

# Smart city acceptance and adoption: The case of potential smart citizens



**Dr. Djida Bounazef-Vanmarsenille**

Post-Doctoral Researcher, Smart City Institute, HEC Liège (Belgium)  
[Djida.bounazef@uliege.be](mailto:Djida.bounazef@uliege.be)



**Co-Author: Prof. Nathalie Crutzen**  
Academic Director, Smart City Institute, HEC Liège (Belgium)



# Introduction

The capacity of a city to develop projects aligned to citizens' expectations

The digital age contributes significantly to transform what citizens think and need



  
Culture, resistance, human capacity, cultural capability and risk aversion

What do citizens really think is important in developing adequate smart city projects.

*Citizens are more supportive if they perceive smart city projects as an opportunity to improve their life.*

How do technological user-friendly students with strong knowledge in Business and Entrepreneurship (defined as potential smart citizens), who are brought to be future leaders in public, private and associative sectors, understand and support smart city projects?

# Literature review (1/3)

Citizens as observers and users of their city (*Image of the city*, Lynch 1960)

Citizens interact with their environment according to how they perceive physically, culturally and emotionally territorial components and transformations.

Each project transforming their city has a potential impact on their city legibility, identity and imageability (Lynch 1960, Schleich & Faure, 2017)



Willingness of citizens to accept and support local transformations



Interest = expectations = needs = culture



- They adapt their cultural and social constructions
- They develop new positive values and identities
- They increase their level of involvement and participation in developing smart city projects



Interest  $\neq$  expectations  $\neq$  needs  $\neq$  culture



- They develop fears and resistant behaviors
- They lose public authorities' legibility and trust
- They lose their city legibility and identity
- They associate innovation and smart city projects as a risky phenomenon for their quality of life

# Literature review (2/3)

Different users and observers for different profiles of understanding

Citizens belonging to a same socio-professional subcategory such gender, age, culture, native region, religion, level of education develop similar understandings (Tajfel, et al., 1971).



*Until now, there is a lack of scholars exploring deeply the understanding of smarter cities by different communities such companies, (smart) citizens, students or governments.*



## **Research assumptions**

The aim of this research is to identify a typology of understandings corresponding to different willingness to support and get involved in smart city projects.

We assume that citizens build a different understanding of smart cities according to:

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

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

# Literature review (3/3)

Tab. 1. Research variables

Factors conditioning how citizens understand smart cities	
<b>Focus</b>	Technological factors Human factors Institutional factors
<b>Reference</b>	Neighborhood or city level Provincial or regional cities Country level European cities Asian cities North American cities
Understanding of smart city components	
<b>Development of an innovation ecosystem and people centric approach</b>	Who are the main involved actors in developing smart city projects?
<b>Clarity of vision</b>	How 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?
<b>Support programs and leadership</b>	What are the actions to be developed to support implementing smart city projects?
<b>Implementation of smart policies and track record of previous initiatives and projects</b>	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?

# Methodology (1/2)



Responding to Walloon (the French region of Belgium) governmental willingness to support smart cities and to involve citizens in a '*smartainable transition*', this research focuses on how does the potential Walloon smart citizen is able to understand and support smart cities.



Educated citizens are particularly legitimated to participate and empower actions in the community (Roth & Lee, 2004) with a more mature forms of engagements and critical thinking. They are trained to accept, adopt and generate transformations in their environment. (Carini, Kuh, & Klein, 2006).

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.

# Methodology (2/2)



SAMPLE: **215 business** students enrolled in their final year of master degree  
(the most important business school in Wallonia)

**21 to 31 years:** an average of 23 years old

Women: 48% - Men: 52%

**A sum of 117 municipalities** represented: 20% of Wallonia

**All Walloon provinces are represented:** 72% Liège, 16% Luxembourg, 5%  
Namur, 3%, Hainaut and 2% Walloon Brabant

The research is limited to those **officially live in Wallonia**

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)

A general linear model (GLM) was selected to analyze the survey's data.

Technology, human and institutional factors were selected as categorical factors and the smart city references 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:  $p < 0.05$ ).

