Quaderni della Rassegna

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LANGUAGING THE CITYSCAPES: CHANGING LINGUISTIC LANDSCAPES IN PUBLIC DISCOURSES

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Amelia Bandini, Marcella Corduas*

THE DISCURSIVE REPRESENTATION OF SMART CITIES IN THE GERMAN MEDIA[1]

1. Introduction

In recent years, the idea that a city could be 'smart' has attracted much attention and has become an essential, fundamental paradigm of urban planning, policy and development. This interest is not limited to the application of the technological innovations for the design of modern infrastructures; it also concerns the creation of a new type of environment where high-tech solutions are supposed to increase the quality of life, lead to sustainable growth and empower citizens (Joss/Cook/Dayot 2017). Obviously, such transformations are reflected in contemporary language, and, consequently, discourses on how cities are conceptualised, imagined and planned in a technological era, are assuming increasing importance.

In parallel with the scientific research work, which typically involves the flow of information among researchers or experts, the transfer of innovations to the public requires a preliminary, and sometimes enduring, process of divulging future technological advancements. This step is mainly aimed at creating the needs and expectations of potential users and generating positive attitudes towards the chan-

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[1] The authors have jointly discussed and conceived this paper. Nevertheless, individual contributions in writing this research article are identified as follows: Amelia Bandini is responsible for Section 4 and Section 5, while Marcella Corduas is responsible for Section 1 and Section 3. Section 2, finally, was written collaboratively by the two authors.

ges that innovations will produce. The use of the Internet, smartphones, cloud computing and open-source data, just to give a few examples, have significantly changed the way human relationships are established and how daily activities are carried out. Moreover, this transformation process is continuously accelerating because of the large-scale policies that institutions and large companies, such as IBM and CISCO, are pursuing to promote the construction of high-tech environments worldwide. Within this framework, scientific and technology news popularise innovative products, services and software devices, but also announce large investment programs and renewed public policies.

A clear definition of a 'smart city' does not exist (Albino/Berardi/Dangelico 2015). The term appeared in the late 1990s with a focus on the growth of new information and communication technologies (ICT). However, the connotation of the word rapidly evolved and expanded, absorbing numerous other terms that were coined to describe future cities with reference to specific domains. The technological issues, for instance, generated a broad terminology that echoed the construction of networking infrastructures and the increasing availability of data facilities, such as wired city, Internet city, informational city, intelligent city and digital city. Similarly, the green movement and the environmental debate emphasised the idea that city planning should reduce environmental impact[2]. Consequently, terms such as eco-city, green city, zero-carbon city and low-carbon city have entered the language (De Jong et al. 2015). Finally, new interpretations of economic and social behaviours have produced further attributes qualifying the city, including sustainable city, creative city, knowledge city, innovative city, learning city and, more recently, humane city, human sustainable city and resilient city. Each notion corresponds to different conceptual perspectives about the design of the city as a compound of new material substrata with reshaped socio-political relationships (for more detailed discussion, see Nam/Pardo 2011; Joss et al. 2019; Paganoni 2017). High level technologies modify the cultural, social and linguistic features of communities facilitating the creation of new forms of semiotic codes as discussed by Blommaert (2012).

The process of city redefinition is carried out by four main groups of stakeholders (i.e. governments, private companies, research centres, and civil society) that contribute to the creation of new models of urban space with their views and initiatives (Fernandez/Fernández-Güell/Giffinger 2018; Han/Hawken 2018). The shift in societal values towards values like innovativeness, sustainability, creativity and user-friendliness affects the desired profile of future cities. For instance, according to Jaššo/Ladzianska (2017: 3), the «[a]bility to learn and forget, [the] ability to interpret chaos and [the]

[2] For example, the project of Abu Dhabi's Masdar City, which started in 2006, is a typical demonstration of the potential of clean energy deployment, clean-tech innovation, sustainable urban development and human capital creation. The city is designed as a true innovation ecosystem where education, research, technology and business opportunities are connected.

ability to work in virtual networks and environments are prime examples of the new skills which should be added to smart/creative city profile».

In this context, news media have assumed a key role because they are the meeting point between specialists and the general public, contributing in a significant way to the social representation of scientific knowledge (Calsamiglia 2003). The aim of this paper is to investigate how German newspapers construct the imagery of smart cities and how they contribute to the delineation of the future city identity describing the set of unique abilities needed to manage the spatial, economic, social and cultural lives of German citizens. In particular, an integrated approach is applied. This combines a statistical method with corpus analysis in order to examine how newspapers disseminate and popularise scientific knowledge about smart cities and how they shape public opinion and promote the comprehension and acceptance of innovations among their readers.

The remainder of this article is organised as follows: Section 2 describes the main features of the selected corpus and methods; Section 3 presents the results of correspondence analysis (Benzécri 1973) providing an overview of the content of the corpus; Section 4 illustrates the linguistic analysis. The final section contains some concluding remarks.

