

Smart small villages conceptualization based on the capabilities co-elevation for smart citizens

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Abstract. Smart Cities represent a new paradigm, a new smart and sustainable urban model that is empowered by increasingly sophisticated technologies applied in various sectors of city ecosystem to enable actors to co-create value. The main actors to be engaged in this transformation process are the citizens who in turn can represent multiple actors simultaneously within the urban environment and are actively involved in economic, social and political life. For this reason, this conceptual paper aims to point out the effective smart city patterns enabling factors. This topic can be very issued in small towns where there are numerous structural, cultural and demographical barriers that inhibit their use from every day-life to urban settings of an increasingly digitized Public Administration. After framing cities as smart service systems and given the issues regarding the citizens' predisposition and ability to use technologies, with effects in terms of value co-creation, smart citizens and capabilities co-elevation have been outlined as drivers. An illustrative case involving a smart tourism app (PayTourist) in a small town in Southern Italy (Castellabate) is proposed to outline the factors that influence the technology acceptance by citizens and the ways to foster a capabilities co-elevation path. It would be appropriate for scholars and practitioners to adopt the service innovation roadmap to design and map the development of smart cities through the capabilities upskilling of actors involved.

1 Introduction

The term Smart City (SC) itself remains inherently vague, and consequently can be seen as a wide range of ideas, concepts and discourses [1]. Thus, there is no single model or definition that applies to everyone to frame a SC. In fact, there are different definitions, with attached conceptual variations obtained by replacing 'Smart' with alternative adjectives, such as 'intelligent' or 'digital', depending on which point of view is interpreted and some of the research in fact was done just to better clarify the term [2]. Albino, Berardi, & Dangelico [2] report multiple definitions of SC, disseminated by various authors over the years, from which it can be deduced that the concept is not limited to ICT deployment, but looks at the needs of people and the community, with the goal of improving their quality of life. It is precisely the various aspects of sustainability, creativity, social inclusion, and cultural development that determine the true notion of a SC [3]. Smart City represents a

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new paradigm, a model of intelligent and sustainable urban development and which aims to achieve a balanced sustainability in the dimensions that make up the city, thanks to the forward-looking use of digital technologies [4]. Concisely, the goal of SCs is to develop smart living environments, improve citizens' living conditions, automate city services and processes, develop open and transparent systems, and build smarter and more connected communities [5]. The focus then is to ensure that citizens' needs are met and that they are technologically empowered to influence the functioning of the city, following a citizen-centred, technology-driven approach to government. SCs could be also summarized in these terms: sustainable and livable city [6]. By Polese et al. [7], SCs are seen as systems based on participatory governance in which different actors address negative externalities through technological innovation, renewable energy production, the need for sustainable use of resources, and especially through information and communication technologies (ICTs). These are seen as a necessary condition for the totalizing growth of the city itself, as their use makes infrastructure components and services smarter, more interconnected, and efficient, thus fostering social learning and citizen engagement [7, 8]. From the analysis of the scientific literature regarding smart urban models, it can be found that there is no single definition of the term that satisfies all stakeholders. The divergences that have arisen within the scientific community are to be found in four main points [9]. The first concerns the role that digital technologies play in the transformation of a city into a smart urban context. Indeed, one part of the scientific community asserts that digital technologies are the only factor to be considered to initiate a proper transformation toward a smart urban model [10-12]. These authors directly and indirectly emphasize the role of technologies as a defining characteristic of SCs. The second part of the scientific community considers technology as a mere tool and that other much more key factors such as environmental and social factors should be considered [13, 14]. This approach emphasizes more the humanistic aspect and places more emphasis on social capital as a crucial aspect of societal and city change. The third line-up, on the other hand, it considers the possibility of creating intelligent collaborations between all stakeholders in a city and between humans and computers from a vital systems perspective [15-18]. SCs actors in this case are seen as nodes in a network necessary to produce benefits and sustainable development of the urban context. Finally, the fourth viewpoint is the organizational and managerial viewpoint according to which there can be no technological innovation, sustainability and environmental care, and smart transformation without a high degree of control and management of systems. From this viewpoint, SC is seen as a multidisciplinary domain that can increase efficiency in connecting institutions, services, citizens, resources, and processes [19-21]. However, SCs are ultimately heading in the direction of a human-centric approach [22]. Other authors have dabbled in the creation of research and articles about SCs in other industries, including tourism, health care, governance, industry, and education. The common thread in these is the change of society and the conventional paradigm for restructuring and re-designing complex systems toward a smart perspective [8, 23-29]. Following the numerous definitions, a model has been created to aid understanding which aims to condense the elements that hypothetically make up the notion of Smart City according to a holistic perspective capable of allowing policymakers to challenge and manage environmental changes [30]. This model provides an overview of a Smart City's ecosystem, which includes the following six dimensions: Smart People, Smart Living, Smart Governance, Smart Environment, and Smart Economy [31]. However, in the literature the smart cities analysis from a technological point of view is widely diffused, less the role of citizens in enabling the smartness of cities and in fostering value co-creation phenomena through the use and acceptance of technologies, as well as the impact of new technologies in making smart small villages.

