Exploring the ability of tomorrow's leaders to support smart city projects

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Abstract:
In the extent literature, several case studies explore interdependencies between smart cities and concepts such smart communities, corporate citizenship and citizen involvement. Thus, citizens are more supposed to accept and adopt transformations in their city if they perceive smart cities as an opportunity to improve their daily life. Conversely, they tend to be more resistant and mistrustful if they perceive any form of uncertainty or risk. The paper explores how do 215 potential smart citizens, who are brought to be future leaders, understand different components of the smart city. A general linear model is developed for the propose of this research to underline a typology of smart citizens based on their willingness to understand, accept and support smart city projects. The findings highlight that citizens build an understanding of smart cities based on what is developed in their city, in Flanders, in Belgium and in Asia. Technological factors seem is be less important comparatively to human and institutional ones. Citizens are more commonly supporting projects improving sustainability, governance, inclusiveness and wellbeing. However, these latter need to be aligned with cultural identities and social expectations. Based on significant factors, the research identifies six profiles of citizens: the local planner, the regional green questioner, the national entrepreneur, the international public supporter, the humanist and the marketer. Each profile is characterized by a different balance between uncertainty, resistance and supportive willingness. This finding demonstrates the importance that public authorities need to decade to the critical thinking, the imaginary and the behavior of different categories of citizens.
Keywords: smart city projects, cultural identity, uncertainty, supportive willingness, transformations

Introduction

The fast urbanization leads to new challenges for cities (Dierwechter, 2013). In order to be smarter, cities implement strategies to support sustainability, workability and livability (Bibri and Krogstie, 2017). New researches on the future of urban life explore definitions, societal components, opportunities and threats related to the emergence of smart cities (Milliken, 1990). Different scholars underline the necessity of cities to innovate in city administration, education, healthcare, safety, infrastructures, technology and ICTs (Fernandez-Anez, Fernández-Güell, & Giffinger, 2017; Giffinger, 2007; Harrison, C. and Donnelly, 2011; Nam & Pardo, 2011b, 2014; Parmar et al., 2010; Washburn & Sindhu, 2009). As a result, the capacity of a city to innovate and to develop projects aligned to its challenges and to citizens' expectations defines its smartness and adaptability level (Alawadhi et al., 2012; Chourabi et al., 2012; Gil-Garcia, Pardo, & Nam, 2015). This willingness to transform the city brings out in the literature review an increasing decade for digitalization, sustainable urban transition (Yadav, Mangla, Luthra, & Rai, 2019), urban planning, well-being and citizen inclusiveness (Dameri, 2014; Dameri, Negre, & Rosenthal-Sabroux, 2016; Lapsley, Miller, & Panozzo, 2010). However, questions are also emerging on cities' ability to face potential risks to ensure a successful transformation (Milliken, 1990).

As the core of a transforming city, digitalization is frequently associated to sustainable transition (Shelton, Zook, & Wiig, 2015). As example, urban transformations are using ICTs and technological solutions to rethink adapted neighborhoods and infrastructures with important green spaces (Kumar,

Singh, Gupta, & Madaan, 2018). As such, the digital age contributes significantly to transform what citizens think and need. Garcia et al published a book on a comprehension of the 21st century city. According to the authors: "*Cities are working to respond to their changing reality and to become smarter*" (Gil García, Pardo, & Nam, 2016, p.2). The concept of smart cities is regularly used by elected officials, civil society, private companies and academia to aggregate innovative programs or projects transforming a city. Actually, there is a lack of common meaning and understanding of what is a smart city in the literature review. As such, bottom-up and top down projects improving aspects related to people, living, governance, mobility, economy and environment at a city level are more and more associated to a smart city approach.

Traditionally, the increasing use of ICTs associate systematically smart cities only to the technological side (Kummitha & Crutzen, 2017, 2019). Different scholars are now exploring how sustainability and digitalization are contributing in developing smart cities (Yigitcanlar & Kamruzzaman, 2018), and, how cities can be smart differently according to their challenges and ecosystems. The development of smart cities is mainly observed in Europe through different sensitivities proposed by the European Commission. As a result, different smart city projects at local, regional, national and European levels are emerging to achieve H2020 program's objectives. The development of such projects generates tangible and intangible transformations. Different scholars are pointing linkages between the adoption of innovation and the acceptance of changes. As such, culture, resistance, human capacity, cultural capability and risk aversion are stressed as strategic factors based on scholars of Goodman (1982) , Quinn and Cameron (1989) (Prastacos, Söderquist, Spanos, & Van Wassenhove, 2002) and (Albury, 2005). To strengthen the acceptance of innovative projects transforming a city, the philosophy of innovations and implemented projects need to be aligned with values, behaviors and social norms. Then, transformations are adopted when innovations' objectives meet citizens' expectations.

Based on contingency theory, cities are motivated by implementing smart city projects to respond to environmental demands. Citizen opinions and expectations are then more and more integrated as an input in defining smart city orientations. Moreover, referring to scholars of Arnstein, illustrating levels of citizen involvement (passive, symbolic and effective participations), cities are fostering dynamic collaborations based on effective participations of citizens in developing bottom-up smart city projects, financing projects and deciding urban planning policies (Arnstein, 1969). In the literature review of smart cities, several case studies explore interdependencies between smart cities and concepts such smart communities, corporate citizenship and citizen involvement (Ismagilova, Hughes, Dwivedi, & Raman, 2019; Zhang, He, & Zhu, 2017). Thus, it seems that what do citizens really think about strategic projects is important in developing adequate policies responding to economic, institutional and social pressures. Hence, citizens are more supposed to accept and adopt transformations in their city if they perceive smart cities as an opportunity to improve their daily life. The primarily psychological perspective emphasizes the capacity of citizens to accept change and to develop an adequate behavior regarding implemented transformations (Jun & Weare, 2011). As example, (Damanpour & Schneider, 2009; Walker, Damanpour, & Devece, 2010) highlight that innovations are accepted according to their characteristics, ecosystem and group-based interest. Giving the background of existing work on the subject, it seems that not all smart city projects developed by cities are systematically accepted and supported by citizens (Chong, Habib, Evangelopoulos, & Park, 2018).

This paper aims at exploring what smart cities mean for potential smart citizens. Based on the global idea of Lynch (1969) in his theory of the landscape's perception, we assume that innovative projects transforming a city - labelled in some policies and countries as smart city projects - generate cultural, material and immaterial transformations. These can be perceived as an opportunity to improve the city, or contrariwise, as a factor increasing uncertainty and risks. This research paper is based on a survey carried out among potential smart citizens in Belgium. Thus, the smart citizen is characterized by his

ability to adapt and to live in smarter cities (use of technologies, aware of sustainability (Ahvenniemi, Huovila, Pinto-Seppä, & Airaksinen, 2017) and quality of life's challenges, capacity for life-long technological learning), in which, he has the necessary abilities to imagine (critical thinking) and initiate changes (capacity to give his opinion, to propose or to get involved in innovative actions) (Vanolo, 2014; Cardullo & Kitchin, 2019). Based on this definition, the sample of this research is composed by 215 technological user-friendly students with strong knowledge in Economy, Business and Entrepreneurship in order to explore how these potential smart citizens, who are brought to be future leaders in public, private and associative sectors, understand the concept of smart cities. More specifically, the research explores how do they associate this concept to community involvement, territorial benefits and uncertainties and to strategic projects to develop at local level. The paper is divided into four parts. First, a literature review is developed to determine different factors measuring the understanding of smart cities based on theoretical foundations of the understanding of the city's theory developed by Lynch (1960). Based on scholars in smart cities, research variables are selected in the second part, to identify different profiles of understanding. The third part highlights methodological aspects such data collection and analysis. The last part stresses the main findings and discusses profiles of understanding identified in variate and multivariate analyzes. Furthermore, the paper proposes theoretical contributions and managerial implications for public authorities in order to ensure a positive understanding of smart city projects developed locally.