# Results (1/2)

Tab. 2. Significant dependent variables of the GLM

Var. Dependent Variables		Multiple R	Multiple R <sup>2</sup>	Ajusted R <sup>2</sup>	SC	dl	MC	F	p
<b>Positive transformations for cities</b>	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
<b>Risk aversion associated to smart city projects</b>	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
<b>Association between sustainability and smart city policies</b>	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
<b>Uncertainty regarding transformations generated by smart city projects</b>	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



# Results (2/2)

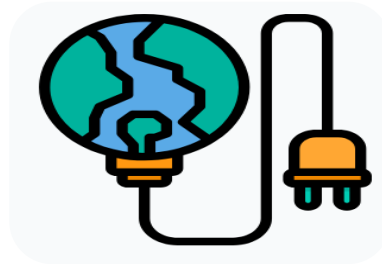
Table 4. Analysis of significant univariate results

		Continuous predictors			Categorical factors		
		Local level	Flanders	Belgium	Asia	Human	Institutional
<b>Actors involved in developing smart city projects</b>	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	-	
<b>Positive transformations for cities</b>	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	-
<b>Actions to be developed to support smart city projects</b>	Integrated municipality	-	-	-	-	-	X
	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
<b>Risk aversion associated to smart city projects</b>	Threat to cultural heritage	-	X	X	-	X	-
	Complexity of cities' strategic planning	X	-	-	-	-	-
	Privatization of public spaces and public authority	-	-	-	X	X	-
<b>Strategic areas to develop to be a smarter city</b>	Smart Environment	-	X	-	-	-	-
	Smart Governance	-	-	-	X	-	X
	Smart People	-	-	-	-	X	-
	Smart Living	-	-	-	X	-	-
<b>Association between sustainability and smart city policies</b>	There is no link between smart city projects and sustainable projects	X	-	-	-	-	X
<b>Uncertainty regarding transformations generated by smart city projects</b>	The smart city is feared	-	X	X	-	X	-
	The smart city is unknown	-	X	-	-	-	-
	The smart city is incomprehensible	-	X	-	-	X	-

# Discussion (1/8)



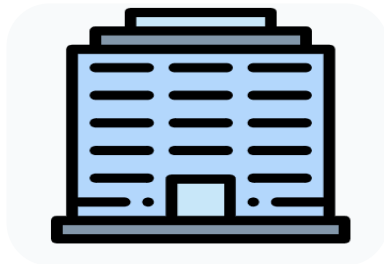
The local planner



The regional green questioner



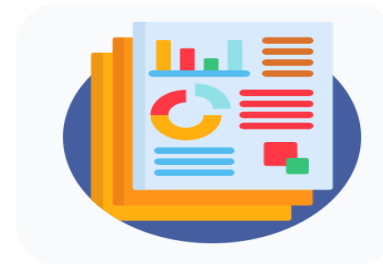
The national entrepreneur



The international public supporter



The humanist



The marketer

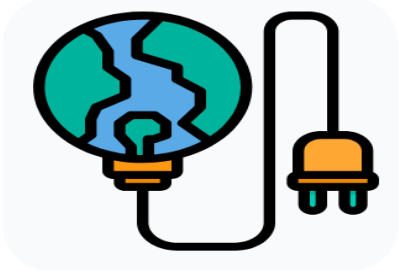
# Discussion (2/8)



## The local planner

- focuses on *how* and *who* can contribute in facilitating the urban planning.
- Local initiatives need to be aligned with federal and regional objectives.
- Is aware about the importance of co-creating bottom-up initiatives.
- Sustainable and smart city projects need to be planned separately to be more effective.
- Structured planning of smart city projects eliminates uncertainties regarding to :
  - how a city can be materially and immaterially transformed.
  - potential complex strategic planning induced by collaborative models.
- Defined as an effective smart citizen.
- **Has a strong willingness to accept, support and moderately participate.**
- Smart city projects is the responsibility of the relevant actors.
- **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.**

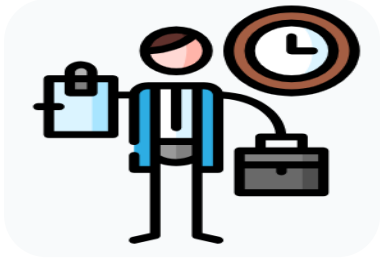
# Discussion (3/8)



## The regional green questioner

- Needs to be frequently reassured about the mastery of risks and uncertainties.
- 
- Is more confident with sustainability and green policies.
- Refers to provincial or regional cities developing a mature eco-strategy.
- Is less reactive and does not feel the need to be informed and engaged in projects.
- Has confidence only in projects planned by the federal government and implemented by expert regional public organizations.
- Smart city projects are a threat to cultural heritage and identity.
- Does not currently identify any opportunity or benefit of developing smart city project.
- **This profile (weak interest and desire to get involved, resistant to change...) cannot be defined as a smart citizen.**
- Is characterized by **weak willingness to accept and support smart city projects.**

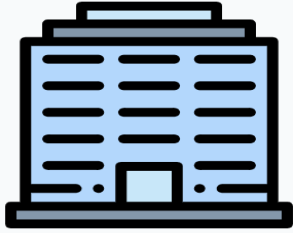
# Discussion (4/8)



