

Comparing Research Streams on Smart City and Sustainable City*

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Nowadays, the issues connected to the new configurations of urban contexts are gaining more and more space both in management literature and in city managers' agendas towards the conceptualization of "smart city". More recently, sustainability has acquired even more relevance in smartization interventions as a goal to reach in the long term. The pivotal role of sustainability led to a new perspective acquiring relevance, namely the "sustainable city" as a new way to approach to the resources' management of a city and to the implementation of services, both old ones and innovative ones. In order to investigate if the new topic could be considered as an evolution of the previous, the authors performed a multi-level analysis starting from a bibliometric analysis to investigate on the ties between smart and sustainable aiming to understand if these two topics are related from the scholars' point of view and which are the possible connections. A content analysis on official reports issued by 17 out of 30 industry players listed on the *Navigant Research Report 2014*, as they are involved in the most advanced smart city projects, is aiming to observe the connections between smart city features and each of the three dimensions of sustainability. The results from the first step of the investigations show that, as the labels previously examined, it is not easy to define this more recent conceptualization, because it is still hard to observe it from an all-inclusive point of view; following in the comparison between the "characteristics" of a smart city and the three dimensions of sustainability—economic, environmental, and social—the results led to consider the economic domain as the most relevant one when debating about sustainability.

Keywords: smart city, sustainable cities, sustainability, bibliometric analysis, content analysis

Introduction

Interest in ecological issues has being widely grown together with the increased awareness of the damages caused by the irrational usage of the available resources (Nichols & Williams, 2006), due to the processes linked to the globalization.

Indeed, starting from 70s, sustainability has become one of the hottest topics in the contemporary debate;

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the preservation of non-renewable resources is one of the main issues for the contemporary society. This is the reason why the attention of the international political and economic agenda over the last few decades has been focused on social and environmental problems even more than before, as a result of the ecological and social crisis (United Nations, 1972; Bruntland, 1987; United Nations, 1992; Cicin-Sain, Bernal, Vandeweerd, Belfiore, & Goldstein, 2002).

More in detail, one of the most significant events among the ones cited above has been the initiative of the United Nations (UN) World Commission on Environment and Development to publish a report—the so-called Bruntland report: *Our Common Future* (Bruntland, 1987)—proposing the first and most cited definition of sustainable development as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs, such guidelines to find a long-term equilibrium between ecological issues and social and economic development from a sustainability perspective.

Sustainability has become one of the hottest topics in the contemporary debate and the sustainable development has been depicted as one of the main goals pursued in the most of projects; indeed, each economic, social, and environmental effect is subordinated to an evaluation in order to verify local and global impacts (Epstein & Buhovac, 2014) in line with the global axiom of “think globally, act locally” (Senge & Sterman, 1992, pp. 137-150).

It is meaningful that, after the report realised by the World Commission on Environment and Development as the first step towards a sustainable perspective, lots of initiatives have been realized linked to the ecological issues showing the increased attention and interest of the global institutions and community.

The new sustainability perspective carried on the application of new actions performed on the basis of the “Triple Bottom Line” approach (Rogers & Ryan, 2001, pp. 279-289) that involves elements as environmental integrity, social equity, and economic prosperity (Chabowski, Mena, & Gonzalez-Padron, 2011).

More recently, a strongly detailed representation of the dimensions of sustainability has been proposed which described sustainability as a conceptualization identified in five fields (Enquist, Edvardsson, & Sebhatu, 2007):

- the ethical dimension, which refers to the objective to find a rediscovered equilibrium between the social and the economic development based on a moral relationship towards the protection of future generations;
- the social dimension, which refers to the equity among citizens;
- the “nature-philosophic” dimension, which refers to the awareness that the most available resources are vulnerable and limited and their preservation is necessary to ensure a suitable quality of life to future generations, in line with the bequest value proposed in economics ecology literature (Sutherland & Walsh, 1985);
- the economic dimension, which refers to the sustainable perspective in each economic process in order to ensure long-term self-sustainability through the practice;
- the legal dimension which refers to the importance and guarantee of human rights in all aspects of human life (Enquist et al., 2007).