2. Corpus and methods

Germany constitutes an interesting case study for investigating the deployment of smart technologies in Europe. First, it is widely recognised that the development of smart cities is correlated with the expected rapid increase of population in urban areas[3]. In this respect, Germany has 6 of the 20 largest functional urban areas[4] in the European Union, where 23 million inhabitants live, which is about 27% of the total German population (Eurostat 2016). Second, in the last decades, the federal government has strongly supported the innovation process as part of the industrial and exporting national policy and, specifically, of the high-tech strategy for the country to become a worldwide innovation leader (BBF 2014, 2015). In this regard, the national high-tech strategy for 2020, proposed in 2007 and expanded in 2014, set 10 forward-looking objectives. These include CO2-neutral and energy-efficient cities, intelligent energy supply systems, the enlargement and improvement of Internet use, the protection of communication networks, the research of innovative vehicles (new engine and drive technologies) and the creation of global knowledge that is digitally available and accessible. Finally, German manufacturers are very much involved in

[3] According to the World Population Prospect 2017 (UN 2017), the world population from 7.6 billion will have possibly reached 9.2 billion by 2050. The proportion of urban population is constantly growing, and it is expected to increase from 55% in 2017 to 68% by 2050.

[4] So-called functional urban areas include the city area and the commuting zones.

the research and development of new technologies. For instance, Siemens AG is one of the top three worldwide leaders supporting high-tech projects for the redesign of cities (or as Siemens itself states, «to build a digital ecosystem»)[5].

As a result, German newspapers receive significant input from various sources (e.g. companies, politicians, experts, citizens, etc.) regarding the applications of technologies in urban planning. They are a fundamental means to improve scientific communication, to strengthen acceptance of societal and technological innovations and changes and, therefore, to outline the new identity of the city.

This paper analyses a collection of 1,464 articles from 47 German quality newspapers (online editions) retrieved from the LexisNexis academic database and published from January 2013 to April 2018. The search has been mainly based on the following query terms: *smart city*, *smarte Stadt*, *intelligente Stadt* (*intelligent city), digitale Stadt (digital city), high-tech Stadt, Wissensstadt (knowledge city), Kreativstadt* (*creative city).*

Fig. 1 - Geographical location of the newspapers

[5] Available online at new.siemens.com/hk/en/company/topic-areas/mindsphere-application-center-city/mindsphere-academy-hong-kong.html.

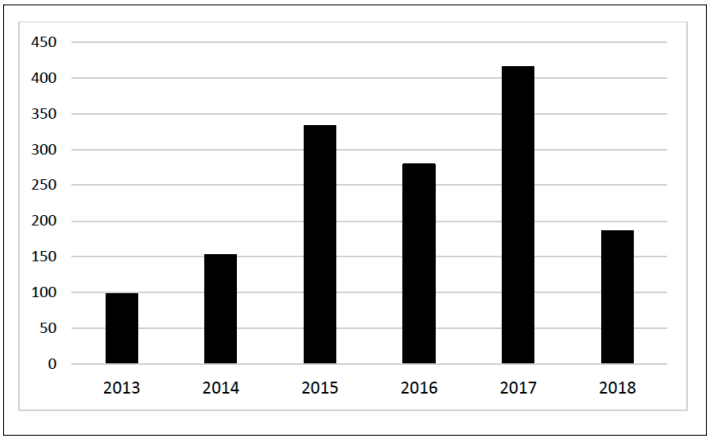

Fig. 2 - Number of articles in the LexisNexis database from 2013 to 2018

The retrieved newspapers are published daily and, according to the LexisNexis description, 18% of them are national newspapers and the rest are local or regional newspapers. This reflects a typical feature of the German press that is centred around localities (Kleinsteuber 2004). In addition, the available group of newspapers represents the majority of the German Länder (Fig. 1). As expected, the number of articles has increased considerably during the last five years (see Fig. 2), confirming that the design of the future city is a hot topic.

The final corpus of 801,505 words has been analysed by means of the on-line software Sketch Engine (Kilgarriff *et al.* 2004; Kilgarriff 2012) using the German Web 2013-deTenTen13[6] as a reference corpus to detect unusually frequent words and multi-word expressions. This allows the identification of the smart city features that newspapers highlight to attract the interest of the readers and acquaint them with the topic.

Moreover, the corpus has been examined from the point of view of the transitivity system. This focuses on the semantic structure of clauses that represent reality, and investigates what processes are involved in the action and who are the addresser(s) and the addressee(s) of the action. The concept of transitivity transcends the traditional grammatical approach and assigns an ideological significance to all linguistic choices. It helps encode how an action is performed and how speakers or writers express their mental representation of the surrounding world by means of the language used (Halliday 1994; Van Dijk 2011).

[6] This is a built-in corpus of 16,526,335 tokens.

3. A global view of the discourse about smart cities

A preliminary overview of the corpus content can be obtained from the statistical analysis based on correspondence analysis (CA). The reader can refer to the fundamental contributions by Benzécri (1973) and Greenacre (1984) for technical details, and to the historical review of the method by Beaudouin (2016) that frames the method within textual data applications. Hereafter, the main steps and the results of our study will be briefly illustrated.

