WHO MATTERS TO SMART CITIES? A STAKEHOLDER PERSPECTIVE

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I. INTRODUCTION

Smart city model was implanting in different cities around the world and implies a huge amount of investments in infrastructure. For instance, Songdo in South Korea cost around 40 billions of dollars. These great investments in smart cities were explained by expectations about benefits of smart cities for different stakeholders. However, smart city model has been criticized in academic works and specialized media because it could not provide until this time that smart city model is benefit for stakeholders. Shelton *et. al.* (2015) consider the concept of smart city nebulous, because it was based on liberal ideologies with technocratic governance and marketing rhetoric of corporations, such as IBM, Cisco and Siemens. For Holland (2008) a concept of smart city it is not new and has a self-promotional value, a discourse of smart cities against cities which were not smart.

In this context is important to understand expectations and utility functions for each stakeholder involved in smart city context. Government agencies beliefs as they will be able to provide better public services for citizens and quality of life. Firms and business expected more innovative and attractive environment in the city. Finally, general citizens waited for better public services, environment and work opportunities. Is it possible to measure value created for stakeholder of smart cities? Stakeholders received different levels of value?

This research has aim to analyze distribution of value created by smart cities using the stakeholder theory as background. Several studies and working papers are trying to describe how to measure performance and value created by smart cities. But no one tried to apply stakeholders' theory to solve this problem, in the other words, to describe value creation by each stakeholder influenced by this smart cities.

Our study has important practical and theoretical implications. For government of smart cities, these study could help mayors, public managers and politicians to evaluate an implementation of smart city in stakeholders perspective. For scholars, our study could help to improve tools to analyze smart cities performance, specially because we not found studies which used stakeholders theory to analyze value creation in smart cities.

II. THEORETICAL BACKGROUND

A. Value Creation for Stakeholders

The concept of value creation and utility for stakeholder theory is based on utilitarian or happiness theory of Mill. In utilitarian theory, happiness is the fundamental principle of morality and the source of moral obligation (Mill, 1971). Mill stated a proposition about happiness (1) happiness is a good; (2) each person's happiness is a good to that person, and therefore that; (3) general happiness is a good to the aggregate of all persons. Underlying of the principle of utility is desirable that everybody has an equal right to happiness (Mill, 1971). In sum, for Mill happiness is a desirable as an end and there are a diversity ingredients of happiness.

Jones and Felps (2013) recommended that stakeholder happiness enhancement (SHE) should replace profit as guide for economic activity. In this context, economic activity is the means and happiness is the desired end. Also Harrison and Wicks (2013) translated the notion of happiness and utility to the stakeholder context, and used a concept of utility to describe a value which a stakeholders receive in a relation with an organization and express preferences for a particular utility function.

For this reason, comprehension of utility function is one of the key elements to manage stakeholders and could give competitive advantages for an organization (Harrison *et al.*,

2010). However, understand utility function is a question of which information about stakeholder an organization have. Harrison *et al.* (2010) stated an organizations might obtain two types of knowledge about their stakeholders: a description of factors which are driving the utility of the stakeholder and seeking to define the relative weighting of each factor.

Based on this conception, the authors argues for obtain information about stakeholders, an organization should maintain a relationship with primary stakeholders based on trustworthiness, history of fair distribution of value and history of stakeholder influence on management decision (Harrison *et al.*, 2010). Mutual confidence between stakeholder and organization is necessary to avoid an exchange which will result in exploitation of vulnerabilities (Barney, 1994). Then, to advance in stakeholder management providing value for stakeholder, two elements are necessary, trustfulness and information about equations of utility.

Remains a question of which stakeholder should be considered in an analysis of utility functions and if all stakeholders might my attended with equal treatment. Under fairness principle, Philips (1997) stated that "whenever persons or groups of persons voluntarily accept the benefits of a mutually beneficial scheme of co-operation requiring sacrifice or contribution on the parts of the participants and there exists the possibility of free-riding, there exist obligation of fairness on the part of these persons or groups to co-operate in proportion to the benefits accepted". In other words, Philips argued which stakeholder deserve a correspondence of a firm based on the contribution of this stakeholder.

Based on fairness principle, Philips (2003) has suggested that stakeholders may be described as normative and derivative stakeholders. Normative stakeholders are those to whom the organization has a moral obligation to provide their well-being, and derivative stakeholder are groups or individuals who has no direct moral obligation as stakeholders, but could benefit the organization. This concept added a differentiation for groups of stakeholders based on moral obligation.

