SUSTAINABILITY INDICATORS OF THE SPANISH MUNICIPALITIES: A METHODOLOGICAL PROPOSAL TO VIEW OF ITS EVOLUTION BETWEEN 2002-2015

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ABSTRACT

The use of indicators is usual in many fields of knowledge as a tool for assessment of the phenomena under study. In the field of sustainability, they already appear in works as *Blueprint for Survival* or *Our Common Future*, when the real possibilities of the planet are intended. But, it is not until the *Declaration of Rio* and the subsequent Conference of *Aalborg* in the European context, when the idea of assessing the European cities through a set of specific indicators takes place.
This communication assesses the state of the art of the municipal sustainability indicators from a triple approach. First, deals with the concept of indicators according to works of Hernández Aja, the Observatory of Sustainability in Spain, Antequera and Carrera, Salvador Rueda, Zavadskas and Ester Higueras, and proposed a classification based on the proposal of the last author. Then described how the initial vagueness of the concept of sustainability that recognize Hernández Aja o Naredo work has been overcome with the adoption of the different municipal catalogues of indicators of sustainability. Finally, there is the evolution experienced by these indicators in Spain by the analysis of the Juan de Herrera Institute study on indicators of sustainability in the Spanish municipalities published in 2003, and the proposals for indicators of urban environment of Andalucía and other autonomous communities, the European Environment Agency, the United Nations Urban Settlements programme, UN-HABITAT. From the national level, it has been taken the necessary references to the proposals of the Network of Networks of Local Sustainable Development, the National Institute of Statistic and the Observatory of Sustainability in Spain. And at the local level, the proposals of the municipalities of Málaga, Sevilla and Victoria-Gasteiz.
As a final conclusion, a methodological proposal is set to respond to the need to assess the different European, national and autonomic strategies of sustainability through the definition of a group catalogues of municipal sustainability indicators.

Keywords: indicators, sustainability, strategies, municipalities.

1. Objectives and Methodology

Since establishing the need to evaluate the achievements that are obtained in terms of sustainability, researchers, local governments and national and international organizations have made different proposals for catalogues of indicators for this purpose. Proposals that have been configured a wide and varied range of indicators, whose analysis has helped to establish the characteristics that must have these instruments of assessment and classifications of them. However, while there are clear criteria about the characteristics that should have indicators on an individual basis, a proposal will miss about what should be the criteria to define a few catalogues and a methodological proposal for your choice.

This proposal aims to establish what are the criteria that must answer the choice of municipal catalogues of indicators of sustainability, as prior and necessary step for the definition of a specific proposal for a reference, in a later work.

To achieve this goal has been followed a methodology that has been reflected in the structure of this communication:

- Approach to the concept of indicator by exposing their characteristics and different classifications made by different authors.
- Analysis of the qualitative characteristics acquired these items when you select a group of them with the objective of evaluating a territory.
- Compilation of catalogues of the most significant sustainability indicators performed in Spain with the analysis of the criteria that inspired them.

That concludes in the definition of the methodological criteria should respond to the choice of a catalogue of indicators.

2. The concept of indicator

As the object of sustainability indicators is to determine the evolution of the territory on which it acts, values obtained are significant quality and must represent the result of actions taken in those fields that have been defined as critical. This opinion which already Hernández held [1], matches with collected the Observatory of Sustainability in Spain, OSE, a few years later in one of his reports [2]. In it, it affected the relevance of indicators beyond their own ability of representation; defining them as a variable that *"provides an aggregated synthetic information, regarding a phenomenon beyond their ability to self representation"*. For his part, Antequera and Carrera [3] affect the information associated with an indicator has to look at two characteristics that must be contrasted:

- a representative value of the real situation obtained as a result of a specific prior procedure: mathematical algorithm, survey, etc;
- a threshold obtained from a previous reasoning about the situation desired and expressed as a value which is adopted as a target and serves as a starting point to define a scale of the degree of compliance.

Later, Salvador Rueda [4] has been even more precise to define their characteristics and link them to the specific interests of the territory in which they are defined: *"The system of urban indicators is an ordered set of synthetic variables that aims to provide a comprehensive vision regarding predominant interest relating to the urban reality in question".*

Cities are complex entities, whose study is approached from the definition of catalogues of indicators included in the structures of analysis that enhance its role as a medium of information. This complexity is which requires tools that provide an overall view if you want to properly capture the scope of that reality, since the sectorial visions are at risk of losing the information that only provides the holistic vision of the phenomena that hold.

There are no specific criteria about what should be the extent of these catalogues expanding continuously while they glimpse what will be their end, but it is clear that very large catalogues make you the overview which claims to lose the OSE or Rueda. On the other hand, are clear characteristics that must have these indicators, that authors like Zavadskas [5] and Higueras [6] have been synthesized and which could be materialized n the following proposal:

Address aspects that intends to act by planning to achieve a more sustainable development;
respond to achievable goals according to the existing capabilities for a given period;
keep consistency between indexes and criteria of evaluation;
be sensitive to changes;
As far as possible; be reflection of an international consensus;
Have a regular update of data reliable, documented, consistent with recognized quality with an acceptable cost-benefit ratio;
Maintain a constancy in time that establish series;
Clear, simple, devoid of ambiguity and easily understood by experts and the general public alike.