First, a number of target words describing the digital transformation is selected from the keyword list, and the joint frequencies of those words with the most typical collocates over a L5-R5 span are evaluated (e.g. Sinclair 1991). Second, the co-occurrence frequencies are displayed in a contingency table[7]. Finally, this table is analysed by correspondence analysis, a multivariate exploratory statistical technique to show the row and column profiles of a contingency table as points in a low-dimensional geometrical space.

In particular, in the case under investigation, a column profile consists of the relative frequencies of a given target word with the main collocates in the chosen window span. The set of column profiles constitutes a cloud of points in a high-dimensional space that cannot be displayed graphically. The main idea is to reduce the complexity of the cloud and to find a way to show most of the information about the linguistic phenomena in two or three dimensions. Similarly, a row profile consists of the relative frequencies measuring the co-occurrence of one (surrounding) word with each of the target words so that an analogous geometrical representation can be achieved. The CA method is particularly helpful because it provides a global view of the association between columns and rows of the data table (i.e. co-occurrences of target words and collocates) that facilitates the interpretation of the relationships. As a matter of fact, CA produces the portrait of the column profiles and row profiles in separate plots. More interestingly, it also allows the superimposition of the two representations on the same axes, so that the relationships between the target-words and collocates can be investigated graphically. Like other multivariate statistical techniques, CA uses a distance measure (i.e. the chi-square distance) to assess the similarity of rows (or column profiles) and relies on a projection principle to produce the final (low-dimensional) data representation.

The CA plot of the selected target words is illustrated in Fig. 3. The upper area of the plot contains the terms describing the means needed for the construction of the new city: *Internet der Dinge* (IoT), *Vernetzung (networking) Technologie (technology)*, *Infrastrukture (infrastructure)*, and, in general, *Lösung (the solution).*

[7] For this aim, the terms are aggregated according to their meaning. For example, the adjectives: *smart*, *smarter, smarte, smarten* are associated with the same label, denoted as *smart.* Similarly, the German multi-word expressions are assimilated to the corresponding English expressions (i.e. *smarte Stadt* and *smart city*).

The lower-right area of the plot shows the fields of applications: *Energie (energy production/use)*, *Gesundheit (health)*, *Umwelt (environment)*, *Bildung (education)* *Wirtschaft (economy)*, and *Mobilität (mobility).* Two intangible concepts*, Innovation and Lebensqualität (quality of life)* are in the central area of the plot. Note that the points close to the origin usually contribute little in determining the axes of the final representation. In this case, this effect is probably due to the fact that those abstract terms are mentioned in general statements. Finally, the most influential actors of the change – *Unternehmen (companies)* – are located on the left-hand side of the plot.

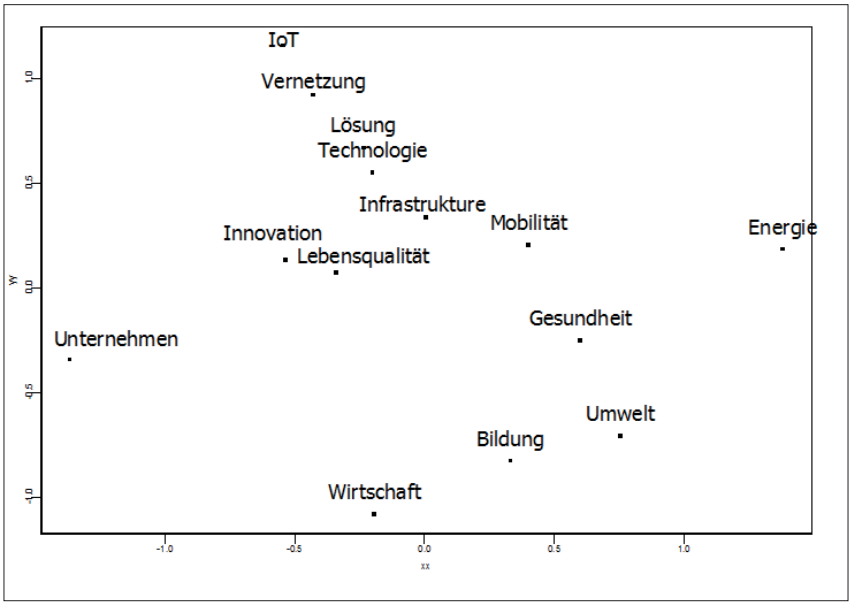

Fig. 3 - CA plot of column profiles (=target words)

It is worth pointing out that the closeness of two target words in the CA plot means that they share a significant number of collocates. By superimposing the CA plot of the collocates, it is possible to highlight interesting relationships. For the sake of space, in the following figure, only the CA plot with the English translation of the target words and collocates are presented (Fig. 4 and Fig. 5). The original CA plots derived from the German text are provided as supplementary material[8].

[8] See www.researchgate.net/profile/Marcella_Corduas/research.

