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SMART CITY PROJECT ASSESSMENT MODELS: A PROPOSAL OF MODEL STRUCTURE FOR SMALL CITIES.

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The smart city concept has recently been consolidated as a general guideline in urban transformation and development processes in order to face the global challenges of sustainability, integration, efficiency and resilience. Many conceptual models based on smart cities of different typologies have been developed in recent years: qualitative, quantitative, based in assessment of the transformation process status and based in project evaluation. The vast majority of these models are aimed at cities with a population of more than 100,000 inhabitants. The scalability in these ones of projects and strategies developed in bigger urban centres presents obvious difficulties due to their comparative limitations in terms of economic, technical and financial resources. This paper presents a proposal for the structure of a smart city project assessment model specifically for urban centres between 100,000 and 45,000 inhabitants, based on a holistic concept of the city, considering its different dimensions and sub-dimensions, introducing as part of the model the main urban stakeholders and the specific challenges that this kind of cities must face, with the ultimate goal of developing a tool to help in the decision-making processes of urban transformation.

Keywords: Project assessment; Smart cities; Sustainable projects.

MODELOS DE EVALUACIÓN DE PROYECTOS DE CIUDADES INTELIGENTES: UNA PROPUESTA DE ESTRUCTURA DE MODELO PARA CIUDADES PEQUEÑAS

El concepto de ciudad inteligente se ha consolidado recientemente como directriz general en los procesos de transformación y desarrollo urbanos con objeto de afrontar los retos globales de sostenibilidad, integración, eficiencia y resiliencia. En los últimos años se han desarrollado numerosos modelos conceptuales basados en ciudades inteligentes de diferentes tipologías: cualitativos, cuantitativos, de evaluación de la situación del proceso de transformación y de evaluación de proyectos. La gran mayoría de estos modelos tienen como objeto ciudades con tamaño superior a los 100.000 habitantes. La escalabilidad en estas últimas de proyectos y estrategias de transformación desarrollados en núcleos urbanos de mayor tamaño presenta dificultades evidentes por sus limitaciones comparativas en recursos económicos, técnicos y financieros. En este trabajo se presenta una propuesta de estructura de modelo de evaluación de proyectos de ciudades inteligentes específico para núcleos urbanos entre 100.000 y 45.000 habitantes, basado en un concepto holístico de la ciudad, considerando las distintas dimensiones y subdimensiones de la misma, introduciendo como parte del modelo los principales agentes urbanos y los desafíos específicos que esta tipología de poblaciones deben afrontar, con el fin último de desarrollar una herramienta de ayuda en la toma de decisiones de los procesos de transformación urbana.

Palabras clave: Evaluación de proyectos; Ciudades inteligentes; Proyectos sostenibles.

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1. Introduction

Global challenges to be faced by cities in the next years and decades, such as sustainability, efficiency, integration, resilience, and definitely quality of life of the citizens, have found in Smart Cities a guideline and solution for their transformation and development processes. Actually, the Smart City concept, as a way of understanding these urban processes, has evolved from a technology focused conception in its early beginning, to a much more complete and general view of all the different aspects of a city. The sectorial approach, as sealed compartments has been overcome, and now is generally accepted the holistic conception of the smart city, with a multi-dimensional approach trying to represent all the characteristics of the city as a whole, interrelated with each other.

Most of the modern conceptual models consider urban demand, i.e. citizens, as the core of the Smart City, (Nam, Pardo 2011, Manville et al., 2014, Fernández Güell et al., 2016, Fernández Añez, 2019). and the participation and involvement of the main urban stakeholders is also regarded as a critical step in the planification and development processes (Castelnovo, Misuraca, Salvodelli, 2015, Fernández Güell et al., 2016, Fernández Añez, 2019).. Information and communication technologies are considered more as a catalyst in the transformation processes than as a final goal in itself.