However, in stakeholder theory there is not a consensus about egalitarian treatment of stakeholders, in other words, if an organization should attend different utility functions in an equal manner. In order to summarize the contest, normative stakeholder's theorists suggest that all legitimate stakeholders should be treated equally (Clarkson, 1995; Donald and Preston (1995), and some authors recommend which stakeholders should receive more attention to stay according with the principle of equity (Philips *et al.*, 2015).

Donaldson and Preston (1995) stated a normative aspect of stakeholder theory based on intrinsic value, which could be characterized as each group of stakeholder's merits consideration for its own sake and not merely because of its ability to further the interests of some other group. For Jones and Wicks (1999), belief in the intrinsic value of the claims of all legitimate stakeholders is fundamental to stakeholder theory. Also, this is an important point to reject the neoclassical theory of the firm, because stakeholder theory present a normative justification to replace a stockholder wealth maximization as the main firms' aim. On other hand, for Philips *et al.* (2015) one of the common misunderstandings about stakeholders' theory is that all stakeholders must be treated equally.

B. Stakeholders utility in smart cities context

In the literature, there are many definitions for smart cities. In general, researchers used to define smart city as use of modern ICT technology in the city (Hall, 2000; Harrison *et al.*, 2010), intelligent and coordinated manner to develop urban centers (Washburn *et al.*, 2010; Lombardi *et al.*, 2012), sustainable development (Thuzar, 2011), high capacity for learning and innovation (Kourtit and Nijkamp, 2012), and participatory governance (Caragliu *et al.*, 2009). In the first studies, a concept of smart cities is related an technological-determinist

point of view, and changing towards a more citizen-centric approach (de Lange and de Waal, 2013).

An attempt to use stakeholders' theory in another context, such as in public administration, have some challenges. One main question is to define the unity of analysis. First, reviewing cases about smart cities in literature, we found a city hall as the organization responsible for implement smart city model. For instance, previous researches defined a main role of city hall in smart cities implementation, such as happened in New York (Goldsmith and Crawford, 2014), Barcelona (Lee *et al.*, 2014; Grimaldi and Fernandez, 2016) and Seoul (Hwang, 2013). Also European Union (EU, 2014) considered that city hall, in smart city implementation, "acts as a guarantor or supporter, providing co-finance, strategic guidance and administrative support". Then, our answer for the question is city hall as main unity of analysis in each smart city of this study.
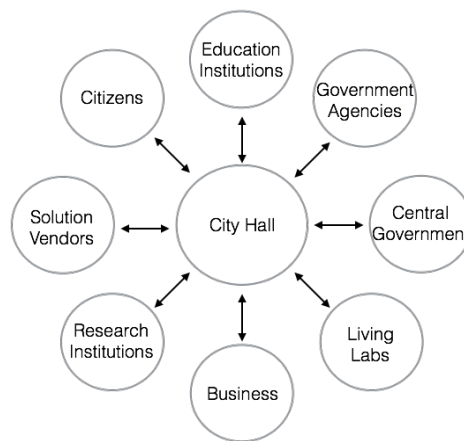

Fig 1 – Stakeholders of Smart Cities Model. Source: Authors.

Dameri (2013) there are different stakeholders cited in literature of smart cities. Solution vendors, governments, research and education institutions, living labs, public administration, businesses organizations and citizens. At this point, is important to define who is a primary stakeholder, in other words, stakeholders more closely associated with organizational objectives (Harrison et al., 2010). Frequently three of these stakeholders are cited in the literature as primary stakeholders. This is the case of government agencies (Nam e Pardo, 2011; Goldsmith and Crowford, 2014), businesses organizations (Shelton *et al.*, 2015; Yin *et al.*, 2016) and citizens (Schaffers *et al.*, 2012; Dameri, 2012). However, each stakeholder has different interests in smart city project and the city hall should manage different expectations and is important to understand utility functions for each of these stakeholders to analyze value created by smart city model.

Government agencies are which one that use smart cities technology to provide public services with higher efficiency and better transparence (Dameri, 2012). They are very influent stakeholder because they could influence rules, laws and policies to control and support smart city implementation. Specifically, with smart cities projects they are interested in enhance city planning (Anthopoulos, 2016), improve efficiency and solve problems proactively (Shelton et al., 2015), and to establish more transparent governance (Giffinger, 2007).

