

Assessment of the Sustainable Development in Urban Poles: The Case Study of the Urban Pole “Ain Abid” Constantine Province, Algeria

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Abstract

Achieving sustainable city development is a goal sought after by many countries— one of which is Algeria. The hope is to strike a balance between economic development needs and social needs, with optimal utilization of ecosystems within geographical spheres, more so after the development of urban poles. This is only achieved through compatibility testing between goals and tangible outcomes. Monitoring measurements through both quantitative and qualitative means, such as the internationally accredited System for Leadership in Energy and Environmental Design. Bearing this in mind, the paper aims to study the degree of sustainable development of urban poles through a theoretical approach to deciphering relevant concepts, coupled with descriptive analytics analyzing the subject of study, the urban pole of Ain Abid, located in Constantine Province, Algeria. The process utilizes indicators of the internationally accredited System for Leadership in Energy and Environmental Design, in the evaluation of sustainable development, which has shown a tremendous lag in developing these poles, despite continuous efforts.

Key words: Ain Abid area, Indicators, Urban pole, Sustainable development, System for Leadership in Energy and Environmental Design.

INTRODUCTION

From the time when sustainable development emerged in the early eighties, countries have sought to attain a balance between the economic necessities and the social needs on the one hand, and the optimal use and preservation of environmental systems on the other hand. Nonetheless, interest in cities and urbanization was not effective and has yet to rise to the level of achieving sustainable development except at some stage in holding of the Third Conference on Housing and Sustainable Urban Development in October 2016, in Quito (Ecuador), as it was an opportunity to study the main challenges facing cities, along with rethink the way they are built and managed to play its role as an engine in sustainable development, within the scope of an integrated urban plan [1]. Nevertheless, the determination of States has hitherto increased in adopting a set of reforms in an attempt to attain a socially and economically stable society in such a manner consistent with the environment and resources thereof, by developing systems to evaluate such development and stand on the extent to which the achievement thereof is realized.

Indeed, Algeria was among such countries that adopted of their own accord the achievement of the sustainable development goals and took upon itself the responsibility of putting into operation its contents by its specificity and national constants. More to the point, Algeria created urban poles, within the scope of the new approach adopted by the same, from which the Province of Constantine got benefited, similar to the remaining provinces of the country, among which the urban pole of “Ain Abid” at the Constantine Province being of great importance, which was privileged with projects of various forms and an assortment of equipment [2].

This study aims to assess sustainable development through the scientific measurement of its indicators using quantitative and qualitative methods through adopting the Leadership in Energy and Environmental Design (LEED-ND) system as one of the internationally approved systems in an urban area [3] to lay the foundations that do create a harmonious and sustainable environment with the same.

The first version of this system was invented in 1994, whilst its indicators were updated and developed until reaching the latest version, which is Version 4 published in July 2018, as it stands for a voluntary, non-binding system issued by the US Green Building Council (USGBC). Further, it contains many conditions that are required to be met, and each condition has a certain balance or point, together with comprising five main groups, whereat each group seeks to attain a specific number of goals, as follows:

- Smart Location and Linkage: Amid its objectives encouraging the development near and within the existing communities, developing the public transport infrastructures, together preserving the environment and water quality, protecting agricultural lands as a perishable resource, and preserving the green spaces, as well.
- Green Infrastructure and Buildings: It aims at efficient use of water and energy to avoid the wastage thereof, in addition to recovering and using the old buildings, recycling materials, eliminating pollution sources, and encouraging green buildings.
- Neighborhood Pattern and Design: It aims at making walking easing in various streets and public places, reducing dependence on cars, and providing a safe, attractive and comfortable environment that supports public health and encourages walking and cycling.
- Innovation and Design Process: It aims at encouraging creative performance in designing green buildings and smart growth, provided that such creativity is measurable in terms of benefit, comprehensiveness, and the ability to transfer and apply to all projects.
- Regional Priority Credits: This aim at attaining integration between the environmental requirements and the geographical and climatic reality of the project [4].