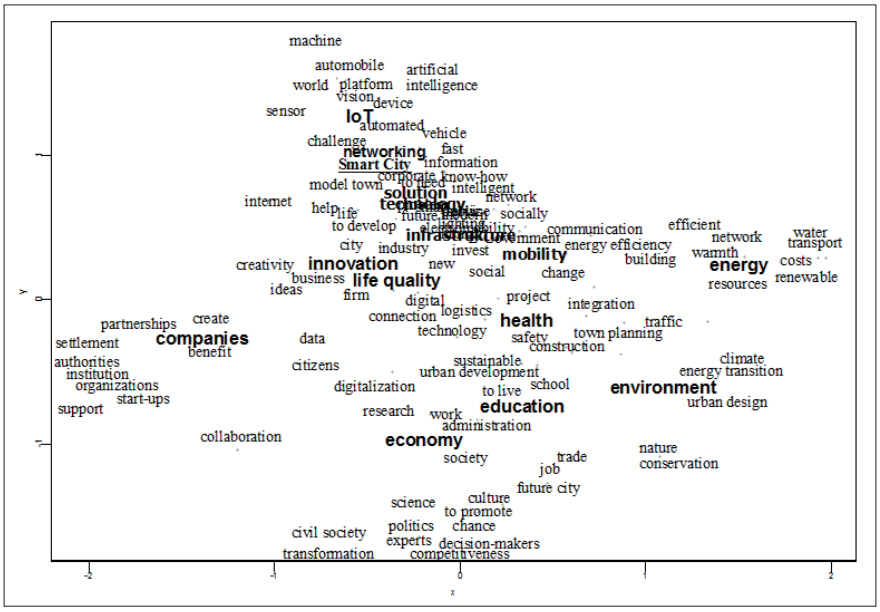

Fig. 4 - CA plot of column and row profiles (target words and main collocates)

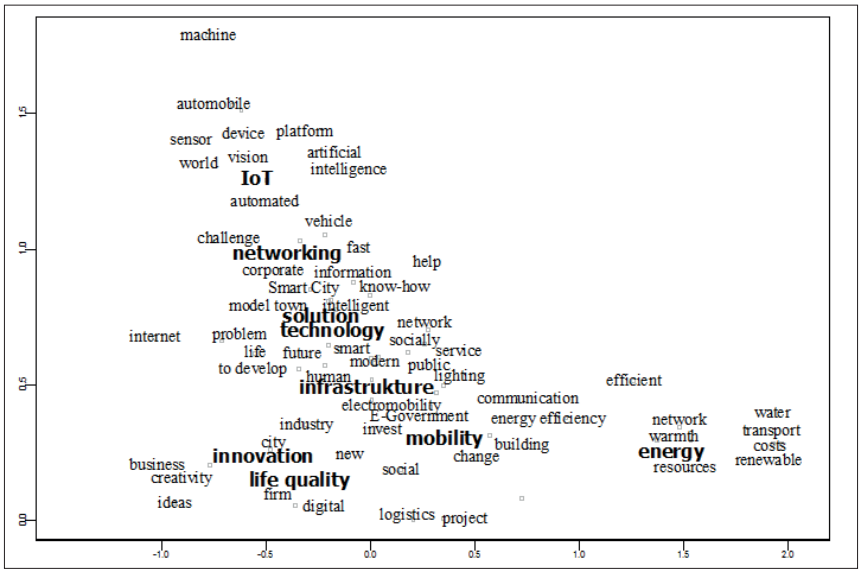

Fig. 5 - Enlargement of the upper region of the CA plots of Fig. 4

First, the extreme points in the plot are identified because they are the most relevant in determining the direction of the horizontal and vertical axes. As expected, a number of collocates around the term *companies* are typically related to the high-tech and innovative businesses. As a matter of fact, this requires *partnerships*, *start-ups*, *collaboration and cooperation* (*Zusammenarbeit*) and relationships with the other actors of the change. These are *authorities* (*Behörden*), *institutions* (*Institutionen*) and, in general, other *organisations* (*Organisationen*). The aim is to produce innovation, and this implies support of *creativity* (*Kreativität*), *create* (*schaffen*) and *generate valuable ideas* (*Ideen*). All the stakeholders will take *advantages and gain benefits* (*profitieren*) from the *data (Daten*) availability and *digital revolution*.

Restructuring energy system is the most important field of application that has driven the innovation process in recent years. The corresponding points are located at the right extreme of the horizontal axis. As mentioned before, an important long-term objective of German government policies is the development of CO2-neutral, energy-efficient and climate-adapted cities. However, these objectives are not only the elements of a political plan promoted by Chancellor Angela Merkel (The Guardian 2011), but they are part of the green values that characterise German society (Dominick 1988). The corpus and then the identity of the future city reflect such issues.

