002, 2004, 2005) about the influence of the emerging creative class on the wealth of cities. The existence of a creative class drives competitiveness; this is the premise defended by Florida and Tinagli (2005), who claimed that the development of a creative class depends on the so-called “3 T’s of economic development”: technology, talent, and tolerance.

The creative class includes those who work in science and technology, research and development, technology-based industries, the arts, music, culture, aesthetics, and design sectors, and the professions based on knowledge of the medical, financial, and legal sectors (Florida and Tinagli, 2005). There are several critical aspects and drawbacks related to the concept of the 3T’s, nevertheless this approach illuminates on the role of the service sector and of the creative class in shaping growth development paths in cities (Florida, 2014). Therefore, our analysis supports a perspective on smart cities focused on attributes different from the traditional ones typically associated to smart city in the established research field, which is mainly concentrated on economic and technological aspects.

Some contributions highlight the importance of a more holistic approach to smart cities, which considers in combination multiple attributes. This suggests that an efficiently functional smart city is based on its capacity to link the dots between citizen’s needs, solutions offered by all kinds of businesses (from a restaurant to a startup), articulation between diverse governmental fronts, knowledge produced in the think tanks and universities etc. Implicitly, this relates to municipalities’ capacity to be involved in a network of collaborations with territorial stakeholders and between municipalities (Menahem and Stein, 2013). Consequently, smart cities are much more than just geographic space that uses data and technology to improve essential services for the municipality; accordingly, Kourtit and Nijkamp (2012) defined them as follows:

“Smart cities are the result of knowledge-intensive and creative strategies aiming at enhancing the socio-economic, ecological, logistic and competitive performance of cities. Such smart cities are based on a promising mix of human capital (e.g., skilled labor force), infrastructure capital (e.g., high-tech communication facilities), social capital (e.g., intended open network linkages) and entrepreneurial capital (e.g., creative and risk-taking business activities)” (Kourtit and Nijkamp, 2012).

The second objective of our literature review is identifying existing smart city indicators. Many institutions have created smart city parameters connected to different attributes to monitor and evaluate how smart is a smart city. However, they often show a high degree of overlapping, as synthesized in Table 1, based on the analysis of articles in the Scopus database published from 2000 to 2019 and reporting indexes to rank how smart a city can be.

*Table 1- Attributes associated with measuring smart cities*

<b>Index, Author, Year</b>	<b>Attributes considered</b>	<b>Indicators</b>
Smart City Index, IMD World Competitiveness Center and Singapore University of Technology and Design (2021)	Health and Safety; Mobility; Activities; Opportunities; Governance	39
ISO 37122: Sustainable cities and communities (2021)	Urbanism; Technology and Innovation; Health; Safety; Economy; Mobility; Environment; Entrepreneurship; Education; Energy; Governance	75
Connected Smart Cities, Urban Systems (2021)	Same as ISO 37122	22
Smart City Index, EY (2020)	Sustainability; Resilience; Accessibility; Inclusiveness	456
Smart City Index Master Indicators, Cohen (2014)	Environment; Mobility; Government; Economy; People; Living	46
Lombardi <i>et al.</i> (2012)	Smart Economy; Smart People; Smart Governance; Smart Mobility; Smart Environment; Smart Living	60
Lazaroiu and Roscia (2012)	Same as Lombardi <i>et al.</i> (2012)	18

Developed by the authors

The most common indicators are Economy, Education, Energy, Environment and change, Finance, Governance, Health, Housing, Population and social conditions, Recreation, Security, Solid waste, Sport and Culture, Telecommunications, Transport, Urban/local agriculture, and food security, Urban planning, Wastewater, and Water. Thus, it appears that there is only a partial use of the indicators for qualifying a smart city conceptually. A more qualifying approach to smart city development should entail inspirations from the quadruple-helix model, which considers the interactions between the private sector, government, citizens, and universities (Leydesdorff and Deakin, 2011).