To fill this gap, this conceptual work aims to answer the following research question:

R.Q.: Which are the effective smart small village patterns enabling factors?

To address the research question, the role of citizens in making cities smarter will be investigated using the service innovation perspective with a specific focus on value co-creation, possible through capabilities co-elevation. To sum up the paper structure: the theoretical background is described (par.2) to outline the smart citizen profile in a smart small town intended as a smart service system (par.3); an illustrative case is then presented (par.4) and the paper ends with discussions (par.5) and non-conclusive considerations (par.6).

2 Theoretical background

To carry out this research, service innovation according to the service research perspective [32, 33], with a specific focus on value co-creation, has been adopted to investigate the enabling factors of effective smart small village patterns. According to this perspective, innovation, through the creation, renewal, and transformation of pre-existing knowledge [32] provides new solutions for new or existing problems and new value propositions [34]. Innovation, understood according to the service ecosystem approach [35], does not occur when a new product, or a service, is introduced into a market but when this favors changes in institutional arrangements and their institutionalisation [36]. Innovation takes place in a network of actors who integrate their resources to co-create value [37]; Helkkula et al. [38] proposed a value-focused service innovation perspective, according to which innovation occurs thanks to the integration of four archetypes: output-based, process-based, experiential-based, and systemic, with different effects in terms of value co-creation. Following this approach, it is also necessary to revise the role of new technologies, understood as key levers to favor the dynamic integration of resources between the actors based on the active remodelling of institutions and as strategic tools to improve the value co-creation [39], considering that value co-creation is a phenomenological construct deriving from the experience of the subjects in a specific social context [40]. Value co-creation therefore becomes a fundamental concept in the debate on innovation. According to Service Science, Management, Engineering and Design [41, 42], the correct unit of analysis to frame the service exchange is the service system [43, 44], understood as a configuration of resources, including people, information, and technology, connected to other service systems through value propositions. Interactions and integrations of resources take place within and between service systems that allow value co-creation [45].

Among the more recent conceptualizations of service systems there are smart service systems in which big data analytics have been used to generate information and automate operations that enhance the potential for co-creating value for people in service systems [46]. A smart service system is a service system strongly linked to innovation, as only thanks to the data received and processed is it able to learn and improve its response to future problems. It is also strongly human-centred, as people within the system generate and exchange knowledge, skills, and value. Smart service systems are characterized by continuous interactions mediated by technologies [47], such as analytics, cognitive and human systems on which service innovation of smart service systems, that enables value co-creation, is based.

Value co-creation can occur through the capabilities co-elevation, but this requires practicality and continuous improvement of skills [48]. Individuals, companies, universities and regional governments and nations can create Service Innovation Roadmaps to undertake effective paths of service innovation [48]. This tool could allow responsible

entities to learn and achieve value co-creation through capabilities co-elevation, as the goal is to stimulate them to become not only smarter service systems but wiser service systems by implementing better future versions of themselves.