In practice, referring to the economic sphere, sustainability is applied as corporate social responsibility (CSR) (Jones, 1980), hence a set of activities realized with the aim to reduce social and environmental impact and at the same time improve the performance, thanks to the suitable involvement of workers; the CSR practices could be identified as driving force for value creation through service-quality improvement in sustainable service businesses (Enquist et al., 2007).

Literature Review

The Sustainable City: Towards a New Configuration of Urban Contexts

Sustainability conceptualization has had its widest application through a set of tools useful to achieve the sustainable development. Such tools would find their own implementation in all the fields described in the previous paragraph.

One of the most discussed field of application of the conceptualization is management and governance of urban context (Schaffers et al., 2011) giving to sustainability a pivotal role in the new configuration of “smart city”. The relevance acquired by sustainability drives smartization process to consider the idea of sustainable development in defining the activities to be deployed as the main goal. Moreover, the meeting point between the urban contexts considered as smart and the idea of sustainable development drives to the new definition of “sustainable city” (Schaffers et al., 2011; Flint & Raco, 2012).

Although the conceptualization is complex and recently widespread, scanning literature (Flint & Raco, 2012) is possible to observe an approximate period of origin for the sustainable city (Flint & Raco, 2012); the necessity to apply sustainability perspective to the territorial development came out from the first big ecological crisis which characterized 1960s and 1970s. The global society for the first time acquired the awareness of the global environmental damages caused by the rapid industrialization together with the increasing irrational usage of natural resources deteriorating quality of urban life for many citizens because of pollution, urbanization, and the connected social problems. According to this, the sustainable urbanism was firstly considered as a way to plan and manage cities defining suitable processes and providing innovative systems.

A Brief Overview on Smart Cities

As introduced in the previous part, in order to reach the sustainable development and ensure a better quality of life and a suitable standard of living to the future generations, the global society is being shaped by urban governance and management with a sustainability perspective employing new technologies and innovative systems as tools to reach the goal (Nam & Pardo, 2011).

More in detail, the globalization process and the evolution of the social context have brought new and various elements in everyday life leading to the individuation of different urban configurations on the bases of the most relevant features.

As new configurations have been shaped, new definitions have been spreading to depict the cities. With the aim to describe the renewed shapes acquired by the local contexts under the engine of globalization, scholars, central and local institutions, and big corporations, lots of contributions have being offered and several definitions proposed (i.e., digital, intelligent, ubiquitous, wired, hybrid, information, creative, learning, humane, knowledge, and smart) (Dameri & Cocchia, 2013).

Referring to the above cited series of conceptualizations, as observed in previous studies, the long-lasting, more cited and more complete definitions are “digital city” and “smart city”. It is not easy to explain the differences between the two labels, as in the literature contributions and in the reports issued by institutions, a terminological confusion about these topics often emerges due to the participation of the same elements in various labels (Tregua, D’Auria, & Bifulco, 2014).

Anyway, when scanning contributions, it is possible to define the digital city as mainly shaped by technological features (Ishida & Isbister, 2000), while the smart city, often considered as an evolution of the first one, is a more complete and complex configuration that concerns all the aspects of everyday life, adding

the human features of city life to the contributions offered by technology (Caragliu, Del Bo, & Nijkamp, 2011). Hence, more in detail, digitalization process is essentially based on software infrastructure, mobile devices, sensors, and innovation systems, while smartization process considers the most important aspects of everyday life, such as transports, communication, energy savings, urban green areas care, reduction of air pollution, and local growth (Talen, 2011), from a sustainability perspective using information and communications technology (ICTs) as a support to improve city services also involving community (people, enterprises, organizations, and etc.) to lever on actors' participation (Bingham, Nabatchi, & O'Leary, 2005) in city governance and management (Bingham et al., 2005; Bifulco, Tregua, & Amitrano, 2014a; 2014b), on the basis of the "quadruple helix model" (Carayannis & Campbell, 2009) as depicted in the following lines.