### *2.1. Sustainable and Inclusive Smart Cities*

In the context of smart cities, there is a significant emphasis on sustainable aspects, which is evident in the inclusion of environmental attributes in the metrics used to evaluate successful smart cities, as discussed in the previous section. However, there remains a significant gap in the development of social features that promote inclusiveness. It is important to recognize that cities are made up of individuals with diverse socio-economic backgrounds, which reflect into diverse needs. According to Seyranian et al. (2008, p.21), any comprehensive discussion on smart cities must include the consideration of minority or marginalized groups:

“besides denoting numeric size, these terms have acquired socioreligious (minority heretics), sociopolitical (majority rule), socio-economic (majority share), and sociodemographic (ethnic minority) connotations. The terms majority and minority also reflect positive or negative social conditions and treatment”.

Examples of minority groups in society include women (Hacker, 1951), ethnic groups (Rishbeth, 2010), homeless individuals, the lesbian, gay, and bisexual community in many countries, and people with disabilities (Seyranian et al., 2008). Individuals from ethnic minority backgrounds often have distinct experiences living outside their hometowns, which may differ significantly from those of white individuals. Previous studies and examples suggest that the physical environment can positively and negatively impact one's perceptions of daily life.

Nowadays, even if in numeric terms there is a balanced number of women (49.7%) and men (50.3%) in the world (World Bank, 2022), the first group is not represented in society as the second one. For this reason, it is necessary to think smart cities, also considering the specificities of this social group, as stated by Nesti (2016). She underlines the importance of including women as active members in city governance processes, contributing to defining the role of new technologies in improving services for satisfying their needs and fueling their empowerment, for example in transport, health, safety, training.

According to Rishbeth (2010), certain scholars argue that landscapes possess a symbolic dimension, and specific features can be perceived as either inclusive or exclusive. Nam and Pardo (2011) suggest that true inclusivity in smart cities requires collaboration among public institutions, the private sector, the voluntary sector, and citizens. However, the development of IoT solutions is often beyond the agency of citizens (Waart et al., 2015), which is especially true in developing countries where the lack of a supportive environment can worsen the situation (Datta, 2015).

## 2.2. *Smart Cities in Italy considering Sustainable and Inclusiveness Aspects*

In most cities, technological, and social innovation should enhance natural, historical, and cultural heritage by supporting the reworking of new articulated and interconnected cultural heritage preservation and enjoyment processes (Manitiu and Pedrini, 2018). Nevertheless, a dichotomy between southern and northern provinces characterizes Italy. This contrast is related to socio-economic aspects that influence the implementation and development of smart cities in Italian territories (Vinci *et al.*, 2019). Because of this complexity, cities from the north are always at the top of smart city indexes. Besides, it is essential to remember that those indexes consider different categories to evaluate the “smartness” of a city. Anyhow, there are some cities that always position at the top: Milan, Turin, Bergamo, and Rome (IMD, 2021; EY, 2022; ICity, 2022).

Cities that have traditionally focused on innovation processes are now being joined by those who have recently ventured into digital services, resulting in shorter distances between them. Florence and Milan retain their top positions, while smaller cities and those in the south, such as Messina, have made a comeback, moving up of 34 positions in just one year. Bergamo, Bologna, Cremona, Modena, Rome, and Trento are tied for the third place. The progress of L’Aquila, Cuneo, Imperia, and Trapani is also noteworthy (ICity, 2022).

Another highlight in the discourse about smart cities in Italy is the *Piano Nazionale di Ripresa e Resilienza* (PNRR), or National Recovery and Resilience Plan (NRRP). The NRRP is Italy’s response to the Covid-19 global emergency and the obstacles that have stalled the growth of the country’s economic, social, and environmental system in recent decades. The NRRP is part of the Next Generation EU recovery project, a program of unprecedented scope and ambition, with several resources introduced to boost growth, investment, and reforms of 750 billion euros, of which more than half, 390 billion, are grants (MUR, 2023).

The National Recovery and Resilience Plan, which the European Council approved in 2021, contains 16 Components, grouped into 6 Missions respectively: Digitalization, innovation, competitiveness, culture, and tourism; Green revolution and ecological transition; Infrastructure for sustainable mobility; Education and research; Cohesion and Inclusion; Health (MUR, 2023). All these topics are related to the construction of sustainable smart cities because they align with digitalization, sustainability, and infrastructure.

