

Development of Sustainable Communities according to LiderA

Analysis and Approaches of Portuguese Cases

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Abstract

The population living in urban centers is increasing, and since cities have a huge role on resource consumption and greenhouse gas emissions, is necessary to find ways to reach for sustainability. One way to do this is through sustainability assessment systems or rating tools. Different systems have been developed and applied worldwide, including BREEAM, LEED and LiderA. These systems started by focusing only on the buildings but they recently started to turn their attention to the community and city scale, since the green buildings have demonstrated to be insufficient to guarantee sustainability of the built environment. Communities are nowadays considered as a proper scale to access sustainability of the built environment because it considers aspects that are not accounted for when simply focus on the building scale.

This paper applies a new version of the LiderA System to assess the sustainability of two neighbourhoods, and seek to make their transition to sustainable communities. This paper also shows that environmental impacts, social wellbeing, economic vitality, sense of community and connectivity truly depend on how urban environments are planned and shaped.

Finally, it shows that sustainable communities challenge the way we build and live, because they involve changing practices and behaviors. The real challenge is in making the modern city, and the way of life lived in it, sustainable, in order to maintain the balance between finite resources and our biological need to form relations and connections.

Keywords: Sustainable Community; Sustainability Assessment System; Neighbourhood; LiderA

1. Introduction

We are living in a very crucial phase for cities and human life particularly with over 50% of the world's population currently living in urban areas, a figure expected to rise to 66% by 2050 (UN, 2014).

The importance of urban areas is also confirmed by the diffusion of megacities: cities with more than 10 million inhabitants (UN, 2016). In 2016, there were 31 megacities globally and their number is projected to rise to 41 by 2030 (UN, 2016). As a result, most resources are nowadays consumed in urban environments worldwide. This fact contributes to the economic and social importance of urban communities, but also to their poor environmental sustainability (Berardi, 2013).

Urban areas are (and probably will always be) net consumers of resources (Berardi, 2013), causing innumerable negative effects on the environment. In fact, cities consume 78% of the world's energy and produce more than 60% of all carbon dioxide and significant amounts of other greenhouse gas emissions (GHG), because of activities such as energy generation, vehicles, industry, and biomass use (UN-Habitat, 2012).

This has created a strong need to seriously reconsider the way cities should be designed, in order to produce greener, healthier and eco-friendlier cities, starting by addressing sustainability performance of its buildings and other infrastructure. Urban design is considered an essential instrument to shape the future of the city, to determine the pattern of a city's resource usage and its resilience to change, from climate or otherwise (Ameen et al., 2015).

Besides aiming to improve the environmental performance by the reduction of greenhouse gas emissions, better air quality, conservation of energy, among others, cities are now at the forefront of efforts for achieving goals in social and economic aspects such as social justice, elimination of poverty, and economic vitality (Komeily & Srinivasan, 2016).

At the same time, the increase of the number of people living in urban areas and the technological advances has been contributing to isolate and push people away from each other, reducing meaningful connections and relationships. Because of this, the concepts of neighbourhood and community are being left behind (Barton, 2000). It's necessary, not only to create more green cities but also to bring back these concepts, transitioning cities toward sustainable communities.

Urbanization and population density are suggested as the key determinants that will shape the future of cities in the 21st century. It's necessary need to find effective solutions for new and existing urban areas to mitigate the impacts of human development and climate change, and to achieve a balance between the various dimensions of sustainability (Ameen et al., 2015).

This paper intends to apply a new version of the LiderA system to two specific case studies – the neighbourhoods of Alta de Lisboa and Belas Clube de Campo – aiming to assess the actual performance level and analyze which type of strategies and solutions could be adopted and implemented in order to improve the global sustainability level of these neighbourhoods, and bring them closer to sustainable communities.

