

## **Smart city management and Service System: Towards Social Innovation**

**Background.** In contemporary scenario, in order to meet the existing and future needs of citizens and territory, cities have to be up to the times, focusing on innovation that contribute to making them more dynamic and interactive. These changes in the urban areas give birth to the so-called *Smart Cities* (Holland, 2008).

Deriving from an ICT-based approach, the adjective “smart” indicates an efficient, inclusive, modern, sustainable city. In fact, smart city means a systems which includes a series of urban planning strategies favored by the use of ICTs for the optimization of public and private services, in order to relate the physical infrastructures cities with human, intellectual and social capital of those who live in it (Naphade et al., 2011).

The widespread use of new technologies for the communication, mobility, environment and energy efficiency favored the process of economic and social development of a city, fostering the social innovation, improving the quality of life and meeting the needs of citizens, companies and institutions (Greco and Bencardino, 2014).

For this reason, the importance of smart city has grown and the concept has become pervasive both in the political scene and in literature (Cocchia, 2014; Meijer and Rodriguez Bolivar, 2016; Arasteh, 2016), where numerous researches tried to offer innovative insights to smart city management, promoting different point of views. On the one hand, there are studies that affirm that innovation can only be achieved through the main role of technologies (Olso, 2005; Caraglio and Del Bo, 2009); on the other hand, there are studies that focus on the importance of social variables, considering the promotion of the human capital the only way to reach the innovation (Berry and Glaeser, 2005).

The presence of contrasting studies highlights the need to rethink the models of socio-economic development, considering a holistic vision to the achievement of social innovation.

According to a holistic vision, smart cities can be seen as an integrated system of resources based on partnerships and collaborative strategies whose members interact with each other in order to co-create and produce innovation through the acquisition of new know-how.

Following this line of thinking, the concept of smart city is in line with the recent service theories, such as Service Dominant logic (S-D logic, Vargo and Lusch, 2004; 2008; 2011) and Service Science, Management, Engineering, and Design (SSMED or Service Science, Maglio and Spohrer, 2008), and can be compared to the *Service System*, the most appropriate organizational model to support the emergence of value also in public service, according the S-D logic and the SSMED. The service system is a dynamic value-creation and innovation network in which people and organization share resources and information through the main role of the technology (Maglio e Spohrer, 2008). The synergic combination of these elements produces exchange of information and resources that promotes value co-creation (Maglio et al., 2006), and in long run fosters innovation (Polese et al., 2018a, 2018b).

Although it seems that many similarities between the concept of smart city and the concept of service system exist, few studies approach the smart city through the lens of the recent service theories, which adopt a holistic vision to the service management and involve significant implications in terms of service management both in private and public (Gretzel et al., 2015).

**Purposes.** The work aims at filling the above-mentioned gaps, re-conceptualizing the smart city as a service system, in line with the SSMED (Maglio e Spohrer, 2008), which adopt a holistic vision to the service management. A framework combining the drivers of the smart city and the key points of the service system is proposed. The proposed model is characterized by a reticular configuration, within which the adequate variety of cognitive knowledge guarantees the harmonization with other network resources. The development of collaborative logics, resulting of continuous processes of cooperation between public decision makers and citizens, allows to multiply moments of value creation as a result of synergistic interactions. The network also involves citizens, as a system of

customers, with whom objectives, value categories and knowledge are shared and with which the engagement of users must be sought, as they represent fundamental partners in achieving the specific objective of value co-creation, in the short term, and social innovation, in the long term.

**Methodology.** Starting from a short literature review about the smart city and the service system, the research re-conceptualize the smart city according to a Service Science perspective.

First, are collected information about the drivers of the smart city. Afterward, is analyzed the role of every single driver and its interactions with the service system key point. Lastly, are identified the similarities between the service system and the smart city and are matched through an holistic approach. This allowed to re-configure the smart city as a service system, following the framework of Spohrer et al. (2012). Finally, a new framework is provided to better manage the dynamics underlying service management.