Less is known on how to integrate a stronger integration of the concept of sustainability, in its various meanings, within the discourse on cities. Regarding sustainable and inclusive smart cities in Italy, there are two main points to consider: 1) how much citizens are ready for it and 2) how they behave in this context, which often requires specific knowledge to deal with new technologies and rules (EY, 2022). In addition, Italy has a significant elderly population, which accounts for 23.8% of the total population, and is expected to reach almost 19 million, or 34% of the people, by 2042 (Istat, 2022). It is also important to consider other social profiles, such as the 8.5% of foreigners (Istat, 2022) residing in Italy and the nearly 400 million tourists in 2022 (Confesercenti, 2022). Therefore, developing tailored solutions within the smart city context could prove valid. Furthermore, countries like Italy, with a significant population of immigrants, refugees, and elderly individuals, may require an inclusive and sustainable smart city to cater to their needs.

### 3. Methodology

The research in this study was conducted using a mixed-methods approach, following the classification outlined by Caruth (2013), which organized the methodology by types of information acquisition and its sequence. Specifically, we used an exploratory sequential design. We initially collected qualitative data through interviews to investigate a phenomenon and subsequently gathered quantitative data with a survey to further explain the qualitative findings.

First, we conducted four in-depth interviews of around 40 minutes each with city managers from Procida, Villanova Mondovì (Cuneo), Ferla (Siracusa), and Padova. The questions of the interview can be seen in Appendix I. After this, we elaborated a survey on the basis of a structured questionnaire composed of 34 questions. The questionnaire was administered to 83 city managers from all over Italy, following a random sampling criterion. The questions of the survey can be seen in Appendix II.

Access to these city managers was only possible because of the partnership between the Department of Economics and Management of the University of Padova and Blum, a company specialized in innovation research and communication, and responsible for the organization of City Vision<sup>1</sup>. Blum

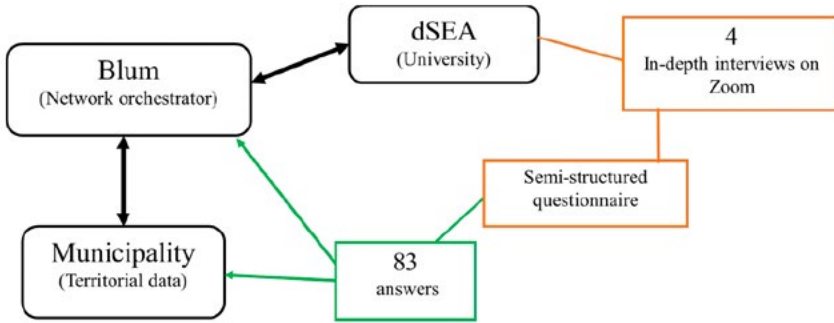
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<sup>1</sup> City Vision is the content and events platform that facilitates the exchange of experiences, needs and solutions for the smart transformation of territories. City Vision community includes public administrators, public administration officials, businesses, organizations, professionals, researchers, innovators. The activities of the "Osservatorio City Vision", which collects data from the municipalities, are pursued thanks to the support of Jakala Civitas.



acted as a network orchestrator connecting the university to the municipalities. This dynamic is synthesized in Figure 2.

Figure 2-Methodology flowchart



Source: Elaboration of the authors.

Most of the survey respondents (56%) were men aged 45 to 55 years. The highest level of education achieved by the majority of respondents was secondary school (37%), followed by a bachelor's degree in Economics (36%) or other Social Sciences. The most common profession among the respondents was civil servant, with more than five years of experience working in municipalities with populations ranging from 60,000 to 249,999 (30%). The remaining respondents were women (44%), aged 35 to 44 years (30%). The majority of them had a master's degree, while some had a bachelor's degree in Arts or other Humanities (23%). Administrator was the most frequent role (69%), with experience ranging from 3 to 5 years (34%) in municipalities with populations of 10,000 to 19,000. We conducted descriptive analysis on the survey responses, which is discussed in the following section.