3 Smart citizens in smart small towns intended as smart service systems

The smart city approach is not only for large cities with more resources but can also be used in smaller communities in which there could be smart growth starting with their own citizens [49]. Smaller towns appear to benefit greatly from the technology, but in general, they often lack key infrastructure [50]. A city without physical infrastructure or connectivity is at a disadvantage for smart transformation as these are necessary to enable technologies to fit with citizens' needs [51, 52] and citizens to exchange information in real-time and self-regulate, avoiding potentially dangerous situations [53] and modifying their own behaviours. In this regard, smart small smart villages are analyzed in this work as smart service systems, as this construct allows the exploration of the active involvement of people who, thanks to human-computer interactions, can co-create value and innovative solutions [54]. The new technologies favor the exchange of resources and co-learning, so they can be understood as facilitators of the involvement of actors who populate these smart contexts [55]. Given that smart service systems are human centered, it can be argued that technology is the basis of a smart service system, but citizens are at the center [56] and often technology is not understood by citizens, especially in small towns. For this reason, policymakers should implement information and mediation mechanisms with the sole aim of achieving technical inclusiveness as a prerequisite for inclusiveness tout court [57] and lay the foundations for co-creative city-making in which citizens become active co-makers through the use of empowering technologies [58]. Such a condition, which stimulates active citizenship, would lay the foundations for value co-creation increasingly central to the emerging trends in the literature on smart cities. Smart urban contexts can be understood as smart multidimensional systems capable of transforming themselves and generating innovation and social changes through bottom-up collaboration between users [54], which is why in order to understand how smart a city really is, it is necessary to understand how much there are interactions between the actors aimed at value co-creation, which presupposes an active and central role of the consumer, which in this case translates into smart citizenship based on a citizen acting in the community in which he lives and works [59]. Some studies even believe that the territory itself should be understood as an active resource and actively participates in the co-creation of value through interactions with other actors such as businesses, inhabitants and tourists [60]; an adequate combination of activities carried out by different actors, such as administrators, citizen-users, technology and other actors involved in social life, aimed at the co-creation of value, leads to better performances in the urban sector [61] and allows them to achieve a sustainable and resilient city [62]. In small towns, such active citizenship is difficult to pursue due to the various factors that characterize them, such as population ageing, desertification, lack of infrastructure and digital divide, however, the value perception of the experience that can be enjoyed through technology appears to be an enabling factor to foster the adoption of technology [63]. Currently, research on small and smart villages has focused on applications concerning cultural heritage management [64], smart heating [65] and lighting systems [66]. The focus of smart city development in small Finnish towns studied by Ruohomaa et al. [67] is composed of shared e-bikes (smart mobility), waste management services (smart environment), and robots in education and elderly care (smart life). Finally, Zavrtnik et al. [68] underlined the importance of communities in the development of the

small town and illustrated how sustainability for the future can only be achieved through the active participation of the community and, therefore, of people.

4 Illustrative case

4.1 Context of study: Castellabate, Italy

We enrich the debate by presenting an illustration: Castellabate, a small Southern Italian town with a strong tourist vocation. Castellabate is a small town in the province of Salerno, southern Italy, with a relatively big area (37 km²) drenched by the Tyrrhenian Sea, with various hamlets, and a medieval historic centre, that is considered one of the most beautiful villages in Italy. It was chosen in 2010 to host the Italian version of the French film "Bienvenue chez les Ch'tis": "Benvenuti al Sud" (Welcome to the South).

Table 1. Accommodations in Castellabate. Source: authors' elaboration from municipality data

Type of accommodation		Tot.	%
Apartments		902	84,2
Hotels	<i>1-star</i>	1	
	<i>2-stars</i>	1	
	<i>3-stars</i>	13	
	<i>4-stars</i>	11	
	Tot.	26	2,4
Guest Houses		50	4,7
Bed & Breakfasts	<i>1-star</i>	72	
	<i>3-stars</i>	2	
	Tot.	74	6,9
Agrotourism		3	0,3
Resorts	<i>3-stars</i>	1	
	<i>4-stars</i>	2	
	Tot.	3	0,3
Camping	<i>1-star</i>	5	
	<i>3-stars</i>	2	
	<i>4-stars</i>	1	
	Tot.	8	0,7
Widespread hotels		1	0,1
Rural tourism		2	0,2
Residences		1	0,1
Faith home		1	0,1

Given the roughly 12 kilometres of shoreline, the pure seas, the untainted landscape, the history, and the stories dating back to ancient Greece, it is inevitable that the economy depends heavily on the tourist sector and the other industries it creates. Bathing, nature, and boating are thus the three basic types of tourism. Due to this same reason, the town has about 8,000 residents and up to 1071 routinely assessed tourist-friendly lodgings, which, along with "second houses," more than treble the population during the summer. Using the primary data that the tourism bureau gave us, we can affirm that most of them (84%), as seen in Table 1, are Apartments (houses, homestays, or villas), which are only given by locals to host visitors throughout the summer season. Therefore, most of the citizens are engaged in seasonal activity, and very few are involved in entrepreneurial ones. The 11% of facilities is made up of bed and breakfasts and guest houses. Hotels make up just 2.4 percent of the buildings, primarily 3- and 4-star ones. In addition, 2% of all recognized kinds include resorts, camping, agrotourism, rural house, widespread hotel, faith home, and residence. Therefore, from a multi-actor perspective [69, 70] all practitioners in this case are also citizens, taxpayers, and actively engaged in the political and economic life of the city.

