

Application of the INDI Model of the HQE²R Approach to Assess the Sustainability of a Neighbourhood: Case of Jijel City in Algeria

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ABSTRACT

Increased interest in developing sustainable urban areas has become an important feature in recent urban development studies. In fact, the question of neighbourhood sustainability assessment is a major part of this interest. Accordingly, a number of methods and tools for evaluating sustainable development projects in the urban areas have emerged particularly at district level. However, the urban development in Algeria is far from having achieved a clearly defined frame. This work therefore aims to demonstrate the contribution of sustainability assessment to any development project as well as the importance of the district level as a lever for local sustainable development. For this study, the district of the "Beach" formerly known as "Casino" located Jijel city centre, in Algeria, is chosen as a case study. We will focus on the assessment of its current state in relation to the principles and objectives of sustainable development, through a shared diagnosis of the Heritage, environmental Quality, Diversity, Integration, social Link (HQDIL) method and the INDicators Impact (INDI) model of the High Environmental Quality (HQE²R) approach. Along the same lines, a comparison between its initial state and the proposed development project by the land use plan study was made. The results obtained enabled us to draw up a detailed representation of each indicator on a sustainability scale. This led to deduce the degree of sustainability of the "Beach" district, thus to define the weak points, the strong points and to lead to a reflection on the issues and the action plan to be taken into account during a sustainable intervention on the latter. This work provides an aid to decision-making for researchers and urban actors, in order to orient urban development or renewal projects towards sustainability.

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1. Introduction

In recent years, sustainable urban development strategies have become an interesting research field that has attracted the attention of a large number of researchers. This was motivated by a number of challenges that face the urban areas and cities in the

future such as shortage of resources, atmospheric pollution, exploding technologies, climate change and global warming. However, the topic is far from having achieved its main goals especially when case studies meet the real context situations.

By its intermediate status between the building scale and that of the city, the district scale presents a unity and an entity on which the intentions of urban development should be focused to be sustainable. As stated by several authors the neighbourhood is defined as the relevant scale for any urban intervention (Catherine & OUTREQUIN, 2009a, 2009b; C Charlot-Valdieu & Outrequin, 2007; Dind, Thomann, & Bonard, 2007; Gagnon, 2012; Marconot, 2003). The neighbourhood is the place where the inhabitants live and is the social interaction environment (Dind et al., 2007). Certainly, the local and the often decisive scale. Da Cunha (2005) and C Charlot-Valdieu and Outrequin (2007) are based on the social component in their definition of the neighbourhood. They believe that the identity of a neighbourhood refers to the sociological context rather than the geographical one. Indeed, the neighbourhood remains the place where social ties are rebuilt, since it is at this level that the maximum social interactions are concentrated in a minimum amount of space and the place where the most profound manifestations of behaviour and lifestyles take place. In the same logic Bourdin(2003) emphasize on the district-city duality, stating that it is possible to believe that the city's production depends largely on that of its districts. On the other hand, Godard (1996) strongly criticizes this assumption according to which "for global development to be sustainable, it is sufficient that the development of each local space or urban ensemble is itself viable". This is not a question of transposing "generic" models (Da Cunha, 2011), but of providing specific responses for each territory.

In the light of the growing success of the concept of sustainable development and its variations, numerous reflections and research works are focusing on urban sustainability at the city, neighbourhood and even building levels (Ben Cheikh & Bouchair, 2004; Cherqui, 2005; Emelianoff, 2007; D Kaoula & Bouchair, 2018; Dael Kaoula & Bouchair, 2019, 2020; Yopez-Salmon, 2011). Thus, confirming that it has become inevitable to reshape traditional urban policies and strategies. Today, the challenge is to ponder about the tools, mechanisms and devices to identify global problems at the local level, in particular that of the district. It has become clear that the district, the appropriate level of urban intervention, must take into account new global concerns, demands and issues, as well as the diversity of actors and lifestyles. In this context, assessment by indicators has become more generalised. Dahl (2008) listed more than 1200 reference systems in the field of the environment and sustainable development throughout the world. Indicator-based assessment is one of the means for implementing urban sustainability policies at the district level. Moreover, a system of indicators is a switch for moving towards sustainable development (C Charlot-Valdieu & Outrequin, 2004). Diagnosing the sustainable development of a district, therefore, leads to a certain number of relevant questions; the evaluation of which makes it possible to improve the decision-making process and provide "graphic representations" of the quality of life in the neighbourhood (Augiseau, 2009).