1. Literature review

The increasing interest dedicated to well-being and quality of life in cities reinforces research on how citizens perceive their city (Surrallés & García Hierro, 2005). From the urban perspective, the perception of material and visual transformations in a city is coming to the fore. Different scholars are testing how citizens perceive physical elements such structure of buildings, neighborhoods, spaces and cultural heritages (historical sites, churches, architectures…), and how do they associate them to the identity (ambiance, symbols, references…) of their city. For scholars exploring the human side of the landscape's ambiance, the quality of life is mainly explored to determine city attractiveness and social responsible citizenship (Macke, Casagrande, Sarate, & Silva, 2018). Cities are fostering an active citizen involvement in urban thinking, implementing and monitoring.

1.1. Citizens as observers and users of their city

Actually, there is no framework exploring how do citizens really perceive or understand transformations generated by smart city projects. However, scholars of Lynch propose an interesting approach that can be extrapolated in exploring the understanding of a smarter city. In his theory of the understanding of a city, Lynch defines citizens as the main observers and users of spaces and cities. Citizens as humans, build different stimulus and sensations regarding transformations operated in their city. They understand differently elements due to their different sensitivities. A city, defined as a landscape or a territory, is perceived as a combination of material and immaterial components which define interactions, values, culture and norms. Citizens interact with their environment according to how they perceive physically and emotionally territorial components and transformations. They build a co-constructed understanding of their city with specific individual and common associations, memories and meanings based on experiences, practices and daily habits. Thus, they associate their city to a set of cultural, material and emotional references. Each project transforming their city has a potential impact on their city legibility, identity and imageability (Lynch, 1960). Therefore, citizens as individuals or groups structure physical and immaterial components of a complex ecosystem in order to build a global positive or negative understanding (Schleich & Faure, 2017).

1.2. Willingness of citizens to accept and support local transformations

Changes and transformations generated by implementing innovative programs, such smart city projects, modify both the ambiance and the perception of the landscape. These (economic, structural and social) changes impact on symbols, physical landmarks and on dynamic relationship between the self and its environment (Lynch, 1960). Transformations operated by implementing innovative programs, such smart city projects, impacts on collective behaviors and social representations. Transformations can then be supported or rejected according to collective visions and cultures. On one hand, if supported, citizens progressively adapt their cultural and social constructions. Material and immaterial transformations are then associated to new positive and approved values, symbols and identities (Pike, Dawley, & Tomaney, 2010). This support favors a potential increasing citizen involvement in the development of strategic city projects, such smart city projects. The acceptance and adoption of transformations are conditioned by first, the availability of information related to potential changes, second, structured changes in accordance with their territorial identity, and third, improvements of their quality of life (Lynch, 1960). On the other hand, fostering creativity, innovation and entrepreneurship with a focus on technology and digitalization increases the risk of isolation (access to internet, elders, isolated areas) and addiction to technology (data privacy). Other limits are highlighted in the literature review, such major financial investments, threat to territorial identity, complexification of urban planning and privatization of public spaces and services (Sunley, Martin, & Tyler, 2017). If citizens associate transformations in their city as a complicated or risky phenomenon, they lost the legibility, identity and imageability of their living environment (Lyhne, et al., 2018). Thus, citizens will be more likely to develop negative perceptions regarding the concept of smart city and regarding transformations generated by such innovative projects.

1.3. Different users and observers for different profiles of understanding

Based on social categories, the imageability of a city varies according to individuals, groups and societies. Even for a same observer and user, a city can be perceived differently according to contexts and to both physical and psychological states. Common sensitivities impact on individual mental representations of the living environment. Based on this, citizens belonging to a same social subcategory such gender, age, culture, native region, religion, socio-professional category and level of education develop similar understandings (Tajfel, et al., 1971). However, theses similarities are accentuated by the position of citizens. Engaged-ones are more eager to support innovation and changes (Nilssen, 2018). They develop pragmatic perceptions on potential long-term benefits. Contrariwise, the less engaged ones are more likely to be less attracted by what could be uncertain for their quality of life, symbols and norms (Lynch, 1960).

2. Research assumptions

Until now, there is a lack of scholars exploring deeply the understanding of smarter cities by different communities such companies, citizens or governments. Desdemoustier et al. propose an empirical research on how do Belgian municipalities represent smart cities and how do they understand the importance of smart city components and projects (Desdemoustier, Crutzen & Giffinger., 2018). Based on this initiative with a specific focus on smart city's understanding in Belgium, this paper explores how potential smart citizens understand smart cities in the French region of Belgium (Wallonia). The aim of this research is to identify a typology of understandings. For this propose, we assume that citizens build a different understanding of smart cities according to:

2.1. What they define as the most strategic side to develop (technological, human or institutional)

Nam and Pardo propose in their model interesting understanding of the strategic directions of smart cities. They assume that smart cities combine technological, institutional and human factors. These factors are integrated with different levels according to the vision that cities need to develop to reach their smart city

objectives. When cities define the technological factor as a priority, they focus on digital networks, high tech physical infrastructures and on developing smart visual technologies. The technological factor is integrated as a solution in managing efficiently complex systems, however, it also introduces new forms of complexities based on unexpected challenges to face (Trencher, 2018). When cities focus mainly on the human factor, they tend to develop human infrastructures and social capital. City values are then more oriented to creativity, learning, knowledge, cleverness and skillfulness. As a result, visions and strategies are fostering dynamic learning environment with strong incentives for higher education and smart workforce. When cities define the last core component of smart city (institutional factors) as the most important, they develop a local culture oriented to smart communities, citizen inclusiveness and smart growth (Alawadhi et al., 2012; Chourabi et al., 2012; Nam & Pardo, 2011b). Cities are more oriented to improve governance, policies, directives and propose new adapted regulations in order to design and facilitate implementation of smart city projects. Based on this extend literature, this research assumes that according to their backgrounds and experiences, citizens will associate primarily the concept of smart cities to one of the three factors, and this, will impact on the understanding that they build on what could be the strategic components of a smart city.

