The role of companies in « smart and sustainable city » initiatives in Belgium

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INTRODUCTION

More than half of the world's population lives in urban areas and this percentage rises to more than 66 % in the European Union (Eurostat, 2014). The fast growth of the urban population implies numerous economic and societal challenges in domains such as mobility, housing, employment, education, culture, security and natural resource management such as water, waste and energy (Nam and Padro, 2011).

This evolution requires in-depth thinking and actions for a sustainable development of these urban ecosystems and a better quality of life for the citizens. Thus, in this context, it's essential that the actors of the city develop and implement «long term sustainable strategies» to create an adequate economic and societal environment within which citizens, companies and public authorities can live, work and interact. Beside top-down approach, these actors should also provide the adequate conditions to support the development of bottom-up initiatives/projects that will contribute to the dynamics in a sustainable manner.

The purpose of this research is to explore the state of development of "smart city" initiatives in Belgium and, in particular, the role of companies in these projects. This study considers the past experiences, the prospects, the specific contributions of these players in short, middle and long term projects, the advantages and the added value for them, the barriers towards the emergence of « smart city » initiatives and existing networks as well as best practices around this topic.

The final objective of this research is to highlight some key observations and draw some recommendations for key stakeholders regarding the involvement of businesses in this kind of projects.

As the topic of "smart city" is recent and under-investigated in management sciences, this research proposes a **first exploratory qualitative analysis**. It is based on 10 face-to-face interviews with key actors in Belgium: 2 Cities (Leuven and Liege), 2 Chambers of Commerce (CCI Liege-Verviers-Namur and Voka Gent) and 6 companies operating in Belgium (Accenture, Belfius, Bopro, Fost Plus, Proximus and Siemens).

Our report is structured as follows. Section 1 presents the context of the results and clarifies the definition of key concepts. Section 2 explains our research methodology (sample, data analysis and data collection). Section 3 highlights our descriptive results while section 4 discusses our main observations. Finally a conclusion and key recommendations for major stakeholders are proposed.

1. CONTEXT AND DEFINITIONS

More than half of the world's population lives in urban areas and this percentage rises to more than 66 % in the European Union (Eurostat, 2014). The fast growth of the urban population implies numerous challenges in domains such as mobility, housing, employment, education, culture, security and natural resource management such as water, waste and energy.

More specifically, in Belgium, the population will grow from 11,2 million inhabitants in 2015 to 12,1 million in 2030 and 12,7 million inhabitants in 2060. This growth is estimated at 9,5 % over the period 2012-2030 and at 16 % over the period 2012-2060 (Federal Planning

Bureau, 2015). In our country, 98 % of the population lives in urban areas. This percentage is still increasing and it is one of the highest rates of the world (Eurostat, 2014). The majority of the 589 municipalities of the country recorded a positive population growth in 2013. The most significant increases were observed in Brussels, Antwerp, Ghent, Mons, Aalst and La Louvière (SRBG, 2013).

This evolution requires real reflections and actions for a sustainable development of these urban ecosystems and a better quality of life for the citizens. Thus, it's essential the actors of the city develop and implement «long term sustainable strategies» to create an adequate economic and societal environment within which citizens, companies and public authorities can live, work and interact.

In this context, the concept of "smart city" emerges more and more to limit the problems inferred by the growth of the urban population and to find innovative solutions to meet this challenge. Actually, there is a tremendous and increasing interest in smart cities at the international, European, national and regional levels. All over the world, the multiplication of platforms and other initiatives demonstrate this increasing interest.

Nevertheless, up to now, there is no generally accepted definition of this concept in the literature and in practice. Indeed, the majority of the initiatives and definitions remain focused on very technical and technological aspects/solutions in particular domains (mobility, energy, water, etc.) without proposing a real long-term strategic vision and managerial approaches on these questions (business models, financing, stakeholders' dynamic, etc.).

You will find below some examples of definitions of the concept.

- Washburn and Sindhu (2009)

The use of ICT [makes] the critical infrastructure components and services of a city – which include city administration, education, healthcare, public safety, real estate, transportation, and utilities – more intelligent, interconnected, and efficient.

- Caragliu, DelBo and Nijkamp (2009)

"A city is smart when investments in human and social capital and traditional and modern communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance."

- Schaffers et al. (2011)

"A city may be called 'smart' when investments in human and social capital and traditional and modern communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance."

- Haque (2012)

… Any adequate model for the Smart City must therefore also focus on the Smartness of its citizens and communities and on their well-being and quality of life, as well as encourage the processes that make cities important to people and which might well sustain very different –

sometimes conflicting – activities.

- European Parliament (2014)

The idea of Smart Cities is the creation and connection of human capital, social capital and information and Communication technology (ICT) infrastructure in order to generate greater and more sustainable economic development and a better quality of life.
A Smart City is a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership.
These solutions are developed and refined through Smart City initiatives, either as discrete projects or (more usually) as a network of overlapping activities.

Smart Cities have been further defined along six axes (Giffinger, 2007):
- ☐ Smart Economy
- ☐ Smart Mobility
- ☐ Smart Environment
- ☐ Smart People
- ☐ Smart Living
- ☐ Smart Governance

In fact, a few years ago, technology-centred approaches were predominant (Washburn et Sindhu, 2009). Nevertheless, overtime, broader definitions and more global approaches including the three pillars of sustainability and human and social capital for example, have emerged. These latter are progressively becoming the rule. Today, technologies are rather perceived as a mean, an enabler.

This research project has been conducted in the spirit of the Sustainable Living in Cities European Business Campaign (CSR Europe)[1] which aims to work with business, national partner organisations, policy makers, urban sustainability experts and city stakeholders, towards the creation of local and regional sustainability alliances for the acceleration of urban sustainable development. The territorial alliances will lay the necessary ground for companies to identify, seize and scale up opportunities in a smart, sustainable and inclusive way.