2. Sustainability and sustainable development

Sustainability started to be considered primarily as an ecological concept (Ameen et al., 2015). In addition, sustainability and sustainable development were (and still are) subject to multiple interpretations and definitions, making them vague concepts, difficult to understand, and therefore, difficult to put into practice (Ameen et al., 2015; Komeily & Srinivasan, 2015). Conversely the most internationally accepted definition of sustainable development, given by the Brundtland Commission, is: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987).

During the course of its evolution, the scope of urban sustainable development has widened to incorporate economic and social dimensions, primarily due to the increasing knowledge on the impact that of urban form has on a range of sustainability indicators related to social and economic aspects (Ameen et al., 2015).

Brundtland's definition of sustainability can be seen as very succinct in its scope, as it encompasses the human need together with environmental, social and economic issues, thus it considers the three dimensions of sustainable development (Figure 1). Hence, the definition serves as the basis for emerging urban sustainability assessment methods (Ameen et al., 2015).

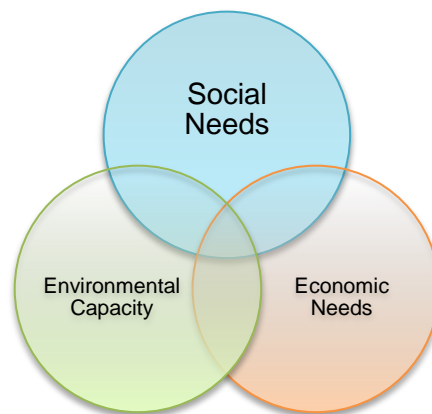


Figure 1 - The three dimensions of Sustainable Development.

2.1 Sustainable Communities

There is an increasing search and need for sustainable communities, associated with the increase concern with the ecological damage being done to our planet. Today's modern industrial systems were and continue to be built on carbon-based energy systems, an excessive non-sustainable exploitation of our natural resources and a debt-based view of consumerism (Petit-boix et al., 2015). The outcome of these actions has exhausted our planet as measured by a host of indicators on climate change, global warming, sea level rising and diminishing biodiversity, among other factors (WWF, 2018; NASA, 2014). The current development trends are unsustainable and reflect a privatized and commoditized society, showing that it is necessary to adopt a more sustainable lifestyle.

The term "sustainable community" has been spread in recent years, with regards to the built and social environment. It tends to be applied to either new or existing communities who promote or seek to promote sustainability not only in sectors such as water, food, transport, waste and energy, but also in social wellbeing, happiness, connection and economic vitality (Pfeiffer & Cloutier, 2016; Rae & Bradley, 2012).

According to the Institute for Sustainable Communities, "a sustainable community is one that is economically, environmentally, and socially healthy and resilient. It meets challenges through integrated solutions rather than through fragmented approaches that meet one of those goals at the expense of the others. And it takes a long-term perspective – one that's focused on both the present and future, well beyond the next budget or election cycle" (ISC, 2018).

As a result, a sustainable community manages its human, natural, and financial resources to meet current needs while ensuring that adequate resources are equitably available for future generations. It seeks social wellbeing, economic security and healthy ecosystems (ISC, 2018).

According to Hugh Barton, the main goal of a sustainable community is to build an attractive and green neighbourhood which is safe, pollution-free and uncongested, a sense of local community and

excellent access to friends and facilities both locally and regionally, leading to a less frenetic and more locally-based life (Barton, 2000).

3. Rating tools / Sustainability assessment systems

Once sustainability problems are interdisciplinary, very complex and to some degrees subjective, establishing reliable methods for measuring sustainability is currently a major issue, which acts as the driving force in the discussion on sustainable development (Komeily & Srinivasan, 2016).

Urban sustainability is characterized by a large number of indicators in the different dimensions (environmental, social and economic). The method of reconciliation and inter-dependence of the indicators from the different dimensions is the key in achieving urban sustainability (Ameen et al., 2015).

The need to assess and monitor the sustainability of cities resulted in a series of sustainability assessment tools and rating systems being developed worldwide. Buildings were among the first elements of built environment to be analyzed and a series of assessment tools were created, mostly known as green building rating systems (Komeily & Srinivasan, 2016).