**Findings.** Findings show the interaction between the two entities analyzed: the smart city and the service system. The comparison between the drivers of the smart city and the key points of the service system brings out a series of common aspects between the two systems, that allows to configure the smart city as a service system.

The first aspect in common between the two systems is the overcoming of the internal verticalization of the administration, in favor of a landing towards a horizontal dimension of government that allows to understand in a unitary and harmonized way the different vertical functions (for example the sectors of smart energy, smart house, smart building, etc.) on the market. The overcoming of old management logics allows all the actors of the system to have equal rights (Parente and Petrone, 2010).

The second aspect in common is the organic and holistic approach to the reorganization of the territory and the context in which a company operates in general that allows to integrate, enhance and direct towards common objectives, solutions and interventions. To make this integration happen

it is necessary that all the resources within the city or the system enjoy equal rights and power and that they are placed on the same level. The resources exchanged by citizens take on the same role as those exchanged by organizations, for this reason it is possible to talk about democratization of the role of resources.

Lastly, the third aspect in common is the main role of ICTs, indispensable both in smart cities and in service systems, whose use generated e-government stands as a connecting point between the two concepts. From the moment the whole city becomes an integrated system of resources that interconnect with each other in order to co-create value, then the smart city can be seen in all respects as a service system.

**Conclusions.** The re-conceptualization of the smart city as a service system allows to analyze the smart city as a huge service system within which the integration of knowledge resources is available, thanks to the collaboration between organization and citizens. Knowledge exchanged is possible thanks to citizens engagement, that can be seen as a model to looking for (Ciasullo et al., 2016). The exchange is made efficient by the technology, which should be used as an accelerator of the co-learning processes between administrators and citizens (Parente, 2008; Parente et al., 2014). Smart cities develop cooperation frameworks and synergistic links between technology, urban development policies and the creation of user-oriented open innovation. Key elements of such a management model are the sharing and the access to different cognitive resources, the use of innovative policies to align technological development and social challenges and the establishment of open innovation models to create sustainable cooperation (Schaffers et al., 2011). In such a scenario, it is easy to identify the link between service systems and smart cities, represented by the increasingly decisive role of technology, which becomes transversal not only to the process of supplying a single service but also to the entire cooperation framework, which leads to an economic and social development that in the long run leads to social innovation. The ICT tools allow the exchange of systematic information flows and the effective management of resources within the

network system. Through digital technologies and the use of technological infrastructures and applications that connect the entire city, it is possible to connect organizations, social groups and companies located in different points of the territory (Anthopoulos and Fitsilis, 2010).

In both the smart city and the service systems, technology plays a fundamental role. In both cases, in fact, there is an integration of technologies, systems, infrastructures, services and skills within an organic network that is sufficiently complex for the emergence of new knowledge. The technology, in reality, is not an element like the others because it is transversal to the various components: technological innovation, as anticipated, is the means of intelligent service systems, not its purpose, since it is the indispensable prerequisite for enabling communication between the various parts. By connecting the actors of a network, the ICTs shorten the physical distances between them and thus streamline the times of any process. The technology acts as a facilitator for the creation of a new type of innovative environment that requires the balancing of creative skills, the creation of innovation-oriented institutions and collaborative networks. Considering that the whole city becomes an integrated system of resources that interact with each other in order to co-create value, then the smart city can be seen to all intents and purposes as a service system, which through strategies and ideas to social innovation. In conclusion, it can be stated that thanks to the integration of all the resources available within an urban area, deriving from the collaboration of the citizens themselves, it can be framed the whole city as a huge service system within which we can co-creates public value.

**Theoretical and practical implications.** The proposed framework highlights the systemic nature of both the smart city and the service system and proposes practical and theoretical implications for the management of public services.