In this context, for the purpose of this research, we have chosen to define a smart city as follows[2]:

A "smart city" is a multi-stakeholders' ecosystem (composed with local governments, citizens' associations, multinational and local businesses, universities, international institutions…) engaged in a sustainability strategy using technologies (ICT, engineering, hybrid technologies) as enabler.

This approach implies the progressive development of a common strategic vision and the development of concrete initiatives in various domains (smart mobility, environment, economy, living, people and governance) in order to generate sustainable economic

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[1] CSR: The European Business Network for Corporate Social Responsibility:
http://www.csreurope.org/innovate-peers/sustainable-living-cities

[2] Smart City Institute HEC-Ulg: www.smartcityinstitute.be

development and to offer a better quality of life along with a wise management of natural resources.
In addition to this strategic perspective, smart cities also require the development and diffusion of new business models that will contribute successfully to their transition towards sustainability, innovative financing instruments as well as a good understanding of specific stakeholders' dynamics.

2. RESEARCH METHODOLOGY

In the context of this research, an exploratory qualitative analysis has been conducted to explore current perceptions of key stakeholders on smart city initiatives in Belgium and, in particular, their perceptions about the role of companies in these projects.

2.1. Sample

The sample includes different stakeholders: six companies, two chambers of commerce and two cities. We assumed that they could have different ideas, perceptions and interests about the « smart city » phenomenon and about the role of companies in these projects.

The sample is the most diversified it could be at the Belgian level as you can see it in the tables below. It is composed with:
   a) Two cities: one Flemish and one Walloon
   b) Two organisations representing businesses (one in Flanders and one in Wallonia)
   c) Six companies from diverse sectors and sizes.

a) List of the cities

Name	Size (population)	Region/area	Interviewee	Function
Leuven	100.000	Flanders	Katrien Rycken	Coordinator of "Leuven Klimaatneutraal 2030"
Liege	200.000	Wallonia	Jean-Christophe Peterkenne	Director of Strategy

Table 1: List of the sampled cities

* In the city of Leuven we interviewed the manager of "Klimaat Neutraal". It is a non-profit association whose main focus is the reduction of CO_2. Its office is hosted in the municipality of Leuven and comprises 230 members among which 60 associations.
* In Liege, we interviewed the head of strategy (Jean-Christophe Peterkenne) and the communication manager (Jérôme Hardy) of the strategic department of the city.

b. List of the Chambers of Commerce

Name	Size	Region/area	Interviewee	Function
CCI Liege-Verviers-Namur	30 p.	Liege & Namur	Vincent Mausen	Operational Director

Voka-Kamer van Koophandel Oost-Vlaanderen	45 p.	East Flanders	Katrien Moens	Manager Belangenbehartiging

Table 2: List of the sampled chambers of commerce

The CCI Liege-Verviers-Namur is of course competent for the area of Liege, Verviers and Namur. Only in the province of Liege, there are 22.000 members.

Voka is the Chamber of commerce of East Flanders. Since 2004 with 7 other Flemish Chambers and the "Vlaams Economisch Verbond" it is a part of the Flemish network of companies.

c. List of the sampled companies

Name	Industry	Size (people)	Interviewee	Function
Accenture	Consulting	358.000	Bruno De Greef	Senior Manager-lead business strategy
Belfius	Bank	5.000	François Franssen	Director of Marketing Strategy
Bopro	Building	40	Peter Garré	Managing Director
Fost Plus	Waste management	50	Youri Sloutzky	Public relations
Proximus	Telecom	14.500	Jan Manssens	Director of strategy and innovation
Siemens	Technology	360.000	Emanuel Marreel	City account

Table 3: List of the sampled companies

These six companies are all involved in "smart cities" thinking, initiatives and projects in Belgium or abroad and they are all members of " The Shift".

These interviews aimed at understanding better the perceptions of experts in this domain about the state of development of "smart city" initiatives in Belgium and the specific role of companies in these projects.

Our sample was constructed to ensure **diversity** in terms of industry, size and geographic location in Belgium. Our sample is thus composed with 2 small companies (Bopro and Fost Plus) and 4 corporations (Accenture, Belfius, Proximus and Siemens). In addition, there are 2 multinational companies (Accenture and Siemens), 2 national companies (Belfius and Proximus) and 2 local ones (Bopro and Fost Plus).

2.2. Data collection

Semi-structured interviews were conducted with the person in charge of « smart city » topics in these 10 organizations. The interviews were carried out between February 15 and June 9, 2015. Each interview lasted around 1 hour.

Interviews	Dates	Duration of the interviews
Leuven	16-03-2015	1h
Liege	20-03-2015	1h
Voka	12-02-2015	1h09
CCI Liege-Verviers-Namur	24-02-2015	59'
Accenture	9-06-2015	1h
Belfius	13-02-2015	49'
Bopro	4-05-2015	1h21'
Fost Plus	17-03-2015	1h27'
Proximus	10-03-2015	1h
Siemens	1-04-2015	1h23

Table 4: Details about the interviews

Our interview guide (see Appendix 1) contained general questions about smart cities as well as specific questions related to the involvement of companies in these projects (Advantages? Costs? Barriers? Staff concerned? etc).

Additional data sources were used to supplement interviews and by way of triangulation (Yin, 1994; Ahrens and Chapman, 2006). Publicly available information was collected before and after the interviews. A copy of other relevant written documents was requested during the interviews (plans, folders, PPT presentations, etc.)