The consideration of each aspect of everyday life is clearly illustrated through the model of Giffinger et al. (2007), as all the aspects are classified in six macro-categories defined as "characteristics" or "drivers"—smart mobility, smart environment, smart living, smart people, smart governance, and smart economy. According to Giffinger et al. (2007), the integration of all of them through the traditional and modern information and communication infrastructures, could lead to the sustainable growth.

According to the previous description, ICTs and community participation have a pivotal role in governance and management of new shapes of urbanism as depicted by the model known as "triple helix" (Etzkowitz & Leydesdorff, 2002), involving knowledge, entrepreneurship, and institutions. As it was disclosed before, there are two evolutions of the model, the "quadruple helix" and the "quintuple helix" (Carayannis & Campbell, 2009): The former introduces the civil society as the community of users that in the modern configuration of the city takes an essential part in the governance and management beside the local administrator becoming, at the same time, operators and users; the latter takes into account the natural environment as the context framing the interventions and even as something to be safeguarded when performing smart interventions.

In the following Table 1, the most relevant definitions about smart city have been collected with reference to the pivotal elements of the smartization process, namely sustainability and ICTs.

Table 1

Most Relevant Definitions About Smart City

Authors	Definitions
Caragliu et al. (2011)	When investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance
Giffinger et al. (2007)	A smart city is a well performing city built on the "smart" combination of endowments and activities of self-decisive, independent, and aware citizens

Purpose and Methodology

Purpose

In order to investigate the role of sustainability in smart interventions and the evolution of the new shapes of urbanism linked to the sustainable development perspective, the authors accomplish a double methodology, namely a bibliometric and content analysis, due to different reasons. First of all, the literature review performed gives evidence to a limited number of contributions about sustainable city, thus one more step of analysis can be helpful to achieve better insights. Moreover, the context of smart interventions is permeated by institutional

actors, so the opportunity to take into account their perspective was considered as interesting and this led the authors to perform a content analysis, too. Partnering a previous step of research with a content analysis is suggested (Kohlbacher, 2006), when data material (like reports in this case) emerged as interesting sources of information.

In addition, the two methodological approaches have a similar logic (Debicki, Matherne, Kellermanns, & Chrisman, 2009), as they focus on the most relevant issues, described as keywords in the analysis of literature contributions through a bibliometric analysis and as most frequent words in the reports to be investigated through a content analysis.

Following to this, authors proposed two research questions aiming to deep the analysis through the above described methodology:

RQ1: Which is the relationship between smart city and sustainable city according to literature contributions?

RQ2: What is the role of sustainability approach in smart city according to the official reports?

Methodology and Data Analysis

Bibliometric analysis. In order to answer to the first research question, a bibliometric analysis has been performed, due to the relevance and the novelty of scholars' contributions on smart and sustainable city. In detail, the authors chose an analysis based on literature as the evolution of both topics, as it is just partially implemented in empirical contexts.

As it concerns the sources and the selection criteria, the dataset has been built by considering contributions from all the different branches of science as several fields of research are directly linked to “smart city” and “sustainable city”, as depicted in the literature review; the information about documents have been collected from the database of “Web of Science—Core Collection”, as it is considered as the most reliable database when performing such a kind of investigation (Bremholm, 2004). The author selected the data through a query on the words “sustainable city” and “sustainable cities”, a set of 367 items (papers published on journals and books from 1991 to 2014) was created to start the analysis through software.

The software chosen to perform the analysis is BibExcel (Persson, 2008), as it leads to the chance to select among different kinds of method and to cross the results among them.