Table 1. Research variables

Factors conditioning how citizens understand smart cities	
Focus	Technological factors Human factors Institutional factors
Reference	Neighborhood or city level Provincial or regional cities Country level European cities Asian cities North American cities
Understanding of smart city components	
Development of an innovation ecosystem and people centric approach	Who are the main involved actors in developing smart city projects?
Clarity of vision	In what cities can be positively transformed by developing smart city projects? Which values and city understandings are associated to smart cities? Is there any risk aversion or uncertainty regarding the development of smart city projects?
Support programs and leadership	What are the actions to be developed to support implementing smart city projects?
Implementation of smart policies and track record of previous initiatives and projects	What are the strategic areas to develop in order to be a smarter city? How sustainability and smart city policies should be associated to transform positively a city?

2.1. What they choose as a smart city reference (projects developed at city level, regional, national, or international level)

Previous literature assumes that the understanding of smart cities differs according to urban labelling and popularly common used ideologies and values (Grossi & Pianezzi, 2017). Cities are replacing the "smart" by other alternative adjectives which are more user-friendly. Thus, different reports (IESE, EY, Eden Strategy Institute, ABI research…) propose smart city indexes based on common criteria to measure the most important smart cities in the world. For instance, the ranking proposed by the IESE Cities in Motion analyses cities based on human capital, social cohesion, economy, governance, environment, mobility, urban planning, international outreach and technology. These indexes include ISO 37120 and smart city standard. For 2018, the IESE's report points that 6 of the top 20 smart cities are European cities (Paris (3rd), Amsterdam (10th), Berlin (11th), Copenhagen (13th), Stockholm (16th) and Vienna (19th)).

Excellence in developing smart city projects are also pointed all over the world in cities such New York, London, Tokyo, Singapore, Toronto, Hong Kong and Sydney (Beronne & Ricart, 2018) . Also, the Eden Strategy Institute points out criteria such digital inclusion, sharing knowledge and smart city leadership, and highlight cities such Shanghai, Helsinki and Barcelona (Eden Strategy Institute, 2018). Beyond the analysis of the evolution of the smart city, these researches are proposing models increasingly complete in understanding strategic smart city's components based on international best practices. The media coverage of these rankings (Sarkheyli & Sarkheyli, 2019), massively promoted by the digital age, build an understanding of what could be a smart city by taking these megacities and top ranked smart cities as a reference (Akande, Cabral, Gomes, & Casteleyn, 2019). Thus, this second hypothesis tests how the concept of smart cities is perceived when citizens are referring to what is developed in their city, region, country, or international cities, by doing or not comparison with what is developed locally. The two hypotheses are proposed as factors conditioning how citizens understand smart cities.

Based on the focus and the reference, citizens will have a different understanding of strategic projects to develop, actors to involve, benefits to generate, uncertainties to face, values to share, actions to develop and so on. Based on the ten vectors proposed by the Eden Strategy Institute to rank top 50 smart city governments in 2018, some smart city components are selected in order to build an understanding of what is a smart city for citizens. All the variables of the research are presented in the table 1.

3. Methodology

A survey is developed for the propose of this study. The survey targets the Belgian context in which different innovative programs are developed at local government level with the support of European, federal, regional and provincial resources. These programs are mainly sensitized by the European Union in order to foster innovation, ICTs, governmental policies, quality of life and sustainability within 2020. The European innovation partnership (EIP) on smart cities and communities collaborates with public and private partners in developing strategic smart city programs (energy, transport and public safety, efficient lighting and heat buildings, lower emissions and a better waste and water management)[1]. At the national level, the federal government already launched a strategic plan "Digital Belgium" to support economy, mobility (Crutzen, Bounazef, & Qian, 2018) and energy transition. At regional levels, starting from January 2017, the "Smart Flanders" supports micro and nanotechnology, network technologies, big data, internet of things and mobile applications (Bounazef, Desdemoustier, Crutzen, 2018). The "smart city Brussels" program initiated by the Brussels Regional Informatics Centre in 2014 develops a strategy to foster interconnection, sustainability, open data and safety. Digital Wallonia's program develops the digital strategy to increase digital transformation in living, co-working and governing. The Walloon government (regional government of the French region of Belgium -Wallonia) develops different financial and non-financial incentives to foster the development of smart city projects at municipal levels. For 2018, Digital Wallonia launched call for projects to support energy, sustainability, mobility, logistics, governance and community involvement. Based on this governmental willingness to support smart cities and to involve citizens in this smart and sustainable transition, this research focuses on how do the potential Walloon smart citizen understand smart cities.

3.1.Sample

The level of education and specifically higher education is defined as an index for inclusion (Booth & Ainscow, 2002). Educated citizens are then particularly legitimated to participate and empower actions in the community (Roth & Lee, 2004). Linkages are identified between student engagement, critical thinking, value added and student learning. Educated citizens tend to convert to more mature forms of engagements and critical thinking (Carini, Kuh, & Klein, 2006). Thus, they are trained to accept, adopt

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[1] https://ec.europa.eu/digital-single-market/en/smart-cities

and generate transformations in their environment. Even if there is a lack of researches exploring linkages between level of education and smart citizens, we identify in these categories some similarities such the ability (1) to adapt and live in smarter cities, (2) to imagine and initiate changes, and (3) to use commonly used technology tools (apps available on smartphones and laptops, digital platforms, etc.). The research focuses on young educated citizens with advanced knowledge in economy, entrepreneurship and management and defines them as potential smart citizens. As tomorrow's leaders, business students are trained to identify potential economic and social challenges, opportunities and threats of innovative programs developed locally such smart city projects.

The sample is composed of students enrolled as regular students in their final year of a master degree at HEC Liege (Management School of the University of Liege, which is the most important business school of the region). Only those officially live in Wallonia have been selected. Erasmus students, foreign regular students and whose responding partially to the survey have been excluded. 215 business students out of 288 participated completely to the research. The sample includes students between 21 and 31 years old (with an average of 23 years old), and is composed by 48% of women and 52% of men. Students of the sample live in different Walloon municipalities. Thus, results give an interesting representation of how this subcategory of Walloon citizens understands smart cities. As such, the research includes students living in 117 municipalities, which represents 20% of the Belgian Walloon municipalities. All the Walloon provinces are represented. However, the province of Liège (72%) and of Luxembourg (16%) are overrepresented. The remaining 22% are spited between provinces of Namur (5%), Hainaut (3%) and Walloon Brabant (2%). The research analyses result globally for the sample and does not include in the analysis the age, the gender and the belonging municipality.