2.3. Data analysis

The data were analyzed according to the principles of the qualitative content analysis (Glaser and Strauss, 1967; Eisenhardt, 1989; Miles and Huberman, 1994). In a first time, the data collected were organized and classified into several categories in a systematic analysis grid. The categorization of the data is a crucial step in the data analysis process because it allows the comparison of the data. In a second time, a content analysis of the data was carried out: in-depth horizontal and vertical analyses were successively undertaken (Eisenhardt, 1989). The horizontal analysis consists in a detailed analysis of each case in order to understand it completely while the vertical analysis focuses on the identification of the similarities and of the differences between the answers of the interviewees.

3. RESULTS

Our results are split up into two sections. On the one hand, section 3.1. presents the perceptions of the 10 interviewees about the state of development of "smart city" initiatives in Belgium and key prospects. On the other hand, section 3.2. is dedicated to their perceptions about the specific role of companies in these initiatives.

3.1. Perceptions about « smart city » in Belgium

This section tackles questions about the state of development of "smart city" initiatives in Belgium. These general questions were asked to all the interviewees and provide information about their definition of a smart city, the smart cities they know, the advantages, the costs, the barriers, their role in some "smart city" initiatives, the financing of these projects and the prospects of "smart city" development.

3.1.1 Definitions of a « smart city »

Generally, the interviewees see a « smart city » as **a city that faces its future**.
Four of them point out that it's **an integrated entity/place** « *where the local authority, the businesses and the people live and work together with goals for the future* » (Voka).

« *A smart city is a city that understands that the power of decision relies also on the citizens, it is not a top down process* » (City of Liege).

Six out of ten really highlight **technology**.

« *A smart city is a city that faces its societal challenges through technology, computing, grids: it's a connected city and not a liveable city* » (Bopro).

3.1.2 Best practices

All interviewees agree with the fact that there is **no real smart city in Belgium today**.
Some cities have a vision, a strategy of development for the future. Some have launched projects to improve the quality of life of citizens and city users. But mainly the initiatives **don't have interconnections** and are **not part of a global forward planning**.
Ghent appears as one the most advanced city on the way of being smart because there is a real willingness to bring all the actors of the Society around the table. Similarly, in Leuven, they also invite all the components of the Society to discuss about the future of the city.

Abroad, the 10 interviewees name **Barcelone** as one of the smartest city in Europe. The city has launched concrete initiatives around the 6 dimensions of the Smart City. Initiatives dealing with Smart Energy and Smart Mobility are particularly well developed[3].

After come London, Lyon, Amsterdam and the Scandinavian countries - mainly with Malmö, Copenhagen and Stockholm.
In general, they acknowledge that some cities are partly smart, in one or several domains, but never totally.

 A « *smart city is a concept to which the cities can tend, but no city has* been able to implement the concept entirely » (Accenture).

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[3] Barcelona Smart City Website: http://smartcity.bcn.cat/en

Liege highlights the case of Lyon *"because the city has similarities with Liege. They started with juxtaposed projects that they have assembled with the time. It seems that Lyon has succeeded in organizing these projects to build an overall project"*.

3.1.3. Advantages of « smart city » initiatives

All of them think that it leads to a better quality of life, improvement of mobility and a more efficient use of resources. In a few words: **it's doing better with lower costs**. It's an **urban area that attracts businesses**, that gives the **companies place to operate** and promotes **(local) employment**.

« *A « smart city » is a citizen-oriented city* » (Accenture). The dialogue between the city and citizens is thus very crucial.

It's « win win process » (Bopro)

More specifically, 3 companies insist on the need of open data that could improve the applications needed to build a Smart City.

« *The interaction between different databases could provide smarter solutions. For example, information about the ideal localisation of a company according to the duration of transportation of the staff. It already works at the RATP in Paris* » (Bopro)
It would also be possible « *to customize the trip of each passenger from one point to another* » (Siemens)

3.1.4. Barriers towards "smart city" initiatives

The main barriers pinpointed by everybody are (1) the **lack of money** and (2) the **lack of vision** at city-level. In other words, the majority of the interviewees regret the poor budgetary situation of the Belgian cities as well as the insufficient long-term strategic thinking of their leaders.

The majority of the interviewees really insist on the lack of strategy, of global integrated vision.
"*There are too many vertical projects, silos*"

They also point out that the current business models are not adapted and have to be changed. Two of the interviewees think it's expensive to change the business models that are so far adapted to non-smart infrastructures. Creativity and innovation are essential in technology but also in managerial matters.
« *The rigidity of the public sector obstructs the development of new alternative financing models* » (Accenture).

Three of the 10 interviewees think that a big problem is that **the stakeholders have to invest now while the returns will happen in the long-term.** Before the crisis they were not so eager to have their money back, but nowadays, they want it quicker, sometimes within the year or less, and of course this doesn't match the spirit of the « smart city » process.

Two interviewees also point out the Belgian legislation and, in particular, the institutional complexity of our country which blocks the process.

However, the City of Liege considers that *"there are no barriers if the projects match a real societal goal and if these are explained, well understood and demystified"*.

3.1.5. Financing « smart city » initiatives

Four estimate that the « smart city » initiatives <u>should</u> be funded by public funds but they also realize that the cities are not well off. « *They should be pre-financed* ». (Siemens)

« *The emergence of smart cities is the result of a strong collaboration between the private and public sector. The private sector will mainly finance and operate innovative solutions»* (Accenture).

The main challenge for the cities is to find the right balance between control and opening towards external partners.

Actually, 6 companies note that, today, **it is mainly the private sector which finances and « *pushes* » (Bopro, Siemens) smart initiatives whereas it should be the public sector.**

Financing may also comes from **European funds/programs** and **private-public partnership** as well as **banks**.

All types of financing are acceptable, but they should be more innovative.

One interviewee says that « *the climate is uncertain because there are many changes. A « smart city » forces to opt for long-term choices with many consequences in the future. All these uncertainties have to be financed, but who will do that ? »* (Bopro).
The mentalities should change, in fact, "*only flexible cities will become smart*".