In order to perform the investigation on the literature contributions, the first step has been a co-words analysis, as this approach allows a focus on the connection emerging among the issues of different literature contributions starting from the keywords chosen by the authors when scanning Web of Science. The ties emerging as results will be useful to track the most relevant issues deployed around the central topic of sustainable cities and to track the relationships among them. Finally, the evidences from the software will be mapped through VosViewer (Van Eck & Waltman, 2009), a tool to switch from raw data offered by BibExcel to easily readable representations, as it allows to achieve a graphic representation of the results, known as density map.

Content analysis. An in-depth analysis has been performed with the aim to answer to the second RQ, and to complement the results arising from the bibliometric approach described above. Referring to the sources and the selection criteria, the dataset has been built by collecting official reports proposed by the 30 industry players included in the *Navigant Research Report 2014*, namely Accenture, Cisco Systems, Hitachi, IBM, Microsoft, SAP, Schneider Electric, Siemens, Toshiba, ABB Tropos, AGT International, Atos, Autodesk, Capgemini,

Cityzenith, Esri, Firetide, Honeywell International, Huawei, Itron, KT Corp, Libelium, Living PlanIT, Oracle, Orange Group, OSI Soft, Silver Spring Networks, Urbiotica, Verizon Communication, and Worldsensing.

The documents have been selected through Google engine, picking up the first four documents reported per each player (Campbell & Cornelia Beck, 2004), as in literature, it is suggested to use at least three documents per each actor to be investigated through a content analysis (Campbell & Cornelia Beck, 2004; Rapoport & Vernay, 2011)

Anyway, although the players included in the *Navigant Research 2014* are 30, only 17 of them have been considered in the analysis, viz., the ones that reported at least four reports when the survey has been conducted—Accenture, Cisco Systems, Hitachi, IBM, Microsoft, SAP, Schneider Electric, Siemens, Toshiba, ABB Tropos, Atos, Capgemini, Esri, Huawei, Oracle, Orange Group, and Silver Spring Networks, leading to a database consisting of 68 documents. The documents length ranges from four to 48 pages and a check on their usability into the software was performed before starting the analysis. The choice described above, took into account even the language used to release the report—English—as the analysis can be performed only if the documents are homogeneous.

More in detail, the analysis related to the RQ2 has been performed by a content analysis on the selected documents by NVivo (Bazeley & Jackson, 2013). To achieve the results, the authors chose to realize a multilevel query starting from a “words frequency”, selecting the second level of similarity among words, namely the “stemmed words” (Plisson, Lavrac, & Mladenicić, 2004) and keeping out the words shorter than three letters.

At a second stage, the linkages among the main topics reported in the official reports were then verified through a cluster analysis performed on the basis of the Jaccard’s correlation index, as in literature, it is taken into account as the most used (van Rijsbergen, 1979; D’Enza & Palumbo, 2013) in comparison with the other two indices used by the software NVivo, namely Pearson correlation coefficient and Sørensen similarity index. The index applied to the investigation is between 0.9 and 1, that is the highest possible value of likelihood about the ties emerged from the cluster analysis.

Starting from the collection of the most cited terms, the authors observed the most relevant linkages among them as required. Afterwards, the attention has been focused to the ties related to sustainability in order to observe the main topics related to sustainability concept.

Hence, as a second step, a deeper analysis has been performed through a “text search query”, in order to obtain the main matches between the most cited words among the “sustainability” semantic area, and the mainly cited topics in the documents. In detail, the authors chose to perform this analysis in a proximity range of three words. With the aim to observe which features of the smartization, interventions are more led from a sustainability perspective, the investigation has been carried on by analysing the relationships between smart city “drivers” and the approach to sustainability. Then, starting from the results of the “text search query” analysis, the authors can compare the most cited of them to each smart city driver on the bases of their characteristics and sub-categories.

