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GUIDELINES AND GOOD PRACTICES IN STRATEGIES, INITIATIVES AND MANAGEMENT OF SMART CITY PROJECTS IN SMALL CITIES.

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In recent years, the concept of Smart City has been widely accepted as a model of urban development and transformation and as a strategy to face the global challenges that cities must address in terms of sustainability, efficiency, integration, resilience, and ultimately improvement of the quality of life of its inhabitants. Most of the comparative studies and assessment models are developed based on large urban centres and several authors consider the need for models adapted to the characteristics of smaller cities. Compared with large cities, with a more robust structure and an evident superiority in technical, administrative and economic-financial resources to face transformation processes, small cities present specific characteristics that make direct extrapolation and direct scalability of projects and initiatives pretty difficult. This paper identifies guidelines and good practices in strategy and Smart City projects management specific for these urban centres, which help decision-making in its transformation processes and set strategies and guidelines considering its strengths, weaknesses, opportunities and threats, focused in the challenges they must face.

Keywords: Smart cities; project management; assessment models.

DIRECTRICES DE ACTUACIÓN Y BUENAS PRÁCTICAS EN ESTRATEGIAS, INICIATIVAS Y GESTIÓN DE PROYECTOS SMART CITY EN CIUDADES PEQUEÑAS.

En los últimos años se ha aceptado de forma generalizada el concepto de Smart City como modelo de desarrollo y transformación urbana y como estrategia para afrontar los retos globales que las ciudades deben abordar en lo referente a sostenibilidad, eficiencia, integración, resiliencia, y en definitiva mejora de la calidad de vida de sus habitantes. La mayoría de los estudios comparativos y modelos de evaluación se desarrollan basados en grandes núcleos urbanos y diversos autores consideran la necesidad de modelos adaptados a las características de ciudades de menor tamaño. Comparadas con las grandes urbes, con una estructura más robusta y una evidente superioridad en recursos técnicos, administrativos y económico-financieros para afrontar los procesos de transformación, las ciudades pequeñas presentan unas características específicas que hacen muy difícil la extrapolación de directrices y la escalabilidad directa de proyectos e iniciativas. En este trabajo se identifican pautas de actuación y buenas prácticas en estrategias y gestión de proyectos Smart City específicas para estos núcleos urbanos, que ayuden a la toma de decisiones en sus procesos de transformación urbana y fijen estrategias y directrices considerando sus debilidades, amenazas, fortalezas y oportunidades, orientadas a los desafíos que estas ciudades deben afrontar.

Palabras claves: Smart cities; gestión de proyectos; modelos de evaluación.

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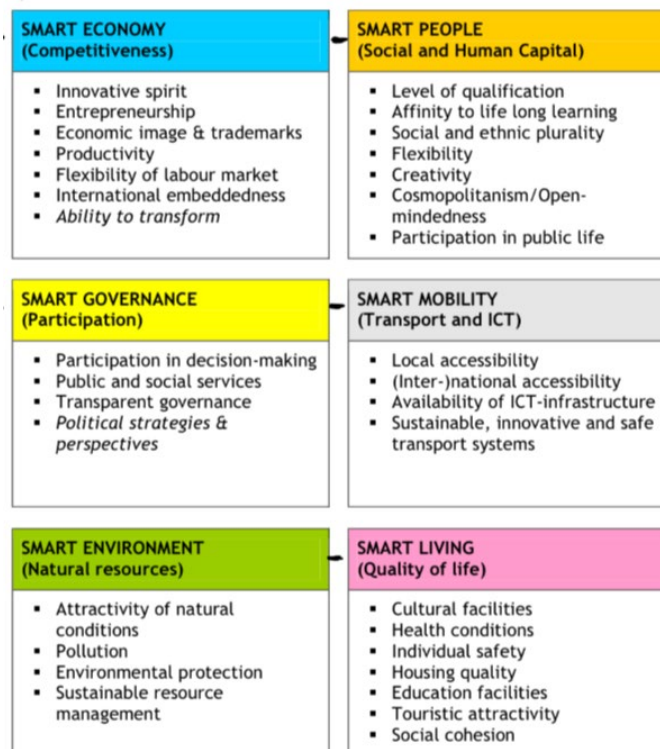
1. Introduction

The concept of a smart city has been evolving over the last years, from the initial conception firmly based on technology to a holistic concept, focused on the urban demand (citizen) considering the city's different dimensions. Today it is widely accepted as a model of urban transformation for cities to face global challenges in sustainability, quality of life and efficiency, and other challenges such as integration or resilience (Fernández Añez, 2019).