3.1.6. Specific role of each stakeholder

The cities consider themselves as **an assembler, a bandmaster**.

The chambers of commerce insist on their mission that is **informing and connecting companies**. The chamber of commerce is a focal point between the economical players of the city.

The role of companies differs in function of their activities. It can be, for example:
- To finance cities, companies and "smart city" projects
- To help defining the vision and designing the strategic plan for the cities
- To improve the energetic performances of buildings which has a positive impact on the environment and more specifically, for example, develop the office of the future, acceptable for both occupants and developers.
- To improve the waste management or to generalize the sorting and the recycling in order to generate a virtuous circle.
- To improve all types of networks.

- To inform cities and key actors about innovative technological solutions useful to develop « smart city » projects.

3.1.7. Sustainability

There is a consensus on the **strong link between smart cities and sustainability**.

All say sustainability should obviously be the ultimate goal of a smart city. It will become sustainable if it is well organised and if good decisions are taken for the future.
«The label « smart city » is trendy, but, in a way the concept has existed for ever » (Belfius)

A smart city is the future: it is A MUST.

3.1.8. Prospects of " smart city" development

Three interviewees specify there is a **need for new business models financed by the cities and other key actors**.

Half of the interviewees insist on **the need to change the mentalities, the behaviours and the legislation**. There should be less individualism, more collaborations, more mutualisation, owing less each other and more all together. *« A « smart city » is supposed not being selfish and not creating ghettos ».* (Fost Plus).

In a nutshell: a "smart city" is the result of multi-stakeholders collaboration: companies, citizens, civil society, universities etc.

In the technological field, 3 companies recommend to have access to open data, a better data processing, to install more sensors and to work more in the cloud.

3.1.9. Networking between cities

Liege collaborates with Montpellier.

They are also involved in several European initiatives. Liege is one of the signatories of the Convenant of Mayors[4] and they are involved in the "3X20 network"[5].

In Leuven, "Leuven Klimaatneutraal 2030" collaborates with Ghent and Antwerp, but it is not that easy because they don't have enough staff and time. They have some contacts with "De

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[4] The Convenant of Mayors was launched by the European Commission in 2008 with the aim of achieving the « 3x20 » of the European Union. It is the main European gathering involving local and regional authorities. Capitals as well as little villages are eligible. Already, in December 2009, there were 1.000 signatories. In October 2015 they will be 6.491 participants. www.convenantofmayors.eu

[5] Taking into account the objective of the EU2020 strategy for a sustainable growth, the "3x20 network" aimed at fostering a European approach toward CO2 emission reduction, through awareness raising actions on energy efficiency and the use of renewable energy in everyday life, exchanging local experiences and defining common communication and participation strategies http://ec.europa.eu/citizenship/europe-for-citizens-programme/sharing-experiences/networks-of-towns/short_content_en.htm

Zwijger"[6] in the Netherlands and the « GRE"[7] from Liege. These contacts are far less frequent than the contacts with the cities of Ghent and Antwerp.

3.2. Perceptions about the role of companies in "smart city" initiatives

The overall aim of this section is to explore the perception of the companies, of the chambers of commerce and of the cities about specific role of private actors in "smart city" projects.

In this section we make a distinction between the answers of the companies and the chambers of commerce on one side and the cities on the other side.

3.2.1. *The point of view of COMPANIES and the CHAMBERS of COMMERCE*

Companies can play various roles in "smart city" initiatives. Their specific role is related to the domain of expertise of each organisation - technology partner, financing partner, consulting partner, etc. - and it depends also on the type of « smart city » project.

Three interviewees think that the **companies can take the initiative** and propose some innovative, green and sustainable solutions, but the vision belongs to public authorities and to the citizens.

3.2.1.1. *Types of organizations involved*

Most of the interviewees insist on the fact that "smart city" initiatives can concern companies from various industries - eg. financing, consulting, technology, building, energy - and from various sizes - eg. start-ups, SME, MNCs - as well as federations of companies which should have a broader vision.

In fact « *any company is potentially a stakeholder of a « smart city » for all that it brings solutions related to its Smart development* » (Accenture).

- As far as the industry is concerned, the interviewees mention that technical and computing companies will of course be a must.

- As far as the size is concerned, two interviewees note that SMEs are more innovative, flexible and local whereas big companies sell more and have R&D units.

  « *The small companies are like the finishes adapted to the requests of the city while the big companies are a kind of structural work* » (Siemens).

  Any companies - small ones and bigger ones – should be potentially involved. Nevertheless, according to the interviewees, sometimes, working with small

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[6] Independent Dutch platform for inspiration, creativity and innovation in the city. https://dezwijger.nl/
[7] GRE-LIÈGE is an "integrator organ» with a strategic vocation for the region of Liège where big private and public operators meet and develop projects: http://www.gre-liege.be/

enterprises is easier because they are more creative and flexible. Concerning the larger companies it depends on their internal « philosophy ».

Both sampled chambers of commerce also consider that collaborations between companies and cities is essential in order to solve the problems as mobility, environment, public space etc. *« The city can't become a smart city if it doesn't work with the companies »* (Voka).

One of the challenges is to motivate companies to leave the zonings (at the fringe of cities) and to settle in the city centres. For some jobs such as a graphic designer, *« it doesn't make sense to be installed outside the city »* (CCI Liege-Verviers-Namur).

3.2.1.2. Key contributions of companies to « smart city » initiatives

All the six companies studied contribute to "smart city" thinking and initiatives in Belgium and abroad but, of course, their contribution is related to their core business.

- Accenture is a major partner in the definition and implementation of « smart city » projects.

- Belfius finances cities and companies in order to build a better Society.

- Bopro participates to "Gent Neutraal" and copes with the office of the future and improvement of housing. This company presents itself as totally smart.