Giffinger´s model in 2007 sets for the first time the above mentioned holistic approach considering six dimensions of the Smart City (Giffinger et al., 2007). The main motivation of this work is to develop a specific model for cities between 500,000 and 100,000 inhabitants, in order to measure its performance as Smart Cities to have a ranking of this kind of urban centers. Characteristics and idiosyncrasy of medium-sized cities are considered different to the ones of large metropolises, so rankings for these big cities do not apply to the medium-sized ones, due to the fact that they have to focus their goals much more closely than large cities, which can cover much broader scenarios.

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.

Following Giffinger´s reasoning, same can be said for small cities, i.e. those with less than 100,000 inhabitants, which share common characteristics. Their needs to focus on specific targets is even more accentuated, as it is its scarcity of technical, administrative, financial, and economic resources. 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.

This particularity of the small cities is actually observed by several authors in the scientific literature: considering type of projects to be developed and pointing also its differences and some possible opportunities (Neirotti, et al., 2014) and pointing the importance of the elaboration of a strategic plan (Fernández Güell et al., 2016).

Scalability of projects developed in larger cities is not direct in any way: the European Commission's survey "Mapping Smart Cities in the E.U." (Manville et al., 2014) considers the need to analyse this scalability of projects to smaller cities and also to the need to share experiences and best practices in the transformation of cities according to the Smart City concept.

The use of assessment models for Smart City initiatives and projects to anticipate their impacts in order to prioritize inversions becomes even more relevant, given the clear scarcity of resources in this type of urban centres, and considering the difficulty of scalability of projects for this type of cities.

There are several qualitative and quantitative models in the scientific literature that address the analysis of large and medium-sized cities, but not of small cities. This gap is even clearer in the case of models for project assessment, which are of crucial importance as a tool in this type of municipalities. The relevance is even higher if we consider that in Spain this range of cities 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

The main objective of this paper is to make a proposal for the structure of a smart city project assessment model specifically for urban centres below 100,000 inhabitants. The model is based on a holistic concept of the city. Dimensions and sub-dimensions will be defined, as it will the general structure of the model including how stakeholders and citizens are considered as a part of the model. It is also considered the steps to be taken to include in this structure the challenges, objectives and actions within a transformation strategy in the framework of the smart city paradigm. The final objective is to develop a tool to help in the decision-making processes of urban transformation in small cities.

3. Methodology

This research has been developed in three stages:

- Stage 1: a systematic literature review, in order to identify theories and papers related to conceptual models and assessment models under the paradigm of Smart City.
- Stage 2: Establish the necessary particularizations to focus the model on small cities and considering stakeholders and urban demand as a part of the model.
- Stage 3: Development of the dimensions and sub-dimensions through a comparative study of those considered in relevant models and adapting them to small cities according to the previous steps.

As a first stage, a systematic literature review has been carried. The sources chosen have been the following 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 considered 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.

In the second and third stages the model is described, starting with the necessary particularization derived from the works studied in the first phase, i.e., the characteristics that the model should cover more intensively for a better representation of the characteristics of small cities.

Subsequently, the structure of the model itself is defined. First, the stakeholders are defined in their typology and their role in the model, together with the urban demand as the core of the model. Next, we define the dimensions and sub-dimensions by means of a comparative study of the models studied that are considered to be close to the philosophy of the model we intend to create. Finally, with all its elements described previously, the general structure of the model is described, with the main working guidelines that the model is expected to submit.

4. Results: proposal of structure of the model.

As a result of the literature review, in this section we define the structure of the model by its components, and the general description of the expected way of working. We follow the general outline of the main parts of the model: working premises, citizens and stakeholders, dimensions, sub-dimensions, and finally description of the expected working guidelines and general explanation of the functioning of the model for the assessment of Smart City projects.

4.1. Premises for the particularization of the model to small cities.

Before defining the components of the model, the results of the research carried out in the existing literature on guidelines, success cases and best practices in Smart City projects for smaller cities, are presented. These results are considered as the premises that are going to conditionate the model itself. A previous work of the same authors “Guidelines and good practices in strategies, initiatives and management of Smart City projects in small cities” (Esteban, Lo-Iacono-Ferreira, Torregrosa-López, 2021), was focused on this premises.