## 4. Results and Analyses

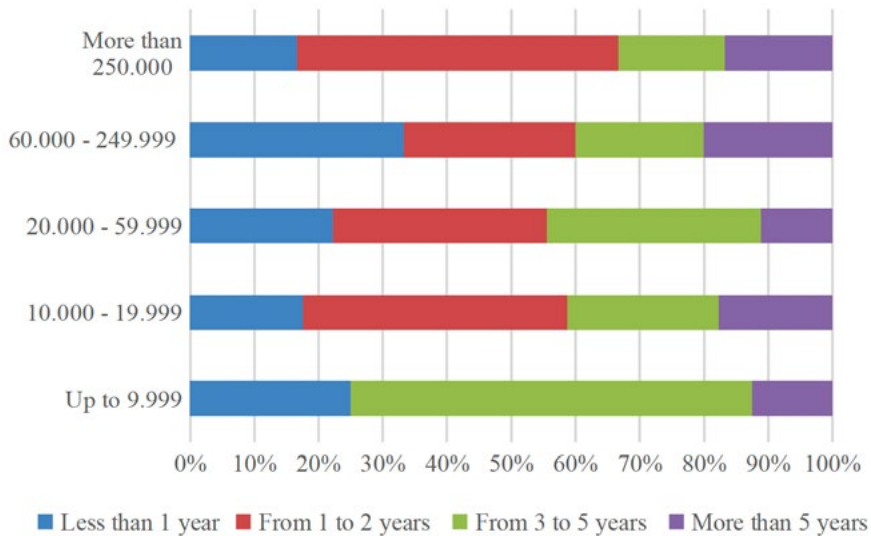
### 4.1. Profile of Smart Cities in Italy

The results of the survey indicate that a majority of the respondents hold a “more positive than negative” view (43.48%) towards smart cities, followed by a “definitely positive” view (31.88%). A smaller percentage of respondents had a “neutral” view (15.94%), while only a few held a “more negative than positive” view (2.9%). Interestingly, none of the respondents expressed a “definitely negative” opinion about smart cities, and 5.8% chose not to an-

swer. However, the resistance from the public administration towards implementing smart city projects may impact how citizens, businesses, universities, and other stakeholders benefit from it.

Most of the municipalities that participated in the survey reported having engaged in smart city projects for one to five years (59.42%), while a minority had less than one year of experience (17.39%). On the other hand, 17.39% reported having more than five years of experience. In general, municipalities have not been involved in smart city projects for more than five years, and larger cities tend to work on these projects for longer than smaller ones, as illustrated in Figure 3.

Figure 3-Smart cities projects time of experience and municipality size



Source: Elaboration of the authors.

When inquired about the utilization of NRRP resources for smart cities projects, the majority of respondents mentioned “Digitization and innovation interventions” (89%), followed by “Ecological transition” (54,69%), “Re-development of public buildings such as schools, judicial headquarters and public housing units” (48,44%), “Sustainable infrastructure” (46,88%), and “Urban regeneration to transform vulnerable territories into smart and sustainable” (32,81%). Upon further scrutiny, the most common themes within smart city projects were “Digitalization of public services”, “Data management”, “Dematerialization”, “Waste management”, “Energetic community”, “Implementation of electric vehicle charging spots”, “Bike sharing”, “Cyber-security”, “Car sharing”, and “Technologies for public safety”.

The following section highlights the primary challenges faced by the public administration in Italy to establish and promote sustainable and inclusive smart cities, considering the complexity of smart cities functions due to the involvement of diverse actors and the profile of the study respondents.

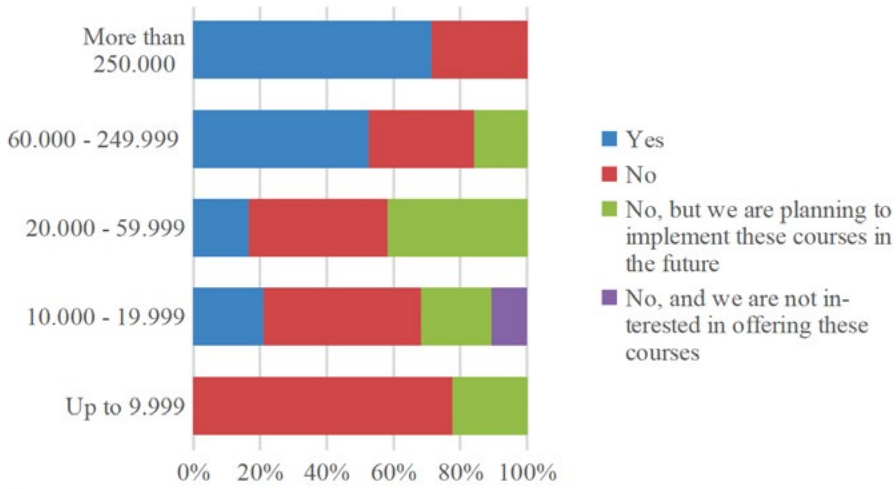
#### *4.2. Main Challenges of Smart Cities in Italy*