Tools such as BREEAM (United Kingdom), LEED (United States) and CASBEE (Japan) have been used applying a multi-criteria approach and assess building performance with respect to various criteria such as energy efficiency, water efficiency, atmospheric emissions, low impact materials, indoor air quality, and accessibility (Berardi, 2013).

One of the main critiques of sustainability assessment on the building scale has been its inability to capture what makes a built environment sustainable for its citizens (Berardi, 2013). Despite its important role in sustainability assessment, the assessment of buildings without the environments that they are inserted in, doesn't represent an inclusive option (Ameen et al., 2015).

By only focusing on the building scale, assessment tools fail to consider and integrate the multiple dimensions of sustainability, particularly social and economic dimensions. Urban environment needs to be considered as a system in which single buildings influence and are influenced by other buildings, the spaces between them, services that are provided, humans and other organisms that are living there (Komeily & Srinivasan, 2015).

Expanding the boundaries of assessment to the neighborhood scale allows considering all the factors, relationships and interdependences between these broad range of elements and activities in the complex building-urban system. As a result, several neighborhood sustainability assessment tools have been developed for evaluating sustainability at the neighborhood scale, such as BREEAM Communities (Com), LEED for Neighborhood Development (ND) and CASBEE for Urban Development (UD) (Berardi, 2013).

4. Concepts of neighbourhood and community

The term "neighbourhood" implies a locality which is familiar or has a particular unifying character, and can be defined as a residential or mixed use area around which people can conveniently walk and has an identity which local people recognize and value (Barton, 2000). Thus, the concept of neighborhood is entirely linked to the place.

"Place" is an important element in our cultural identity. People define themselves by the place they live in (Barton, 2000). However, people's ties to place has been decreasing due to the development in transport technology, specially, the motor car, the rising material standards, and the widening educational and employment opportunities. Neighbourhood is now a nostalgic concept associated to the pre-motor, pre-phone age, when many people lived out much of their lives in one locality (Barton, 2000).

Contrary to “neighbourhood”, “community” is a social term which does not necessarily imply “local”. Community is made by people, and people often belong to diverse interest based communities which barely touch the locality. It means a network of people with common interests and the expectation of mutual recognition, support and friendship. Community refers to that layer of society in which interaction takes place between people who are not close family or friends, but neither are total strangers. It is the interaction, not the place, that is the essence of the city and of city life (Barton, 2000).

The sense of local community is important since it can enrich lives and assist health, transmitting a sense of security and companionship. In fact, place communities are increasingly recognized by social care and health professionals as important for mental health and social inclusion, and by the police for security (Barton, 2000). Therefore, sense of community is a critical element of a sustainable community (Chan & Huang, 2004).

4.1 Neighbourhood design and its impact on social wellbeing, happiness and connection

The impact of built environments and neighbourhood design on social wellbeing, physical and mental health, connection and, ultimately, happiness of the population living in cities and urban centers, has also been recognized as an important dimension of sustainability (Paralkar et al., 2017; Pfeiffer & Cloutier, 2016).

Some neighborhood built environment characteristics that seem to directly improve these aspects include access to open, natural, green spaces, and design features that allow for social interaction and ensure personal security. Other factors such as the diversity of housing types, housing conditions and values, transportation infrastructure, commute time, polluting land uses, and population density also affect those aspects (Pfeiffer & Cloutier, 2016).

High quality community amenities, less dense places, such as rural areas or small cities, may contribute to higher social engagement and cohesion among neighbours. In general, places with more traditional neighbourhood design, with features such as grid-lined streets, moderate housing density, compact neighbourhood and entrances to street frontage, doors and windows facing the street, have greater social interaction and engagement among neighbours, and increase the sense of security. Social engagement and personal security are strongly linked to happiness, thus design interventions leading to these outcomes may indirectly promote greater happiness (Pfeiffer & Cloutier, 2016). Also, more social engaged residents have a stronger social tie which makes them more able to combat threats such as crime and recover from disasters, increasing the community resilience.