The CA plot shows the term *energy* and nearby the adjectives *efficient* (*effizient*) and *renewable* (*erneuerbaren*), recalling two typical instances of the green approach to power supply. The same area of the plot also displays other terms that refer to the mentioned issues, reduction of *costs* (*Kosten*), energy *efficiency* (*Energieeffizienz*), improvement of *buildings* (*Gebäude*) and energy *network* (*Netz*). The *environment* is the bridge that leads to the *energy transition* (*Energiewende*), that is, the transition from fossil-based to a zero-carbon energy system, and then to the *climate* change (*Klima*), the *preservation of nature* (*Naturschutz*) and to the need for an *urban design/town planning* (*Städtebau/ Stadtplanung*) satisfying such requests.

In the lower part of the CA plot, the extreme point is associated to the term *economy* (*Wirtschaft*). Looking at the surrounding words, it is clear that the economy is the cornerstone of the German pathway to smart cities because in this arena, actors and actions find their essential motivation. The improvement of the economic (or material) well-being is often seen as the primary engine of the scientific progress. Then, *employment* (*Arbeit/Beruf*), *trade* (*Handel*), *competition* (*Wettbewerbsfähigkeit*) and *administration* (*Verwaltung*) are benefits of such *transformation*. The change involves *policies* (*Politik*), the contribution of r*esearch* (*Forschung*) and *science* (*Wissenschaft*). However, the view regarding the *future city* (*Zukunftstadt*) should also encompass the human-centred discourse including *culture* (*Kultur*), the importance of *civil society* (*Zivilgesellschaft*), social learning and *education* (*Bildung*)[9].

[9] For instance: «*Alternative Wohnlösungen und neue technische und soziale Infrastrukturen müssen gefunden werden, um Zusammenleben zu ermöglichen, Mobilität zu verbessern und Kultur,*

Finally, the upper part of the plot (see the enlargement in Fig. 5) shows a sort of path through the means that are used to build the smart city. The terms range from the *physical substrata* (*Infrastrukture*) to *IoT* (*Internet der Dinge*), the network of intelligent objects that are going to change everyday life[10]. For example, the transformation affects the *electro-mobility* (*Elektromobilität*), the *public lightning*, the *Internet use,* and the enlargement and improvement of the *network* (*vernetzen*). The search for *solutions* and *technologies* acts as a bridge between the infrastructure and the networking. The relevance of such a search is meaningfully expressed by a number of terms in the immediate context of the target words, in particular, the adjectives *smart*, *intelligent*, *modern*, *new* (*neu*), *social* (*sozial*) and societal (*gesellschaftlich*), and the nouns *life* (*Leben*), *future* (*Zufunkt*) and *people* (*Mensch*). In the proximity of IoT, there are all the words referring to this innovative environment, where applications of *artificial intelligence* become real, such as the *automated vehicle*, and where the *sensors*, *digital platforms* and *device*s have an important role to play.

Finally, the expression *Smart City* is located in the upper part of the CA plot among the terms that immediately make reference to the digital environment. These allude to the networking infrastructure (*Vernetzung)*, technology (*Technologie*) and solutions (*Lösung*), together with some collocates that recall the main feature of smart cities related to information and fast communication (*information* and *intelligent technologies*).

The picture that CA produces highlights that Germany is still going through a phase of research and experimentation of technologies for restructuring its cities and that the vision of smart cities is strictly linked to the implementation of an efficient networking and ICT system. The discourse seems to be characterised by ideas and concrete solutions that can be implemented. However, the process is still in the early stage where the techno-centric view seems to be dominant.

4. The linguistic analysis

The results illustrated in the previous section are confirmed by the corpus analysis. The top collocates of the noun *Stadt* (city), categorised by grammatical relations, are illustrated in Fig. 6. The most frequent tokens include the word *Zukunft* (future), as the genitive object of the noun *Stadt*, but also *Zukunft* with *Stadt* as the genitive object (*Die Stadt der Zukunft* or *Die Zukunft der Stadt*). The

Bildung und Gesundheit voranzutreiben». (trans.: «Alternative residential solutions and new technical and social infrastructures must be found to facilitate coexistence, to improve mobility and culture and to promote education and health»).

[10] IoT is «[a]n open and comprehensive network of intelligent objects that have the capacity to auto-organize, share information, data and resources, reacting and acting in face of situations and changes in the environment» (Madakam/Ramaswamy/Tripathi 2015: 165).

reference to the future discursively constructs an image of a city that has to be fully reinvented. However, the newspapers promote the idea that the process of designing smart cities is based on already available means. As a matter of fact, the top collocates include *Digitalisierung* with *Stadt* as the genitive object (*Die Digitalizierung der Stadt*), the adjective *digital* as a modifier of *Stadt (digitale Stadt)*, and other modifiers that recall the typical features of the high-tech city, such as *smart*, *vernetzt (networked/wired)* and *intelligent*. The verb *wachsen (to grow)*, with *Stadt* as the subject and the related modifier *wachsend (growing)*, highlights that the process leading to the development of the future cities has already started.