There are numerous challenges that need to be addressed in order to successfully implement a smart city. While some of these challenges can be easily identified, such as the lack of or decline in essential services for citizens, others may be more subjective. To gain a better understanding of these challenges, we conducted a survey asking participants to rate the importance of various issues. The issues were ranked in order of significance, from most to least important, as follows: “Public employees’ lack of sensitivity to the issue”, “Difficulty coordinating with other organizations on the ground (such as universities, businesses, and other public bodies)”, “Resistance from the municipality”, “Size of the municipality”, “Lack of economic/financial resources”, and “Bureaucratic complexity”.

Recognizing the importance of having a clear understanding of what constitutes a smart city, we inquired whether the municipalities we interviewed provided training courses on smart cities for their employees. Such courses could help workers comprehend the concept and be better equipped with information about innovations that may interest citizens and businesses. The responses we received were as follows: 42,19% answered no, 32,81% answered yes, 21,88% answered no but were interested in offering such courses, and 3,12% answered no and were not interested in providing them. In a subsequent analysis, we examined the relationship between the offer of awareness courses on smart cities for public administration and the size of the municipalities. We found that larger cities were more likely to be engaged in such efforts. However, small to medium-sized cities were also willing to address the issue of a lack of course offerings and were actively developing such programs, as shown in Figure 4.

Recognizing the significance of participating in networking groups, one key aspect we examined in the survey was the extent to which municipalities were involved in networks. The results showed that 48% of municipalities participated in a network, 43% did not participate, and 9% were unaware of this information. Thus, participation in a network may be linked to public employees’ awareness of smart city projects and the need to present these projects to a diverse range of people and companies that can contribute to their construction and development.

Figure 4-Smart city awareness courses interest by municipality size



Source: Elaboration of the authors.

Regarding networks, the relative importance of different actors in a smart city network was examined, with businesses ranked the highest, followed by universities, citizens, business accelerators or incubators, other public agents, public or private research centers, knowledge-intensive business services (KIBS), and trade unions and other professional associations in decreasing order of significance. Additionally, the size of the municipality was found to be correlated with its level of participation in networks. Larger cities were found to be more active in networking activities and more engaged with businesses, universities, citizens, and KIBS, as illustrated in Figure 5.

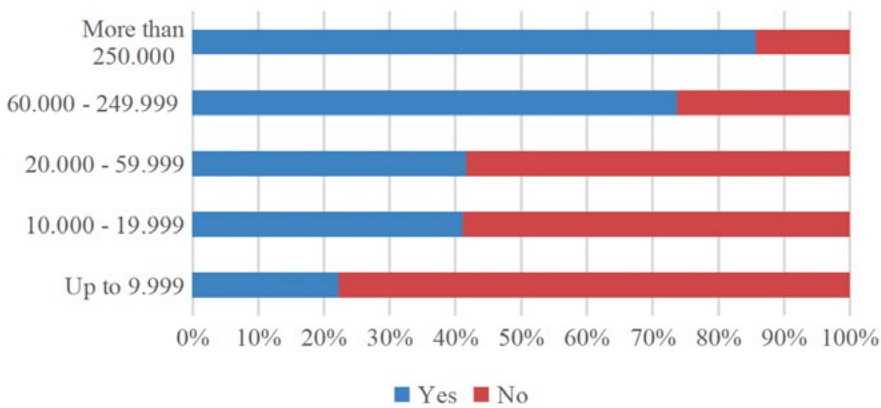
Figure 5-Network engagement actors for smart cities



Source: Elaboration of the authors.

Regarding the relationship between the municipality and its citizens, we inquired whether citizens' awareness of smart city projects contributes to their implementation. 81% of the respondents answered affirmatively. However, when asked if the municipality had tools for citizen interaction (online or offline) to participate in the co-creation process of smart cities, 53% responded negatively, 44% responded affirmatively, and 3% were uncertain. As with previous findings, larger cities are more active in communicating smart city services to their citizens than smaller cities, as shown in Figure 6.