## The national entrepreneur

- Needs to have a clear global vision of changes that will be operated.
- Tends to be reactive (getting informed about smart city initiatives and good understanding of the global vision of smart city policies).
- Fears the impact of smart city projects on the culture heritage.
- Supports public-private partnerships, collaborative models and an active smart city ecosystem fostering an economic growth.
- Does not support bottom-up or top-down initiatives, but direct collaborations between city administrations and different startups implemented nationally.
- Can be defined as a **smart citizen (ability to support creativity, innovation, entrepreneurship and the emergence of new business models based on new collaborations)**.
- Has **relevant willingness to accept and support smart city projects**.
- **Has a moderate willingness to get involved as a simple citizen. He would be more participative as an entrepreneur or an economic actor proposing a solution.**

# Discussion (5/8)



The international public supporter

- Trusts only projects developed by the government and public institutions.
- Focuses on public local-regional collaborations increasing a quality of life.
- Supports smart city projects generating opportunities for the surrounded cities.
- Focuses on smart governance and smart living projects fostering smart regional transition.
- Necessity to establish flexible procedures between cities and the provincial administration.
- Is wary of the power that private companies can acquire through solutions they bring to cities.
- Refers to the role of public authorities in developing Asian smart cities.
- **Does not have the adequate characteristics to be defined as a smart citizen.**
- **Supports and accepts smart city projects developed only by public authorities.**
- **Is not aware about the strategic role that all the ecosystem or that he can play in developing such projects.**

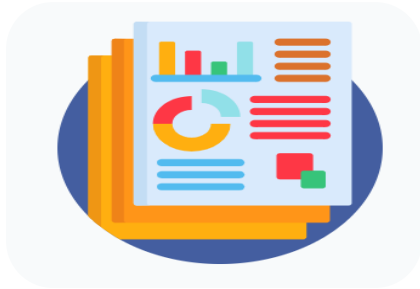
# Discussion (6/8)



## The humanist

- Focuses on developing the human side of the smart city.
- Top-down projects necessitate a transversal collaboration.
- Is aware about the strategic role of universities and hospitals
- Focuses on smart people projects fostering dynamic participations.
- Bottom-up and top down approaches are complementary.
- The strategic role of politicians in regulating the power of private companies (the power distribution is unclear and incomprehensible).
- **Is a smart citizen even if he develops some concerns, he has a strong willingness to be informed, to support, accept and participate.**
- **His vision of the smart city is not sufficiently mature.**
- his **participation can be punctual** on some projects **aligned with the cultural identity.**
- Is attracted by **the opportunity to vote, to meet smart city actors and to participate in debates and exchange committees.**

# Discussion (7/8)



## The marketer

- Smart cities are limited to a city branding or a label empowering all actors (important communication campaign or brand marketing strategy).
- The importance of political support and citizen involvement in co-defining the city strategy.
- Focus on the institutional side through developing smart governance projects.
- The necessity to help, in terms of administrative procedures, all actors developing bottom-up projects.
- Citizens are more engaged when the city administration develops an image of facilitating the development of bottom-up initiatives.
- Attaching a great importance to the image and values conveyed by projects.
- Dissociates between sustainable and smart city projects (different identities, values and norms).
- Can be **defined as an idealist smart citizen**.
- 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**.



# Discussion (8/8)

Even if previous literature brings out the strategic role of ICTs, this component seems to be less important for potential smart citizens (based on their level of education, their age, their knowledge in economy and business, and their friendly usage of ICTs).

We can wonder how less smart categories such seniors, not educated and isolate citizens can behave in face of technology and digitalization.

When citizens prioritize human factors, some social inquiries like potential threat to cultural heritage are emerging

When citizens prioritize institutional factors, the priority is set on improving the city branding, and not systematically for improving policies, directives and urban planning.

citizens refereeing to what is developed locally are pointing the urban planning challenges associated to inclusive participations of different actors.

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.

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

*"A city only becomes truly "smart" when all citizens are ready for it...These often assume that citizens enjoy ...to use and interact with the city's spaces and services". (50 smart city government 2018, Eden Strategy Institute)*

This citation points out the necessity for cities to continually think with different inventors and companies on how to **include all categories of citizens**.

the existence 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.

Citizens 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.

## **New insights in the literature of smart cities:**

- Trust in public authorities : Scholars of Kelly and Swindell (2012)
- Land factors: Using the model of Dameri (2014) in the place of of Nam and Pardo's framework
- Link between sustainability and smart cities: in the opposite of Matin et al (2019) - sustainability as a goal for smart cities



Thank you for your attention

Questions?