The most common type of projects to be developed in the kind of cities that we are focused on is going to conditionate the structure of the model. In this point the research of Neirotti et al. (2014) "Current trends in smart city initiatives: Some stylized facts" establish a very applicable classification: "hard" domains and "soft" domains.

Table 1: Soft and Hard domains, Neirotti, 2014

Domain	Sub-domains
Hard	Energy grids Public lighting, natural resources, water management and waste management. Environment. Transport, mobility and logistics. Offices and residential building. Healthcare. Public security.
Soft	Education and culture. Inclusion and social welfare. Public administration and (e-)government. Economy.

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

In this research predominance of project development in the hard domains in larger cities is detected, given their greater availability of resources. On the contrary, smaller cities develop more frequently projects focused on soft domains. This type of projects do not require large investments and yet focus on fundamental aspects of civic life. For this reason, in the structure of the model to be developed, this type of initiatives will have an important presence for their possible analysis.

Another interesting conclusion of this paper related to the scarce of resources in small cities is the advantage observed in these cities comparing to the large ones: they present lower inertia to change, so they are a good ecosystem for implementing pilot projects based on innovation and getting quick and representative results allowing continuous improvement of initiatives and projects. (Neirotti et al., 2014).

Using “bottom-up” strategies to manage these projects and to increase citizen implication, and the use of techniques applied in the business world (Lean-Start-up, Design-Thinking, Sprint) that support them, are presented as guidelines to follow in small municipalities, due to their ease of establishing and drawing conclusions from these pilot projects (Cohen, 2014). In this way, quick results of the "minimum viable product" type are obtained. By analysing their results and iterating to introduce improvements in the projects before their general implementation, resources are optimized.

Micro marketing techniques, supported by big data and Business Intelligence, is an important tool to analyse these results, classifying citizens into smaller groups with homogeneous interests and concerns, and analysing their common needs with the help (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.

So a proper innovation strategy is another key part also related to the above mentioned actions. This strategy must be commanded by the local administration, assuming it internally as a part of the strategy, in three lines (Nam and Pardo, 2011):

- Technological innovation: improvement of services and the creation of conditions where technological tools can be used, harmonizing them with physical space.
- Organizational innovation, more effective management and organization, changing the traditional internal bureaucracy and implementing transversality and eliminating departmental silos.
- Political innovation, creating the conditions for the development of the Smart City, 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):

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.

The implementation of Smart City innovation projects must be bi-directionally conditioned by the implementation of innovation in public administration (Alawadhi et al., 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. Spreading the use of technology to facilitate administrative procedures and improve governance, in terms of inclusion and decision-making is also an important part of the governance transformation that Smart city policies implies. In this line the trend to Collaborative governance, as a more concrete and less broad and diffuse concept than participatory democracy, is considered (Castelnovo, Misuraca, Salvodelli, 2015).

In an atmosphere of innovation, rejection of change must be specially 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 (Neirotti et al., 2014).

As a summary, a model focused in the assessment of Smart city projects for small cities must specially consider:

- Projects related to “soft domains”, affecting directly, and with less investment, to the quality of life of the citizens.
- The low inertia for changes in these cities points to special technics of analysis, deployment and implementation of projects: Pilot projects, new technics in project management, micro marketing, all of them related to innovation.
- “Botton-up” strategies as a mean to increase citizen implication.
- Innovation as one of the main characteristics of the strategy, with a deep change in the dimension of governance.
- Rejection to change must be avoid, so inclusion is considered also as a key factor.

4.2. Citizens and stakeholders.

It has been mentioned the importance of the urban demand, i.e., the citizens to be included as the core of the model: most of the recent conceptual models give to urban demand or citizens a key importance, becoming 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 (Nam and Pardo 2011, Manville et al., 2014, Fernández Güell et al., 2019).

The proposal of model to be defined also includes citizens as the core, giving the fact of the importance that the citizen implication and involvement is going to have in all the analysis. Placing the citizen at the centre of the model is also considered a statement of intent of the model's philosophy.