In conclusion, the system grants certificates that express the extent to which the elements of sustainable development have been attained, as shown in (Figure 1), as listed hereinafter:

- Accredited LEED-ND Certificate: The number of its points ranges from 40 to 49 points.
- Silver LEED-ND Certificate: Its points range from 50 to 59 points.
- Gold LEED-ND Certificate: The number of its points ranges from 60 to 79 points.
- Platinum LEED-ND Certificate: The number of its points ranges from 80 to 100 [5].



Figure 1. LEED-ND Certificate

The value of the present research paper is reflected in its scientific originality as the problem of assessing the sustainable development in the urban poles has become one of the current strategic concerns to achieve viable, flexible, and sustainable cities, together with ensuring their bequeathing to future generations. One of the most important motives that led us to choose this subject matter is the growing interest thereto at present, particularly in countries that have adopted sustainable development as an approach to their policy, along with the development of systems that contribute to its assessment to attain the highest standards of decent living standards [6]. Furthermore, upon completion of this research, we chose the Leadership in Energy and Environmental Design (LEED-ND) system [7], being globally approved, due to its compatibility with the data obtained from the field of this study. Nonetheless, as for the field of our study, we went for a selection of the urban pole "Ain Abid" as one of the modern poles in which the entire social, economic, and environmental aspects are incorporated, and one of the new options being adopted by Algeria to for achievement purpose of the sustainable development.

MATERIALS AND METHODS

The Urban Pole “Ain Abid”: The Excellent Location and the Distinctive Urban Composition

The urban pole is considered one of the important expansions of the Province of Constantine in the east of Algeria, at latitude 36.4484° and longitude 6.63394°; It is bordered to the north by the secondary agglomeration and vast agricultural lands, to the east and south by the East-West Highway and the west by the main agglomeration of Ain Abid (Figure 2). Besides, the site sits on a flat plain whose height does not exceed 850 meters on the surface of the earth, with an average slope of 08%, whose surface is assessed to be 183.38 hectares, which encourages the reconstruction process.

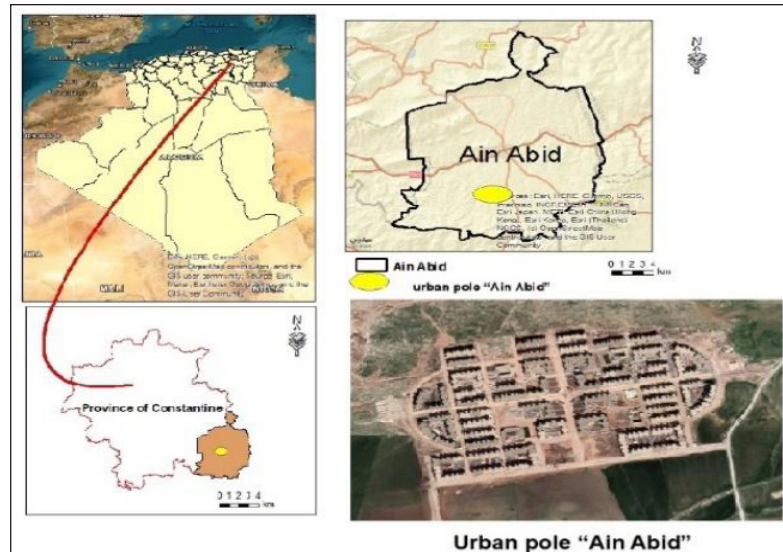


Figure 2. Urban pole “Ain Abid” Prepared by the researchers on ArcGIS

The urban pole “Ain Abid” has excellent natural qualifications that contribute to the implementation of various projects, in respect such as:

- Being located on vacant lands with poor agricultural yields belonging to the State’s properties;
- Having a large real estate surface estimated at 183.38 hectares, free from natural and technological obstacles;
- Being located in the vicinity of the province of Constantine.
- Being located in the proximity of the East-West Highway, which facilitates its connection to its immediate surroundings;
- Being easily supplied with various networks, in respect such as drinking water, sewage, electricity, and communications networks.