3.2.Data collection

The survey was online and shared on the internal pedagogical platform of HEC Liege. The data collection lasted two months (from September 2017 to November 2017). The survey aims at exploring the factors conditioning the understanding of smart cities and the components of smart cities' understanding. Thus, students were asked to note between 1 and 10 the importance that they dedicate to technological, human and institutional factors. In the data treatment, only the factor with the highest score is retained and is defined as the prior focus to develop in a city for each respondent. Then, students had to select a territorial reference when they think to the concept of smart cities. Respondents had the opportunity to refer to what is developed locally, regionally, nationally or internationally (at European, Asian and American levels). Afterwards, students were asked to note between 1 and 10 the level of developing smart city projects in the territory that they choose as a reference. For the understanding of smart city components, different measures have been used. First, the survey necessitated to note the level of involvement of strategic actors (9 national or regional public actors, 8 local public actors, 9 private actors and 3 actors of the civil society) in the development of smart city vision. Second, three questions have been proposed to explore the clarity of the vision. Globally, students had the opportunity to select elements that they associate as an opportunity for cities (e.g.: sustainability, economic growth and city branding…), a limit or an uncertainty (e.g.: threat to cultural heritage, changes generated by such projects are feared and unknown…) and finally as a social value (e.g.: creativity, integration, smartness, dynamics…). Third, students were asked to select one or several essential elements that they estimate as strategic to sustain smart city vision or projects (e.g.: politician support, citizen involvement, flexible procedures…). Lastly, students had to rank the six dimensions of the smart city according to how they understand territorial challenges and strategic areas increasing the smartness and sustainable level of a territory. Then, to distinguish between a smartness and a sustainable approach in developing smart city projects, students gave their opinion about how they understand linkages between sustainability and smart city policies (for more information on research variables, see appendix 1).

3.3. Data analysis

A general linear model (GLM) was selected to analyze the survey's data. Technology, human and institutional factors were selected as categorical factors to explore possible differences on the understanding of smart cities. The smart city references selected by the sample (local, regional, national, European and international levels) were defined as continuous predictors. The analysis of the restricted sigma parameterization was calculated with Wilk, Pillai, Hotelling and Roy (multivariate tests of significance, significance level: $p < 0.05$). Only significant dependent variables of the full R model are presented in the results. An in-depth analysis of significant univariate results is presented for significant categorical factors and continuous predictors.

4. Results

This section presents two categories of findings. First, multivariate tests of significance of the general linear model will be presented. These findings allow to determine relevant factors that will be used to identify potential profiles of understandings. The tests of Wilk, Pillai, Hotelling and Roy are realized to strengthen the robustness of our statistical model. They are also used to explore our research assumptions through testing the null hypothesis, which is rejected when $p < 0.05$. Only factors getting significant results in at least three tests on the four applied in our model are selected for next analyzes. Second, the first undersection proposes a global vision of how smart cities are understood by our sample based on multivariate and univariate tests.

4.1. Factors impacting the understanding of smart cities

The table 2 shows that three multivariate tests (Wilks, Hotelling and Roy) are significant for the analysis of the GLM. Thus, the significant categorical factors and continuous predictors impact significantly on how citizens build an understanding of what is a smart city. For the continuous predictors, it seems that citizens are referring to what is developed at the level of their neighborhood or city to build an understanding of smart cities. For the case of Belgium, Wallonia is not as a significant predictor, however, citizens take projects developed by the Flemish region and by the federal government as a reference. Even if the concept of smart cities is mainly developed in Europe, it appears that citizens do not refer to European countries or cities to conceptualizing their understanding of smart cities. They are more referring to what is developed in the Asian countries and cities. For the categorical factors, citizens are more associating smart cities to human and institutional factors rather than to technological one.

Table 2. Multivariate tests of significance

		Test	Value	F	p	Significance
		Wilk	0,27	4,81	0,000	X
	Full Model	Pillai	1,00	-	-	-
		Hotelling	296,22	521,71	0,000	X
		Roy				X
Reference		Wilk	0,54			X
	Local level	Pillai	0,46	1,50	0,028	X
		Hotelling	0,85			X
		Roy	0,85			X
		Wilk	0,68			-
	Regional level : Wallonia	Pillai	0,32	0,82	0,814	-
		Hotelling	0,46			-
		Roy	0,46			-
		Wilk	0,48			X
	Regional level : Flanders	Pillai	0,52	1,90	0,001	X
		Hotelling	1,08			X
		Roy	1,08			X
		Wilk	0,55			X
	National level: Belgium	Pillai	0,45	1,47	0,034	X
		Hotelling	0,83			X
		Roy	0,83			X
		Wilk	0,60			-
	International level: Europe	Pillai	0,40	1,18	0,216	-
		Hotelling	0,67			-
		Roy	0,67			-
		Wilk	0,55			X
	International level: Asia	Pillai	0,45	1,44	0,041	X
		Hotelling	0,82			X
		Roy	0,82			X
		Wilk	0,58			-
	International level: North America	Pillai	0,42	1,25	0,141	-
		Hotelling	0,71			-
		Roy	0,71			-
Focus		Wilk	0,05			-
	Technological factors	Pillai	2,30	1,15	0,059	-
		Hotelling	3,96			-
		Roy	1,06	1,95	0,001	X
		Wilk	0,02	1,21	0,007	X
	Human factors	Pillai	3,11	1,19	0,012	X
		Hotelling	5,66	1,23	0,004	X
		Roy	1,45	2,70	0,000	X
	Institutional factors	Wilk	0,01	1,32	0,000	X
		Pillai	3,56	1,23	0,002	X
		Hotelling	7,55	1,45	0,000	X
		Roy	2,88	5,43	0,000	X

4.2. Global understanding of smart cities

The table 3 illustrates significant dependent variables of the GLM. Smart cities are perceived as an opportunity to improve multidisciplinary aspects of a territory including technological, human and institutional components. As educated citizens with strong knowledge in economy and business, they are aware about potential limits that smart cities can generate such as the risk to be addicted to technology, which can exclude minor communities, or the risk to loose cultural heritage through to gradual changes of habits, symbols and norms. Even if scholars associate more and more sustainability and smart cities, the association is not well understood by citizens. According to the model, citizens distinguish between what sustainability policies can bring to a city comparatively to smart city policies. Thus, for them, smart city and sustainable policies have different visions and objectives. Only some projects include both the sustainable and the smart side.

Table 3. Significant dependent variables of the GLM

	Var. Dependent Variables	Multiple R	Multiple R²	Ajusted R²	SC	dl	MC	F	p
Positive transformations for cities	Sustainable urban development	0,48	0,24	0,11	11,85	30	0,40	1,88	0,006
	Economic growth	0,51	0,26	0,14	13,67	30	0,46	2,15	0,001
	Improved quality of life	0,50	0,25	0,13	1,23	30	0,04	2,07	0,002
	Improved project planning and implementation	0,51	0,26	0,14	8,53	30	0,28	2,12	0,001
	Inclusive participation of citizens and both public and private actors	0,45	0,20	0,07	0,97	30	0,03	1,52	0,050
	Integration of new procedural and structural standards	0,51	0,27	0,15	3,92	30	0,13	2,21	0,001
	Brand understanding for cities	0,45	0,20	0,07	118,11	30	3,94	1,54	0,047
	City digitization	0,45	0,20	0,07	23,18	30	0,77	1,57	0,039
	Development of global city vision and challenges	0,45	0,20	0,07	19,31	30	0,64	1,56	0,041
	Accountability to others	0,49	0,24	0,11	17,46	30	0,58	1,91	0,005
Risk aversion associated to smart city projects	Addiction to technology	0,47	0,22	0,09	1,26	30	0,04	1,69	0,019
	Major financial investments	0,49	0,24	0,12	170,96	30	5,70	1,97	0,004
	Threat to cultural heritage	0,45	0,20	0,07	16,60	30	0,55	1,56	0,040
	Complexity of cities' strategic planning	0,46	0,21	0,08	17,98	30	0,60	1,61	0,031
	Privatization of public spaces and public authority	0,46	0,21	0,09	137,25	30	4,58	1,67	0,022
Association between sustainability and smart city policies	There is no link between smart city projects and sustainable projects	0,47	0,22	0,10	113,75	30	3,79	1,77	0,013
	Some projects conducted in cities tend to be smart and sustainable	0,46	0,21	0,08	122,72	30	4,09	1,62	0,029
Uncertainty regarding transformations generated by smart city projects	The smart city frightens me	0,74	0,55	0,48	1,09	30	0,04	7,55	0,000
	The smart city is unknown to me	0,48	0,23	0,11	135,81	30	4,53	1,84	0,008
	The smart city is incomprehensible to me	0,47	0,22	0,10	17,06	30	0,57	1,77	0,012