In recent years there has been a great proliferation of evaluation models based on the Smart City concept, covering different areas and with different scopes and evaluation philosophies: quantitative, qualitative, based on systems theory, oriented to the development of rankings and aimed to the evaluation of specific projects (Giffinger, Fertner, Kramar, Meijers, 2007 and Technische Universität Wien, 2013, 2014 and 2015, Cohen, 2014, Monzón, 2015, Moreno Alonso, 2016, Fernández Güell, Collado Lara, Guzmán Araña, Fernández Añez, 2016, Castelnovo, Misuraca, Salvodelli, 2015, The Transport Research Center, UPM, 2017).

The model of Giffinger et al. of 2007 sets the six dimensions that are generally accepted by the scientific community as a basis for holistic Smart Cities models. These are Economy, Human Capital, Governance, Mobility, Environment and Quality of Life, and are also adopted by the European Commission in the report "Mapping Smart Cities in the E.U." as the basis for holistic city sizing (Manville, Cochrane, Cave, Millard, Pederson, Thaarup, Liebe, Wissner, Massik, Kotterink, 2014).

Figure 1. Dimensions in the model of Giffinger et al. 2007.



Source: Giffinger, Fertner, Kramar, Meijers, 2007

Giffinger's model's motivation (Giffinger, Fertner, Kramar, Meijers 2007) considers that idiosyncrasy of medium-sized cities implies that the rankings for large metropolises do not apply to them and that medium-sized cities have to focus their objectives much more closely than large cities, which can cover much broader scenarios. Giffinger's work, therefore, selects cities with populations between 500,000 and 100,000 inhabitants, considering them from this point of view as having homogeneous characteristics.

The same can be said for smaller cities, i.e. those with less than 100,000 inhabitants, which share common characteristics. They need to focus on specific targets even more accentuated.

According to the European Commission (European Commission, 2012), cities are classified corresponding to their number of inhabitants into:

- Large cities between 250,000 and 500,000 inhabitants,
- Medium-sized cities between 250,000 and 100,000 inhabitants.
- Small cities between 50,000 and 100,000 inhabitants.

The scarcity of resources characteristic of this last typology of cities, in terms of technical, administrative, financial and economic resources, means that the opportunity cost of choosing one initiative or project over another is very high, i.e., erroneous decisions have significant consequences in terms of the use and availability of resources.

Models oriented to the elaboration of city rankings such as the Smart Cities Wheel (Cohen, 2014) or more qualitative (Chourabi, Nam, Walker, Gil Garcia, Mellouli, Nahon, Pardo, Hans, 2012) are also applied globally to large cities above, mostly well above, 100,000 inhabitants.

Table 1: Example of cities analysed in a quantitative model (Cohen, 2012)

Europa	Asia/Oceania	America	
Amsterdam	Singapur	New York	Santiago de Chile
Vienna	Hong-Kong	Washington	México City
Paris	Sidney	Chicago	Rio
London	Melbourne	Seattle	Curitiba
Barcelona	Perth	San Francisco	Montevideo
Stockholm	Tokio	Portland	Buenos Aires
Berlin	Osaka	Boston	Bogota
Hamburg	Kobe	Toronto	Medellin
Helsinki	Seoul	Vancouver	
Copenhagen	Auckland	Montreal	

Source: Own elaboration based on Cohen, 2012

It seems clear that there is a gap in the evaluation models and, above all, in the guidelines for appropriate strategies and initiatives. This is mainly because direct scalability fails resoundingly in most cases in the cities of this population range, which in Spain account for more than 7.2 million inhabitants (population between 100,000 and 40,000), more than the sum of the populations of Madrid, Barcelona, Valencia, Seville and Zaragoza, the five largest Spanish cities (National Institute of Statistics, data from the municipal census as of January 1st, 2020).