From the point of view of sustainable development, urban policies in Algeria have long been the subject of much criticism. Nowadays, it seems essential to wonder about the future of districts in Algerian cities in terms of urban sustainability, which

has become a necessity than a choice. In the current alternative sustainable urban development trend, the sustainability assessment at the scales of the territory, city or district is intended to be a real urban management tool, a decision-making aid tool, or even a crucial means of moving towards sustainable urban development. In this sense, several questions arise, among others: What does an urban sustainability assessment system bring to the management and urban development of districts in Algerian cities? How SD elements can be integrated in urban planning?

Thus, this study focuses on assessing the sustainability of a neighbourhood using the HQDIL method and the INDI model of the HQE²R approach, based on a shared diagnosis of sustainable development in order to define the strengths, weaknesses, issues and envisioned actions.

This integrated HQE²R sustainable development approach was written by Philippe Outrequin and Catherine Charlot-Valdieu and developed by a group of 10 research centres and 13 cities in 7 European countries. Our choice fell on this method since it serves as an assessment of the situations carried out and of the project proposals as well as the possible evolution in the future, while ensuring a dialogue between the various partners of the project. On the other hand, this method does not exclude the neighbourhood analysis in its global context, namely that of the city and its inter-neighbourhood relationships.

The HQDIL method proposes a state of places which concern all the poles of SD (Economy, Environment, Social Aspects, Governance) as well as all the fields of analysis necessary for a neighbourhood, i.e. all the elements constituting the neighbourhood.

The INDI model is also a comparative tool which allows a prospective vision of a neighbourhood. In this sense, we tried to draw up a comparative profile between the development project proposed during the study of the land use plan study and the initial state of the district to assess the expected evolution of the latter and improve the project by identifying insufficiently treated targets.

Our objective through this article is to deduce the essential parameters which ensure the intervention on an existing neighbourhood to raise it to the rank of eco-neighbourhood, Thus to develop a new methodology to promote sustainable development and quality of life in the districts of Algerian cities.

2. Method and Materials

2.1 Description of Study Area

The district chosen for the case study is "Beach" formerly called "Casino". It is located east of the city centre of Jijel City (Figure 1). It covers an area of 45 hectares with a population of 3400 inhabitants. This area is marked by a variety of collective and individual housing, as well as, tourist and bathing establishments. It contains some European style individual inhabitations dated from the colonial period that is qualified as urban heritage. In

addition, it is considered as the main source of animation and attraction for the entire local population as well as for tourists from outside the city of Jijel, which clearly justifies our choice. is bordered on the north by the Mediterranean Sea. This district was chosen with the objective to identify the conditions of sustainable development in the context of the environmental qualities of the urban areas. The field investigation was based on a survey of sustainability judgements from a randomly chosen sample within the district.



Figure 1 Aerial view of “Beach” district taken in 2020 (Source: World image altered with ArcGIS)

2.2 The HQE²R approach and its tools:

The HQE²R project has been materialized as an approach to sustainable development at the neighbourhood level (C Charlott-

Valdiou & Outrequin, 2004). It is a tool to help project owners to integrate sustainable development into their work and to see the city from another perspective. This approach addresses the neighbourhood in connection with the city. This is because the neighbourhood cannot be analysed away of its framework.