Finally, a similar analysis was carried comparing the most cited terms to each sphere of the “Triple Bottom Line” approach in order to investigate which aspect of sustainability is more considered by big companies involved in smart city interventions. This last step of analysis depends on the relevance of the partition of sustainability issue in the three areas shaping the “Triple Bottom Line”, namely social, economic, and environmental, as it emerged from the literature review.

Results

Bibliometric Analysis

The bibliometric analysis performed has been conducted starting from the selection described in the research methodology.

Starting from the database of 367 contributions, the most relevant and frequent keywords have been pointed out, thanks to the software as presented in the following representation (Figure 1) through a map of density. In detail, this graphic led to observe the importance of the linkages emerging between a central topic and a connected one through the colours of the areas and dimensions of typefaces.



Figure 1. Main results of bibliometric analysis through VOSviewer.

In order to observe which features of the smart city conceptualization are kept in the new conceptualization of the sustainable city, the authors highlighted the most relevant topics resulting with strong linkages with sustainable cities, pointing out that mostly they can be referred to the domain of environmental issues (e.g., global warming, climate change, urban sustainability, biodiversity, environment, environment management, and green spaces).

One minor area on which scholars focused their attention is the social aspect, e.g., one of the most cited words is “participation” even if it is the only way in which contributions can be taken into account, as it regards social aspects of sustainability.

Anyway, it is relevant to highlight that, differently from what the authors expect when shaping the first research question, an almost total absence of references to “smart city” contributions emerges, as they are cited just more than a couple of times. In detail, the authors investigated the evidences of “smart city” as a topic linked to the main issue of the literature contributions on sustainable cities in the dataset. The results picked up a very low usage of “smart city” issue, cited just four times in connections with the topic of sustainability. The investigation carried on investigating by analysing the few evidences through the contents introduced in the abstracts.

The evidences showed just in one case a linkage between “smart city” and “sustainable cities” as topics coming one after the other like in an evolutionary path. In the other few cases, the usage of both terms in the same articles showed a theoretical tie related to the usage of technology or the approach to environment as something to be safeguarded, then not in terms of a conceptualization evolution. Moreover, one more interesting evidence emerges as an attempt to combine the two issues under a unique perspective and tag—a “smart living and sustainable city”. Anyway, such a case has been observed just in one contribution in the whole dataset, then its significance to this investigation is really limited.

By summarizing, it is possible to state that “sustainable city” is not theoretically proposed as the evolution of “smart city”, but as something linked and running on a different path.

In order to accomplish an in-depth analysis, the authors observed the linkages between the smart city features and the sustainable city characteristics, from the results stated through BibExcel; the following Table 2 summarizes the 20 most important and frequent topics.

Table 2

Main Evidences From the Co-words Analysis Through VOSviewer

Words	Frequency
Sustainable cities	161
Sustainability	96
Sustainable development	86
Sustainable city	79
Industrial ecology	49
Cities	43
Climate change	38
Urban planning	31
Urban sustainability	26
Urban agriculture	25
Environment	23
Urban metabolism	22
Urbanization	21
City, China, and Urban greening	19
Urban, eco-city, and environmental assessment	16
Biodiversity, urban environment, and governance	15
Urban development, resilience, and global warming	13
Environmental planning, participation, urban tools, built environment efficiency, urbanisation, transition, environmental management, and compact city	12
Indicators, sustainability indicators, urban green space, and Australian cities	11
Ecological footprint, sustainability science, option space, urban governance, and energy use	10

Source: Authors' elaboration.

Starting from the six “characteristics” introduced by the model proposed by Giffinger et al. (2007), namely smart living, smart people, smart governance, smart economy, smart mobility, and smart environment, the most cited features are all connected to the environmental and mobility fields. Moreover, referring to the “Triple Bottom Line” approach as a whole, it is hardly ever considered. This statement can be better described by looking at the three single elements of the framework: The citations about the environmental sphere (smart environment and smart mobility) are approximately 80%; while the citations about the social sphere (smart

people, smart living, and smart governance) are about 18%; and the citations about the economic sphere (smart economy) are just 2%.