According to reports from the National Institute of Statistics (2020) the citizens of this small city are increasingly older and have low schooling on average. In this municipality, in fact, the population over 65 years old is about 24 percent of the total, with an old-age index of 192.86% out of an Italian average of 183.3 [71]. Migration of younger people is very frequent in this municipality and, in addition, an increase in residences for seasonal purposes only, that is, people who buy homes but live elsewhere during the year, thus accentuating depopulation, which, however, is also small in this municipality compared to other neighboring rural areas. This small city does not yet have an integrated ecosystem of technologies that would enable it as a Smart Cities, but along with the slow digitization of public administration, this municipality uses technology to regulate and analyze tourist flows starting with the hospitality sector.

4.2 Tourism technology for Smart Cities: PayTourist

Every property in Castellabate, regardless of size, has been encouraged to voluntarily register on an online platform for free starting in 2019: PayTourist (PT). It is practical, totally devoted to lodging proprietors and managers, and closely collaborates with the Tourist Office. The project, whose tagline is "Tourism, Innovation, and Smart City," has been certified by the Digital Italy Agency, registered as a patent with the Italian Ministry of Economic Development, and is held by Kitesun Company. PayTourist is an easy-to-use digital platform system that engages many actors within the urban ecosystem as depicted in Fig.1. PT enables owners and managers of lodging facilities to carry out the fundamental tasks for the management of tourist flows, including: guest registration in connection with the State Police portal; automatic communication with Italian National Statistical Institute (ISTAT) and the Revenue Agency (Italian Agenzia delle Entrate); generation of models for tax return purposes; and generation of receipts for the payment of tourist taxes, which are paid monthly to the municipality with the integration of the Italian online payment system for Public Administration (Pago PA). Even those who do not have their own management system, which comprises the great majority of city residents and businesses, can benefit from these characteristics. And instead, people that have other technologies can combine their systems using API linkages. With effect from 2021, PayTourist will offer customized, verified public profiles of hotels that are available to customers seeking for accommodation. Without commission, the tourists may book directly, contact, and check availability, and give feedback on both the facility and the city they visited. However, the municipality has regulated the census and mapping activities first and foremost by requiring all lodgings to

register on the platform. The Government can utilize this platform to: increase tourist tax collection and allocate funds for promoting tourism activities; automate collection and verification processes; generate reports for all assessment activities; standardize fulfillments for lodging facilities; monitor tourist flows in the area in real time; and send them communications of all kinds and newsletters. Additionally, the platform's intelligence technology finds online listings and locates facilities by cross-checking data to undermine the underground economy's and abnormalities' infrastructure. It is a high-tech device designed specifically for the tourist industry and intended for smart cities. Municipal organizations can so benefit from financing and resources provided by the EU.

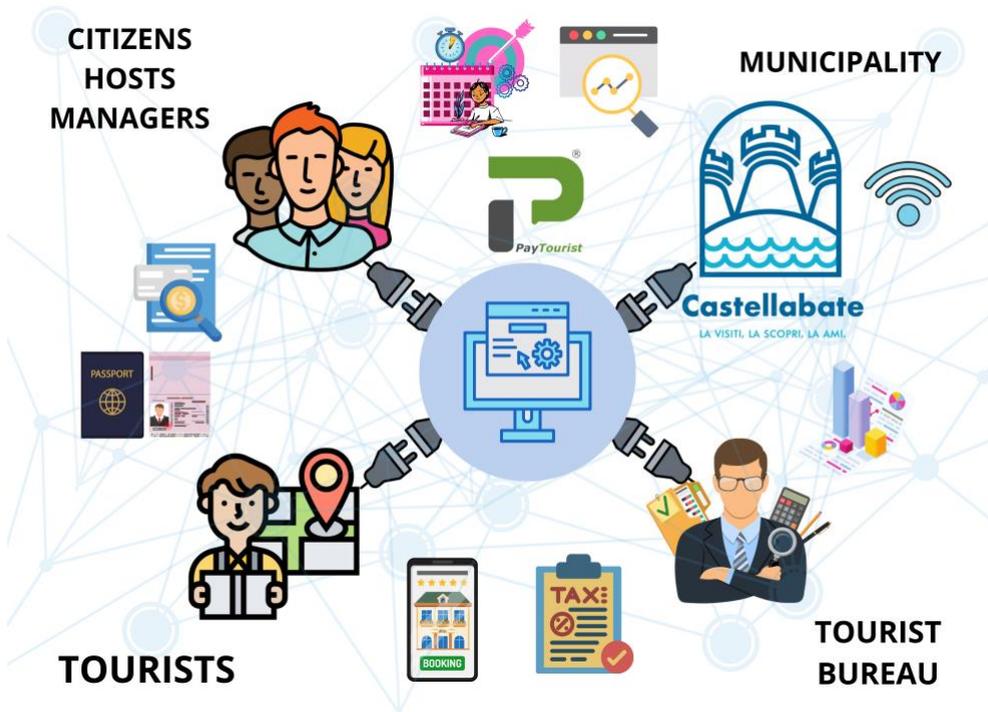


Fig. 1. The multi-layered setup of smart urban ecosystem augmented by PayTourist.