- Fost Plus works on the management of the packaging waste and provides pieces of advice in this field. Upstream, it tries to make the producers of packaging aware of their responsibility. Downstream they can exchange good practices.

- Proximus has developed a complete offering for the different dimensions of smart cities - mobility, energy, etc.- .In addition, the innovation department works on big data.

- Siemens collaborates with the cities and informs them on the green solutions they can provide. These have been developed for some years already.

3.2.1.3. Who?

- Accenture has a global team devoted to the « smart city » topic and regional teams as well, specialised in local questions.

- Belfius has a team coping with this topic, before it was only financial and now it is thematically oriented. The team is growing.

- At Bopro, everybody is smart. The purpose is to create shared societal value. For example, they are certified ISO 9001/ISO 14001 and they are CSR ambassadors.

- Fost Plus has a brand new department devoted to the challenges of the future.

- Proximus has an important innovation team. The "smart city" is a major matter for them.

- Siemens has a « Mister Smart City » who works horizontally supported technically by a virtual team composed by representatives from the different units of the company.

It appears that all these companies have a **specific team devoted to smart cities (often with a transversal function)**.

Referring to the chambers of commerce, at the Voka, 3 people work on sustainability, 4 on the harbour and mobility and 5 people are responsible for the contacts between the city and the companies.
At the CCI Liege-Verviers-Namur, there is an innovation pole but it is not specifically dedicated to the "smart city" thematic as such.

3.2.1.4. Why?

- Accenture: the « smart city » concept is located at the intersection between technology and strategy. Accenture wants to be facilitator and accelerator between different actors, ie. big companies, entrepreneurs, public and private sectors.

- For Belfius, financing the public sector and the companies is the core business of the company.

- At Bopro, they try to have an impact on the society through the improvement of the efficiency of buildings, « *we try to create shared value, societal and environmental* » (Bopro).

- Fost Plus: "*it is impossible to ignore the phenomenon*". That's why they take part in this challenge.

- Proximus: "sees Smart Cities as a strategic domain where its combination of ICT solutions can help achieve efficiencies or create new opportunities for citizens, administration, visitors and companies.*"*

- At Siemens, it is linked to the global trends around sustainability and smart cities. There is a focus on the « smart city » since it is the way we will live in the future.

Again, it is noteworthy that all the companies are convinced of the importance of the phenomenon. They all want to play the game.

Regarding the two interviewees of the chambers of commerce, both agree that companies have to think about a potential involvement in "smart city" initiatives because the phenomenon is already on the tracks and it will be more and more important in the future.

"*We work now together for the future*"

This will lead to a new way of earning money due to new ideas and new business models.

3.2.1.5. Major barriers

There is a consensus about that question. Five major barriers can be highlighted:

- One has to invest now and to harvest later on: **the return is in the long term**.
- There is a **lack of vision**. The cities are reluctant (1) because they are not always aware of the importance of their decisions and (2) because many decisions are taken at the federal level: the mayors don't have the decision-making power.
- The **legislation** must be changed because sometimes it prevents the development of "smart city" initiatives. For example, a smart taxation could discourage « bad » behaviours and could help to change the mentalities.
- There is a **need for disruptive innovation** far away from cosmetic innovation. *« One should break some schemas in order to help some projects to come to an end»* (Fost Plus).
- There are **too many juxtaposed small projects**. There is a lack of global strategy.

The chambers of commerce see two main obstacles preventing the involvement of the companies in "smart city" initiatives: the time and the money since the crisis in 2008. Indeed, due to this crisis, the way of functioning is quite different in companies. The leaders have to work three or four times more to achieve the same results as before. There is less money to invest and the return on investment (ROI) has to be much faster than before.

The companies have no time, the « smart city » topics are, in a way, « luxury concerns » towards the turnover of their company, nice to have, but…
Nevertheless the CCI Liege-Verviers-Namur thinks *« It's to be considered more as an investment than a cost »*.

3.2.1.6. Prospects

Belfius thinks there is a need for investment in non-structural projects.

Proximus "With a rapidly growing global population which is increasingly living in cities, the opportunity and need for Smart City solutions is self-evident. As IT processing power and battery lifetime have gone up exponentially while prices for smart sensors have fallen, the components are ready to go for effective mass implementations. And that's where we want to play a pivotal role in Belgium: helping cities and their citizens, visitors, companies with concrete solutions."

Siemens considers that "*the concept of « smart city » will grow and the size of cities will increase*".

The CCI Liege-Verviers-Namur thinks that "*The XXI century will be under the spirit of the « co », the share, co-working, carpooling, sharing staff, sharing desktop, sharing machines etc. Smart Cities will thus be central*".

According to the Voka: "*It will depend on the money available. Some projects are not expensive. Besides that, it is nowadays difficult to get European money*".

3.2.1.7. New jobs and activities

All the six interviewees from companies think that the phenomenon of "smart city" goes with new jobs and activities.

New jobs, new activities and new businesses have already been created and there will be more in the future in order to integrate existing solutions and respond to new needs as technology, consulting, integration, etc.

For example, jobs around open data aim to create platforms and generate programs to improve the quality of life and help the companies.

 On the other hand, former jobs will disappear.
« One should control the planned obsolescence ». (Fost Plus). There will be a need for technicians to repair instead of throwing away things that became old.

The chambers of commerce are also convinced that there will be new jobs, new services, new ideas, new models, new products related to the development of the « smart city » projects.

3.2.1.8. Networks

All the companies take part in networks related to their activity, but not necessarily in « smart city » networks.

As far as smart cities are concerned,
- Bopro belongs to the ULI (Urban Land Institute) network which is about the « smart city » topic.
- Siemens is a member of Agoria, the technology federation, and is very active in its Network on Smart and Sustainable cities.

3.2.3.   The point of view CITIES

3.2.2.1. Current collaborations with companies

Currently, in Liege, there is little collaboration with private companies at the strategic level, except for the urban WIFI and some applications (cloud computing, e-deliberation and e-billing).