It is considered also as a key step the understanding of the local factors of each municipality, the idiosyncrasy of the city with its cultural values and boundary conditions, (Neirotti e al., 2014). Having a deep knowledge of local identity becomes essential for the success of innovation strategies and to encourage creative environments (Lombardi et al., 2011). Relationship of this concept with citizens and urban stakeholders is clear.

The importance of innovation in this kind of cities has been mentioned: involvement of the private sector in innovation strategy, encouraging initiatives coming from this sector (Lombardi et al., 2011) is also a key factor for success of this strategy. A solid social and intellectual base is also needed, so 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 is considered as critical (Castelnovo, Misuraca, Salvodelli, 2015).

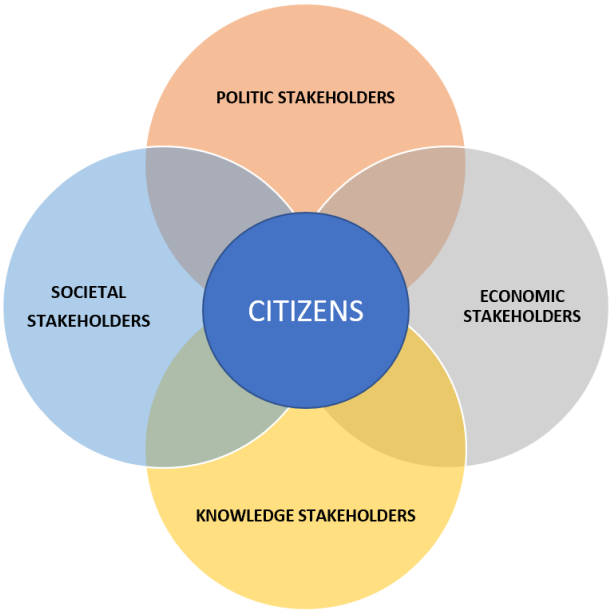
The essential nature of the involvement, collaboration, commitment, and participation in decision-making by urban stakeholders in the processes of transformation of urban centers under the smart city model is a general idea in the scientific literature related to models of representation of the urban environment since even at the European Commission level the smart city is considered as a multi-stakeholder municipally based partnership (Manville et al, 2014).

A proper selection of urban stakeholders should consider heterogeneity and representativeness in terms of sectoral origin, objectives and interests. It is important to ensure that the activities of the different stakeholders are aligned with the fundamental objectives of the smart city plans and projects (Jayasena et al, 2019). Political representatives, within dimension of governance, have a fundamental role in this involvement, favouring collaboration between the different urban stakeholders as a preliminary and necessary step to involve citizens in the planning and management of the city model.

The extended triple helix model, (Leydesdorff y Deakin, 2010, Lombardi et al, 2011), is a simple classification and identification tool. So a complete but straightforward enough classification based on Economic, Politic, Knowledge, and Social agents is considered suitable for Smart city project assessment models. Triple helix model is based on the development of innovation environments, so it also fits appropriately to the smart city projects assessment (Lombardi et al, 2011).

The first classification based on the extended triple helix model must be completed with an identification of stakeholders covering not only the dimensions of the Smart City but also representatives of the other subdimensions of the city. Once subdimensions of the model are defined, it is necessary to include at least a valid representant for each group of stakeholders described, related to each subdimension, to ensure the representation of the stakeholders in the model is complete enough. (Esteban, Lo-Iacono-Ferreira, Torregrosa-López, 2021).

Figure 1. Stakeholders in Fernández Añez´s model.



Source: (Fernández Añez, 2019), own elaboration

Final definition of stakeholders, adapted to the special characteristics of small cities is shown in table 2.

Table 2: Stakeholders proposal for small cities assessment model.

Stakeholders	Description
Knowledge and innovation stakeholders.	Research centres related to Smart cities, University researchers. Research centres not directly related to Smart cities Consultants and urban planners.
Political stakeholders and public administration	Municipal Government Political Parties Municipal Smart cities Department (technicians) Public companies of urban services management. Public entities of supra-municipal scope. Municipal Urban planners.
Societal stakeholders	Citizen groups (micro marketing technics mentioned in 4.1) NGOs Neighbourhood and citizen associations Media
Economic and financial stakeholders	Private urban services management companies. Telecommunications operators. Telecommunications services companies. Local and region companies.