2. Objectives

This paper review guidelines and a general good practise guide for developing strategies and models for the evaluation, development and management of projects in the transformation processes of urban centres of less than 100,000 inhabitants, small or medium-sized cities, under the Smart City model. The goal of the study is to analyze the leading models and works on Smart Cities: focused on small cities.

3. Methodology

A systematic literature review has been done through scientific databases:

- Web of Science, <https://apps.webofknowledge.com/>
- Scopus, <https://www.scopus.com/>

Three key concepts have been defined to focus the review:

- Conceptual models
- Transformation strategies
- Citizen demands (urban demand).

All types of documents have been included: journals, conference proceedings, books, and reports. Results have been analysed in conceptual models, both qualitative and quantitative, of performance, and Smart City initiatives evaluation has been carried out.

Within this review, in the second line of analysis, it has been taken into account those works, which, even although they do not establish conceptual models per se, cover aspects on city transformation strategies under the aforementioned Smart City paradigm. or related to specific actions of small cities. Those including smart territories as a possible way to reduce the problem of the scarcity of resources of this type of municipalities has been included too.

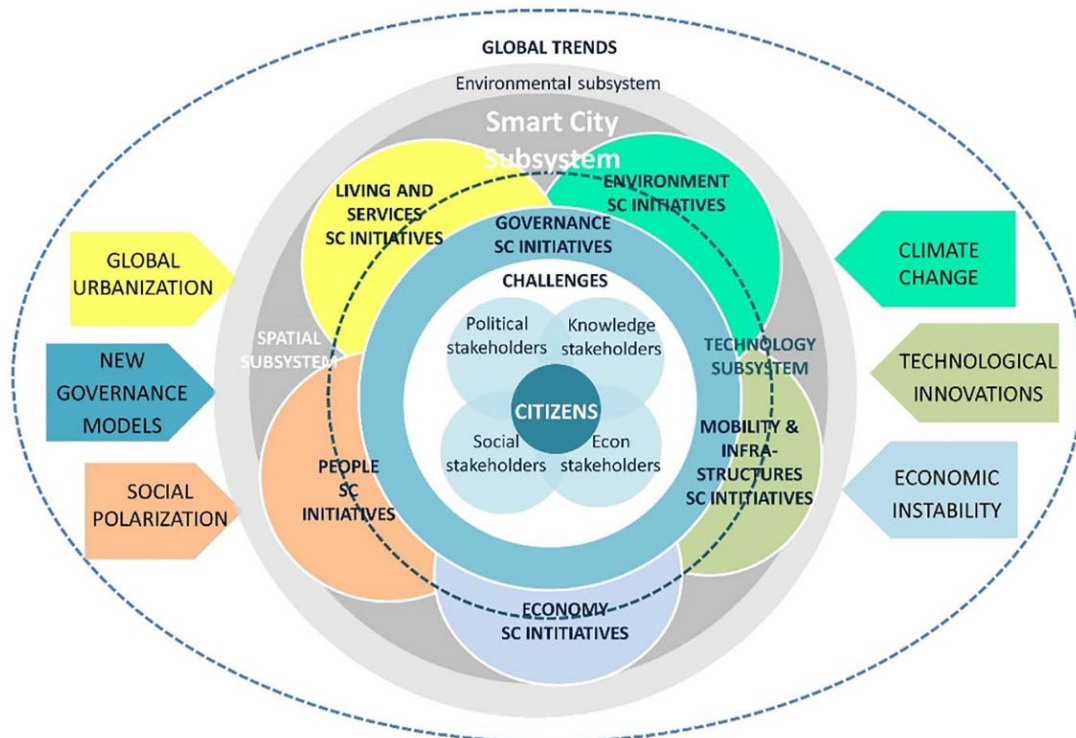
Finally, a review has been made of those works where the case of small cities problems is not explicitly established, but guidelines mentioned could be extrapolated or they present a more direct scalability for their application in municipalities of a smaller population.

4. Results

A total of 37 articles and research papers related to models and development of Smart City strategies and initiatives have been analysed, extracting from them, as a compendium of the guidelines derived from them, a guide of good general practices applicable to cities of less than 100,000 inhabitants.