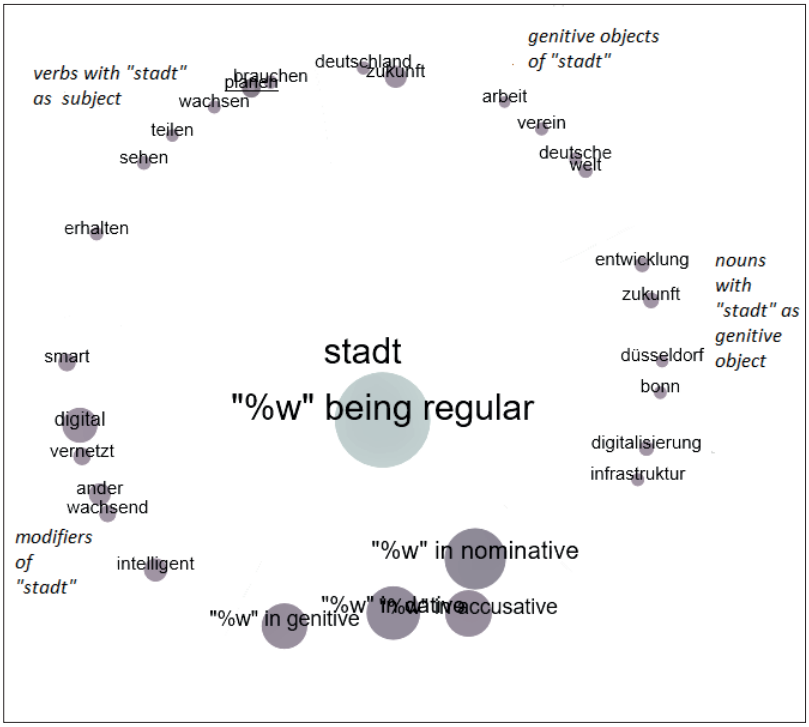

Fig. 6 - Top collocates of the noun *Stadt*

As mentioned previously, the term *smart city* is widely used because it seems to incorporate an ideologically neutral meaning concerning the evolution of technologies and ICT applications. Other terms, such as *eco-city* or *sustainable city,* instead, encompass a political view and are less frequent (Eremia/Toma/Sanduleac 2017). The English expression *smart city* has found a German counterpart *smarte Stadt,* where the modifier *smart* has adopted the German inflectional system as the following examples show.

(1) Doch gibt es schon heute erste Anzeichen, dass die smarte Stadt näher ist, als man vielleicht meint.
Trans.: But there are already the early signs that the smart city is closer than you might think.

(2) Der Duden bietet zum Wort smart in seiner Bedeutungsübersicht gleich mehrere Varianten. Für die smarte Stadt (Smart City) soll jede dieser positiv besetzten Bedeutungen zutreffen.
Trans.: The *Duden* [the most widely used German dictionary] offers several variants of the word *smart* in its overview of meanings. Each of these positive meanings should apply to the smart city.

The modifier *smart* co-occurs with other keywords, such as *Technologien* (technologies), *Lösung* (solutions), *Mobilität* (mobility), *Straßenbeleuchtung* (street lighting) and *Verwaltung* (administration). This appears as a significant trait of discourse elaborated on by the newspapers. Indeed, the word *smart* incorporates the idea that the application, described by the co-occurrent noun, is the fruit of a research at the frontiers of knowledge. This definition is not restricted to tangible aspects of everyday life, but it is extended to the city inhabitants that become *smarte Bürger* (smart citizens).

(3) Die Smart City braucht auch smarte Bürger.
Trans.: The Smart City also needs smart citizens.

Several multiword expressions and compounds, including the word *Stadt,* are used as synonyms of *smart city* in order to help readers understand the meaning of such a term. The most frequent expressions are *die Stadt der Zukunft* (the city of the future), *die digitale Stadt*, *die vernetzte Stadt* (the wired city), *die intelligente Stadt*, and *Zukunftsstädte*, as the following examples show:

(4) *Es werden Ideen gesucht für eine digitale Stadt oder Smart-City, wie das neudeutsch genannt wird.*
Trans.: We are looking for ideas for a digital city, or smart-city, as it is denoted.

(5) Denn unter Smart City, intelligente Stadt, versteht jeder etwas anderes.
Trans.: Because by smart city, intelligent city, everyone understands something different.

(6) Lösungen für die Smart City, die Stadt der Zukunft, will Berlin entwickeln.
Trans.: Berlin wants to develop solutions for the smart city, the city of the future.

(7) Die Stadt bezeichnet sich selbst als Smart City, also vernetzte Stadt.
Trans.: The city describes itself as a smart city, that is, a networked city.

(8) Sie schaffen die Voraussetzung für Smart Cities, die Zukunftsstädte.
Trans.: They create the conditions for smart cities, the cities of the future.

The list of the keywords and multiword expressions, derived from the comparison of occurrences with the reference corpus, again shows the noun *Digitalisierung*, the modifier *digital*, the compound *Digitalstadt* and the multiword expression *digitale Stadt*, in the first positions. In addition, the acronym IoT (Internet of Things), the related German expression, *Internet der Dinge*, and the modifier *vernetzt* (wired) confirm that the newspapers consider ICT the most important feature of the smart city. The keyword list does not include specialised terminology. This finding shows that newspapers present technological and scientific notions to their non-expert readers in an understandable way by using everyday language to highlight the usefulness and impact of the digital environment on everyday life (Peppoloni 2019). This contributes to the ongoing popularisation of the discourse about smart cities.