Even though, citizens do not feel comfortable regarding smart cities, and estimate that they are fearing changes or they do not have enough knowledge or information to really understand this concept. As a consequence, the GLM does not highlight a prerequisite that citizens estimate important or a significant strategic actor involved in developing smart city projects. Also, it seems that smart cities are not well understood (globally) to be associated to a city understanding, to values or to strategic areas to develop. The analysis of significant univariate results brings out an ecosystem composed by strategic actors identified by citizens (Table 4). The majority of the ecosystem is constituted by multilevel governmental actors or by public accompaniment organizations. Despite this, federal and regional administrations are not identified as strategic in developing smart cities. Actors like mayors, head of city departments and smart city managers are also not pointed. This shows that the ecosystem is more associated to strategic organizations rather than on strategic individual actors. For the private sector, even if scholars are pointing the important role of big companies and mainly big giants, citizens do not identify multinationals, large Belgian companies, local SMEs, consulting firms, independents and banks as strategic actors. Only startups and hospitals are pointed as important actors in developing the "bottom-up side". These findings emphasize the importance that citizens dedicate to entrepreneurship and advancements in the smart health. However, citizens and civil associations are not significantly involved in developing smart city projects. Smart cities are more associated to an understanding of a top-down approach with an emerging complementary bottom-up initiatives.

Table 4. Analysis of significant univariate results

		Continuous predictors				Categorical factors	
		Local level	Flanders	Belgium	Asia	Human	Institutional
Actors involved in developing smart city projects	Federal government	-	X	-	-	-	-
	Deputies	X	-	-	-	-	-
	Regional government	X	-	-	-	-	-
	Provincial administration	-	X	-	X	-	-
	Parastatal agencies	-	X	-	-	-	-
	Technical and economic inter-municipalities	-	X	-	-	-	-
	Community college (aldermen)	-	X	-	-	-	-
	City administration	-	-	X	X	-	-
	Municipal administration (Departments)	X	-	-	-	-	-
	Strategic/transverse department	-	-	-	-	X	-
	Public companies	X	X	-	-	-	-
	Hospitals	-	-	-	-	X	-
	Start-ups	-	-	X	-	-	-
	Universities	-	-	-	-	X	-
Positive transformations for cities	Economic growth	-	-	X	-	-	-
	Improved project planning and implementation	X	-	-	-	-	-

	Inclusive participation of citizens and both public and private actors	X	-	-	-	X	-
	Brand image for cities	-	-	-	-	-	X
	Development of global city vision and challenges	-	-	-	-	X	-
	Integrated municipality	-	-	-	-	-	X
Actions to be developed to support smart city projects	Strong support for smart city projects by politicians	-	-	-	-	X	X
	Strengthening flexible procedures and continuous learning	-	-	-	X	-	-
	Involvement of citizens in the city strategy	-	-	-	-	-	X
Risk aversion associated to smart city projects	Threat to cultural heritage	-	X	X	-	X	-
	Complexity of cities' strategic planning	X	-	-	-	-	-
	Privatization of public spaces and public authority	-	-	-	X	X	-
Strategic areas to develop to be a smarter city	Smart Environment	-	X	-	-	-	-
	Smart Governance	-	-	-	X	-	X
	Smart People	-	-	-	-	X	-
	Smart Living	-	-	-	X	-	-
Association between sustainability and smart city policies	There is no link between smart city projects and sustainable projects	X	-	-	-	-	X
Uncertainty regarding transformations generated by smart city projects	The smart city is feared	-	X	X	-	X	-
	The smart city is unknown	-	X	-	-	-	-
	The smart city is incomprehensible	-	X	-	-	X	-

The univariate results highlight some perquisites and strategic project identified by citizens as relevant in developing smart cities. Developing flexible leadership in managing innovative programs, global vision of city challenges and cross strategic consultative committees seem to be less important comparatively to reinforcing political supports, continuous training and citizen involvement. They build an understanding of smart cities prioritizing environmental, organizational and social issues. Projects related to smart economy (creating jobs, developing new business models...) and smart mobility (soft mobility, integrated transport systems, parking and congestion solutions…) seem to be less associated to smart city' priorities. Globally, based on univariate results, smart cities are firstly associated to the variables: the smart city frightens me and is a threat to the cultural heritage of a city" (identified in at least three factors on five). Citizens give their trust to city administration and some public companies to develop smart city projects, however, they are aware of the importance of developing a new way of managing and governing in order to facilitate planning, deciding, and implementing smart city projects.

5. Discussion

This last section proposes firstly an original contribution in identifying different profiles of potential smart citizens. This point underlines the main characteristics for each profile and highlight his willingness to accept, support and participate in developing smart city projects (based on the findings of the GLM). Then, this section links the main findings to research assumptions.

5.1. Different understandings for different profiles of smart citizens

The analysis of univariate results shows that the focus and reference are significantly orienting the understanding of smart cities. The model does not identify significant similarities between variables of the focus and the reference. Thus, we propose a typology of smart citizens corresponding to each significant factor presented in the Table 4.

5.1.1. The local planner

The local planner focuses on *how* and *who* can contribute in facilitating the urban planning of smart city projects. Defining smart city objectives is a strategic point necessitating a transversal contribution of the government and local public authorities. The concept of think globally, act locally can be proposed for this profile. Local initiatives need to be aligned with federal and regional objectives in order to be successfully implemented and supported. This alignment allows to standardize clear planning and implementing procedures. He is also aware about the importance of co-creating and on planning complementary initiatives pushed by civil actors and private actors to support public smart city policies. The planning side is mandatory to succeed the implementing process, specially, to handle potential complex strategic planning induced by collaborative and participatory models. Being concerted by the importance of structuring local initiatives, he estimates that sustainable and smart city projects target different goals, and need to be planned separately to be more effective. The planner develops a pragmatic understanding of the smart city, thus, a structured planning of smart city policies and projects eliminates uncertainties regarding to how a city can be materially and immaterially transformed. As a result, this profile can be defined as an effective smart citizen. He has strong stimulus and positive sensations regarding smart city policies, and consequently, a strong willingness to accept, support and moderately participate in developing smart city projects. The local planner thinks that smart city projects is the responsibility of the relevant actors. He could participate in developing projects if public authorities ask for. His participation would be limited to the proposition of ideas, voting and integrating advisory or exchange committees.