The different types of indicators and their possible classification were analyzed by Higueras (ibidem). This author has established a first division into two groups: *"status or environmental indicators"* and *"sustainability indicators"* (Fig. 1); and it has linked to the first to the analysis and assessment of the situation at a given time, and second with the evaluation of the success of the measures taken by the respective Agendas 21 over time.

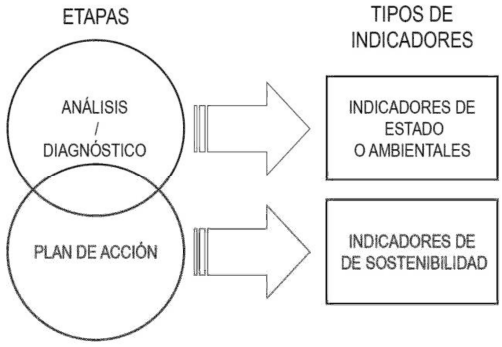

Fig. 1 Classification of the different types of indicators according to the stage in which they are generated. Source: own elaboration based on the proposal of Ester Higueras [6].

"Status indicators" or *"environmental"* aims to assess the social, economic and environmental situation by comparing previous reference values that are getting at different times, so that conclusions about the evolution of the city can be. In practice, the system of *"status indicators"* or *"environmental"* and "sustainability indicators" systems have many elements in common, but echoing us opinion of Higueras, it is interesting to distinguish them since the objectives pursued are different (ibidem).
Methodologically, the process should be to define *"sustainability indicators"* after the diagnosis of the territory on which it will act with the help of *"status indicators"*, and at the time that lays down targets and is necessary to keep track of the actions or initiatives to be launched (according to the terminology of the *Aalborg Commitments* [7]). In this way, sustainability indicators respond to the priorities of the Agenda 21, and as Rueda sets, to *"the predominant interests relating to the urban reality in question"* (ibidem).

A second classification is based on the concepts that its definition encompasses. With this criterion, the indicators are classified into *"global or macro indicators"* which includes several concepts, and *"specific indicators"* that value specific concepts.
The analysis performed by Higueras on the indicators still establishes a third classification that distinguishes between *"simple"* and *"complex"* indicators. Using this classification, those who value a unique aspect of the field subject to evaluation or monitoring is differentiated under the heading of *"simple indicators"*. They are fundamental to observe the evolution of a territory with an easy management of intake data and its evolution, but they provide only partial vision of a single aspect. While under the heading of *"complex"* refers to those that relate to different aspects of the subject of evaluation. Citing Rueda (ibidem), they are the result of a merger in a single numerical expression of different *"variables descriptive of a social phenomenon as a mechanism of synthesis"*. An expression *"called index, and is a dimensionless parameter because it is weighted addition, according to the method chosen, different units of measurement".* In his opinion, *"its social character is more pronounced, given the randomness that surrounds all weighting process. The benefit earned translates into a greater synthesis of relevant information and greater efficiency as input in the decision-making process".* It is evident that the evaluation of these *"complex indicators" is more difficult and expensive than the "simple indicators"*, but it is also true that its monitoring can throw more subtle and sectored conclusions than the first.
Finally, the classification of the indicators according to the degree of spatial segregation chosen for their study leads to new distinction between *"indicators of average values"* and *"indicators of local values"*. In the first case, it pursued a value unique and representative of all evaluated territory that allows comparison with other similar areas. On the other hand, *"indicators of local values"* evaluated different areas of study that has been divided the territory under analysis and allow what Higueras called *"benchmarking"*.
Within this spatial classification proposed by Higueras, establishing a fourth group, *"values of population indicators"*, in which the value is associated with the values of population density of different areas of the city or type-morphological[1] characteristics. If true that it is possible to establish a relationship between the evaluation of certain aspects and the density of population or type-morphological characteristics of different parts of a territory, it is also hat this relationship is not given in all assessed facts. With these characteristics, the distinction of this third group of indicators does not seem consistent with the previous two, as all indicators can be classified as *"average values"* or *"local values"*, regardless of which are associated with values of population density or type-morphological characteristics of the area. And on the other hand, both the values of population density and type-morphological characteristics define specific territorial areas that do not have to coincide with the areas of study that has been able to divide the territory to the valuation of other *"indicators of local values"* effect. For these reasons, a more effective territorial classification would be to distinguish between the first two groups of indicators, *"average values"* and *"local values"*, and recognizing that certain indicators related to the phenomena of population density and type-morphological ordination that are particularly relevant in the case of the analysis of the cities.

[1] Higueras literal reference is the *"morphological"* in the area, but we should understand that a correct reference would be the *"type-morphological characteristics"* as the association can be established, not only with the morphological characteristics of a given urban area but also with certain building typological characteristics or a situation that recognizes certain types associated with a specific urban morphology.

The classification, which is collected in the form of graph in Fig. 2,complete with the definition of a type of indicator that Higueras not considered specifically in its proposal but which collects the OSE as *"basic diagram of sustainability"*, or simply *"diagram of sustainability"*, to achieve the holistic vision that claims Rueda to the systems of indicators. It is a single synthetic indicator which analyzes the global behavior of the territory through the simultaneous evaluation of all indicators. Essentially, it is a sustainability index global analogue to Rueda compact indicators that allows to synthesizing all the information about the territory into a single value. And *"complex"* according to the classification of Higueras. But in any case, as summary and overview of the territory, is a conceptual obligation of any indicators system [8].