The European Commission's survey "Mapping Smart Cities in the E.U." (Manville, Cochrane, Cave, Millard, Pederson, Thaarup, Liebe, Wissner, Massik, Kotterink, 2014) establishes the need to know the best practices in the transformation of cities according to the Smart City concept, sharing experiences lessons learned and analysing the scalability of projects to smaller cities. It also consolidates Giffinger's model's six dimensions as a reference to the holistic conception of the Smart City. The established success factors aim to the role of technology as a catalytic element, considering as fundamental the city's holistic nature focused on citizens, as urban demand, at the core of the model.

Figure 2. Example of a modern holistic model, with citizen as the core.



Source: Fernández-Añez, Fernández Güell, Giffinger, 2017

We will analyse soft domains as initiatives to be developed in small smart cities, the importance of strategic plans and project evaluation models as tools for prioritizing and optimizing resources in this type of cities and the importance of the citizen-centric conception, the relevance of the governance dimension and its relationship with innovation-related initiatives.

4.1. Conceptual models: Soft domains and citizen quality of life.

The research of Neirotti, De Marco, Cagliano, Mangano, Scorrano (2014) "Current trends in smart city initiatives: Some stylized facts" is established as a starting point because of its relative importance and because it creates a primary classification very applicable to small cities: "hard" domains and "soft" domains.

Table 2: Soft and Hard domains, Neirotti, 2014

Domain	Sub-domains
Hard	Energy networks
	Street lighting, natural resources, water management and waste management.
	Environment.
	Transport, mobility and logistics.
	Residential Building and offices.
	Health care system.
	Public Safety.
Soft	Education and culture.
	Inclusion and social welfare.
	Public administration and y (e-)government.
	Economy and innovation.

Source: Own elaboration based on Neirotti, Marco, Cagliano, Mangano, Scorrano 2014

Neirotti (2014) analyzes 70 cities around the world, obtaining a value that they call "coverage index", according to the domains covered by the Smart City initiatives implemented by the cities. The study shows that the most frequent Smart City projects in large cities focus on "hard" domains, especially mobility and energy (although in European cities lower importance is observed compared to the rest of the world) and in smaller cities (although the object of the study is not cities with less than 100,000 inhabitants), wide coverage of "soft" domains is detected, presenting, in fact, negative correlation.

The importance of initiatives focused on "soft" domains for smaller cities stands out, as they do not require such significant investments from an economic point of view, and fundamental aspects of city life are covered.

Small cities have an advantage over larger ones: they have lower inertia to change, so they represent a good ecosystem for implementing pilot projects and innovation projects and obtaining quick and representative results allowing continuous improvement of initiatives and projects. (Neirotti, Marco, Cagliano, Mangano, Scorrano, 2014). This can be applied to both public and private entities, and despite their limitations, they thus present a proper environment for innovation with the right policy and project management.

Therefore, the idea of implementing smaller projects based on innovation and initiatives in the so-called "soft" aspects of the city stands out, mainly because they are the most

directly related to citizens in terms of quality of life, and smart and innovative management, away from traditional systems, is needed.

4.2. Transformation strategies: strategic plans and project assessment and management models.

The scarcity of technical, administrative and economic resources has already been mentioned as a fundamental characteristic that conditions actions in small cities. The opportunity cost of one initiative over another in this typology of the city is very high, so that in these urban entities, the optimization of decision making supported by previously defined strategies and assessment models making possible to foresee the impacts on the different dimensions of the city, takes on a big relevance.

The importance of a defined strategy, through the elaboration of a strategic plan as a starting point, bringing together sectoral plans and providing them with synergies and transversality, is even more important in municipalities with small populations (Fernández Güell, Collado Lara, Guzmán Araña, Fernández Añez, 2016). It is essential to prioritize projects along the lines of these previously defined strategic plans, relying on the use of assessment models for Smart City initiatives, so as to anticipate the impacts that the projects will have on the different dimensions of the city (Fernández Añez, 2019).

In the end, models constitute a basis or tool for decision making and/or formulation of strategies of local governments, they mean an orientation for the transformation of the urban core under the Smart City paradigm, and they should be used as a fundamental instrument in a policy of resource optimization and especially in a context of organizational and economic constraints with very high opportunity costs in decisions and prioritizations.