Additionally, this city consists of a network of perpendicular roads whereat two perpendicular streets exist in the middle of which, paralleled by a group of roads in a chess pattern, which formed clear geometric shapes in which the various housings and equipment are distributed.

Application of the Sustainable Development Indicators to the Urban Pole “Ain Abid”

To figure out the extent to which the sustainable development indicators are applied in realizing the urban pole “Ain Abid”, we relied on the application of the indicators of (the LEED-ND) system, which was developed on the Excel program (LEED v4 for Building Design and Construction Checklist) [8], whereat the five main indicators should be calculated to reach a final assessment and to know the extent of reliance on the sustainable development indicators in urban planning.

In fact, for the determined purpose of the appropriate point for each indicator in the urban pole, field observations were relied upon together with the professional and scientific experience in the field of planning and reconstruction of the heads of departments of the Directorate of Urbanization, Architecture, and Building, the Directorate of Housing for the Province and the Design and Engineering Department specialized in Urbanization and Achievements.

RESULTS AND DISCUSSION

The results of the application of this system to the urban pole “Ain Abid” have shown to be as follows:

Smart Location and Linkage

This indicator was assessed in the urban pole based on its sub-indicators, whereat each indicator has a specific information point. Hence, the result of this indicator was 18 out of 28, i.e., 64%, which is a good result, as demonstrated below in (Figure 3)

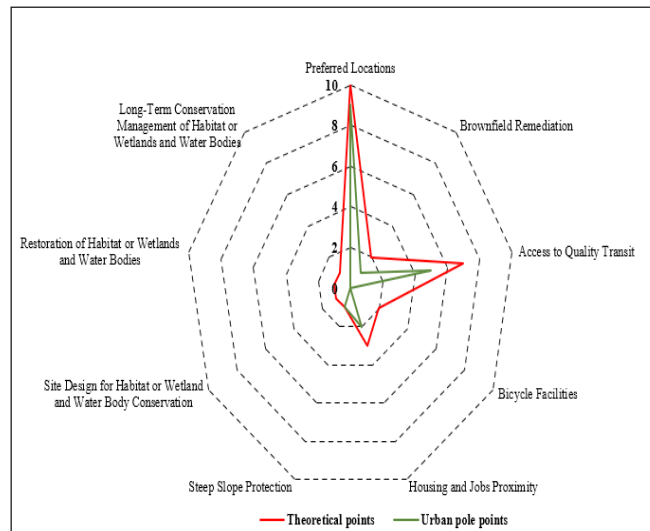


Figure 3. Assessment of the Smart Location and Linkage Urban, realized by the researcher based on the LEED-ND system

The choice of the site got the full point, followed by the indicator of the accessibility to good level transportation due to its ease of linking the same to the road network at the vicinity of the pole. However, stabilizing the slopes, was part of the conducted adjustment works, as this indicator got the full mark. With regards to the indicator of the proximity of housing to workstations, it has shown to be relative and limited to some jobs only, in respect such as trade.

Green Infrastructure and Buildings

The assessment of this indicator depends on the sub-indicators that were applied to the urban pole “Ain Abid”, whereat they were estimated. this indicator is very weak in the study area, at a rate of 29 % only (Figure 4)

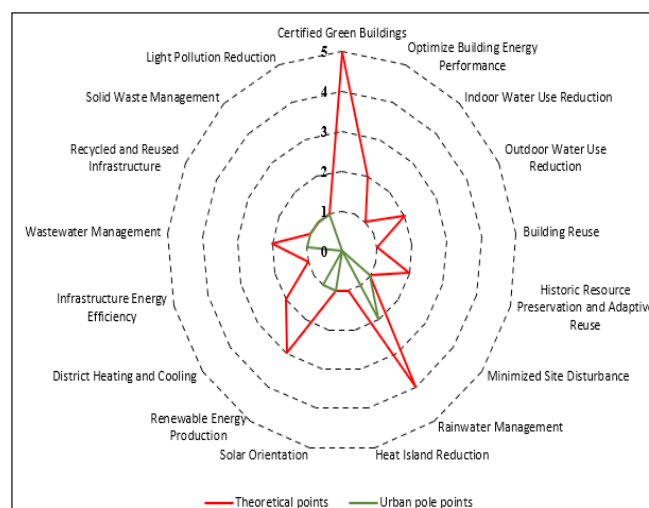


Figure 4. Assessment of the infrastructure and green buildings, realized by the researcher based on the LEED-ND system