Businesses organizations are stakeholders interested in smart cities to improve their economic returns, because they could improve the productivity of their own business process and to innovate their products (Dameri, 2012). In order to clarify they expectations, we could mention an increase of innovative spirit and entrepreneurship (Lombardi *et al.* 2012), economic development (Eger, 2009), international embeddness, and a better economic image and trademarks (Giffinger, 2007).

Finally, citizens could be defined as the final clients of digital services offered by smart cities (Dameri, 2012). Then citizens expect from smart cities a better quality of life (Chourabi *et al.*, 2011), an improvement of public services (Nowicka, 2014), increase of health conditions, environment protection and sustainable resource management (Giffinger, 2007). A summary of the interests of primary stakeholders is reported in Table 1.

For Meijer and Bolivar (2015) is necessary to develop new studies of the impact of smart cities in economic growth and other public values. There are only few o studies in evaluation of smart cities. Lombardi (2011) presented a pilot evaluation based on the main dimensions (clusters) found in literature, as Smart Governance (related to participation); Smart Human (related to people); Smart Environment (related to natural resources); Smart Living (related to the quality of life) and Smart Economy (related to competiveness).

Dameri (2012) proposed a general framework to evaluate digital cities implementation with these characteristics: to promote the awareness of digital city usefulness both for enablers and for users; to demonstrate the possibility to create value for companies and for public administrations; and to show the opportunity of gaining quantitative and qualitative benefits from people. But this approaches are based on criteria that not include groups or individuals in details, in other words, not describe value for each stakeholder and this could be a problem to solve a question of if it is possible to measure value created for smart cities and from whom the value is created.

Also, this papers intended to test a theoretical proposition from Donaldson and Preston (1995) about normative approach in stakeholder theory applied in public administration context. In other words, to understand if managers and organizations tend to treat all the stakeholder holders equally or other explanation, as fairness principle could be more appropriated to explain organizational behavior (Philips *et al.*, 2015). Based on these premises we propose our hypothesis that refutes which all stakeholders' groups have same intrinsic value:

Hypothesis: a city hall's level of attention is different across stakeholder groups.

III. METHODS

A population of smart cities in Europe is 240, according with the report "Mapping Smart Cities in EU", issued by the European Parliament in 2014. However, the sample was composed for 68 medium-sized smart cities from Europe with objective to analyze distribution of value created by smart cities. Data regarding to the stakeholders' value created is of three categories: smart governance, smart economy and smart living. We used smart governance data to the value created to government agencies, smart economy data to the value created for business organizations, and smart living indicators to value created for citizens.

This database was provided by European Smart Cities, an initiative of Vienna University of Technology, University of Ljubljana and Delft University of Technology. European Smart Cities organized a ranking of smart cities in Europe with objective to deal with a gap of information about medium-sized cities and to provide a benchmarking to compare development of these cities. Originally, broad spatial scope was defined to only European cities and data availability also played an important role in the selection of the cities (Gifinger *et al.*, 2007). Under this project, two collections were made in 2007 and 2014. Some data were elaborated by interviews and secondary data from desk research.

A z-transformation was applied to transforms all indicator values into standardized values with an average 0 and a standard deviation 1, as Fig 2. This transformation was necessary to

be able to compare the different indicators. An advantage of this method is to consider the heterogeneity within groups and maintains of metric information.

We used data from database three indicators to describe government agencies: participation in decision-making, public and social service and transparent governance. We collect data related to businesses organizations from seven indicators: innovative spirit, entrepreneurship, economic image & trademarks, producity, flexibility of labor market, international embeddedness and ability to transform Finally, we used to describe value creation for citizens from seven indicators: cultural facilities, health conditions, individual safety, housing quality, education facility, touristic attractivity and social cohesion. A proxy for each stakeholder was calculated using the average of these variables above. A resume was described in Table 2.

This step tests the hypothesis, a city hall's level of attention is different across stakeholder groups, what means operationally to verify empirically if the phenomenon of equal treatment is observable in European smart cities. We developed the test to verify if the value distributed for some stakeholder is higher than other stakeholders. We used the ANOVA test to analyze the hypothesis of differentiated treatment among smart city stakeholders. Also, we used descriptive statistics to analyze the population and the for each of the 68 smart cities in the sample.