Unfortunately, projects under the Smart City label are far from strategic planning even in large cities very often, and it is difficult to replicate them and to obtain scale economies, so it is very difficult to apply them in smaller cities. In fact, attempts to extrapolate projects implemented in much larger cities to other much smaller urban centres are made, and these attempts are meaningless mainly because the fact that they are not supported by strategic targets or their potential impacts on the city's objectives and dimensions have not been assessed. (Fernández Güell, Collado Lara, Guzmán Araña, Fernández Añez, 2016).

The relationship of strategy and vision formulation, assessment and management, public value generation and financial and economic sustainability with the construction of a Smart City Community, its development and growth, the interaction between all these factors, has fundamental importance to achieve efficiency in the use of resources and in the final target of building innovation atmospheres, sustainable strategies coherent with the urban reality and a sense of belonging to the community (Castelnuovo, Misuraca, Salvodelli 2015).

Besides, understanding the local factors of each municipality, the idiosyncrasy of each city with its cultural values and boundary conditions, becomes indispensable as a prior step to the development and orientation of strategies. (Neirotti, Marco, Cagliano, Mangano, Scorrano, 2014). Knowledge of local identity, the feeling of belonging becomes essential for the success of innovation strategies and to encourage creative environments (Lombardi, 2011).

In this area, and taking into account the constraints of scarce resources on the one hand, and the importance of local and regional characteristics and factors, on the other hand,

it seems a direct consequence of the trend to develop projects and initiatives in broader areas, such as smart territories, thus seeking synergies and collaboration in technical and administrative resources, but also as a mechanism for sharing experiences and success stories (Dameri, 2013). In fact, it is impossible to understand cities, and especially small cities, without their environment, being their weaknesses, threats, strengths and opportunities strongly related to the regional environment (Berrone, Ricard, 2014).

4.3. Citizen demand: Urban demand, Governance and Innovation.

A common feature in the most developed conceptual models is the importance they give to urban demand or citizens, placing them as the core of the model (Nam and Pardo 2011, Manville, Cochrane, Cave, Millard, Pederson, Thaarup, Liebe, Wissner, Massik, Kotterink, 2014, Fernández Güell, Collado Lara, Guzmán Araña, Fernández Añez, 2016, Fernández Añez, 2019). It becomes essential to know and understand as far as possible the needs of citizens for the alignment of the initiatives to be undertaken with those needs.

It emerges as a very useful tool for micro marketing techniques, which classify citizens into smaller groups with more homogeneous interests and concerns and allowing the analysis of their common needs with the help of tools such as Big data and Business Intelligence (Fernández-Güell, 2006). Cities of a smaller size have obvious advantages in the ease of application of these techniques, so their use seems highly recommended in the development of strategic plans in general and analysis of initiatives in particular.

In this line of action, the use of "bottom-up" strategies (Neirotti, Marco, Cagliano, Mangano, Scorrano, 2014) in promoting citizen initiatives and the use of techniques applied in the business world (Lean-Startup, Design-Thinking, Sprint) that support and manage them are also presented as very viable and adaptable guidelines for small municipalities, due to their ease to establish and draw conclusions from pilot projects (Cohen, 2014), obtaining quick results of the "minimum viable product" type and analyzing their results in order to "iterate" by introducing improvements in the projects before their general application, as a tool for resource optimization.

The parallelism with the techniques applied in business management in terms of work teams and project management does not end at this point, but becomes even more important in terms of governance at the local level and the implementation of an innovation policy in them, internally as a first step to externalize and spread it into the city. This should be implemented through three lines (Nam and Pardo, 2011):

Technological innovation, as the improvement of services and the creation of conditions where technological tools can be used. The physical space should not be forgotten, sacrificing it to the virtual one; in any case, they should be harmonized, since the concentration of talent in a physical space forms an ecosystem conducive to innovation.

Organizational innovation, in the area of more effective management and organization, changing the traditional internal bureaucracy and implementing transversality and eliminating departmental silos.

Political innovation, creating the conditions from the institutional point of view for the development of the Smart City, regulatory innovation, and focusing on urban demand.