In Leuven, a large number of companies are members of the non-profit organization « Leuven Klimaatneutraal 2030». The organization grows but the new members are mainly citizens.

3.2.2.2 Coordination of "smart city" projects

Liege: There are different projects coordinated by a strategic plan aiming to becoming a smart city.

Leuven: It is a juxtaposition of 22 pilot projects coordinated by the non-profit organization. These projects are multi players.

3.2.2.3 Types of companies

Liege: nowadays most collaborations are with local companies related to the nature of the project, but more and more there are farther collaborations *« it is a territorial approach. The city is the primer smart focus and it stretches all around »* (Liege).

Leuven: there are collaborations with companies in the different projects, and several fields: building, mobility, consumption, etc.

3.2.2.4. Key contributions of companies

Liege has created an ecosystem and elaborated a common action plan. It promotes the R&D of the companies. The city has to work with actors who want to collaborate. « *It is a pool of companies that will allow the achievement of a « smart city » plan. All the companies, small, larger, start-ups have a role to play »* (Liege). It is important to create bridges and to have a common action plan. The advantages for the companies are their commitment in societal projects.

Leuven: thank to their money and their expertise, they « *push* », they make the projects get forward faster.

3.2.2.5. Limits and risks to imply the companies

Liege: "*There is a **risk if the technology proposed is not adapted to the needs***".

Leuven: *« Normally, there is no risk. The companies want first of all to earn their life"*.

4. SYNTHESIS

In general, a « smart city » is seen as a city that faces its future and its societal challenges with the aim of having a better quality of life. It's a **multi-stakeholder ecosystem** composed with the local authorities, the businesses, the citizens and all types of institutions and organisations. The « smart city » is a concept to which some cities tend more or less, but there is so far no real smart city neither in Belgium nor in Europe (European Parliament, 2014). Some cities are partly smart, in one or several domains.

Everybody stresses on the problems of mobility and the lack of attractiveness of the cities as a consequence. It is a dramatic problem for the cities, citizens and companies. The citizens are reluctant to live in the city centres and even to come for shopping. The companies stay outside the city because it's much more convenient for their activity.

The **companies** think that the city must be at the centre of "smart cities" initiatives. The city should have a real vision and a sustainable strategy. Nevertheless, mostly it's not the case.

The city is seen as a connected city in phase with the progress of ICT solutions. Nevertheless the technology should not be the aim or the end, but an enabler, a mean. It is a facilitator that helps to solve the societal challenges.

The companies regret the absence of dynamism of the cities and the lack of new business models. The companies ask for new models: the old ones should be abandoned. This causes of course financial and mental problems.

The companies also point out the legislative barriers and especially the Belgian institutional complexity that are brakes towards the progresses of some initiatives. They don't focus on the lack of money, neither on the crisis. This was not mentioned. Of course, most companies chosen were big ones that are already aware of the importance of moving towards smart cities.

On the contrary, the **chambers of commerce**, speaking in their name, insist on the problems that the companies face since the crisis. They argue that companies have to work much more to maintain the same results as before 2008 and that they don't have time to cope with topics as « smart city ». For them, as far as investments are concerned, they want a quick return - sometimes less than one year – and, of course, this is not possible in the case of "smart city investments" that will pay off in the long term.

As to the **cities**, they don't have much money in general and they have models that don't go along with smart city projects. Most companies insist on their bad budgetary position.

Sometimes, the cities are not aware of the importance of the transition to a smart city. Despite of willingness, many juxtaposed projects are born without a real planning, It is difficult and expensive to redirect all this to a harmonized set.

Nevertheless, Liege and Leuven (the 2 sampled cities) seem very open and interested in developing "smart city" initiatives on their territory as well as in collaborating with companies in this area.

5. DISCUSSION

Companies and cities refer to the concept of "smart city" where local authorities, businesses and people work together to build the city of tomorrow. Both seem to wish a real participation of citizens in "smart city" projects.

This observation is aligned with the scientific literature and the "four helix model" in particular. This model is a reference frame for the analysis of innovation. According to this model, the potential of innovation and economic development of cities lie in the networking and the hybridization of (1) university, (2) industry, (3) government and (4) civil society in order to produce new institutional, social and economic schemes (Etzkowitz, 2006; Deakin; 2010, Lombardi; 2012).
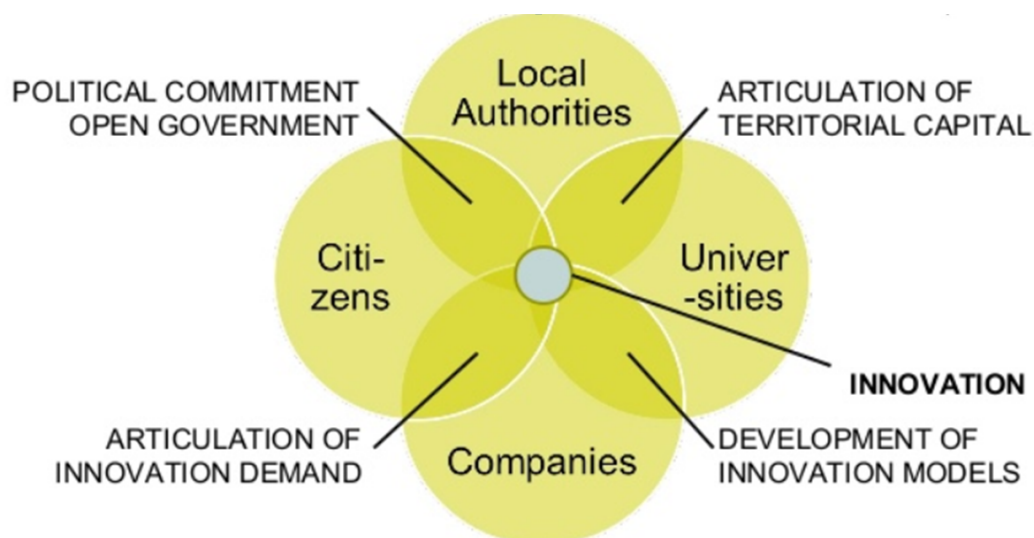
Figure 1: The 4 helix model (*Source*: Jesse Marsh, 2013, Social and territorial innovation, Open days)