In this regard, it is worth recalling that the qualifier *digital* to define the city is not new, but it became popular in Europe in the late 1990s, when the European Commission launched the programme European Digital Cities for the years 1996-1999. Instead, the wider concept of smart cities entered the European programmes only in 2012 when the European Innovation Partnership for Smart Cities and Communities began. Within this framework, the German Federal Government has invested in that direction choosing the digitalisation of the cities so as to administer the complexity of urban life to meet the needs of the German citizens. For example, the recently established *Digitalrat* (Digital Council) should help the federal government keep pace with the technological innovations, and to transfer them into government actions. This circumstance explains the dominant role of the lemma *digital* in the discourse about the future city. For instance, as one would expect, the list of the multiple keywords, including the adjective *digitale*, shows nouns referring to concrete objects or applications, such as *Infrastrukture* (infrastructure), *Karte* (map), *Plattform*, *Produkt* (product). But, more interestingly, the list includes a consistent number of abstract terms such as *Welt* (world), *Zeitalter* (age), *Revolution, Angebot* (offer), *Strategie* (strategy), *Zukunft* (future), *Wandel* (change), *Transformation*, *Geschäftsmodell* (business model), *Wirtschaft* (economy) and *Bildung* (education).

Further examination of the term *Digitalisierung* helps describe the perspectives conveyed by newspapers when presenting the smart city concept. Looking at the list of nouns with *Digitalisierung* as the genitive object, it emerges that the digitalisation is described as an opportunity (*Chance der Digitalisierung*), a possibility (*Möglichkeit der Digitalisierung*) and a challenge (*Herausforderung der Digitalisierung*), which must be exploited (*nutzen*).

> «Wir wollen die Chancen der Digitalisierung nutzen, um die Lebensqualität in der Stadt zu erhöhen und wirtschaftliches Wachstum zu fördern. Auch die Stadtverwaltung wird profitieren», ist Link überzeugt.

> Trans.: «We want to use the opportunities offered by digitalisation to improve the quality of life in the city and promote economic growth. The city administration will also benefit», Link [Lord Major of the city of Duisburg] is convinced.
>
> «Mit den Möglichkeiten der Digitalisierung möchten wir die Lebensqualität unserer Bürgerinnen und Bürger weiter verbessern», betonte der OB.
> Trans.: «With the possibilities of digitalisation, we want to further improve the quality of life of our citizens», emphasised the Lord Mayor.

Newspapers highlight the advantages of the digitalisation and describe it in a benevolent way in order to raise readers' favourable attitude. In particular, digitalisation is a growing process aimed at improving the quality of life (*Lebensqualität*), promoting the economic growth (*wirtschaftliche Wachstum*), and helping city administrations (*Stadtverwaltung*). The list of the genitive objects of *Digitalisierung* shows the numerous fields of application of digital technologies (see Table 1).

Genitive objects	
Wirtschaft	*Digitalisierung der Wirtschaft* (trans.: digitalisation of the economy)
Lebensbereich	*Digitalisierung aller Lebensbereiche* (trans.: digitalisation of all areas of life)
Verwaltung	*Digitalisierung der Verwaltung* (trans.: digitalisation of the administration)
Leben	*Digitalisierung des täglichen Lebens* (trans.: digitalisation of everyday life)
Energiewende	*Digitalisierung der Energiewende* (trans.: digitalisation of the energy system)
Stadt	*Die Digitalisierung der Stadt* (trans.: digitalisation of the city)
Gesellschaft	*Digitalisierung der Gesellschaft* (trans.: digitalisation of the society)

Table 1 - Genitive objects of *Digitalisierung*.

This is confirmed by the investigation of the semantic structure of clauses in terms of agency that highlights the main actors of the process and the role being played. In particular, the verbs with *Digitalisierung* as the accusative object are usually joined with IT companies or politicians as actors. Specifically, companies play a fundamental role in the development and implementation of innovative technologies, but they also act as opinion leaders who significan-

tly influence the public. For this purpose, IT companies participate in fairs, exhibitions and debates producing, therefore, a discourse about [the benefits of] smart cities and the importance of their activities. In this way, companies stage themselves as central actors to introduce a new urban management model (Söderström/Paasche/Klauser 2014). Similarly, politicians, authorities and researchers are official sources upon which journalists depend. As a matter of fact, readers perceive those actors as reliable and credible (Wolf 1985; Fairclough 1995, 2003).

In this direction, both politicians and IT companies declare that digitalisation is their main objective because they want to improve citizens' quality of life as the following examples show.