Within the transformation processes in the field of governance, related to innovation, four types of trends can be distinguished depending on the degree of transformation (Meier and Bolivar, 2013):

- Smart city governance, with a low level of transformation and focus placed on good administration and good policy, without transformation in existing structures.
- Smart decision making, with a medium-low level of transformation and innovation in decision-making processes.
- Intelligent administration, with a medium-high level of transformation and innovation in administration, changes in internal organization.
- Smart Collaboration, with a high level of transformation, and innovation at the governance level, with internal and external changes, making services and operations citizen-centric.

So, the Smart City concept, from the governance point of view, must involve a change at the institutional level (Meier and Bolivar, 2015), internalizing a deep transformation as a previous step to externalize it.

Innovation, both in the field of urban demand and governance, must be taken as a long-term strategy: technology changes very quickly, management more slowly and politics much more slowly (Nam and Pardo, 2011). The implementation of Smart City innovation projects is, therefore, bi-directionally conditioned by the implementation of innovation in public administration (Alawadhi, Aldama, Chourabi, Gil Garcia, Leung, Mellouli, Walker, 2012). It is therefore essential to create a climate of urban innovation (Lombardi, 2011) that starts from the local administration itself internally and expands throughout the entire urban area.

It is widely considered essential to extend the use of technology to facilitate administrative procedures and improve governance, both in terms of inclusion and decision-making, thus facilitating collaborative governance, as a more concrete and less broad and diffuse concept than participatory democracy (Castelnuovo, Misuraca, Salvodelli, 2015).

It is relevant to highlight the importance of involving the private sector in an overall innovation strategy, encouraging initiatives coming from this sector (Lombardi, 2011). A solid social and intellectual base is necessary, a citizen involvement that will always be easier to create by involving as many urban agents as possible in the process of drawing up strategic plans, especially from the private sector in this type of innovation projects (Castelnuovo, Misuraca, Salvodelli, 2015).

The Threats of creating hyper-technological cities, with intensive use of communication and information technologies, generating digital barriers and increasing the vulnerability of part of the population (Neirotti, Marco, Cagliano, Mangano, Scorrano, 2014) and, therefore, as a consequence, rejection of change must be avoided. A policy of inclusion in the evaluation of projects and initiatives, carefully considering their repercussions and involving the stakeholders, becomes absolutely necessary in a specialist in small cities.

In short, integrating citizens in the process of city transformation should be understood as an essential part of a strategy for change from the beginning of its formulation, incorporating the citizen's vision in the assessment of projects and initiatives.

5. Conclusions

Small cities, with populations between 50,000 and 100,000 inhabitants, have special characteristics, especially in terms of scarcity of technical, administrative and economic-financial resources. Strategies, initiatives and projects developed in cities with larger populations are difficult to scale and impossible to be directly extrapolated. The analysis carried out has enabled identification of general guidelines and directives for action, facilitating the planning of strategies and development of projects in these cities, in order to establish a guide of good practices for the transformation processes of these urban areas under the Smart City model.

The lack of resources represents a weakness of this type of cities, but the low inertia they represent to change and to the process of introducing new projects is a strength. Therefore, small cities represent a favourable environment for the implementation of pilot projects or "living labs", and conclusions and lessons can be drawn in an agile and efficient way.

In this context of limited resources with a very high need for optimization and a very high opportunity cost, it is essential to develop a strategy with the main urban stakeholders. The strategy should analyze as a first step the challenges and targets of the municipality and pursuing a high degree of citizen involvement in as many initiatives as possible; being part of this analysis, the deep understanding of the identity and local factors. The use of project assessment models is presented as a fundamental tool in terms of prioritization of initiatives and the implementation of initiatives in the field of intelligent territories as a method for the generation of synergies and optimization of resources.

The development of projects and initiatives within the "Soft" domain of the city with a direct and clear influence on citizens' quality of life is part of this holistic conception with the citizen at the center of the model. It represents an opportunity for small cities to implement an innovation policy as the central axis in both strategic planning and project management, using tools widespread in business management in the urban environment, to take advantage of the characteristics of these cities that facilitate the application of these methods and to generate a creative and innovative environment as a catalyst for the whole process.

In terms of governance in its double aspect as a fundamental dimension of the city and a steering force for the urban dynamics to be achieved, institutional change is considered essential for configuring the set of opportunities that smaller cities have before them.

The threat of the technological gap is present, making social inclusion and citizen involvement even more important.

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