Content Analysis

The content analysis has been performed in order to investigate the way sustainability is approached in smart cities’ projects. In order to deep each aspect of the comparison, the authors realized the analysis in two different steps.

The survey was realized on 68 official reports starting from the “words frequency” useful to build the dataset that was complemented by a “cluster analysis” (Figure 2) to investigate in-depth results of the ties emerging among the several topics. The most significant linkages among the top cited conceptualizations have been pointed out in Figure 2. The general linkages among topics are represented with entire lines, while the dotted lines represent ties concerning sustainability.

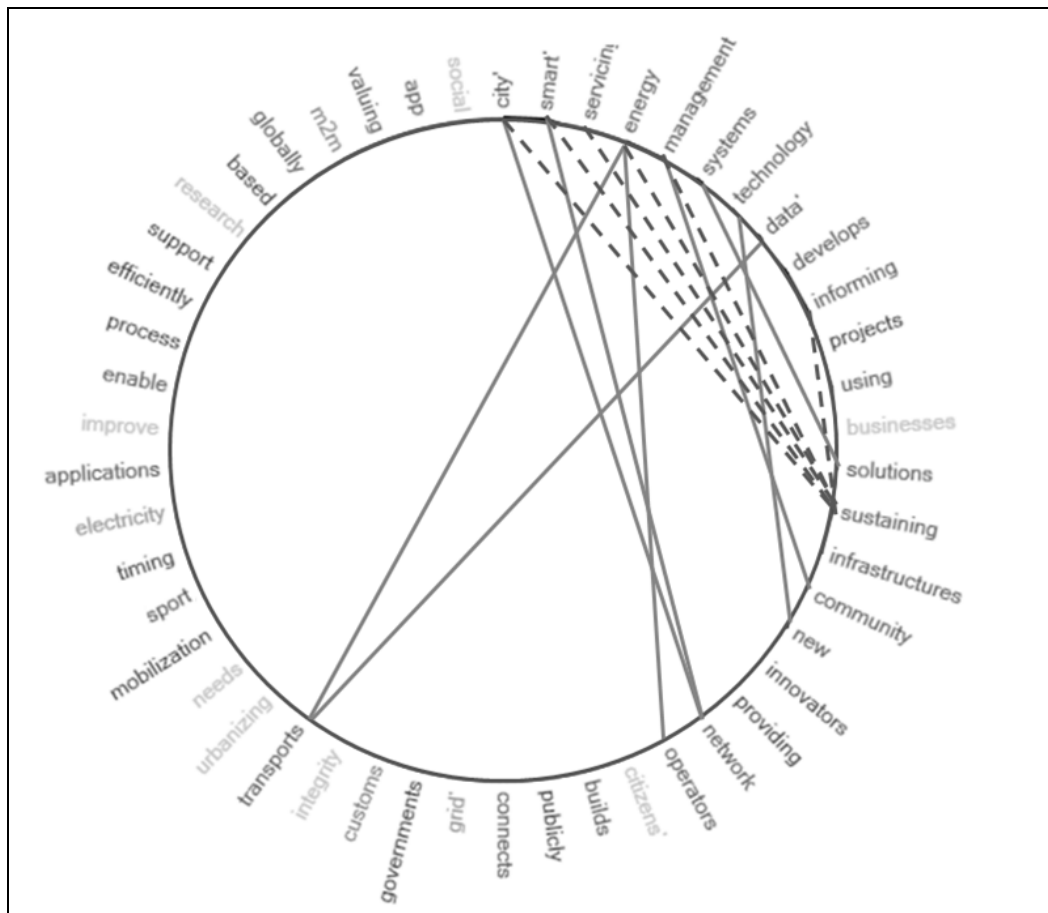


Figure 2. Cluster analysis through Nvivo (Jaccard’s correlation 0.9-1). Source: Authors’ elaboration.