This figure demonstrates the extent of poor application of indicators of infrastructure and green buildings, as a result of using old building methods and the failure to integrate the concept of green buildings into the planning, in respect such as the failure to plan the green spaces despite the novelty of the site, together with adopting the old method in using energy under the form of supplying the networking system. In addition, the application of this indicator was manifested in the sub-index under the form of reducing the site's exposure to the risks present in the study area, by avoiding the establishment of any project in its vicinity. Nevertheless, with regards to the solar orientation indicator, seeing that it is respected as per required by the planning and construction rules; however, it is not exploited in energy production. Besides, in terms of the wastewater management indicator, it is relatively available due to the existence of a modern network with studied standards that are compatible with the size of the existing projects in this area.

Neighborhood Pattern and Design

For the assessment purpose of this indicator, its sub-indicators were assessed (figure 5). In virtue of this, the application rate of this indicator together with its sub-indicators in the urban pole "Ain Abid" was assessed to be 73%, which is a result close to good.

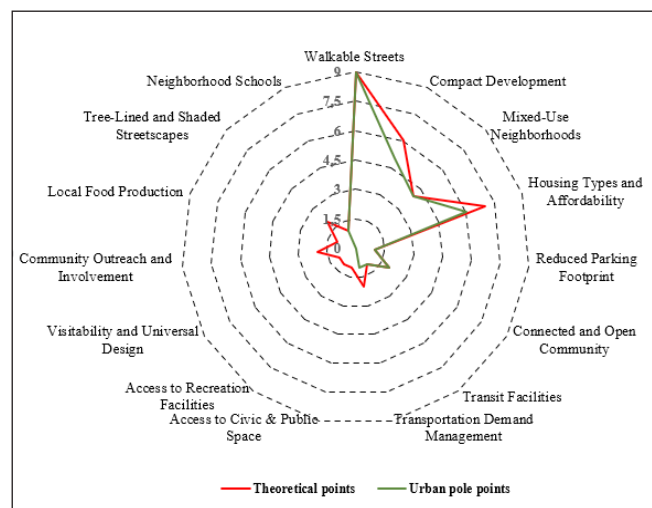


Figure 5. Assessment of the indicators of pattern and design of the city, realized by the researcher based on the LEED-ND system.

This figure illustrates that the application level of the pattern and the design of the city has shown to be average, due to the failure to apply some elements exactly like the existence of no design that shows the identity of this area, as it is a mere chess pattern (customary), which is characterized by the roads intersection and the preoccupation of every single equipment or two of them of a whole plot of land alongside the complete absence of public squares, entertainment spaces and street shading even though the importance of the green component in the urban composition, in addition to the allocation for each residential neighborhood a parking space, which is contrary to the indicator of reducing the area occupied by parking spaces to encourage walking and using the urban mass transportation. More to the point, it should be highlighted that the community participation element is missing in the development of the pole and the preparation of organizational plans, as residency in this area depended on buying housing flats only. Nevertheless, some indicators approached the full mark, in respect such as the presence of wide sidewalks that encourage walking and adopting the principle of diversity in the uses of the land between housing, equipment, and facilities. In addition, there exists a good network of roads that guarantee communication with every.

Innovation and Design Process

This indicator is very important because it allows the creation of innovative methods that contribute to achieving urban development goals, but this indicator has not been fully applied in the urban pole as shown in (Table 1) and the preparation programs are still free of innovation elements such as relying on clean energy and environmental protection from During the good management of rainwater, sanitation, and waste, the introduction of green buildings concepts and the adoption of walking for the health of the citizen.