The HQE²R approach as well as other international tools such as the SDGs, the city prosperity index, etc., is inspired by sustainable development in its logic. The specificity of this approach lies in the fact that it approaches the district level and goes up to the specifications of buildings and non-built elements while putting the citizen at the centre of the decision-making process. No scale is independent of the others, which justifies the choice of the HQE²R method, which is based on multi-scalar reasoning. The HQE²R approach is structured around the breakdown of an urban project into four phases: decision, analysis of the neighbourhood, development of the action plan, action and evaluation. For each of these phases, HQE²R suggests methods, tools or operational procedures to integrate the concept of sustainable development (Figure 2). This article sheds light more particularly on the second and third phases for which a system of indicators is applied. The analysis phase includes the preliminary inventory of fixtures, the collection of data, the carrying out of the diagnosis and then the determination of the development issues and the priorities of the action plan.

In this phase analysis, the HQDIL method is used to develop a shared diagnosis for the sustainable development of the neighbourhood together with the INDI model to complete the HQDIL diagnosis and graphically present the quality of life in the neighbourhood.

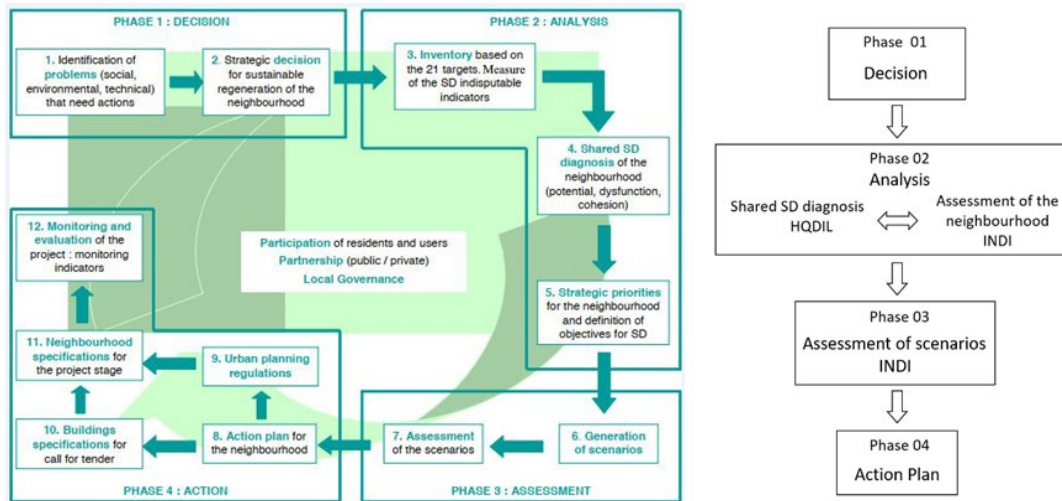


Figure 2 HQE²R phases and integrated tools

2.2.1 The HQDIL method

The HQDIL (Heritage, Environmental Quality, Diversity, Integration, Social Link) method goes beyond the built environment and crosses four categories; residential buildings,

non-residential buildings, building-free spaces and infrastructure with each of the 5 objectives and each of the 21 targets of the ISDIS (Integrated Sustainable Development Indicators System), in order to develop a shared diagnosis of sustainable development. This method is the tool for the HQE²R approach

in the second phase of an urban project. It can be applied to any development or neighbourhood renewal project.

This analysis highlights the potentialities and strengths as well as the dysfunctions and weaknesses of the neighbourhood. The diagnosis should focus on the relationship between the neighbourhood and the rest of the city. The sustainable development of the city can only be guaranteed if that of each of the districts is ensured.