The collaboration between the various stakeholders (companies and cities in particular) is thus essential in order to solve urban and societal problems and to develop successful "smart city" projects. Currently, the sampled cities collaborate mainly with local companies (SMEs), but there is a real willingness to extend these collaborations to all sectors and all sizes of companies. Indeed, even if SMEs are perceived as more innovative, flexible and local, big companies have huge R&D units and useful (international) expertise on this matter.

The emergence of "smart cities" is thus the result of a strong collaboration between the private and public sector. One big challenge for the cities is to find the right balance between control and opening towards this outside world. The lack of flexibility of the public sector is pointed out as being a barrier to this private-public collaboration.

The cities consider themselves as assemblers. The companies, as well, perceive them as bandmasters inside the "four helix" model. They have to run the relationships between the various actors of the city, in particular the citizens. However, in the current literature, we know little about how citizens could be/are engaged in "smart city" initiatives. Indeed, relatively low interest has been directed to investigations on citizen engagement in "smart city" initiatives (Sauer, 2012). Further studies would be useful.

What is currently missing in the Belgian cities to become really smarter?
(1) Real visions and strategies at city-level and (2) interconnections between the "smart city" projects under development (3) Money

Following the majority of interviewees, these visions and strategic plans are really missing.
In the EU Report "Mapping Smart City in EU" (European Parliament, 2014):
- the first level of maturity for a "Smart City" is having a "Smart City" strategy or policy;
- the second level implies that the city has elaborated a project plan or project vision, but no piloting or implementation;
- the third requires - in addition to the previous levels - a pilot testing "Smart City" initiatives;

- And, finally, the maturity level 4 considers a "Smart City" with at least one fully launched or implemented "Smart City" initiative.

As a matter of fact, in Belgium, cities are currently between level one and two in this scale of maturity. This state of things reinforces the opinion of the companies concerning the lack of vision at city-level. Public Belgian authorities have an insufficient long-term strategic thinking. The Belgian legislation and, in particular, the institutional complexity of our country is blamed by the private sector. On the contrary, the 2 sampled cities do not mention directly the lack of vision among the barriers preventing the emergence of smart cities.

Finally, the lack of money for "smart city" projects is also a crucial element considered in this study. Currently it's mainly the private sector which finances and « pushes » "smart city" initiatives. Innovative financing models are crucial for the support of these projects in the future.

6. RECOMMENDATIONS

The recommendations will be divided into two parts. Section 6.1. highlights general recommendations based on the main conclusions of this report. Section 6.2. provides some specific recommendations for the two mains stakeholders studied in this report: the companies and the cities.

6.1. General recommendations

- There are **no « turnkey » solutions**. We can't import into Belgium a « smart city » project from Barcelona or Amsterdam as such. It has to be adapted to the Belgian specificities. Indeed we must take into account the Belgian institutional complexity and the specificities of its urban areas, companies and population.

- In Belgium, **mobility** is a big deal. There is a lot to do in this domain. The challenge is to improve the flows to the city in order to bring the companies and the citizens back to the urban centres.

- We should not necessarily establish pharaonic sites. It is possible to start with **small « smart city » projects**, easy to implement BUT these projects must be coordinated and must lead to a coherent set. This approach allows a broad participation of companies following their size and their industry.

- A « smart city » is seen as a multi-stakeholder ecosystem composed with the four helices of the society: the government/the cities, the businesses, the citizens and all types of institutions and organisations such as universities and research centres. The "smart city" concept is based on the idea of **"co-creation" between all these actors.**

- The interviewees are well aware of the importance of the **participation and engagement of citizens** in "smart city" initiatives. Nevertheless, it is unclear how they

should be/are involved up to now. They should be more involved and should "co-create" projects.

- Very often, the **money** is missing to implement "smart city " projects. Some **new financing solutions**, for example mixing public and private funds, have to be found.

- **Open Data** and **Big Data** are challenges for all stakeholders of the city. It's time to allow more transparency and opening in Belgium in order to create new opportunities.

6.2. Specific recommendations

6.2.1 For Companies

- The "smart city" phenomenon represents real **business opportunities for companies**. While some companies still have a very technology-oriented view on smart cities, related dynamics and initiatives cover a large set of domains (such as mobility, energy, governance, education, etc.) and product- or service- offerings from many industries are essential to develop them successfully.

- The **chambers of commerce** can play a role in informing and promoting this new way of collaborating, working and doing business. In Flanders, the Voka is quite advanced in this field but, in Wallonia, the studied chamber of commerce is not yet very active. More globally, it is important for companies to be part of **networks** dedicated to sustainability and smart cities in order to keep informed, to share best practices and to identify potential business opportunities.

- Companies should not hesitate in **informing cities** about their existing or future product- or service-offerings in the domain of smart cities. Then, the cities will know existing offers or products/services that could be developed in partnership with other actors for a smarter city.

- Companies could also motivate their own end-users, clients to develop "smart city" projects in the urban space. Indeed, as mentioned before, the "smart city" concept relies on co-creation and collaborations between cities, companies and also citizens. **New business models** could consequently appear.

- Public funds, and especially local funds, are quite critical. Cities won't be able to finance all the "smart city" projects. In this context, companies may contribute to the development of smart cities in stimulating or proposing projects based on **innovative financing models**. New kinds of collaborations with financial institutions or partners could be imagined to fund "smart city" initiatives. Some interviewees even argue that the private sector will mainly finance and execute the projects thanks to their expertise to push smart initiatives.