The presence of open, natural, and green spaces is also important, since it has been proven that engaging with natural environments and living things, brings psychological and physical benefits for people (Pfeiffer & Cloutier, 2016). Parks, community gardens, botanical gardens, and building exteriors are examples of restorative open spaces that may increase interaction among neighbours and, at the same time, contribute to physical and mental health, making people feel happier with themselves and with the community they are living in.

5. Goals and methodology

This study presents the application of a sustainability assessment system to two different neighbourhoods. The sustainability performance of the two case studies was evaluated considering all the criteria that constitute the assessment system, which encompass the three sustainability dimensions – environmental, social and economic. After reaching a global assessment value, and a corresponding classification, were suggested, whenever possible, measures that could increase the sustainability performance. The measures suggested intended to reach for maximum classification possible, considering the solutions that were possible, adequate and feasible to implement in each neighbourhood.

For this, was applied the sustainability assessment and certification system LiderA, developed and used in Portugal (and Portuguese Speaking Countries), which first version was released in 2005. LiderA is the Portuguese acronym of 'Lead for the environment' in search of sustainability construction, and is the designation of a Portuguese voluntary system which aims an efficient and integrated support, of the evaluation and certification process of the built environments that seek sustainability.

This system, like others, started by limiting the focus to buildings and then extended the scale to built environments. It assesses residential, touristic, commercial, services, and other developments (including buildings and respective surroundings), in each life cycle phase, from the initial design phase to the construction and operation phases.

For LiderA, the quest for sustainability in built environments is based on six categories: Site Integration, Resources, Environmental Loads, Service and Resilience, Socio-Economic Dynamics, and Sustainable Use. The 6 categories are then subdivided into 20 areas and 40 criteria, each one with a specific weight (Table 1). The weights (wi) of the 40 criteria are then combined to obtain the global environmental performance and the class of sustainability.

Table 1 - Categories, areas and respective weights of the LiderA system.

Categories	Areas	wi	Total Weight
Site Integration	Soil	3%	10%
	Natural Ecosystems	3%	
	Landscape and Heritage	4%	
Resources	Energy	15%	30%
	Water	6%	
	Materials	8%	
	Local Food Production	1%	
Environmental Loads	Wastewater	2%	10%
	Waste	3%	
	Other Environmental Loads	5%	
Service and Resilience	Service Quality and Sustainability	7%	10%
	Structural Adaptation	3%	
Socio-Economic Dynamics	Accessibility	5%	30%
	Space for all	4%	
	Social Vitality	6%	
	Amenities	4%	
	Sustainable Economy	9%	
	Connectivity	2%	
Sustainable Use	Sustainable Management	8%	10%
	Marketing and Innovation	2%	
			100%

According to LiderA, the sustainability degree is measurable and able to be certified in performance levels (C, B, A, A+ and A++), that include an improvement of 12.5% (Class D), when compared to common practices (Level E), an improvement of 25% (Class C), an improvement of 37.5% (Class B), a factor 2 (50%) improvement (Class A), a factor 4 (or 75%) improvement (Class A+) and a factor 10 (or 90%) improvement (Class A++). There is also a Class A+++ to a regenerative performance, structurally improving the environment. This class is only used in specific cases and criteria (Pinheiro, 2011).

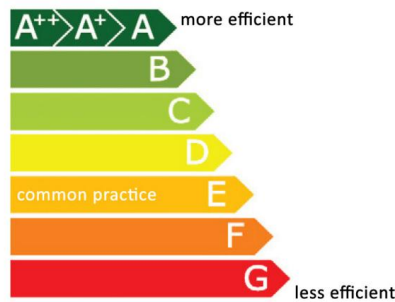


Figure 2 - Levels of performance according to LiderA.