2.2.2 The INDI model

The INDI (INDicators Impacts) model was developed in 2002 by the ISDIS system of sustainable development indicators as part of the European HQE²R project of Philippe Outrequin, La Calade, in partnership with the project's various research teams. In 2005, within the framework of the European SUSI-Man project, an INDI vintage was developed for the French context (C Charlot-Valdieu & Outrequin, 2005). Since then, this reference system has been regularly improved for various development projects. The neighbourhood like the city as a complex system, it requires in its assessment a system of indicators. Accordingly, INDI is a system of indicators and not a set of indicators (Catherine Charlot-Valdieu & Outrequin, 2012). This means that the set of indicators constitutes a one-to-one coherent system. In other words, insofar as this selection of indicators forms an inseparable whole, although it can be completed by depending on the local context. The objective of the INDI model is to help project owners in the evaluation of a territory, a renewal or development project, by integrating sustainable development criteria and objectives. Although it is designed for urban renewal projects, INDI currently can be used for any urban project, in order to improve the decision-making process, to improve the quality of life of the inhabitants and to present it graphically.

The ISDIS system includes 61 indicators that aim to meet the sustainable development objectives of a district. According to C Charlot-Valdieu and Outrequin (2005), each indicator is evaluated individually for a district, in relation to the initial situation and the evolution envisioned within the framework of a project or scenario. This number of indicators appears to be a compromise between a detailed description of the neighbourhood and the project and a capacity to constitute a decision-making tool. That is also a tool for dialogue and even consultation. This model can be adjusted to the context of the application. For our case, the French example, which contains 73 indicators, is the nearest to our context.

This model allows an assessment in two parts. The first consists of an analysis with regard to the 21 sustainability targets and 73 sub-targets. The second is based on the 5 sustainability objectives (table 1). Indicators are tools for analysis, evaluation

and monitoring that can be useful during the different phases of an urban project.

Table 1 5 objectives, 21 targets and 73 indicators

| SD Objectives | SD Targets | Indicators |
|---|------------------------------|---------------------------------------|
| To preserve and enhance Heritage and conserve resources | Energy | 1A - 1B - 1C - 1D - 1E - 1F - 1G - 1H |
| | Water | 2A - 2B - 2C - 2D - 2E |
| | Urban space | 3A - 3B - 3C - 3D |
| | Materials | 4A - 4B |
| | Heritage | 5A - 5B |
| To improve the Quality of the local environment | Landscape and visual quality | 6A - 6B |
| | Built quality and spaces | 7A - 7B - 7C - 7D |
| | Hygiene and health | 8A - 8B - 8C - 8D |
| | Security and risks | 9A - 9B - 9C - 9D |
| | Air quality | 10A - 10B - 10C |
| | Noise | 11A - 11B - 11C |
| | Waste | 12A - 12B |
| To ensure Diversity | Diversity | 13A - 13B - 13C |
| | Urban mixity | 14A - 14B - 14C |
| | Housing diversity | 15A - 15B - 15C |
| To improve Integration | Education | 16A - 16B - 16C |
| | Accessibility | 17A - 17B - 17C |
| | Integration | 18A - 18B - 18C |
| | Mobility | 19A - 19B - 19C - 19D - 19E - 19F |
| To reinforce social Link | Participation | 20A - 20B |
| | Social capital | 21A - 21B - 21C - 21D |

The INDI model uses excel as a tool for assessment based on quantitative and qualitative parameters. The software encompasses four pages: « inputs », « calculation », « analysis » and « results » (figure 3). The indicators are grouped in targets and then into sustainable development objectives. The first page of inputs is presented in the form of a questionnaire concerning the 73 indicators of the model. The exhaustive definition of these indicators is presented in an assessment guide. For each indicator, a quantitative or a qualitative assessment is requested. In the absence of quantitative information a comment is required in order to provide a qualitative response in all cases (Braulio-Gonzalo, Bovea, & Ruá, 2015; Chaguetmi & Derradji, 2019).