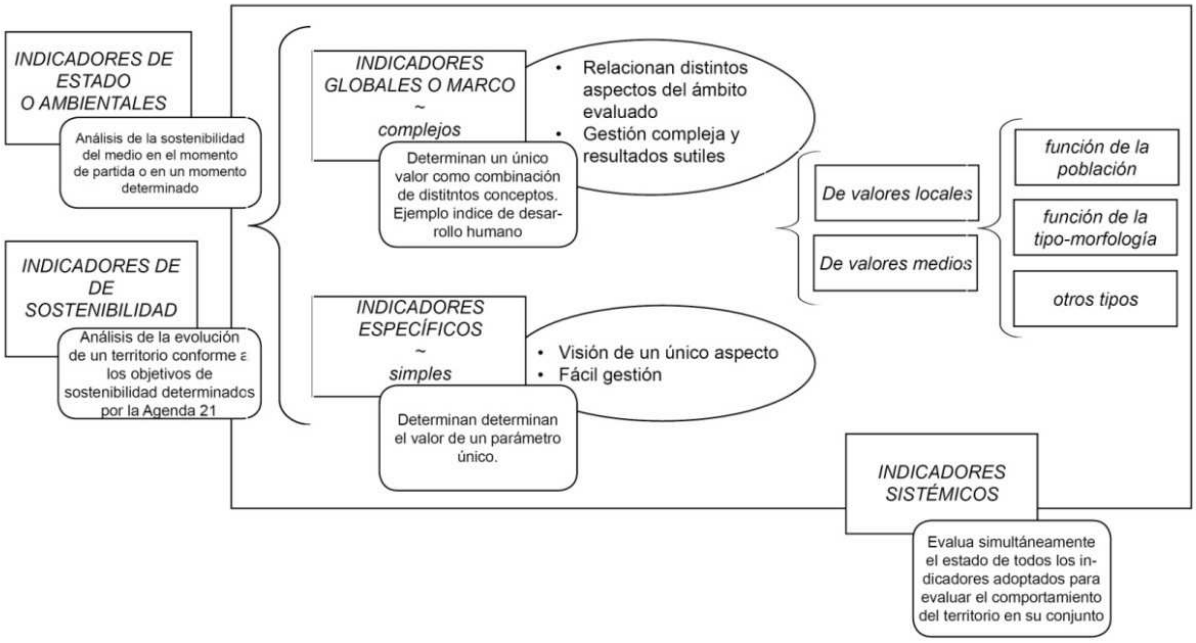

Fig. 2. Classification of the indicators of the Agenda 21. Source: own elaboration based on the proposal of Ester Higueras.

3.- Sustainability indicators as a realization of the concept of sustainable development

As Hernández Aja acknowledges in the introduction to the book *"Sustainability in architectural and urban project"* [8], the definition of the concept of sustainability is not easy. But while it is true that all proposals can be find interesting contributions, another thing to accept that *"there is no more correct than the other vision"* (ibidem).

Furthermore, even accepting that there is no a unique definition of the concept of sustainable development, this does not mean that any definition is correct, and consequently, finish accepting any definition carried out tailored to the facts that they intend to justify or put in value. Moreover, as it holds Naredo [9], the achievement of a more significant advances in the field of global sustainability require a conceptual clarification and a critical review of the current status quo.

All definitions made on the concept of sustainability, the most accepted has been collecting on the 3rd principle of the Rio Declaration [10]: *"The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations".* And according to the final document of the Summit, is built on three interdependent pillars that are mutually reinforcing: economic and social development, and the protection of the environment (Fig. 3).

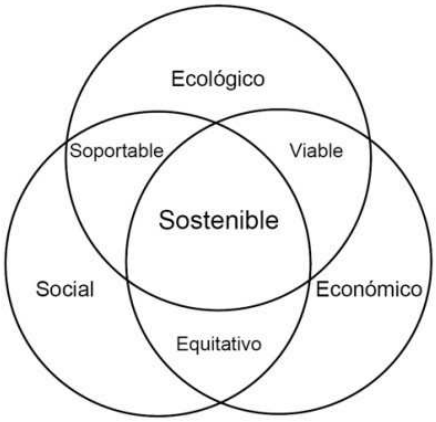

Fig. 3. Diagram of the three pillars of sustainable development. Source: own elaboration.

Although the definition in the UN *Conference on Environment and Development in Rio de Janeiro (Earth Summit)* has been subject to many criticism due to gaps that holds, is not questioned to only be possible to achieve sustainable development from a position dealing jointly and balanced the three mentioned aspects. In fact, in 1972, the Declaration of the United Nations *Conference on the Human Environ* [11] picked up two fundamental contributions in the form of *Principles 1 and 2* showing that the concept of sustainable development has been built on the pursuit of a social, economic and environmental balance since its origins. But what is really important is that you despite the criticisms that can be made to these statements, in the background behind three key principles:

there are certain limits to the economy;
poverty levels are not inevitable;
We must to start by redistributing resources more equitably.

The *Brundtland Report* [12] included three fundamental ideas: the sustainable development has triple dimension (environmental, economic and social); economic and social systems can not be separated from the environmental carrying capacity; and the notion of capital is associated with all types of resource that should be managed rationally. So relate the policies of sustainability aspects exclusively linked to the use of certain resources or energy is completely unfortunate it is very partial and limited.

The final document of the Second Earth Summit, known as Agenda 21 [10], established a framework from which should be developed through local policies of different countries. This framework was strengthened with the declaration of the meeting of Mayors of the Summit in Johannesburg [13] and its mandate on the local authorities so that they will move on to action, from the conviction that local action is an essential instrument for achieving sustainable development.