Figure 6-Communication about smart cities services and municipality size

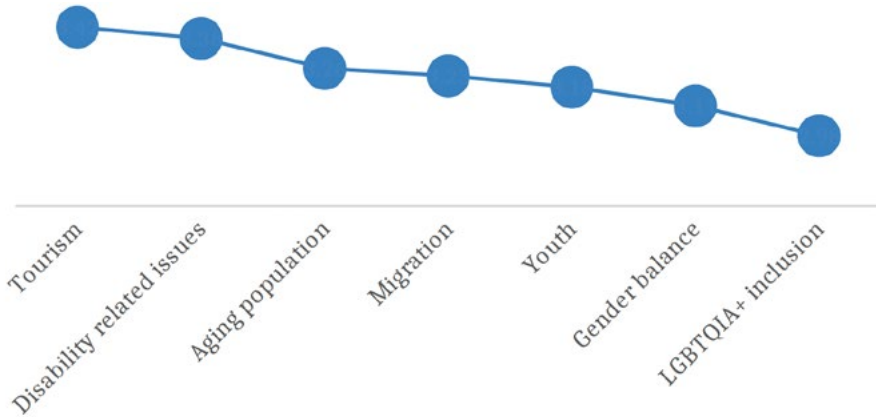


Source: Elaboration of the authors.

The municipality primarily utilizes its website (100%) to communicate information about smart city projects to the public, followed by social media (90,62%), email (31,25%), and other methods such as informative campaigns and billposting (28,12%), SMS (17,19%), letters (6,25%), and telephone calls (3,12%). Inclusive cities must employ diverse communication approaches to reach various segments of the population, including the elderly, foreigners, tourists, and people with disabilities, who require a special communication modality based on their needs. Therefore, it is critical to ensure that messages are conveyed in clear and accessible language.

Regarding the inclusivity of smart city projects, as previously mentioned, the usability of such projects depends on the readiness and behavior of their users. Figure 7 illustrates to what extent various targets are considered in smart city projects on a Likert scale ranging from 1 (least relevant) to 5 (most relevant).

Figure 7- Trajets considered in the smart city's projects



Source: Elaboration of the authors.

Most projects seem to prioritize tourism, likely due to its economic benefits. However, this approach does not necessarily promote inclusivity for all the diverse socio-economic groups that make up a city. Additionally, as indicated in the literature review, safety is a key aspect of achieving smart cities. Thus, it is crucial that the implementation of technological solutions by municipalities considers the varying profiles of citizens.

According to Seyranian et al. (2008), individuals from ethnic minority backgrounds have different experiences when living outside their hometowns, which could impact how they are integrated into the local society. Currently, Italians make up 23.8% of the total population, with this number projected to rise to almost 19 million (34% of the population) by 2042, according to Istat (2022). In addition to the Italian population, other social profiles, such as foreigners, who make up 8.5% of the population (Istat, 2022), are crucial for the workforce and paying taxes, thereby sustaining the economy, and ensuring Italy's position as one of the world's major economies and its high quality of life.

Children and young people make up an important and often overlooked demographic when it comes to the development of smart cities. As the future generation, it is crucial for them to be equipped with the knowledge and skills to navigate new technologies, particularly those that promote environmental sustainability. By exposing them to the concepts of smart cities early on, they may be more likely to become professionals with a keen interest in developing innovative solutions to these challenges.

## 5. Conclusions

After collecting and analyzing some original data from smart cities in Italy, it became apparent that certain areas, particularly sustainability and social inclusion, require further development. Despite this, it is evident that smart cities have a significant socio-economic impact, particularly in expanding technological products and services aimed at improving the quality of life for citizens. All members of smart city networks can benefit from this.

The main challenges faced by smart cities in Italy indicate that the public administration needs to increase its investment in internal and external communication to coordinate better efforts towards achieving sustainable smart city goals and engaging with its users. This would entail providing citizens with greater access to services oriented towards sustainability and sharing, such as shared mobility systems, local production of green energy, digitization of bureaucratic services, more efficient urban management, and sustainable urban solutions.

In smart cities, businesses can develop and provide technologies that improve energy efficiency, reduce waste, and promote sustainable practices. They can also offer services and solutions for better transportation, such as electric vehicles and ride-sharing services, or for managing the flow of people and goods in the city. Additionally, businesses can contribute to developing smart city infrastructure, such as the deployment networks, sensors, and other Internet of Things (IoT) devices.