	Investors and financial institutions. Energy supply companies. Real estate development companies. Professional associations. Business associations. Self-employed workers groups

Source: Own elaboration

Comparing to the extended triple helix model, some changes are introduced in order to adapt the stakeholders selection to a model based in the assessment of projects in small cities.

- Innovation stakeholders are included specifically due to the importance that this field is going to have in the model.
- The definition of political stakeholders is also broader, making it clear that it includes the municipal government, the municipal administration, and the rest of the political parties. It also includes municipal technicians in the field of smart cities and urban planning, separating them from the knowledge agents, since the idea is to include in this part also the technical part of the administration. Public companies of services are also included.
- Media and citizen groups, as classified using micro marketing technics are included in the societal stakeholders.
- Economic stakeholders also include financial agents, as well as private companies with economic activity at the local and regional level. Given that this aspect is of key importance in smart city actions in this type of municipalities, the representation of all business sectors, including the self-employed, is essential.

4.3. Dimensions.

The model of Giffinger et al. of 2007 establishes for the first time 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. The European Commission's survey "Mapping Smart Cities in the E.U." (Manville et al., 2014) consolidates Giffinger's model's six dimensions as a reference to the holistic conception of the Smart City.

Table 3: Dimensions as included in "Mapping Smart Cities in the EU".

Characteristics	Description
Smart Governance.	Joined up within-city and across-city governance, including services and interactions which link and, where relevant, integrate public, private, civil and European Community organisations so the city can function efficiently and effectively as one organism.
Smart Economy	E-business and e-commerce, increased productivity, ICT-enabled and advanced manufacturing and delivery of services, ICT-enabled innovation, as well as new products, new services and business models.
Smart Mobility	ICT supported and integrated transport and logistics systems, sustainable, safe and interconnected transportation systems in situations using one or more modes of transport. Smart Mobility prioritises clean and often non-motorised options.
Smart Environment	Smart energy including renewables, ICT-enabled energy grids, metering, pollution control and monitoring, renovation of buildings and amenities, green buildings, green urban planning.
Smart People	E-skills, working in ICT-enabled working, having, access to education and training, human resources and capacity management, within an inclusive society that improves creativity and fosters innovation.
Smart Living	ICT-enabled life styles, behaviour and consumption, healthy and safe living with diverse cultural facilities, quality housing and accommodation. Linked to high levels of social cohesion and social capital.

Source: Own elaboration based on (Manville et al., 2014)

The mentioned classification of hard and soft domains, in the research of Neirotti et al. (2014) "Current trends in smart city initiatives: Some stylized facts" actually is re-grouped in six categories: Natural resources and energy, Mobility and Transports, Buildings, Living, Government and Economy and people, taking Buildings as a new category comparing to Giffinger´s and uniting Economy and People. Mattoni, Gugliermetti and Bisegna in his paper "A multilevel method to assess and design the renovation and integration of Smart Cities." also make a variant, considering five dimensions or axes as called in their work: Mobility, Energy, Environment, Economy and Community. Living or quality of life is missed as it is considered as a objective and not a dimension, and people and governance ar united in Community (Mattoni, Gugliermetti, Bisegna, 2015).

So these six dimensions are generally accepted and used with slight difference in most of the recent models, a large part of them with exactly the same nomenclature: (Cohen, 2014, Fernández Añez, 2019, Giffinger et al., 2007 and its later version TUW, 2013, TUW, 2014 and TUW, 2015, , Manville et al., 2014, Monzón, 2015, Moreno Alonso, 2016, The Transport Research center-UPM, 2017). They are reflecting the holistic nature of a smart city in a conceptual model and the necessary characteristics for project assessment. So they are taken with slight differences in nomenclature for a greater clarity in its content:

- Economy and Competitiveness
- Human and Intellectual Capital
- Governance
- Infrastructure and Mobility
- Environment and Energy
- Social Welfare and Services

4.4. Subdimensions.

However, more detail than dimensions is considered necessary in the assessment model. In this way the classification of projects is more specific and accurate. In order to define the subdimensions, an analysis of the subcategories of several models which essentially follow the proposed hex dimensional structure, has been carried out. It is not proper exactly to speak about subdimensions, since some of the models used are aimed at the elaboration of performance comparisons or city rankings, so we speak of factors or ranges and at a lower level of indicators. The following models have been used:

Table 4: Models analysed in a higher detail than dimensions.