5.1.2. The regional green questioner

The regional green questioner develops strong concerns regarding smart city projects and needs to be frequently reassured about the mastery of potential risks. He is more confident with sustainability and green policies that are commonly understood and approved in the society. Thus, he builds an understanding of smart cities based on provincial or regional cities developing a mature sustainability and neutral environment plans. He is frightened by transformations that he estimates as uncertain and weakly understandable. Thus, it seems that he is less reactive and does not feel the need to be informed and engaged in projects increasing a territorial transition. In addition, the concerns that he underlines could be a factor increasing resistant behaviors. The regional questioner is more oriented to top-down initiatives that need to be planned and coordinated not locally, but regionally. Thus, smart city policies are more mature when they are defined by the federal government and implemented by several public organizations which have the expertise to develop successful gradual transformations at regional and local levels. Only the

community college is involved to ensure a cohesion between regional and local realities. Therefore, the smart city dynamic is more pushed by the region and by pilot cities. The regional questioner understands smart city projects as a threat to culture heritage (physical and social symbols) and identity (values, cultures and social norms). He does not currently identify any opportunity or benefit that these projects could generate. Consequently, this profile (weak interest and desire to get involved, resistant to change…) cannot be defined as a smart citizen. He is characterized by weak willingness to accept and support smart city projects.

5.1.3. The national entrepreneur

The national entrepreneur needs to have a clear global vision of changes that will be operated on a city. Even if he tends to be reactive (getting informed about smart city initiatives and good understanding of the global vision of smart city policies), he fears mainly the impact of these projects on the culture heritage. Thus, he supports smart city projects aligned to city identity and culture. He focuses on the opportunity to foster an economic growth through public-private partnerships. Smart city projects aim at developing collaborative models and an active smart city ecosystem. Different entrepreneurs and startups are investing in the smart city niche because they identify real economic and social demands expressed by politicians, public authorities and citizens. A real relationship of supply and demand is created between startups and city administrations. Startups propose concrete solutions adapted to local pressures and challenges. City administrations need external expertise in developing specific projects. Thus, the national entrepreneur does not particularly support bottom-up or top-down initiatives. He supports a direct collaboration between city administrations and different startups implemented nationally. Based on his characteristics, he can be defined as a smart citizen (ability to support creativity, innovation, entrepreneurship and the emergence of new business models based on new collaborations). He has relevant willingness to accept and support smart city projects. However, he has a moderate willingness to get involved in developing such projects as a simple citizen. He would be more participative as an entrepreneur or an economic actor proposing a solution.

5.1.4. The international public supporter

The International Public Supporter puts his trust only in smart city projects developed by the government and public institutions. He focuses on the capacity to reinforce public local-regional collaborations in order to facilitate the process of implementing smart city projects. Projects developed locally need to be aligned to provincial smart city orientations in order to foster a provincial smart transition. Based on this, it seems that we would support better global smart city projects including opportunities for different surrounded cities rather than punctual projects developed at the level of a neighborhood or a single city. Actually, he does not specially identify any direct opportunity. It seems that smart city policies are more refereeing to progressive transitions fostering collaborations between cities and quality of life. Indeed, he highlights the importance of developing smart governance (administration 4.0, participatory decision-making, transparency…) and smart living (quality of life, social cohesion, smart housing…) projects to foster a more starter province. The international public supporter is aware about the necessity to establish flexible procedures and to continually learn from mistakes highlighted in previous collaborative experiences between cities and the provincial administration. In the context of smart cities, he is wary of the power that private companies can acquire through solutions they bring to cities, hence the importance of developing more transversal projects. He refers to what is developed at the international level, specially to the role of public authorities in developing the Asian model of smart cities. The international public supporter does not have the adequate characteristics to be

defined as a smart citizen. He supports and accepts smart city projects developed only by public authorities, and it seems that he is not aware about the strategic role that all the ecosystem or that he can play in developing such projects.

5.1.5. The Humanist

The humanist focuses on developing the human side of the smart city such creativity, innovation, education, culture, knowledge and citizen involvement. Before developing smart city projects, the priority is to define a smart city policy aligned to the city strategy based on a transversal approach. Top-down projects are not developed in silo at the level of different city administrative departments. These projects encompass different strategic areas, and thus, the contribution of different experts. The humanist highlights the importance of collaborating with universities and hospitals in the development of smart city projects. The intellectual expertise brought by academic and scientific experts challenges the creativity and the usefulness of such projects, especially in the case of developing a global city vision of territorial challenges. As an opportunity, the humanist associates smart city projects to the opportunity to foster inclusiveness and an active participation of different strategic actors. As such, bottom-up and top down approaches are complementary to efficiently respond to all city challenges. However, he highlights the necessity to have a strong political support to ensure smart city dynamics, and to regulate the power of private companies. He associates smart cities to the opportunity to develop smart people projects through transversal collaborations between public, private and civil actors. However, he develops concerns regarding the power distribution which seems to be unclear and incomprehensible. The characteristics of the humanist allow to define him as a smart citizen. Even if he develops some concerns, he has a strong willingness to be informed, to support, accept and participate in developing strategic projects with the collaboration of scientific entities or public authorities. However, his vision of the smart city seems to not be sufficiently mature. Thus, his participation can be punctual on some projects aligned with the cultural identity. He would be attracted by the opportunity to vote, to meet smart city actors and to participate in debate and exchange committees.

5.1.6. The Marketer

For the marketer, smart cities represent a city branding and an opportunity to brand positively a city and to be labeled as an integrated city, in which, citizens, communities and politicians work together in improving their city. For him, the cultural norms and the image that the city develops impact on its dynamism. Thus, the concept of smart city is not directly associated to specific projects, but mainly to the opportunity to develop integrated values in order to empower all actors in developing, at their level, initiatives improving their city. Therefore, the marketer highlights the importance of political support and citizen involvement in defining the main areas of the city strategy. The value of do it yourself characterizes the marketer. Thus, he estimates that cities need to focus on the institutional side through developing smart governance projects. This focus is justified by the necessity to help, in terms of administrative procedures, all actors developing their social or innovative actions (facility to create an association, to create a startup, to organize debate conferences or meetings, to validate neighborhood committees' decisions, to allow cultural and social activities…). Indeed, the smart governance and the city branding are directly associated for the marketer. Citizens and the community would be more engaged and go-ahead if the city administration develops an image of fostering and facilitating the development of bottom-up initiatives. Attaching a great importance to the image and values conveyed by projects, the marketer dissociates between sustainable and smart city projects, because they require two different primary identities, values and norms. The marketer does not identify any concerns regarding the

development of smart city projects. He also does not point out any strategic actor in the development of such projects. Based on this, the marketer seems to limit the concept of smart city only to a label or an image that cities need to develop mainly through an important communication campaign or brand marketing strategy. The marketer can be defined as an idealist smart citizen. He has strong willingness to support and accept a smart transition improving the image of his city, but his knowledge of the smart city is limited to an ideal vision of the perfect city. His understanding is not sufficiently developed to determine how actors and how he can effectively contribute in developing such projects.