As regard theoretical implications, the developed framework makes a contribution to managerial literature as it combines a holistic and systemic vision (Polese et al., 2011; Wieland et al., 2012; Pels et al., 2012), which places value co-creation and innovation as a coherent link between the

aspects of the two analyzed systems. Furthermore, the configuration of the smart city as a service system allows an enrichment of existing studies both regarding the smart city and the service systems.

With regard to practical implications, highlighting that ICTs foster value co-creation and innovation in smart systems, the work can aid managers to better elaborate strategies for optimizing knowledge exchanges and information flows in the whole process of service provision; supervising and improving the emersion of co-creation in real time; increasing service effectiveness at each stage. The creation of an integration model between the service system key points and the smart city offers organizations a tool for better service management. Moreover, the optimization of value exchanges between citizen and organization could help managers to modulate the offer based on the needs of consumers and to conceive new ways of delivering services aimed at stimulating the involvement of users at each level. The public decision makers could conceive practices aimed at encouraging citizen involvement.

**Originality.** The originality of the work lies in the application of a new holistic perspective to smart city conceptualization, highlighting ICTs influence on user's knowledge and on service innovation, that can bring to value co-creation in short term, and social innovation in long term. Moreover, the application of service theories, and particularly of the Service Science, as a lens to re-conceptualize the smart city, allow the implementation of a systemic framework that highlights the systemic nature of both the smart city and the service system.

**Keywords.** Smart city, Service system, Smart city management, ICT, Citizen Engagement, Social Innovation

## References

- Anthopoulos L., Fitsilis P. (2010) From online to ubiquitous cities: The technical transformation of virtual communities, in Sideridis A.B., Patrikakis C.Z. (Eds), *Next Generation Society: Technological and Legal*, vol. 26, Springer, Berlin, pp. 360-372
- Arasteh, H., Hosseinnezhad, V., Loia, V., Tommasetti, A., Troisi, O., Shafie-Khah, M., Siano, P. (2016). Iot-based smart cities: a survey. In *Environment and Electrical Engineering (EEEIC)*, 2016 IEEE 16th International Conference on (pp. 1-6). IEEE.
- Batagan, L. (2011). Indicators for economic and social development of future smart city. *Journal of Applied Quantitative Methods*, 6(3), 27-34.
- Bryson, J., Daniels, P., Warf, B., *Service worlds: People, organisations, technologies*, Psychology Press, Routledge, 2004.
- Caragliu A., Del Bo C., Nijkamp P. (2011). Smart cities in Europe. *Journal of urban technology*, 18(2), 65-82.
- Ciasullo, M. V., Polese, F., Troisi, O., Carrubbo, L. (2016). How service innovation contributes to co-create value in service networks. In *International Conference on Exploring Services Science* (pp. 170-183). Springer, Cham.
- Cocchia, A. (2014). Smart and digital city: A systematic literature review. In *Smart city*. Springer, Cham, pp. 13-43.
- Florida, R. (2002). *The Rise of the Creative Class: And How it's transforming work, leisure, community and everyday life*. New York: Perseus Book Group.
- Glaeser, E. L. (2005). Smart growth: Education, skilled workers and the future of cold-weather cities. Policy Briefs, Harvard University, John F. Kennedy School of Government.
- Gebauer, H., Edvardsson, B., Gustafsson, A., Witell, L. (2010). Match or mismatch: Strategy-structure configurations in the service business of manufacturing companies, *Journal of Service Research*, vol. 13 (2), 198-215.

Gretzel, U., Werthner, H., Koo, C., Lamsfus, C. (2015). Conceptual foundations for understanding smart tourism ecosystems. *Computers in Human Behavior*, 50, 558-563

Maglio, P.P., Srinivasan, S., Kreulen, J.T., Spohrer, J. (2006). Service systems, service scientists, SSME, and innovation, in *Communications of the ACM*, vol. 49, n.7, pp. 81-85.