More in detail, “network”—“city” and “network”—“smart” are two of the most relevant couples of topics emerging from the “cluster analysis”. Such clusters are useful to highlight the attention paid by firms issuing reports to the necessity of involving all actors in planning and deploying activities aiming to a smart development. Two more relevant linkages are (1) the one between “systems” that can be intended as a set of resources and “solutions” that can be considered as an evolution of the conceptualisation of service provision

and (2) the one between “community” and “management”. The two linkages highlight crucial elements in defining an approach to smart city, such as the necessity to carry on smart city projects through the involvement of the community.

Anyway, one of the most stressed topics is “energy” and all the connected features, emerged in the reports because of the relevance of this issue for all cities’ stakeholders, due to different kinds of impacts, like better environmental performances and economics consequences.

The investigation has been deep by focusing on the cluster analysis with specific reference to the topic of sustainability (Figure 2). In detail, “sustainability” conceptualization groups all words related on the same semantic perspective, namely sustainable, sustain, sustainability, and so on.

The group emerges as the most used in the reports on the base of both the absolute frequency and the weighted percentage. This latter can differ from the former, due to the possibility of words embedded in more than one group of stemmed words, so it is more reliable than the absolute frequency of words. Starting from the stem of “sustainability”, several linkages have been observed. First of all, many terms linked to the notion are related to city, conveying a message in which cities are considered as a context to change in a sustainable way, apart from any implementation of smartization processes. By the way, the investigation has been deepened highlighting how “sustainability” is in connection with “smart” in order to underline that in reports, and in projects, the two approaches are often merged by the firms, as they understand the relevance of both of them.

The investigation led to point out the way in which sustainability can be achieved; in detail, the first tie considered is the one between “service” and “sustainability”, as the impacts on social, environmental, and economic aspects are based on the ways services are provided apart from being smart; among all the services, there is one appearing as more relevant than the others in the path towards sustainability—energy, as the effects of energy policies affect on all the aspects shaping the “Triple Bottom Line” approach, especially as it concerns the environmental issues.

Following, it has been possible to observe some relevant ties connected to the smart approach. In detail, the first link emerges between “sustainability” and “management” considered as the necessity of planning and deploying activities through employment of various and several resources; combining different competences and resources and measuring the impact are conceived as the tasks of the managers to achieve a smart context through a sustainability approach. Another link is shaped by “sustainability” and “informing” stressing that the involvement of people towards the common interest of sustainability is achievable through communication activities, both to inform on what to do and to spread the information about results achieved in a sustainable perspective referring to the “quintuple helix” approach.

Starting from the first results of the semantic area containing the words stemmed to sustainability, the research has been further developed in a second step through a proximity analysis. In detail, the authors compared these outcomes with the elements shaping the so-called drivers or characteristics, as presented in the literature review, namely as introduced by Giffinger et al. (2007).

The words highlighted through the proximity analysis have been associated and attributed to the six above cited drivers, namely smart economy, smart people, smart governance, smart mobility, smart environment, and smart living, in order to understand the more considered ones. The results appear as unambiguous:

- The most relevant one relates to “smart economy” as highly linked to sustainability, thanks to the proximity relations with issues grouped through the following stems: economy, development, enterprises, financing, and so on;

- Two more relevant outcomes connected to “smart mobility” and “smart environment” stressing the environmental aspect of sustainability. These two drivers can be considered together, due to the strong relationship among them as the interventions on mobility favour better environmental performances and they are both linked to sustainability, thanks to sustainable transport systems and sustainable resource management. In detail, the connected terms are used less than half times of “smart economy”; the terms leading to these results are infrastructure, energy, environment, mobility, and so on;

- Moreover, it is necessary to consider two more drivers linked to sustainability, namely “smart living” and “smart people” slightly less connected than the two previous ones; the words leading to these results are community, society, living, technology, and the social sphere; these two drivers are connected to the way services have to be provided, especially with reference to the provision of facilities directly impacting on the quality of life, stressing the social aspect of sustainability;

- Finally, the last driver considered by literature, namely “smart governance” is cited in relation to sustainability just a couple of times, thanks to the management issue. This means that the official reports focus on the ways how sustainability can be achieved instead of planning and managing it. This result depends on the application of the reports conceived as an instrument addressed to the stakeholders to understand practices and results than the way they have been planned.