> Mit dem Wettbewerb wollen der Branchenverband Bitkom und der Deutsche Städte- und Gemeindeverband die Digitalisierung auf der Ebene der Städte vorantreiben.
> Trans.: With this competition, the industry association Bitkom and the German Association of Towns and Municipalities want to promote digitisation at the city level.

> Wirtschaftsminister Tarek Al-Wazir (Grüne) sieht Darmstadt auf dem Weg zur digitalen Vorzeigestadt. «Wir wollen die Digitalisierung so gestalten, dass alle davon profitieren».
> Trans.: Minister of Economics Tarek Al-Wazir (Green Party) sees Darmstadt on its way to becoming a digital showcase city. «We want to design digitalisation in a way that everyone benefits from it».

> Der Wirtschaftsexperte in der CDU-Landtagsfraktion sieht die Digitalisierung als große Aufgabe.
> Trans.: The economic expert in the CDU state parliamentary group sees digitalisation as a major task.

The examination of clauses, based on Halliday's (1994) Systemic-Functional Grammar, reveals that public authorities, politicians and companies are often presented as *sayers*, while citizens are *recipients* of their statements (Halliday 1994). Indeed, articles often quote and/or make reference to mayors (*Bürgermeister* and *Oberbürgermeister*) and members of the German state (*Länder*) parliaments and local governments (*Senator/Senatorin – Minister/Ministerin*). Verbal co-occurrences of these figures are verbs of saying, as 'say' (*sagen*), 'explain' (*erklären*), 'speak' *(sprechen)*, 'see' *(sehen)*.

The focus on the same category as source of information to avoid misleading readers is a typical feature of scientific and technology news (Moirand 2003). For instance, the figure with the highest frequency in the wordlist is the senator for the economic affairs of local governments (*Wirtschaftsenator/Wirtschaftsenatorin*), and in

particular, the most frequently cited source is Berlin's Senator Cornelia Yzer (CDU). This confirms the strong bond between innovation and economic issues, and the fact that Berlin is driving the change leading to the construction of a smart city model.

However, this change seems to be governed by a top-down process. Companies, politicians and experts are represented by newspapers as responsible for the development of smart cities and for the discourse about it. Instead, citizens do not seem to have a direct voice in the choice of the city model (see LARA *et al*. 2016; VANOLO 2016; CARDULLO/KITCHIN 2019). In this regard, despite the few occurrences of *citizen* (*Bürger*), the structure of the sentences is fascinating. When citizens are depicted as actors of material processes, their role is diminished because either their action is supported by others (e.g. by experts), or they are only the recipients of advantages produced by the new technological environment. Moreover, citizens are indicated as the object of interventions aimed at increasing their engagement and their direct participation in the process of thinking, planning and executing social and urban transformations of existing cities in smart cities (MELLOULI/LUNA-REYES/ZHANG 2014) as the following examples illustrate:

> In Sillenbuch haben sich zuletzt am Dienstag mehr als 20 Bürger getroffen, um, unterstützt von drei Multiplikatoren, die Vorschläge für den Bezirk zu konkretisieren.
> Trans.: More than 20 citizens met in Sillenbuch on Tuesday, supported by three consultants, to elaborate the proposals for the district.

> Langes Anstehen, Willkür bei Genehmigungen und gestresste Beamten, auf die Bürger bisher trafen, sollen der Vergangenheit angehören.
> Trans.: Long queues, arbitrary permits and stressed officials that citizens used to meet should be a thing of the past.

> Einen umfassenden Maßnahmenkatalog soll nun die vom Stadtrat eingesetzte Zukunftskommission erarbeiten – und dabei die Bürger einbeziehen.
> Trans.: The Future Commission – appointed by the City Council – has to draw up a comprehensive catalogue of measures, by involving the citizens in this process.

> Dabei geht es vor allem darum, Bürgerinnen und Bürger an den Entscheidungen der Verwaltung zu beteiligen.
> Trans.: The main aim is to involve citizens in the decisions of the administration.

5. Concluding remarks

Our analysis suggests that German newspapers tend to exploit key characteristics of innovative technologies to delineate the identity of the future city as a high-tech environment. Newspapers use everyday language to describe innovations

leading to the digitalisation and networking of the city that are functional to the construction of a new eco-system based on the so-called Internet of Things. They refer to tangible products (e.g. intelligent streetlights, connected vehicles, sensor-driven traffic signals and intelligent bins) that provide practical solutions to everyday urban challenges (i.e. mobility, waste management, energy distribution, etc.). In this way, readers can appreciate the possible benefits of the transformation because they feel that this change will increase their levels of comfort in everyday life.

The discourse about smart cities conveys some of the characteristics of German society: the preservation of the environment, the shift to a sustainable economy and the right to basic services. However, the participation of citizens in the design of the smart city is only evocated. In practice, a participatory approach has not yet been implemented because residents are in a subordinate position being consumers of the innovative applications that entrepreneurs offer. The process leading to the future city seems to be governed by a techno-centric view that combines long-term objectives of the federal government with those of high-tech companies. The human-centred perspective towards smart city is still at its early stage and has not gained the attention of the German media yet.

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