5.2. Exploring research assumptions

The multivariate tests of significance (Wilk, Pillai, Hotelling and Roy) presented in table 2 aim at testing the null hypothesis. Based on these statistical findings, the research confirms that the understanding of smart cities differs according to the most strategic side to develop and the territorial reference that citizens visualize or imagine. Even if the two main categories are significant, the model rejects the following research assumptions: Reference to what is developed in Wallonia ($F= 0,82$; $p= 0,814$), Europe ($F= 1,18$; $p= 0,216$) and North America ($F= 1,25$; $p= 0,141$), strategic focus on technological factors ($F= 1,15$; $p= 0,059$). First, the research highlights an interesting fact about the importance of technological factors in developing a smarter city. Even if previous literature brings out the strategic role of ICTs, digital solutions and technologies, this component seems to be less important for a subcategory that we can define as potential smart citizens (based on their level of education, their age, their knowledge in economy and business, and their friendly usage of ICTs). This observation can also be extrapolated to identify their expectations and needs about how they imagine the ideal city of the future (Vanolo, 2014, 2016).

As potential smart citizens, the sample selected for our survey offers some ideas about how future leaders who are led to lead strategic projects in the public or private sector think and need to see in their living environment. Therefore, we can wonder how less smart categories such seniors, not educated and isolate citizens can behave in face of technology and digitalization. Except for the technological factor which was not significant in our model, citizens prioritizing the human or technological factors develop different understandings of the smart city, and associate it with other aspects expect for the necessity to have a strong support of politicians. Findings confirms writings on the subject. In fact, when citizens prioritize human factors, smart cities are associated to people and education centric approaches (contribution of different transversal actors, development of smart people projects, impact on local culture and norms, importance of including universities…), and this, consequently emerges some social inquiries like potential threat to cultural heritage (Heaton & Parlikad, 2019). For the institutional approach, it seems that developing smart governance projects is important for improving the city branding of a city, and not systematically for improving policies, directives and urban planning.

Second, findings conclude that the understanding of smart cities differs according to what citizens select as a reference. Thus, citizens building an understanding of smart cities based on what is developed at neighbourhood or city levels are mainly pointing the urban planning challenges associated to inclusive participations of different actors. An interesting fact point out that the sample composed by potential young smart citizens living in Wallonia do not refer to what is developed at their provincial and regional levels, even if Wallonia develop important smart city initiatives underlined as the smart region strategy. It seems that citizens are not enough aware about

all initiatives developed in at the Walloon level. However, they are referring to what is developed in the Flemish region and at the national level. For the Flemish reference, citizens point out the importance of developing more sustainable and environmental solutions. As such, the Flemish government and cities have traditionally more pushed sustainability strategies comparatively to Wallonia. From the finding of the international references emerges some questions. It seems that citizens refer only to Asian cities even if the top 10 of smart cities are mostly located in North America (New York, Toronto) and in Europe (Paris, Amsterdam…) (IESE, 2018).

Conclusion

The report of the top 50 smart city governments (2018) developed by the (Eden Strategy Institute, 2018) states in p.18 that: *"A city only becomes truly "smart" when all citizens are ready for it. Urban planners and innovators might develop personas of the ideal "smart citizen" as they prepare future plans for their cities. These often assume that citizens enjoy ...to use and interact with the city's spaces and services. Reality, however, presents a wider range of city users, and cities risk excluding entire segments of their population from the smart city experience if efforts are not made…".* This citation points out the necessity for cities to continually think with different inventors and companies on how to include all categories of citizens. However, the research shows that the existing of a dynamic innovation ecosystem, strong integrated values and people centric environment do not systematically reinforce a positive understanding and acceptance of smart cities. Citizens are more sensitive to the clarity of vision and support programs developed by local authorities. Also, they need to be reassured on the structuring approach that cities are developing to progressively transform territories without impacting negatively their quality of life. Being informed about the main guidelines of smart city policies seems to be more important for citizens comparatively to strategic areas that cities aim to develop in order to be a smarter city.

The findings of this research proposes new insights in the literature of smart cities. The trust in public authorities is highly demonstrated as a strategic component. This finding is in line with scholars of (Kelly & Swindell, 2002) that define city understanding as an outcome of how citizens evaluate city government performance and innovative strategies that public authorities implement. Thus, when government policies meet citizens' needs, citizens will be more likely to adopt trustful behaviors and to support positive transformations in their city. The importance of trust is also illustrated in scholars of (Kopackova, 2019). Kopackova uses Maslow's hierarchy to highlight how important are citizens' needs in defining city government policies. His findings show that citizens need to be continually reassured, and ask, city governments to respond positively to their belongingness inquiries (importance of social and visual local symbols). A case study proposed by (Yeh, 2017) proposes a step further by linking smart city services (defined as innovation concept) to personal innovativeness (capacity of citizens to understand and accept new services), city engagement (place attachment and civic involvement), service quality (capacity of city government to respond to citizens' need), acceptance/usage (attitude towards using), quality of life (material and physical wellbeing, activities related to helping the community) and trust (perception of city government's ability, benevolence and integrity, perception of risk (Kim, Ferrin, & Rao, 2008)). Based on these scholars, a trust relationship need to be established between citizens and public authorities to support smart city projects and a positive understanding of the concept of smart cities.

Even if the framework of Nam and Pardo (Alawadhi et al., 2012; Chourabi et al., 2012; Gil-Garcia et al., 2015; Nam & Pardo, 2011a, 2014) proposes a commonly used smart city model, it seems that the technological dimension is more replaced by land factors. Thus, the model of (Dameri, 2014) is more adapted in exploring how citizens understand smart cities. This smart city model includes the territorial aspect and underlines government (smart city governance, powers distribution, political institutions), people (smart citizens, smart city actors, people involvement), infrastructure (better use of energy, buildings efficiency) and land (geographical aspects, cultural history and heritage, environmental aspects) factors (Dameri, Benevolo, Veglianti, & Li, 2018). Also, different aspects of the multidimensional smart city framework of (Yigitcanlar et al., 2018) have been emerged in our research.

Expect for the technology, community (human factors) and policy (institutional factors) can be defined as smart city drivers. Moreover, all domains proposed in this framework are observed in our research (the economic growth is the main desired outcome, the necessity to improve urban planning and governance, the potential impact of smart city projects on liveability and wellbeing, and finally, the place of sustainability in smart city policies). In the context of the understanding of smart cities by citizens, the components of smart city governance are important in defining clear vision and processes in transforming gradually a city (Heaton & Parlikad, 2019; Kumar, Singh, & Gupta, 2019). As example, (Ruhlandt, 2018) points out the necessity to involve different stakeholders, to define clear structures and processes, to sensitize the role and responsibilities of all actors in supporting transformations, and to support smart city projects with legal policies (Axelsson & Granath, 2018). Another interesting theoretical contribution concerns the link between sustainability and smart city policies. The research determines that citizens really distinguish between these two components (different visions and targets), even if extend literature mentions the importance of sustainability goals in reaching smartness in a city (Martin et al., 2019; Yigitcanlar et al., 2019).