In Europe, the strategy proposed in Johannesburg was materialized in the Aalborg + 10 Conference, whose final Declaration, Aalborg+10 — Inspiring Future [7], new objectives were established and it is required local governments to establish priorities considered appropriate to its situation and needs and they began a participatory process to identify the specific aims and deadlines in which achievements were obtaining could be assessed. In the words of the own final declaration in the form of a decalogue, was to *"translate our common vision for sustainable urban futures into tangible sustainability targets and action at local level"* within a maximum of 24 months.

The vagueness of the concept of sustainable development began to be overcome with the definition of the third line of work of the second point of the Decalogue of the

Aalborg Commitments. This line, *Local Management towards Sustainability,* includes the obligation *"to set targets and schemes in the framework of the Aalborg Commitments and create and follow the Aalborg Commitments".* Thus undertake to different local entities that will equip themselves of some sets of indicators with which to assess the evolution of their respective territories. Definition of these catalogues of social, economic, environmental and institutional indicators, more or less specific to each geographical area, specify the previous generic definition of sustainable development that had been questioned because of its vagueness.
Despite this, the biggest challenge of sustainability remains to precisely define the frames of reference where you have to consider the problems and solutions that allow to solve the problem of the balance between the needs in the short and medium term [14].

4.-Sustainability indicators of Spanish municipalities between 2002 and 2014
In 2004, Hernandez Aja published the report that led between the years 2002 and 2003 in the section of urbanism of the Juan de Herrera Institute (IJH) of Superior Technical School of Architecture of Madrid (ETSAM) on the local level indicators of sustainability of the Spanish municipalities which had signed the Aalborg Charter in June 2002 [7], report which had previously submitted digitally on the web http://habitat.aq.upm.es/temas/a-agenda-21.html [1].
Following the adoption of the Aalborg Charter at the European Conference on Sustainable Cities in 1994 and by his signature, the municipalities that subscribed committed to develop local programs 21 initiatives and their own Agendas. In this context, the purpose of the work of the IJH was to determine what the set of indicators was representative of the choice of signing Spanish municipalities without going to assess the correctness of the elections, determine a set of universal indicators or a methodology for choosing these catalogues. It was to the vision of the state of affairs at that time, on which Hernández acknowledges that it was a question of a process

> *"of sufficient size and depth to merit more than one critical review, especially when the speed of the implementation of Agenda 21 and indicators is occurring individually by each municipality, the absence of a discussion forum or a framework of minimum requirements that ensure the relationship between the declared purpose and means used".*

It is logical that after twelve years since its publication will reflect on the validity of its results in view of the proposals that have appeared on the national scene. Despite the fact that in opinion of the Observatory of Sustainability in Spain OSE [2], the results obtained in this field have been *"rather limited, even existing gaps of information and research in some areas"*.
As Hernández Aja study not intended to determine universal indicators, but give a view of the state of affairs, it established a methodology which is summarized in fig. 4 and that he left the survey for 165 Spanish municipalities over 10,000 residents signatories of the Charter of Aalborg and a sample of the minor (189 total) as well as the totality of municipalities, country councils and autonomous communities. 30 local authorities indicators were collected through this survey, and after a series of interviews in depth to 7 of cities, was completed making the selection of 50 indicators that were considered most significant. The result constitutes a sufficiently precise in the Spanish municipalities x-ray panorama on that date which has not been revised since then.

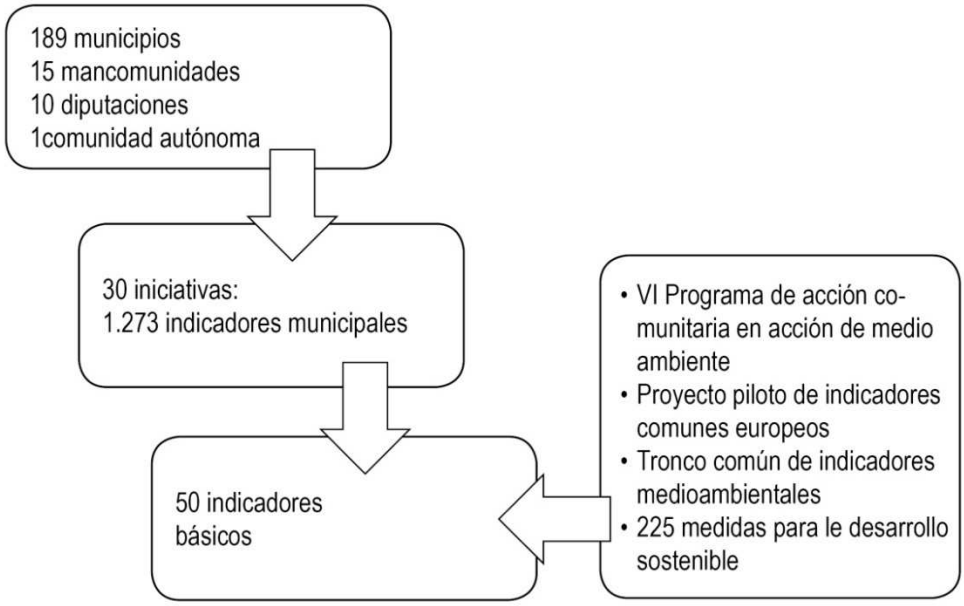

Fig. 4. Selection process of the catalogue of 50 basic indicators of Hernandez. Source: own elaboration.