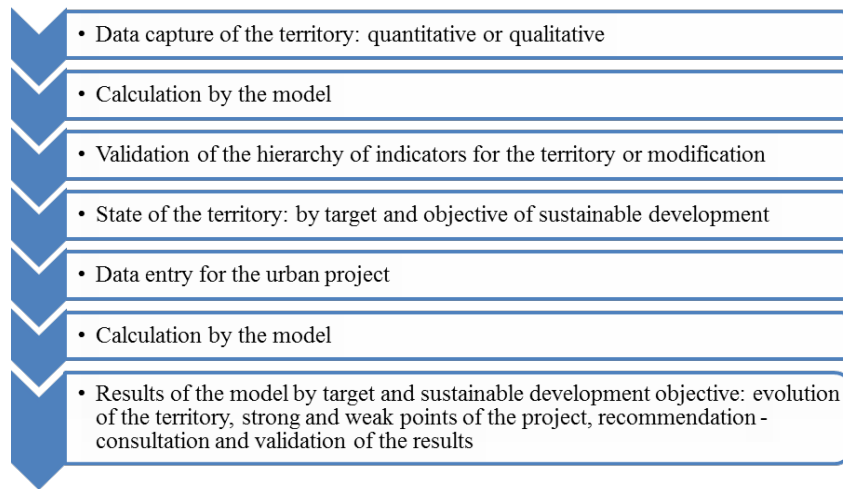


Figure 3 Steps in using the INDI model. (Source : www.credd-lacalade.com)

Table 2 Calculation process of the INDI model (Target 3)

| Objectives | targets | N | Benchmark Unit | Meaning of sustainability | Weighting Coefficient | Site Data | Sustainability Weight | Measurement source |
|--------------------------------------|---------|---|------------------|---------------------------|-----------------------|-----------------|-----------------------|---------------------------|
| H | 3A | 1 | a/m/mf | / | 3 | m | 4 | calculation |
| | 3B | 2 | 40m ² | increasing | 3 | 6m ² | 0 | Calculation and diagnosis |
| | 3C | 3 | 0% | descending | 3 | 0 | 10 | diagnosis |
| | 3D | 4 | 18 | increasing | 2 | 0 | 0 | diagnosis |
| Sustainability Index Target 3 = 3.81 | | | | | | | | |

Following this entry, each indicator is assigned a sustainability function ranging from 0 to 10. The lower value (0) is assigned to the worse situation and the higher (10) to the ideal situation (Figure 4). The development of the sustainability function is defined by a curve and depends on the definition of "benchmark" or target values that allow an indicator to be considered as moving or not towards sustainability. This multitude of indicators refers to the fact that the city is a complex system that should not be reduced to a grid of streets

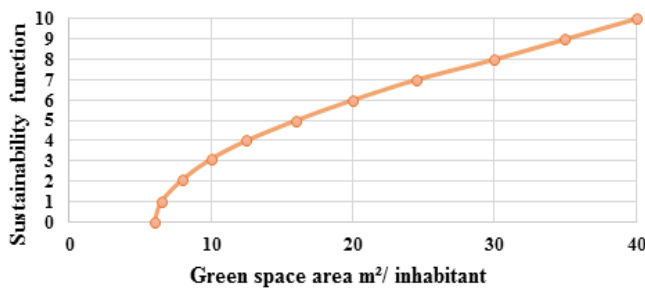


Figure 4 An example of how to determine indicator value (3B) on the sustainability scale. (Source: www.crd-lacalade.com)

or built elements. The weighting given to each indicator depends on its importance in relation to the previously outlined and targeted objectives. Indicators must be measured using effective and reliable information (Table 2).

We choose weighting by the scoring method: distribution of 3 points:

- Three points: Situations believed critical
- Two points: Urgent situations requiring short and medium-term interventions;
- One point: situations requiring improvement over time.

$$\text{Sustainability Index Target} = \frac{\sum (\text{Sustainability Weight} \times \text{Weighting Coefficient})}{\sum \text{Weighting Coefficient}}$$

$$\text{sustainability index objective} = \frac{\sum (\text{sustainability index target})}{\text{number of targets}}$$

2.2.3 The Questionnaire

From a sustainable development perspective, an inventory of fixtures or a shared diagnosis must be carried out by seeking the participation of the inhabitants and users of the district. This stage fully participates in a good evaluation of the existing situation and the definition of an action plan and priority targets for intervention.