6. Approach and cases

The current approach intends to apply the LiderA system to two specific case studies – the neighbourhoods of Alta de Lisboa and Belas Clube de Campo – aiming to assess the actual performance level and analyze which type of strategies and solutions could be adopted and implemented, regarding environmental, economic and social aspects, in order to improve the global sustainability level of these neighbourhoods.

These case studies have both been assessed before by the LiderA system, so the aim of this study is to do another assessment of the sustainability of these neighbourhoods, now a few years later and with a new version of the system (V3.00), and propose measures of improvement. However, a greater emphasis on the community aspect will be given, aiming to foment the sense of community and the social inclusion, cohesion and wellbeing.

Both case studies are located in the region of Lisbon, Portugal, about a 20 minutes drive from each other.



Figure 3 - Location of the two case studies.

The project of Alta de Lisboa was officially born in 1984, has an area of about 382 ha, and foresees 60000 inhabitants. The project was planned in detail since its inception with the aim to increase the quality of life of the citizens who live in that area, providing a coherent urban supply which includes housing, commerce, services and hotels. The plan is based on the idea of induced social mixture, that is, the idea was to mix classes and ethnicities in the same territory, incorporating common coexistence.

Although the original plan of Alta de Lisboa did not focus on the search for sustainability, it already had some sustainability principles that were a base for that search, which included a mixed-use strategy, a compact development, green areas, open blocks with public accesses and a defined transportation strategy.

Belas Clube de Campo (BCC), inaugurated in 1997, is an urban development located in the Belas village, in the municipality of Sintra, which covers a total area of 138 ha and is essentially a residential neighbourhood, with about 2500 residents. The promoter of this project has defined the environment as a key element, since its early conception stages. Belas Clube de Campo was born with the concern of safeguarding an area of great natural beauty, adapting it to an urban project where the environmental qualities were rigorously preserved. The project was created with the aim to provide high quality lifestyles whilst developing an urban project that pursues high environmental qualities.

7. Results

The applicability of the LiderA system to two specific cases (Alta de Lisboa and Belas Clube de Campo) allowed to access the implementation of the sustainability assessment to the community scale, in the typology of neighbourhood. These two cases showed different performance levels which can be explained by various factors such as the population density, which is much bigger in Alta de Lisboa; the location and context - Alta de Lisboa is inserted in the urban/city context while Belas Clube de Campo was developed in a suburban, green-field area; the urbanization plan, where in Belas Clube de Campo the environmental sustainability was a concern since the beginning, which didn't happen in Alta de Lisboa; and the people that live in those neighbourhoods - Belas Clube de Campo is targeted to medium and high classes, while Alta de Lisboa is home to all social classes.

The assessment of these two cases by the LiderA system resulted in a 15% improvement (Class B) for Alta de Lisboa and a 33% improvement (Class A+) for Belas Clube de Campo. Facing these results, were suggested, measures to improve the sustainability performance. Therefore, was considered that Alta de Lisboa could improve to a factor 1.26 (26%), upgrading to a Class A, and Belas Clube de Campo to a factor 1.53 (53%), maintaining a Class A+.

The global assessment of Alta de Lisboa shows good practices in criteria such as Territorial Contextual Valorization (C1), Land Use (C2), Active Mobility (C25), Flexibility (C28) and Social Responsibility (C29). The criteria that show better potential for improvement are the ones related to energy (C7 to C9), water (C10 and C11) and wastewater (C15), Safety and Risk Control (C21), Efficient Transport Solutions (C24), among others.

In the case of Belas Clube de Campo, good practices are achieved in criteria such as Habitat Network and Services (C4), Energy Passive Management (C7), Material Responsible Management (C13), Quality of Service and Sustainability Integration (C20), Flexibility (C28) and Maintenance and EMS (C38). The greatest potential for improvement is showed in Food Production and Access (C14), Wastewater Management (C15), Digital Network (IT economy) (C36), among others.