Model	Description
Giffinger et al. 2007	Oriented to obtain a ranking of Medium-sized cities in the Europe (Giffinger et al., 2007)
Cohen, 2014	Elaborated to obtain a ranking of cities worldwide (Cohen, 2014)
Neirotti et al., 2014	To analyze performance of 70 cities of all over the world (Neirotti et al., 2014)
Moreno Alonso, 2016	To analyze performance in 62 cities of the Spanish smart city network "RECI".(Moreno Alonso, 2016)
ASCIMER, 2017 and Fernández Añez, 2019	Model for project assessment for Mediterranean cities (Fernández Añez, 2019, Monzón, 2015, The Transport Research centre-UPM, 2017)

Source: Own elaboration

A comparative study has been made of the next level of detail of these models, whether the aforementioned ranges or factors, subdomains, work areas or project areas, depending on the nature of the model. These subdivisions have been classified according to the dimensions

proposed, i.e. not according to the original dimensions of the models taken, as their scope does not always coincide.

The results have been analysed according to the highest number of coincidences. In some cases the subdimension is included in a model as a single group. In these cases the concept has been taken separately. These results are shown in Table 5:

Table 5: Results of study of these models' subdimensions.

Dimensions	Subdimensions (number of coincidences)
Economy and Competitiveness	Entrepreneurship (5), Innovation (4), Local-global interconnectedness (4) Flexibility Productivity (3) of labour market (2)
Human and Intellectual Capital	Creativity (3) Level of qualification (2), Digital education (2), Working flexibility (2) Community building and urban life management (2)
Governance	Transparency (5), E-government (3) Participation (3) Efficiency in municipal management (1)
Infrastructure and Mobility	ICT infrastructure (3) Public transport (2) Logistics (2) Multimodality (2) Sustainable transport (2)
Environment and Energy	Environmental monitoring (4) Energetic efficiency (4), Resources management (4) Waste management (2) Environmental protection (2), Awareness and behaviour change (1) renewable energies (1)
Social Welfare and Services	Healthcare (5), Social inclusion (4), Culture and leisure (4), Social and Public services (4), Tourism (2).

Source: Own elaboration

After this analysis, the selection of the subdimensions of the model is completed by, adjusting them to the typology of projects and strategies that are more efficient in this type of population (small cities, below 100.000), placing special emphasis on projects in the dimensions of Governance, Economy and competitiveness, Human and intellectual capital, and Social welfare and services, and highlighting the aspects of innovation in all dimensions but especially in these ones, and considering inclusion as a fundamental part of the model.

Finally, four sub-dimensions by dimension are considered according to these parameters:

Table 6: Subdimensions.

Dimensions	Subdimensions
Economy and Competitiveness	Business and labour innovation, Entrepreneurship Productivity Local-global interconnectedness
Human and Intellectual Capital	Academic and digital training Creativity Management and promotion of urban life Work flexibility and work-life balance
Governance	Transparency and citizen communication channels E-government and online services Participation in decision making Innovation and efficiency in municipal management
Infrastructure and Mobility	Public transport and multimodal network ICT infrastructures Urban logistics Sustainable mobility
Environment and Energy	Energy efficiency Resource and waste management Environmental monitoring Renewable energy and social awareness
Social Welfare and Services	Public, social and security services Tourism, culture and leisure