Maglio, P.P., Spohrer, J. (2008). Fundamentals of service science. *J. Acad. Mark. Sci.*, 36, 18–20.

Meijer and Rodriguez Bolivar, (2016). Governing the smart city: a review of the literature on smart urban governance, *International Review of Administrative Sciences*, 82(2).

Nam, T., Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. In *Proceedings of the 12th annual international digital government research conference: digital government innovation in challenging times* (pp. 282-291). ACM.

Naphade, M., Banavar, G., Harrison, C., Paraszczak, J., Morris, R. (2011). Smarter cities and their innovation challenges, *Computer*, vol 44 (6), 32-39.

Osborne, S. P., Radnor, Z., Nasi, G. (2013). A new theory for public service management? To-ward a (public) service-dominant approach. *The American Review of Public Administration*, 43(2), 135-158.

Parente, R. (2008). *Co-evoluzione e cluster tecnologici*. Aracne.

Parente, R., Feola, R., Rassega, V. (2014). Smart grid technologies: the role of ICT based start-ups. In *ICSB World Conference Proceedings* (p. 1). International Council for Small Business (ICSB).

Parente R., Petrone M. (2010). Strategie di co-evoluzione nei sistemi locali innovativi. *Sinergie*. Fascicolo 83, Volume 28 - Settembre/Dicembre 2010. Pag.31-52.

Pels, J., Polese, F., Brodie, R. J. (2012). Value co-creation: using a viable systems approach to draw implications from organizational theories. *Mercati e Competitività*.

Polese, F., Botti, A., Grimaldi, M., Monda, A., Vesci, M. (2018a). Social Innovation in Smart Tourism Ecosystems: How Technology and Institutions Shape Sustainable Value Co-Creation. *Sustainability*, 10(1), 140.



- Polese, F., Troisi, O., Carrubbo, L., Grimaldi, M., Monda, A. (2018b) Technology in value co-creation experiences: how ICTs shape customer activities before, during and after delivery in smart tourism systems. In: Cantino, V., Culasso, F., Racca G., Ed., *Smart Tourism*, McGraw-Hill, Milano, 523-547.
- Schuler, D. (2002), *Digital Cities and Digital Citizens*, Digital Cities II: Computational and Sociological Approaches, Springer LNCS , Volume 2362, pp. 71-85.
- Schuurman, D., Baccarne, B., De Marez, L.; Mechant, P. (2012). Smart Ideas for Smart Cities: Investigating Crowdsourcing for Generating and Selecting Ideas for ICT Innovation in a City Context. *Journal of Theoretical and Applied Electronic Commerce Research*, 7 (3), 49-62.
- Spohrer, J., Piciocchi, P., Bassano, C. (2012). Three frameworks for service research: exploring multilevel governance in nested, networked systems. *Service Science*, 4(2), 147-160.
- Testa, P., Dominici, G., *Vademecum per la Città Intelligente*, Edizioni Forum PA, 2013.
- Vargo, S.L.; Lusch, R.F. Evolving to a new dominant logic for marketing. *J. Mark.* 2004, 68, 1–17.
- Vargo, S.L.; Lusch, R.F. Service-Dominant Logic: Continuing the Evolution. *J. Acad. Mark. Sci.* 2008, 36, 1–10.
- Vargo, S.L.; Lusch, R.F. It's all B2B . . . and beyond: Toward a systems perspective of the market. *Ind. Mark. Manag.* 2011, 40, 181–187.
- Wise, S., Paton, R.A., Gegenhuber T. (2012). Value co-creation through collective intelligence in the public sector, *A review of US and European initiatives*, vol. 42 (2), 251-276.
- Wieland, H., Polese, F., Vargo, S., Lusch, R. (2012). Toward a service (eco) systems perspective on value creation.
- Zygiaris, S. (2013). Smart city reference model: Assisting planners to conceptualize the building of smart city innovation ecosystems. *Journal of the Knowledge Economy*, 4(2), 217-231.