Table 1. Innovation and Design Process

Indicators	Theoretical Points	Urban Pole Points
Innovation	5	0
LEED® Accredited Professional	1	0

Regional Priority Credits

This is an important indicator that urban projects seek to provide to attain integration between environmental requirements, geographical reality, and climate. Besides, looking at the projects in the study area, we found that they respect this indicator because the study area is built on buildable land far from the agricultural lands, and thus protects the environment despite some of the shortcomings recorded at the internal readiness thereof, as per demonstrated in (Table 2). Hence, this indicator collected a score of 75%.

Table 2. Regional Priority Credits

Indicators	Theoretical points	Urban pole points
Regional Priority Credit: Region Defined	4	3

CONCLUSIONS

Upon analyzing and assessing the sustainable development indicators in the urban pole "ain abid" according to the lead system, we conclude that the planning of the pole has not yet reached the desired level of sustainable development, as the pole got 60 points out of a total of 110, as per demonstrated in (table 3) nonetheless, this policy is still looking for laying the foundations for sustainable development that reconcile reality with the economic, social and environmental needs of the society.

Table 3. Comparison between the theoretical indicators of development and the reality of the urban pole

Indicator	Theoretical points	Urban pole points
Smart Location & Linkage	28	18
Green Infrastructure & Buildings	31	9
Neighborhood Pattern & Design	41	30
Innovation & Design Process	6	0
Regional Priority Credits	4	3
TOTAL	110	60

In light of this, it turns out that there are indicators that fulfill some of the sustainable development conditions, in respect such as the indicator of Smart location and urban communication, as a result of the location of the study area in a suitable environment and easy to connect to different networks of communication and transportation. Nonetheless, the location was not designed to preserve the environment, as evidenced by the realization of projects that are not equipped with clean energy resources and lack green infrastructure, as per evidenced by the indicator of Infrastructure and Green Buildings, in addition to the absence of the element of innovation in the design process because the projects are devoid of programs and mechanisms for good management of rainwater, sewage, and waste, together with the introduction of green building concepts and the adoption of walking for the health of citizens.

However, according to the classification, the urban pole "Ain Abid" has obtained an accredited certificate, but it needs to fulfill other conditions to attain real sustainable development. Hence, Figure.4 demonstrates a comparison between the theoretical indicators and the extent of their application in the urban pole "Ain Abid".



Figure 6. Comparison between theoretical indicators and the reality of the urban pole “Ain Abid”

Above and beyond, amid other conclusions that can alike be drawn, we count:

- Lack of reliance on walking due to the lack of dedicated lanes for bicycles.
- Resorting to the application of using old building methods and the failure to integrate the concept of green buildings into the planning, in respect such as the failure to plan the green spaces despite the novelty of the site.
- Adoption of the old method of using energy in form of supplying the networking system.
- Lack of a design that inspires national identity.
- Complete absence of public squares, entertainment spaces, and street shading, even though the importance of the green component in the urban composition, in addition to the lack of means of transportation.
- Allocation for each residential neighborhood a parking space, which is contrary to the indicator of reducing the area occupied by parking spaces to encourage walking and using urban mass transportation.
- The absence of community participation in the development of the pole and the preparation of organizational plans. Since housing in the pole depends on the purchase of apartments by a certain category only.
- Lack of innovative elements, in respect such as reliance on clean energy, management of environmental protection, the introduction of green building concepts, and the use of walking to serve the health of citizens.

In light of the obtained results, several recommendations were formulated, as follows:

- Creation of urban poles that respect all sustainable development indicators through developing an integrated urban plan to attain a socially and economically stable society in such a manner consistent with the environment and resources thereof.
- Highlighting the reality of sustainable development, and how to rely on the principles and objectives thereof in the urban poles, to create an integrated urban unit within a tight and sustainable urban organization.
- Encouraging the application of sustainability assessment systems, in respect such as the Leadership in Energy and Environmental Design (LEED-ND) system to monitor the extent to which development is achieved.

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