Our results suggest the importance of the diffusion of a culture oriented to innovation, especially open innovation, which is necessary to create the preconditions for an intelligent transition. Businesses can collaborate with governments and communities to design and implement smart city projects. By working together, they can bring diverse skills and perspectives to the table and help ensure that smart city solutions meet the needs of all stakeholders. This cultural transformation requires the development of specific competencies and skills in people employed by public administration, which might be reached by creating *ad-hoc* training programs in collaboration with universities and other high education providers. Additionally, businesses can provide employment opportunities and contribute to the city's economic growth.

Future research could explore why some municipalities consider the smart city advent more negative than positive or neutral. This may explain if there is any interference from decision-makers about smart city projects or if it is a position reflected by the population. It is crucial to consider the heterogeneity of the needs of different public administrations, which are influenced

by the size and the availability of resources. The one size fits all solution does not apply.

In conclusion, we suggest researching effective interaction between the municipality and citizens and between citizens, developing forms of co-creation based on existing or new digital platforms that allow stakeholders to participate in smart cities projects, such as crowdfunding or crowdsourcing, or a combination of the two. Exploring participatory methodologies, such as ethnography, netnography, participative exploration, focus groups, and experiments, as tools for smart city development focusing on citizen involvement could create a more inclusive, fair, respectful, and environmentally sustainable smart city. A final recommendation to policymakers is to look at territorial development alongside an ecosystemic perspective, which enables the creation of networks of relationships to support the digital and ecological transition of the municipalities.

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## **Appendix I**

- (1) What are the main challenges to making (CITY NAME) become a smart city?
- (2) Is there a network (network) to articulate smart cities solutions for the (CITY NAME)?
  - 2.1 How is the participation of companies in the development of smart cities
  - 2.2 How is the participation of business accelerators and incubators in the development of smart cities?
  - 2.3 How is the participation of universities in the development of smart cities?
  - 2.4 How is the participation of citizens in the development of smart cities?
- (3) Do civil servants know what smart cities mean?
- (4) Are there training courses on smart cities for civil service employees?
- (5) Do you know that the National Recovery and Resilience Plan (NRP) dedicates funds for the development of smart cities?
- (6) What are the main bureaucratic difficulties in developing smart cities?
- (7) Is there resistance from key stakeholders in the area in embracing the transition to smart cities?

## **Appendix II**

- What is your opinion on smart cities?
- How many years has your municipality been working on the topic of smart cities?
- What is your role in the design/implementation of interventions to make your municipality a smart city?
- On what lines of projects dedicated to smart cities is your municipality active?
- Express with a rating from 1 (absent) to 5 (high) the presence and weight of the listed obstacles in the implementation of smart city projects in your municipality.
- Do public administration employees know what is meant by a smart city?
- Does the municipality organize smart city training courses for public administration employees?

- Does the age range of civil servants interfere with the acceptance and development of smart cities projects?
- Is it necessary to have professionals in the public administration who are sensitive to environmental and ecological issues for the development of smart cities?
- What training is preferable for civil servants employed in the development of smart cities?
- Are the managers and technicians involved in the transition to smart cities mostly women or men?
- Is the city administration ready to use PNRR funds for the transition to a smart city, investing mainly in:
- Is your municipality included in a network (network) that facilitates smart cities solutions?
- How do you assess the participation of the following actors in the implementation of smart cities projects?
- Has your municipality equipped itself with interaction tools (online or offline) for citizen involvement in the smart cities co-creation process?
- Indicate on a scale of 1 (not at all) to 5 (very much) to what extent smart cities development projects take into consideration the needs of:
- On a scale of 1 (absent) to 5 (high) what is the level of awareness of citizens regarding the projects already implemented on smart cities.
- In your opinion, does citizens' awareness of smart cities projects contribute to their implementation?
- What channels does the municipality use to communicate smart cities initiatives to citizens?
- For which administration does it serve?
- Please indicate approximately the number of inhabitants of the municipality in which you serve.
- What term do you use most when you want to refer to municipalities/cities that invest in digital innovation, environmental sustainability and social inclusion?
- What is your position in the administration in which you serve? We kindly ask you to specify the type of assignment by entering a note in the comments space.
- How many years have you held this position?
- How old are you?
- What is your gender?
- What is your highest level of education?
- What kind of education do you have?