This difference shows the importance that a good planning and the choice of the best materials and practices have on the sustainability performance. Belas Clube de Campo was planned since the beginning to with consideration for the environment and selected high quality materials, unlike Alta de Lisboa, where the construction was made more disorderly and the materials and techniques chosen weren't the best. Not even applying improvements that aim to achieve the best possible performance, Alta de Lisboa can reach the performance of Belas Clube de Campo.

Table 2 - LiderA Sustainability Assessment.

Category	Area	Weight	Criteria	Alta de Lisboa		Belas Clube de Campo	
				Class	Class Improved	Class	Class Improved
Site Integration	Soil	1%	Territorial Contextual Valorization (C1)	A	-	B	-
		2%	Land Use (C2)	A	-	A+	-
	Natural Ecosystems	2%	Ecological Valorization (C3)	B	A+	A	A+
		1%	Habitats Network and Services (C4)	B	A+	A++	-
	Landscape and Heritage	2%	Landscape (C5)	B	A	A+	A++
		2%	Built Heritage Valorization (C6)	A	-	C	-
Resources	Energy	5%	Energy Passive Management (C7)	C	A+	A+	A++
		5%	Energy Systems (C8)	D	A+	A	A+
		5%	Carbon Management (C9)	D	A+	A+	A++
	Water	4%	Water Supply Systems (C10)	E	A	A+	-
		2%	Local Water Management (C11)	C	A	A+	A++
	Materials	4%	Built Structure Durability (C12)	B	A	A	-
		4%	Material Responsible Sources (C13)	E	A	A+	A++
Local Food Production	1%	Food Production and Access (C14)	C	A	E	A	
Environmental Loads	Wastewater	2%	Wastewater Management (C15)	E	A	E	A++
	Waste	3%	Waste Management (C16)	A	A+	A	A+
	Other Environmental Loads	2%	Noise Management and Other Nuisances (C17)	C	A	A+	-
		2%	Atmospheric Emissions Management (C18)	D	C	A	-
		1%	Other loads (C19)	D	A	A	A+
Service and Resilience	Service Quality and Sustainability	5%	Quality of Service and Sustainability Integration (C20)	C	A	A+	A++
		2%	Safety and Risk Control (C21)	C	A	A+	-
	Structural Adaptation	2%	Climatic Adaptation (C22)	D	C	A+	-
		1%	Resilience and Happiness (C23)	C	B	A	A+
Socio-Economic Dynamics	Accessibility	2%	Efficient Transport Solutions (C24)	B	A+	A	-
		3%	Active Mobility (C25)	A	A+	A	-
	Space for all	2%	Safe and Appealing Common Spaces (C26)	B	A	A+	-
		2%	Space layout for all (C27)	B	A	A	-
	Social Vitality	2%	Flexibility (C28)	A+	-	A++	-
		2%	Welfare and Affordable (C29)	A	A+	A	A+
		2%	Social Responsibility (and Social Vitality) (C30)	A	A+	A	A+
	Amenities	2%	Friendly Amenities (C31)	A	A+	A+	A++
		2%	Cultural Heritage, Identity and Education (C32)	C	A	A	-
	Sustainable Economy	5%	Contribution to the low-costs in the lifecycle. Value and Fiscal Policy (C33)	C	A	B	A
		2%	Local eco dynamic and economic attractiveness. Affordability (C34)	A	A+	B	A
2%		Sustainable or Green buildings and Infrastructure (C35)	D	C	A+	-	
Connectivity	2%	Digital Network (IT economy) (C36)	D	A	C	A	
Sustainable Use	Sustainable Management	3%	Sustainable Information Management (C37)	E	A	A+	-
		3%	Maintenance and EMS (C38)	C	A	A++	-
		2%	Governance and Monitoring (39)	C	A	A	A+
	Marketing and Innovation	2%	Marketing and Innovation (C40)	D	A	A	A+
TOTAL				B	A	A+	A+

8. Limitations

Despite sustainability assessment systems, such as the LiderA system, appear to be suitable tools for evaluating the sustainability performance at the community scale, a set of limitations can be listed.