Since the choice of an indicator depends on what you want and can be measured, Hernandez compared the results of his survey with four proposals unrelated to the Spanish municipalities. The proposal of the European Union gathered in the *VI Program of Community Action in the field of Environment* of the European Parliament [15] represents the environmental dimension of the EU Strategy for sustainable development, while the *Pilot Project of European Common Indicators* of 2000 [16] is an initiative directed at the establishment of a common system of evaluation and measurement of the conditions of local sustainability, which keeps some parallelism with the proposal of the Ministry of Environment *"Common core of environmental indicators* [17] focused on reaching a consensus on a family of indicators enabling comparison between the different Spanish municipalities. With the proposal of the Spanish environmental groups, *225 Actions for Sustainable Development* [18],is introduced an alternative approach to the official line.

It must be empathized that, although Hernandez takes two proposals supranational like the *VI Program of the European Parliament* and the *Pilot Project of European Indicators* as instruments of comparison, ignores the proposal of 134 indicators of the Commission for the Sustainable Development of the United Nations, *Indicators of sustainable development: framework and methodologies* that had been approved a year earlier [19].

After these comparisons, Hernández Aja chose 50 representative indicators of the choice of the Spanish municipalities (Table 3) according to the following criteria:

found in a category that appears in at least twenty of the analyzed municipal initiatives;

be included among the ten European Common Indicators;

that after appearing in the proposal of at least fifteen municipalities also belongs to one of the proposals for reference of the: *VI Action Programme of the European Community, Common Core of Environmental Indicators, 225 Actions for Sustainable Development*.

that regardless of the number of municipalities, it is collected in two blocks of reference[2];

That in the opinion of the surveyed technicians appears at least ten times among the more useful indicators.

Area	Category	Indicator	
Economic area	Production	1	Economic viability
		2	Touristic viability
	Private sector	3	Environmental certificate
	Work	4	Unemployment
	Agriculture	5	Environmental agriculture
Environmental area	Water	6	Water supply
		7	Saving water
		8	Water consumption
		9	Depuration of water
		10	Water ecology
		11	Water reuse
	Atmosphere	12	Air quality
		13	Ozone layer
		14	Greenhouse effect
		15	Tropospheric ozone
	Energy	16	Energy savings
		17	Bioclimatic architecture
		18	Energy consumption
		19	Renewable energies
	Environmental management	20	Efficacy of administration
		21	Public expense
		22	Risk prevention
		23	Organic production
		24	Environmental management programs
	Resources	25	Environmental conservation
		26	Environmental degradation
		27	Biodiversity
		28	Environmental regeneration
	Waste	29	Waste control
		30	Waste production
		31	Waste recycling
		32	Ecological recycling
	Noise	33	Noise condition
		34	Noise control
Social area	Quality of Life	35	Displacement the child to school
		36	Citizen satisfaction
	Environmental education	37	Environmental education programs
	Social inclusion	38	Excluded population
	Participation	39	Agenda 21
		40	Associationism
Urban area	Resources	41	Accessibility to facilities
		42	Spatial quality
		43	Green areas
	Management and Planning	44	Rehabilitation
		45	Existing housing
	Land	46	Intensity of urbanization
		47	Sustainable use of the land
	Transport	48	Restricted traffic areas
		49	Mobility
		50	Public transport

Table 3. Selection of 50 basic indicators performed by Hernández Aja. Source: own elaboration based on the proposal by Hernandez Aja

[2] Hernández does not expressly define what constitutes "blocks" that alludes in his job. Of his reading it appears that refers to the classification made thereof under consideration made by technicians and municipalities on its usefulness, but this is a personal interpretation not verified by the author.

Adding nine more indicators, without fulfilling these conditions, it means that they must be considered to be *"emerging"* indicators that have to merge for the interest of promoting sustainability, regardless of the importance or development which currently have.

Hernández held the catalog in four major areas which in turn divided into nineteen homogeneous categories: economic, environmental, social and urban development. Classification that includes the concept of sustainability as a result of a social, economic and environmental triple balance, and adding a fourth, the urban area. This fourth area is not consistent with the first three as indicators comprising valued aspects that could have been seen within the social area (*access to facilities, existing housing*), environmental (*environmental quality, green areas, intensity of urbanization, sustainable use of the soil, restricted areas to traffic, mobility, public transport*), and depending on which incidents are the most important, in the economic or environmental area (*rehabilitation*). After all, the urban phenomena do not stop to be social, economic or environmental phenomena, or a combination of these.

In any case, we must be aware that the choice of indicators and their organization in these subject areas and categories, responds to a difficult process of simplification, given the disparity between the whole set of indicators, and in some cases, the difficulty *"to understand their goals and intentions"*.

The first validation of the results of Hernández must come from the hand of his comparison with the indicators of the system of urban environment of Andalusia which were developed by the same date [20] , since neither took into account the other and the Andalusian proposal, which was developed on the basis of the analysis of the 37 municipalities of the community with more than 30,000 inhabitants, included 8 selections of Hernández (Table 4). This comparison allows you to compare two contemporary conclusions from different starting points and arguments.