Through an interview with the tourism office of the municipality, it was found that about 15% of citizens who manage a property used for tourist hospitality do not know how to use this software and that they are helped themselves by the municipal employee. In addition, thanks to the patenting company's primary data, we can indicate that citizens who use it do not use the platform's customer service very often: between September 2021 and September 2022, only 76 tickets were processed with 38% positive reviews with comments, 59% positive reviews without comments, and only 3% negative reviews without comments. Thus arises the need for both the research, the municipality, and the patenting company to understand the needs and factors that influence the degree of adoption and acceptance of this type of technology within a small town such as this.

5 Discussion

The utility of infrastructures and technologies for smart cities depends on their use by the beneficiaries [72], in fact, the development of citizen-oriented smart cities requires effective

technological acceptance and implementation [73]. And this is even more significant if we consider that, according to the service research approach to innovation, new technologies are considered useful drivers to favor the integration of resources between actors, functional for the remodelling of institutions, with the aim of improving co-creation of value. After framing small towns as smart service systems, it is necessary to understand what the levers can allow the actors to design effective models. Considering that technologies, such as PayTourist in Castellabate, are levers to favor the co-creation of value, small villages, as smart service systems, can be characterized by continuous interactions mediated by technologies, on which the service innovation of intelligent service systems is based, that allow for the co-creation of value. However, value co-creation, which can be streamlined by technologies and the interactions enabled by technologies, can happen through the co-elevation of skills and continuous improvement of skills. For the development of technologies to be applied to the urban context, it could therefore be useful to use the Service Innovation Roadmap [48], which would enable accountable entities to learn and achieve co-creation of value through co-elevation of capabilities. This could be useful to understand through which methods, a small town, understood as a service system, can not only be smarter but also wiser and the better future versions of itself. In the same way, citizens involved in an innovative path can equally aspire to become not only smarter but also wiser and the best future version of themselves. A roadmap understood here as a new institution, capable of stimulating and spreading a service innovation, created by the actors involved and shared among them, would allow for the monitoring and stimulation of a capabilities co-elevation through a common understanding according to the principle, therefore, all the actors are to be understood as integrators of resources and potential co-creators of value.

For this reason, to answer the **R.Q.** we can say that smart small villages enabling factors are smart citizens and the capabilities co-elevation. For a city to be smart, users must accept the technology and must be able to use it correctly. The service innovation perspective applied to the smart city and in particular the roadmap designed to enable entities learning for service innovation, allow for the design of innovative paths, applied in this case to cities, created through a capabilities co-elevation of the actors who should thus be better inclined to value co-creation and therefore more and better prepared for the use of the technologies that make up a smart city.

5.1 Non-conclusive considerations, implications, and limitations

To sum up, successful acceptance and adoption of technology is essential to building citizen-centered smart cities. Infrastructure and technology for smart cities are meaningless if the people who are intended to benefit from them do not use them or do not know how to use them [73]. An analysis aimed at investigating the acceptance of technology by citizens would not only allow scholars and operators to understand the strategies to enable the use of technology within smart cities to manage transformations and guide citizens' behavior [74], but it would also allow for the design of smart city models capable of facilitating the integration of resources as an opportunity to further promote value co-creation processes [75]. In order to see attitudes and trends surrounding the transformation of their small towns into smart, sustainable, and livable cities, we therefore need to look for a huge amount of citizen engagement and participation, as well as their level of trust in institutions. For these reasons, considering a small town as a smart service system, we can argue that it is necessary to stimulate active citizenship, which would guarantee smart citizens. The service innovation roadmap could be a useful tool to improve the technology acceptance by citizens, favoring an upskill of all the actors involved through a capabilities co-elevation

path thanks to a common understanding. It would be appropriate for scholars and practitioners involved in the design and study of smart cities to adopt this perspective.

The main limitation of this work lies in its purely conceptual nature, for which there is no empirical evidence to support such insights. However, this qualitative and exploratory study with illustrative case is only meant to be a first starting point that moves future research toward an in-depth quantitative analysis that should study the factors that influence the degree of engagement and acceptance of this technology using the models mentioned above. By doing so, it is possible to bring empirical results, contributing greatly to the scientific debate in the Smart Cities field, and particularly regarding small cities that are not much studied. Then the research can be extended to other small cities and see if there is a pattern that unites them so that it can be theorized in the field.

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