Extent literature on innovation offers new insights for the literature review of smart cities. It seems that theories of (Albury, 2005) on the acceptance and adoption of innovations can be extrapolated to analyze how citizens can accept to live in a smarter city. As innovations, smart city policies need to be aligned with citizens' values and norms. Therefore, when citizens perceive positively smart city policies, city governments are then more motivated to implement new projects in order to respond to citizens' expectations. This willingness to develop different aspects in a city increases a dynamic collaboration between strategic actors. However, not all smart city projects can be easily accepted and adopted by citizens. As illustrated in this research, citizens are more commonly supportive for projects related to environment, governance, people and living/wellbeing. In terms of the perception of a city, the research demonstrates that a subcategory of citizens puts themselves as observers and users of social and material transformations (Engelbert, van Zoonen, & Hirzalla, 2018). Thus, the smart city is perceived as a set of cultural, material, visual, social and emotional references with a potential impact on the city identity. In the extend literature, the framework of Lynch is mainly used to explore the perception of landscape with an urban perspective (limited only to visual and material transformations). This research shows that this framework can be used to explore social transformations such quality of life, cultural heritage and smart city dynamics.

More and more cities are engaging innovative projects to become smarter. City governments are aware about the necessity to develop a human centric approach and to encourage an active community involvement (Aguilera et al., 2017; Sepasgozar, Hawken, Sargolzaei, & Foroozanfa, 2018). As observers and users of their cities, citizens impact directly (bottom-up initiative, consultancy participation, voting system…) and indirectly (accepting and resisting to physical and social transformations) on the development of smart city policies and projects. Thus, city governments need to include how citizens think, imagine and behave to really propose solutions adapted to local challenges. The concept of smart citizens is actually commonly used to define citizens adopting new behaviours regarding the use of new technologies or any smart city initiative. Therefore, the concept of "the smartivist" is emerging in more practical studies. As example, the hub bee smart city[2] which is hosting a database of 594 smart city solutions developed by 988 cities in the world is claiming the importance of citizens in accelerating smart city development. The "smartivist" is defined as an active individual, group or association supporting innovation, creativity and a multi-stakeholder approach in the process of developing new solutions on a voluntary basis. The "smartivist citizen" plays a key role in influencing city governments in engaging immediate changes and in encouraging inclusive society through reinforcing public-private-civil partnerships and contributing in financing smart city initiatives (Barlow & Levy-Bencheton, 2019).

While this research succeeds in identifying different profiles of understanding smart cities, it would have been more relevant to select different social categories of citizens (different age, different professions, different background and level of education). This research is limited only to business students with strong knowledge in economy, business and entrepreneurship. Therefore, this subcategory of citizens is supposed to give a global vision of how potential young citizens and future leaders think and behave face to physical and social transformations in their city. Also, the research focuses only on the French region of Belgium. It could be more relevant to compare between citizens living in Brussels, Flanders and Wallonia, and also, between students, young active citizens and entrepreneurs without taking account their level of education. This paper induces potential linkages between how citizens perceive smart city and their willingness to accept, adopt and be active in developing smart initiatives. As future research insights, a combined qualitative and quantitative researches can explore more deeply factors generating emotional reactions such fearing changes or the loss of the cultural heritage associated to the concept of smart cities. In addition, as observers and users of cities, case studies can explore linkages between the understanding of smart cities and the development of "the smartivist citizen".

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Appendix 1

	Federal government
	Federal administration
	Deputies
	Regional government
	Regional administration
	Provincial administration
	Parastatal agencies AdN, IWEPS, FRW
	Technical and economic inter-municipalities
Level of actors' involvement (attributing a note between 1: low involvement and 3: high involvement)	Mayor
	Community college (aldermen)
	Town council
	Municipal administration (Departments)
	Municipality controlled companies
	Head of departments
	Smart city manager
	Strategic/transverse department
	Public companies
	Hospitals
	Multinationals

	Large Belgian companies
	Local SMEs
	Start-ups
	Consultants/consulting firms
	Independents
	Banks
	Associations
	Citizens
	Universities
Positive transformations for cities (checking all they apply)	Sustainable urban development
	Economic growth
	Improved quality of life
	Improved project planning and implementation
	Inclusive participation of citizens and both public and private actors
	Integration of new procedural and structural standards
	Brand image for cities
	City digitization
	Development of global city vision and challenges
	Accountability to others
City values associated to smart cities (checking all they apply)	Sustainability
	Creativity
	Green and neutral environment
	Digitalization and technology
	Smartness and intelligence
	Enthusiasm and dynamism
	Integration and social cohesion
	Competitiveness
Territorial reference when responding to the survey (checking all they apply) & the perceived level of being a smart city (attributing a note between 1: weak implementation of smart city projects to 10: High implementation of smart city projects)	Neighborhood or city level
	Provincial and regional levels: Flemish cities
	Provincial and regional levels: Walloon cities
	Federal or national level
	European cities
	Asian cities
	North American cities
Level of importance dedicated to each smart city factor (attributing a note between 1: not important to 10: very important)	Technological factors (bid data, open data, cloud computing, digitization)
	Human factors (creativity, citizen participation, education, culture, knowledge)
	Institutional factors (governance, regulation, smart growth, procedural standardization)
Actions to develop in order to support the implementation of smart city projects (check all they apply)	Strong support for smart city projects by politicians
	Application of participatory and flexible leadership
	Development of global vision of the city challenges
	Creation of strategic and cross strategic committees
	Strengthening flexible procedures and continuous learning
	Involvement of citizens in the city strategy

Risk aversion and limits (check all they apply)	Addiction to technology
	Major financial investments
	Threat to cultural heritage
	Complexity of cities' strategic planning
	Privatization of public spaces and public authority
Strategic areas to develop in order to be a smarter city (ranking smart city dimensions according to how they positively contribute in facing territorial and social challenges)	Smart Economy : New services, business models, ecosystems, E-business
	Smart Environment : Sustainable and green urban planning, smart energy management
	Smart Governance : Administration 2.0, participatory decision-making, transparency, open data
	Smart People : Development of skills and share-knowledge, better access to e-learning
	Smart Living : Quality of life, smart housing, social cohesion
	Smart Mobility : Integrated sustainable transport system
Linkages between sustainability and smart city policies (select the best proposition)	There is no link between smart city projects and sustainable projects
	Some projects conducted in cities tend to be smart and sustainable
	There is a direct link between all smart city projects and sustainable projects conducted in cities
	Smart city projects are integrated into sustainable city challenges
	Sustainable projects are integrated into smart city challenges
Uncertainty associated to smart city projects (check all they apply)	The smart city phenomenon frightens me
	The smart city phenomenon is unknown to me
	The smart city phenomenon is incomprehensible to me