One limitation is the lack of consensus on the definitions of some terms, starting with the term sustainability, which is still not a single and well defined concept. Many definitions have been given to this term and new definitions are continuously added.

Other limitation is that there are innumerable rating tools around the world, and despite pursuing the same goal, they have different methods of assessment, considering different criteria and different weights for the different criteria. The fact that doesn't exist a universal rating tool to assess sustainability can result that the same community achieves different performance levels, when accessed by different tools, resulting in a different perception of sustainability.

On the other hand, this is necessary, because each country, region or community has different contextual characteristics, being essential to develop a tool that can adapt to those characteristics. With this viewpoint, some of the systems may consider some aspects more important than others, showing different priorities, according to geographic, demographic, climate, environmental, social, and economic factors of the community. Thus, it is not feasible to use one global assessment tools as a ready recipe to fit all.

The subjectivity of the whole process of evaluation through the system, is also something to have into consideration, since there are criteria that can subdue to subjective evaluation. For example, for the LiderA system, criteria such as Landscape (C5) and Safe and Appealing Common Spaces (C26) can be conditioned by the personal opinion and taste of the evaluator. Other criteria such as Energy Systems (C8) and Water Supply Systems (C10) can be assessed in a more objective view through concrete available data, and is essential to do it in the best way possible in order to achieve the most efficient results. The weighting of the different criteria means giving more importance to some aspects than others, which is also a subjective process. Thus, the evaluation shouldn't be carried out by only one person, but by a group of experts in different areas, and also include residents' perception, in order to reach a more precise and coherent performance level.

Another limitation that may exist in these systems is the adoption of a static perspective, that is, the assessments are done only a single time, which is not enough. Instead, continuous evaluations should be incentivized, in a way that sustainability assessments become an interactive process, which could be used to map the evolution of the urban development. It would be interesting to apply the system in a situation in which the neighbourhood is still in the design stage and in another situation where it is already consolidated, and then compare the two situations and assess what measures could be applied in each of them, in order to improve the final performance. Is particularly relevant its application in the design phase, since it could allow to obtain a higher performance level in the construction phase.

9. Conclusion

This paper has presented and discussed the application of a sustainability assessment system at the community scale. With this analysis was possible to verify that the communities are a relevant concept for the urban planning and development of the society and built environment, and can enhance the fundamental characteristics of sustainable development. In this perspective, the sustainable planning of the neighbourhoods, through the correct use and development of its main criteria, based on sustainability assessment systems, such as the LiderA system, appears to be a tool for territorial planning and management with an appropriate scale and as a desirable concept. It is understood that this approach, to the study of the sustainability of the neighborhoods, could be a starting point for the phased implementation of the sustainable development process in successively larger scales.

The holistic approach used in this paper involves analyzing all the elements that are present and constitute a community by analyzing each criterion that comprises the assessment system. This allows not only to evaluate each criterion individually, but also their interactions and synergies, since one criterion can influence other criteria, i.e., the elements of the community are all dynamically interlinked. For example, the attractiveness of the public space can have an impact on safety, active mobility, and ultimately on the wellbeing and happiness of the members of a community.

The results show that the LiderA system is a suitable and complete tool to evaluate the sustainability at the community scale, in this case neighbourhoods, allowing to analyze the different aspects that comprise the community, in the three dimensions – social, economic, environmental – that constitute the process of sustainability assessment.

For future work in this subject, to make his type of systems clearer and more accurate in their mission of promoting sustainable communities, is important to consider and mitigate their limitations, being them the multi-definitions concepts, the systems' subjectivity, adaptability, perspective and monitoring. Systems should include more concrete performance indicators, should be updated and adapted on a regular basis, and should promote the continuous monitoring of the sustainability in all life-cycle phases. The active participation and engagement of the different stakeholders, mainly of the members of the community, should also be included in the process for a more authentic perspective.

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