There are, however, not lose sight of the fact that the Andalusian proposal acknowledges from the outset: the measurement of urban problems depends on the scale from which are addressed to the global, European, regional or local. What explains that the system of indicators proposed by the European Environment Agency [21] demonstrate a concern other than that detaches from the catalogues made by international organizations such as the United Nations Settlements Programme, UN-HABITAT (ibidem) and focuses more on the impact of cities on the environment and resources of the planet, thus obviating the evaluation of the achievement of certain levels of life already achieved in Europe. On this point, the proposal of the Junta of Andalusia establishes a reflection to consider when catalogues of indicators are defined: the selected set of indicators must consider the choices made by international organizations such as UN-HABITAT or EEMA, but at the same time, may not be *"the most useful to identify the specific problems of their cities"* (ibidem). This means that the choice of the catalogue of indicators of sustainability of each territory must meet both their problems as of territories in which fits.

The final choice will be confusing if the scope of study of the indicators is in some cases local (municipality), while in others it is autonomous because it is only possible to assess the cities as a whole system. There are, however, to bear in mind that this circumstance is not a mistake when the chosen catalogue respond to a target as the heading in the Andalusian work: *"design environmental policies at the regional level"*. Object to which the municipal choices are not, and which leads to the Consejería to ignore economic indicators and passing on tiptoe by the social.

PROVINCE	Hernández Aja		Junta de Andalucía
		MUNICIPALITY	MUNICIPALITY
Almería			Almería
			Ejido, El
			Roquetas de Mar
Cádiz			Algeciras
		Cádiz	Cádiz
			Chiclana de la Frontera
			Línea de la Concepción, La
		Jerez de la Frontera	Jerez de la Frontera
			San Fernando
			Puerto de Santa María, El
			Puerto Real
			Sanlúcar de Barrameda
Córdoba		Baena	Córdoba
		Córdoba	
		Lucena	Lucena
		Palma del Río	
		Peñarroya-Pueblonuevo	
		Priego de Córdoba	
		Villaviciosa de Córdoba	
Granada		Granada	Granada
		La Taha-Pites	
		Motril	Motril
Huelva		Punta Umbría	Huelva
Jaén			Jaén
		Andújar	Andújar
		Bailén	
			Linares
			Úbeda
Málaga			Antequera
			Estepona
			Fuengirola
		Málaga	Málaga
			Marbella
			Mijas
			Ronda
			Torremolinos
			Vélez-Málaga
Sevilla			Alcalá de Guadaira
		Cazalla de la Sierra	
		Écija	Écija
			Dos Hermanas
			Mairena del Aljarafe
			Palacios y Villafranca, Los
		Sevilla	Sevilla
			Utrera
		Villamanrique de la Condensa	

Andalusian municipalities that responded to the survey that resulted in the proposal of 50 core indicators.

Table 4. Comparison between the municipalities contacted and surveyed by Hernández Aja and referred to in the proposal of indicators of urban environment of Andalusia. Source: own elaboration.

The Andalusian proposal is not an isolated proposal. Since its publication have arisen other similar ones in the rest of the autonomous communities, conceived in some cases as a system of indicators of the network of cities of the community, while others are presented as guidelines for the preparation of the catalogues of municipal indicators. In this way, and without wanting to be exhaustive, we can count on the *Sustainability Local Indicators Panel for the Municipalities members of the Network of Sustainable Cities and Towns in Castilla-La Mancha* [22], *Sustainability Local Indicators of Navarra* [23], the Panel of Municipal Indicators of Sustainability in the

Autonomous Community of Euskadi [24], the publication *Local Agenda 21 in Asturias Guide for Municipalities* [25], the system of *Sustainability Indicators of the Local Sustainability Network in Cantabria* [26], the *System of environmental and sustainability indicators of Castilla-León* [27] and the *Sustainability Indicators in the Region of Murcia* [28].

Initiatives that have been complemented with the *System of indicators and factors for large and medium cities* [29] and the *Municipal system of sustainability of the Network of Networks of Local sustainable development indicators* [30], the *System of indicators of Spain for monitoring the Sustainable Development Strategy of the EU* [31], and the *System of indicators of the Observatory of Sustainability in Spain* (OSE) held since its creation in March of 2005 until its closure due to lack of funding from the Ministry of Agriculture, Food and Environment and Biodiversity Foundation (the dependent) in 2013, 2014 continued from the Observatory of Sustainability, from national level.

Among the activities developed by the OSE found the preparation of thematic reports on local sustainability. With them sought to *"deepen the analysis of the processes of local development from the perspective of the integral sustainability"* [2] and complete some aspects of the Spanish Strategy of Sustainable Development (EEDS) which had been excluded due to the national perspective adopted by this initiative [32]. With this intention, the Observatory conducted between 2005 and 2012 eight reports in order to *"provide a rigorous and objective view of the situation of sustainability of our country, through information"* [33].

As stated on the website of the Environmental Network of Asturias [34], the nature and structure of sustainability indicators has changed as it has increased the knowledge and specific policies and strategies at national and European level have been implemented. Thus, while the first report of the OSE [36] addressed at the national level by applying a system of 65 indicators following community lines, the second deepened into the regional situation through a range of indicators which expanded up to 88 [35]. To keep track of national development strategies within the context of the renewed *Strategy for Sustainable Development of the European Union*, the third report [36] established a catalogue of indicators that rose up to 155. The following year report [37] continued the line started in 2007 but was adjusted to the new national framework defined by the *Spanish Strategy of Sustainable Development* which had just come into force [32], which saw 51 indicators that for the first time be georeferenced. Number increased to 167 in the following [33] where they arose in an atlas to show the spatial distribution of the indicators georeferenced and the territorial dimension of the process associated with the sustainable development. In 2010 [38], with 103 indicators and looking at the claims of the *Law of Sustainable Economy* [39] and the new *European Strategy 2020* [40]; and already fully in a context of crisis [43] is included the *National Reform Programme*, the *Strategy for the Sustainable Economy* [41] and the *Europe 2020 Strategy* [40]. The latest report of the OSE [42] was published in 2012 until withdrew funding and included 52 indicators, taking aim to assess progress towards the objectives set out in the national and European strategic and regulatory frameworks, and the scenario marked by the Europe 2020 Strategy.