By summing up, there are strong relationships between sustainability tasks and the drivers and the most relevant are linked to “smart economy”, while the other ones are more or less linked in a similar way to sustainability. Starting from these conclusions, it is interesting to merge the results obtained and to compare them with the three pillars of the “Triple Bottom Line”. It appears that the most frequent ties are related to the economic sphere, followed by the environmental issues and the social ones. Anyway, the social, economic, and environmental spheres are linked to sustainability in quite a similar way, showing that such a concept is conveyed in a way looking at all the three pillars of the “Triple Bottom Line” in the same time.

Discussion

The research carried on led to results both for scholars and for practitioners, namely for city managers, due to their crucial role in planning and developing smart interventions oriented to sustainability.

First of all, the focus on scholars contributions allows to depict smart city as slightly related to sustainable city; more in detail, the two conceptualizations cannot be considered as one coming after the other in a cause-effect relation or in an evolutionary path; by the way, these two notions can be connected as there are lots of topics playing a relevant role in both smart and sustainable cities approaches. The two research streams have been originated in separate ways and they can be seen as two paths with some overlaps, but they are not totally overlapping, neither running on a parallel way. One key element in the comparison between smart and sustainable cities lays on the overall approach, because investigations on sustainability are addressed to the impacts to be achieved before deepening the ways to reach the planned aims, whilst smart city definition and approach are both built around the “characteristics” (Giffinger et al., 2007) or drivers before taking into account the expected aims. These latter are embedded in the features of a smart city, so the characteristics consider both the tool and the aim.

Moreover, the role of technology is totally different in the two conceptualizations, as the history of the definition of smart city is strictly related to ICT, due to its relevant role in the previous notions of intelligent city and digital city (Ishida & Isbister, 2000; Dameri & Cocchia, 2013). Conversely, the contributions on

sustainable city are strongly related to the three sphere of the “Triple Bottom Line” (Rogers & Ryan, 2001) and this is useful to underline once more how the targeted effects come before the tools in such an approach.

The two approaches to improvement in urban contexts can be merged and this is a relevant issue both for scholars and city managers, as the content of the characteristics of smart city are fully permeates by the issues about sustainability; as a consequence, approaches to sustainability in smart cities can be deployed, with scholars focusing on models to be proposed to understand how smart city can be driven towards a stronger approach to sustainability and even how sustainable cities can aim to do a smarter evolution of their features. As it concerns city managers (Schaffer et al., 2011), the merge of the two sets of aims can be useful to achieve more efficient performances, without doubling the efforts, as the overlaps between the two approaches can lead to wastefulness of resources.

Conclusions

Sustainability is a hot topic in several fields of research and it is relevant for human beings even without taking into account smart approaches. By the way, it is useful to combine these two approaches, first of all for city managers and then for scholars observing these phenomena. Further researches on smart city and sustainable city have to be carried on, due to the recent development of both conceptualizations, even if there were antecedent contributions in last decades. Finally, the differences emerged between the two analysis led to suggest a different approach for scholars, in order to be able to depict what firms are really doing for smartization and sustainability. In line with this, new investigations will be carried on to benefit from the continuous updates emerging from the empirical evidences and to adopt an abductive approach to understand how sustainable perspective and smart approach can be combined to give more efficiency to interventions in urban contexts. This is a relevant issue, due to budget restrictions that are currently challenging city governance and managers, leading them to look for new ways to financially support the investments.

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