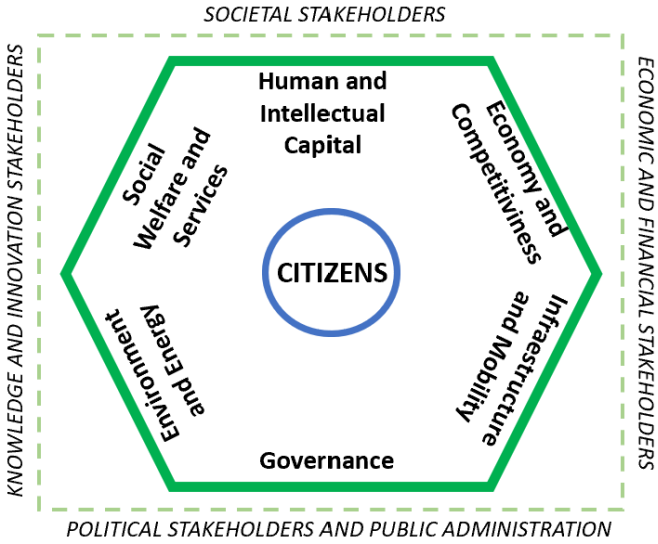
	Social cohesion and inclusion Health and welfare.

Source: Own elaboration

5. General structure of the model and discussions.

Once the philosophy of the model has been defined, with urban demand as its core and a holistic character, the typology of stakeholders involved in the processes and the dimensions and subdimensions of the model, the general structure of the model is defined (Figure 2).

Figure 2. General structure of the model.



Source: Own elaboration

Citizens are placed at the core of the model, surrounded by the six dimensions that defines the holistic character of the city. Stakeholders, according to the classification made and considered to be representative for the main agents involved in the smart city, are placed also in the model as a part of it, with its relationship to the dimensions and subdimensions of the city.

The structure has been defined by adapting the most recent conceptual and evaluation models of smart city projects with a more modern conception. Subdimensions defined in table 6 means an essential part of the definition of the model.

The characteristics that condition the strategies, initiatives and projects in this type of cities have been considered, creating a model that fits them. With this structure, the proposed model aims to fill the gap in terms of specific project assessment models for cities below 100.000 inhabitants. In this aspect, the characteristics of small cities have been the fundamental conditioning factor when defining the sub-dimensions, highlighting especially fundamental aspects such as innovation in the areas of governance and economy, and social inclusion and cohesion and training in the dimensions of human capital and social welfare:

- Projects related to “soft domains” are specially considered to be developed in this kind of cities, so subdimensions are defined in order to its assessment.
- Projects related to new technics in project management mentioned, as micro marketing technincs, pilot projects with quick results as minimum viable product, are considered also.
- Increasing the citizen implication with “Botton-up” strategies are also considered mainly in the way of managing stakeholders and its inclusion in the model.
- Innovation policies are reflected in the sub-dimension conditioning its definition, with special emphasis in the dimension of Governance, where innovation policies are critical, but also in Economy and Competitiveness, so this two axis for innovation are defined. Innovation has also a representative position oin stakeholders’ selection.
- Inclusion policies, as an important part of the smart city project management, are considered especially in the dimensions of Social Welfare and Services, Human and Intellectual Capital and Governance, and of course in the stakeholders’ involvement.

The model establishes a strong interrelationship between the urban stakeholders and the defined sub-dimensions, as at least one representative from each of the four defined groups of stakeholders related to the field of each of the 24 sub-dimensions of the small smart city is considered necessary.

It is important not to lose sight of the ultimate goal of establishing a decision-making tool based on the evaluation of smart city projects in small cities: The structure of the model defined represents the general guidelines for project assessment, the lines of action that are considered most important in this type of urban area and the involvement of its urban stakeholders, filling the gap of the lack of specific models in this case.

From this point, a validation of the model in a real case would be developed, with a first phase of validation of project typologies and their adequacy to the defined structure, and a second phase of obtaining evaluation results in real developed projects. Future research will advance also in the process of defining the objectives and challenges of the municipality according to the sub-dimensions defined with the participation of the stakeholders involved, and the actions to be implemented by the smart city projects to be developed.

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