IV. ANALYSIS

As previously stated, the population of this study comprised 68 (N=68) publicly medium-sized smart cities listed on the European Smart Cities database. The sample consisted of all smart cities with data available in 2014. First, we presented a descriptive analysis with some measures of dispersion and position, reported in Table 3. This initial approach was important for a prior understanding of the data to be analyzed. Second, we reported outcomes obtained from ANOVA test. The conducted ANOVA test indicated that there was no statistically significant difference between business index, government agencies index and citizens index ($F = 0,141$, $df = 2$ and $p > .05$). The hypothesis is not supported by the data, in other words, a city hall's level of attention to stakeholders is equal across stakeholder groups. In this sample, city hall treat stakeholders equally. These results were reported in Table 4.

Several studies have denied the classical hypothesis of equal treatment proposed by Donaldson and Preston (1995). For instance, Vazquez-Brust *et al.* (2010) analyzed influence of stakeholders in decision-making process of 505 Argentinian firms and identified ranked the stakeholders. Also, Boaventura (2016) conducted a test of this hypothesis with stakeholder in companies of Brazilian stock exchange and demonstrated its inapplicability. Also, other author found salience of stakeholders in public sector field. For instance, Gomes (2004) found a salience of government agencies caused by access key decision makers and empowerment by the principals, legitimacy granted by legal means to carry out their primary activities, and urgency for the ability to have their requests immediately solved. In opposition, we found evidences that the hypothesis of equal treatment among stakeholders could be applied in public sector, probably because is aimed at serving the society as broadly and unrestricted as possible.

V. CONCLUSION

The study using secondary bases of smart cities of European medium cities confirmed the equal treatment among the smart cities' stakeholders, using as criteria the utility functions of each stakeholder described in the literature. Then, a contribution of the study is related to the confirmation of a hypothesis of equal treatment in the context of public administration,

specifically in smart cities. Even though the results are not statistically significant, is contrary to the expectations of the literature on smart cities, since several authors have criticized the unequal treatment of stakeholders in smart cities, more specifically the citizens' mistrust in this context.

To practice, the study demonstrated that there is a balance of efforts to meet the stakeholders of smart cities. A plausible explanation for this result is that efforts related to the adoption of smart cities have is a synergistic effect among the actions applied to smart cities. In other words, actions directed at a stakeholder may positively influence other stakeholders.

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TABLE 1
Stakeholders' Interests

Stakeholders	Interests	Theoretical foundation
Government agencies	Enhance city planning Efficient and proactive problem solving Transparent governance Improve political strategies & social perspectives	(Anthopoulos, 2016) (Shelton *et al.*, 2015) (Giffinger, 2007)
Businesses organizations	Innovative spirit Entrepreneurship International embeddness Productivity	(Giffinger, 2007)
Citizens	Better quality of life Improvement in quality of public services Housing quality Increase of health conditions Environmental protection Sustainable resource management	(Chourabi *et al.*, 2011) (Nowicka, 2014) (Giffinger, 2007)

TABLE 2
Initial Variables Employed for each Stakeholder

Index	Indicator	Theoretical foundation
Government agencies index	Participation in decision-making Public and social service Transparent governance	Smart governance (Giffinger, 2007; Lombardi et al 2012) Transparent Government (Lazaroiu and Roscia, 2012)
Businesses index	Innovative spirit Entrepreneurship Economic image and trademarks Producity Flexibility of labor market International embeddedness Ability to transform	Smart economy (Giffinger, 2007; Lombardi et al, 2012) Economic social-political issues of the city (Nam and Pardo, 2012) Economic development (Eger, 2009)
Citizens index	Cultural facilities Health conditions Individual safety Housing quality Education facility Touristic attractiveness Economic welfare	Smart living (Giffinger, 2007; Lombardi et al, 2012) Households consume (Shapiro, 2006)

TABLE 3
Descriptive Statistics

	business index	government agencies index	citizens index
Mean	-0,022394608	-0,001882353	0,020644958
Standard Error	0,060268856	0,060370682	0,050237755
Median	-0,071	-0,013166667	0,087428571
Standard Deviation	0,496989718	0,497829394	0,41427114
Sample Variance	0,246998779	0,247834105	0,171620578
Minimum	-0,857333333	-1,125	-0,860571429
Maximum	1,988833333	1,118	1,125285714
Sum	-1,522833333	-0,128	1,403857143
Count	68	68	68

TABLE 4
ANOVA result for Business index/Citizens index

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0,063027762	2	0,031513881	0,141857832	0,867831413	3,040828049
Within Groups	44,65238199	201	0,222151154			
Total	44,71540975	203				