In December 2014, is created the Observatory of Sustainability (OS) with the intention of continuing the work begun in 2005 and discontinued in 2013. With this aim, in 2015 published the report *Sustainability in Spain 2014,SOS 14* [43] with which it is intended, in the words of its authors, being in the line of other publications such as the *World Resources Institute* and the *Worldwatch Institute*. This report joins the socioeconomic, environmental and productive sectors indicators to a series of synthetic indicators or *"of progress of society"* including the *Index for a Better Life*

(OCDE), the *Happy Planet Index*, the *Index of Happiness of the United Nations*, *Human Development Index* (HDI), the collective *IOE Index* and the *Index of Transparency*.

Amid the previous reports, the OSE developed a specific report called *Local Sustainability in 2008, An urban and rural approach* [2], which analyzed the behavior of fifty provincial capitals by a compact urban sustainability indicator with only 12 indicators. The Observatory took reference to the selection of the indicators of this compact indicator *"system integrated of urban indicators developed in the year 2004"*[3] by the Observatory for Urban Environment of Málaga (OMAU) in cooperation with the European Commission and United Nations, Habitat [44], but reduced it to only twelve indicators so that *"they were the most relevant as possible, the most reliable, easy to measure, obtain and follow, that they were more synthetic as possible"* without leaving include the environmental, economic and social variables, and others related to the occupation of the land (Table 5).

Risk of unsustainability		**Indicator**[4]
Socioeconomic	Economic activity	Urban economic activity index
		Unemployment rate
	Excessive motorization	Motorization index
	Inefficiency in the use of the housing stock	Primary housing ratio / non-primary homes
Environmental	Excessive consumption of water	Consumption of water in homes
	Excessive consumption of energy	Estimated consumption of electricity per capita
	Quality of the air	Annual average concentration of PM_{10}
		Annual average concentration of NO_x
	Generation of waste	Generation of urban waste
Territorial	Low urban density	Urban density
	Excessive growth of artificial surfaces	Increase of the artificial surface per capita
		Area of urban green areas per capita

Table 5. Selection of indicators of the OSE for the elaboration of the proposal of synthetic indicator in 2008. Source: own elaboration

Beyond the specific indicators managed in any of the ten reports of the OSE and the OS referred, must highlight two particularly relevant methodological contributions. The first is derived from the selection criterion handled in eight annual reports to choose the variables to evaluate. Own explanations of the Observatory contained in the reports show that the selection of the indicators can not only respond to the criteria of the drafting team, but must also respond to national or European criteria established through different strategies, plans and laws. Is the second the use of a synthetic indicator as a tool for overall assessment of the sustainability of the municipality and comparison with the state of others municipalities. For this purpose, the OSE set an indicator called *"diagram of sustainability"*, following the methodology of the study of *Urban Ecosystem Europe* [45], to which it refers, collect the information of the twelve indicators selected for an integrated assessment of the state of the sustainability of the municipality.

While these catalogs have been developed from supramunicipal organizations, different municipalities have established sets of indicators with which to assess the evolution in their territories, as already indicated, not responding to the same priorities that have inspired the former organizations. Without being exhaustive, can be set as references the proposals of essentially geographic nature of Seville [46] or

[3] The literal reference of publication of the OSE makes reference to 2004 as the year of the development of the system of indicators by the OMAU, although references of the own OMAU, set the year 2005 as the year of development of the mentioned system of indicators.

[4] Depending on the page work of the OSE to read, the specific name of the indicator can vary. For the preparation of the table the nomenclature contained in paragraph 1.1 of the cited publication has adopted, and specifically, in the different sections devoted to specific explanation of each indicator.

the Vitoria-Gasteiz [47]; but perhaps deserves a specific mention of the Observatory of Urban Environment of Malaga, OMAU, since its proposals relate to other supranational projects writed with its cooperation such as the project CAD-MED and the Integrated System of Urban Indicators developed by the Observatory itself and the Regional Office of UN-HABITAT for Latin America and the Caribbean, ROLAC [48], with the participation of the cities partner of the OMAU of the *"network nº 6 of the European program URB-AL"*.

Since in 2005 established a system of municipal sustainability indicators was in Málaga on the occasion of the first revision of its Agenda 21[5], the OMAU has been making periodic publications of the monitoring of its catalogue of indicators —[44], [49], [54], [50], [51], [52] y [53]—, which has been changing every year and have been grouped under a new division into four categories. Since 2005, it has organized grouping the social and economic aspect in a new field called *"social cohesion and economic development"*, and by introducing a new, *"City government"*, equivalent to the institutional area which the Commission of Sustainable Development of the United Nations (ibidem), which is related to the social area of Hernández, but it also covers other indicators specifically related to participation (Fig. 5).