- Due to the increasing importance of the phenomenon, it would be interesting for each company, following its size, to have a **team** or a person in charge of the concerns of the city of tomorrow.

6.2.2. For Cities

- The city is perceived as an **assembler**, a **bandmaster** in "smart city" initiatives. The public authorities have to be the **link between all the stakeholders of the city**.

- Smart cities will be developed thanks to innovative **collaborations** between all the stakeholders (four helix model). In particular, companies of various sizes and industries can contribute to the **co-creation** of "smart city" initiatives. The main challenge for the cities is to find the right balance between control and opening towards external partners.

- A **"smart city" vision** and a **strategic plan** (with an appropriate action plan) are essential in order to ensure a consistent long-term development of the urban territory. Cities need to have a long-term strategic thinking and to communicate about it.

- The **legal framework** is sometimes an obstacle to the development of « smart city » initiatives. Public authorities could think about potential adaptations/adjustments, in order to be more flexible in the support of "smart city" initiatives for example.

- **Education** and **sensitization** to the major (urban) societal challenges we are facing and to current barriers to smart cities are important in order to change people's mentalities and attitudes.

- **Open Data** and **Big Data** represent opportunities for the development of (smarter) cities (eg. improvement of mobility). Therefore, cities must think about an efficient storage of the generated data and about the creation of databases, which could be freely available for companies and the civil society, so that they could develop programs and products to improve the quality of life in the cities.

Final remark:

As this study is based on 10 interviews, the results presented and discussed cannot be generalized. A quantitative research would be useful in the future to validate the findings.

In addition, this research is mainly based on the primary data collected during the interviews with people familiar with the "smart city" concept. The results are thus reflecting their perceptions.

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Appendix 1: Interview guide

- **<u>General questions about Smart Cities</u>**

  1. In your opinion, what is a «Smart City »?

  2. Do you know one or some cities that is/ are « smart cities » in Belgium and in foreign countries?

  If, yes, except the generic name or the way they call themselves, what makes them really smart?

  3. What are the main benefits/advantages of the « Smart City » initiatives?

  4. What are the main costs related to « Smart City » initiatives?

  5. What are today the main barriers towards the emergence of « smart cities » in general and in Belgium?

  6. Following your experience, how are the initiatives of « Smart City » financed?

  7. How does your involvement in a « Smart City » process look like or how would you imagine it?

  8. Do you collaborate to « Smart City » initiatives? Which ones?

  9. Do you think the process will be sustainable?

  10. What are the prospects in the field of « Smart City »

     ° in Belgium?

     ° in foreign countries ?

- **<u>Questions for the cities</u>**

1. Do you work in synergy with the private sector, in general and in « smart cities » projects? What are your past experiences in this field, or collaboration with private enterprises?

2. Is it a collection of juxtaposed projects or is there a space of coordination? Where, via whom and with who?

3. With which type of companies do you collaborate or would you collaborate?

4. What are the main contributions of the companies to the « smart city » projects ? What is the advantage of implying them?

5. What are the major advantages for the companies?

6. What are the advantages and disadvantages of working with an ecosystem of companies?

7. What are the main limits, the main risks to imply them?

8. Do you see barriers today?

9. Do you participate to some networks of cities or networks dedicated to the thematic of smart cities?

10/ Do you have a one or two models ? Why ?

- **Questions for the companies** (Accenture, Belfius, Bopro, Fost Plus, Proximus, Siemens)

1. In your opinion, what is the role of companies/businesses in a « smart city » project?

2. Which kind of companies should be involved? Why?

3. Is your company involved in « Smart City » initiatives?

    °if yes, which ones ? Could you explain your role in this process?

    °if not, would you like to take part in such process and why ?

4. In your company, is a person of a team devoted to the topic of the « Smart City »?
    ° If yes, which kind of role does he/she have? Why ?

    ° If not, do you have an innovation pole that could cope with this   subject?

5. Why do you think it's important to take part in a « smart city »   experience?

6. What are the main contributions of the companies to the « Smart City » projects? Is there some interest to involve them?

7. In your opinion, what are the advantages for the companies?

8. For a company what is the cost of being involved in a « Smart City » process?

9. For the time being, do you see some barriers? Which ones?

10. What are the prospects of "Smart City" development ?

    ° for the Belgian and foreign cities ?

    ° for your company, how can it take part to it ?

11. Do the processes « Smart City » lead to some new jobs, new businesses, new activity sectors?

12. Do you participate to some networks of cities or networks dedicated to the thematic of smart cities?

13. What are the interactions and creation of business system around the « smart city » projects?

14. Do you have models ?

- **Questions for the chambers of commerce**

1.   In your opinion, what is the role of a company in a « Smart City » initiative?

2. Which kind of companies should be involved? Why ?

3. Is your organization involved in « Smart City » initiatives?

   ° if yes, which ones ? Could you explain your role in this process?

   ° if not, would you like to take part in such process and why ?

4. Is a person of a team devoted to the topic of the « Smart City » in your organization?

   ° If yes, which kind of role does he/she have? and why ?

   ° If not, do you have an innovation pole which could cope with this subject?

5. Why do you think it's important to take part in a « smart city » experience?

6. What are the main contributions of the companies to « Smart City » projects? Is there some interest to involve them?

7. What are the advantages for the companies?

8. What is the cost for an enterprise of being involved in a « Smart City » process?

9. For the time being, do you see some barriers? Which ones?

10. What are the prospects of Smart City development

   ° for the Belgian and foreign cities ?

   ° for the companies, how can they take part to it ?

11. Do the processes « Smart City » lead to some new jobs, new companies, new activity sectors?