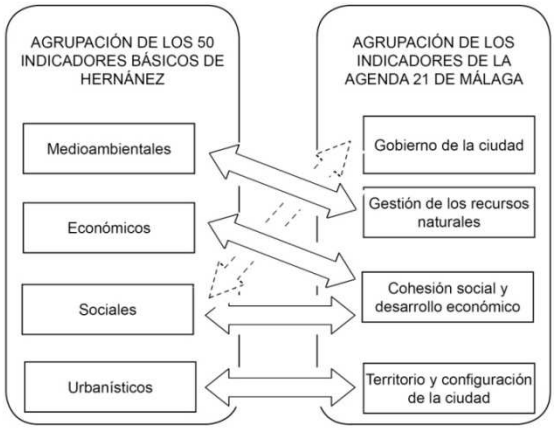

Fig. 5. Relationship between groups of 50 core indicators described by Hernandez and the set of indicators of the Agenda 21 for Málaga. Source: own elaboration.

5.- Conclusions: A proposal for action

The specific characteristics that must have an indicator have been defined by many authors, in the same way that the classification of Higueras synthesized in this communication has been shown the different types that exist. However, there is no one proposal about what are the characteristics that must have the catalogs of indicators. The initiative of the OSE synthesize at a unique value the sustainability of a municipality by a single systemic indicator, called *"basic diagram of sustainability"*, should be understood as an essential characteristic that has to be present in any system of sustainability indicators.

The vagueness of the concept of sustainable development has begun to overcome with the obligation to establish objective premises to develop the *Commitments of Aalborg*, setting these objectives, are materialized the real concerns enclosing the pursuit for sustainable development. This idea is expressly reflected in the explanation of the Agenda 21 for Málaga on the choice of indicators of sustainability, where exposed the election respond to the will to evaluate the achievements in the pursuit of the objectives previously established, in parallel with the *Aalborg+10 Commitments* and the actions proposed for this purpose.

[5] At the time of writing, Agenda 21 of Málaga is immersed in a new review process that should culminate throughout 2015 with the approval of the third Agenda 21.

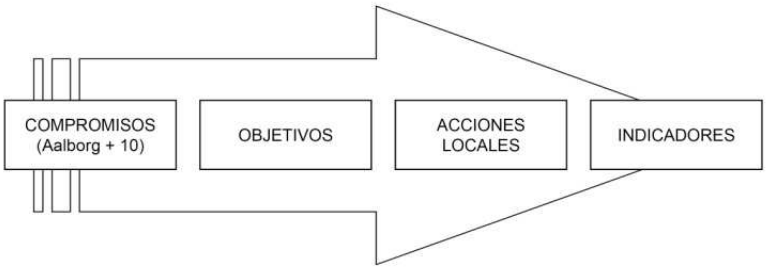

Fig. 6. *Reflection process of the local Agenda 21 derived from the Commitments of Aalborg and the statement of objectives of the Agenda 21 of Malaga.* Source: own elaboration.

In 2002, Hernandez compiled the 50 most representative elections in municipalities indicators to date, but does not make any quantitative or qualitative criticism of the election. An analysis of systems of indicators in the different territorial areas concludes that these must respond both to the problems of the territories for which are defined as those of that fall and that this response must be in relation to various supra-municipal development strategies. In this regard, proposals for the OMAU fall short as not contemplating strategies and supra-municipal plans considered by the OSE, which in contrast do not recognize the need to consider the Aalborg+10 Commitments.

Synthesizing both proposals, the catalogs of local sustainability indicators must respond to the definition of local objectives that respond to the proposals contained in the *Aalborg+10 Commitments*, the *European Strategy 2020*, the *Spanish Strategy of Urban Sustainability and Local*, and the agreement of the *Association of Spain to the European Authorities for 2014-2020 period*, and depending on specific territorial scope in which we find, the strategies of regional sustainability defined (Fig. 7). These well defined, sustainability indicators are those that allow the monitoring of achievements that are reaching in an action, even though it runs locally, only it makes sense from a global conception.

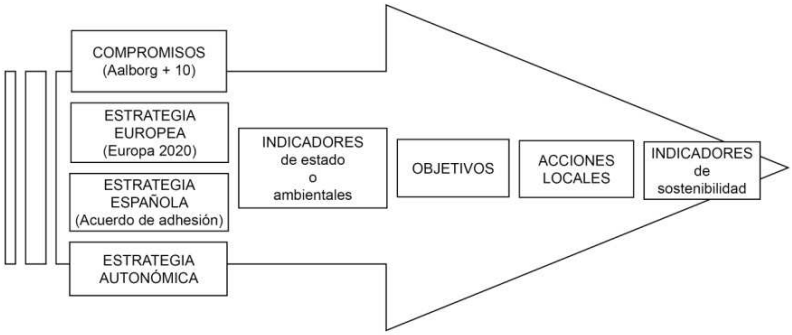

Fig. 7. Reflection process of the local Agenda 21 derived from the Aalborg Commitments and the different national and regional strategies. Source: own elaboration.

A future definition of a proposal for a catalogue of local sustainability indicators must be developed following these steps:

- definition of European, national and regional sustainability strategies that will drive next to the Aalborg Commitment through a set of specific local actions;
- assessment of the validity of the conclusions of Hernández in view of the different proposals that have appeared since its publication;

choice of a set of indicators able to assess the achievements made with local actions on different sustainability strategies, fig 7 (must be relatively limited as possible, assess annually so may constitute series and constant in time);

definition of a "basic diagram of sustainability" able to jointly evaluate the sustainable development of the municipality.

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