Some indicators calculation of the INDI model requires a survey among the inhabitants and visitors of “Beach” district in Jijel City. For this purpose, we have chosen to base our survey on a questionnaire which is subdivided into 3 aspects: form, function and ecology. A population of 250 persons is randomly selected from a total population of 3400 inhabitants of the neighbourhood in question. A confidence level of 95% and a margin of error of 6% is considered. The questions asked concern the following indicators: part of trips made by public transport, part of walking and cycling, part of the population committed to sustainable development initiatives in the district, part of the population participating in community activities or

solidarity and presence of activities in the field of the local economy. The responses to the questionnaire were then transferred into the SPSS software for statistical analysis. These results are then translated to a durability weight that varies between 0 and 10 depending on a benchmark value (ideal value provided by the INDI model)

3. Results and Discussion

3.1 Results of HQDIL Analysis

The current situation analysis of the neighbourhood was made by crossing four categories namely: Residential space: (habitat), non-residential space: (public facilities, services and activities), non-built space (green spaces, woods and all natural areas), Infrastructures and networks (roads, streets, sidewalks and networks) with physical structures of the neighbourhood and their uses. The results obtained through the application of the HQDIL analysis grid are presented in the table 3.

Table 3 Casino neighbourhood analysis by HQDIL method

| Element of district | Structure | Use |
|-----------------------|--|--|
| Residential space | <ul style="list-style-type: none"> -Housing Park: composed of 20% individual housing and 80% collective housing. -The condition of the built environment: in good condition (bad 5%) -The built environment of the site houses a layout of the French colonial period of individual housing type. | <ul style="list-style-type: none"> -The population of the neighbourhood is characterized by extreme youth and a more or less high birth rate -The sex ratio is more or less balanced with a slight advantage for the male sex -A resident population with a diverse social level -Profession: 68.2% public sector and 32.4% private sector -Drinking water consumption of 93 l/day/inhabitant |
| Non-residential Space | <ul style="list-style-type: none"> -The neighbourhood gathers a diversity of cultural, educational, administrative and other sports facilities. -Presence of communal equipment: stadium, railway station and clinic | <ul style="list-style-type: none"> -The diversity of equipment has resulted in a diversity of uses and visitors -The diversity of equipment contributes to social cohesion and provides a flow of capital and information - This diversity is mainly aimed at satisfying the needs of the inhabitants but also to meet the needs of the population of the whole city |
| Non-built space | <ul style="list-style-type: none"> -Green space area: 6m²/inhabitant -Lack of relaxation areas for young and old people | <ul style="list-style-type: none"> Use: low utilization Cleanliness: degraded condition, poorly maintained Security: more or less ensured |
| Infrastructure | <ul style="list-style-type: none"> -Good public transport service -Good road conditions | <ul style="list-style-type: none"> -Mechanical mobility: strong dependence on the private car -Mild mobility: low |

3.2 Results of the Application Of The INDI System

Table 4 and figure 5 show the results of the assessment of the sustainability of the “Beach” district with the INDI

model in relation to 73 indicators. This allowed us to assess the current situation of the site in relation to the different dimensions of sustainable development. In this graph we can see those indicators: 2A, 3C, 8D, 9A, 10B, 10C, 19D are located in

the range of strong sustainability (exceed the average) with scores above the reference value. Whereas, the indicators: 2E, 3A, 8A, 19C, 19F are sustainability averages lying between 4 and 6. The situation of the latter is not considered critical, while

indicators 1A, 1B, 1C, 2C, etc. are of low sustainability (or non-sustainability situation). Urgent actions must be taken to address these. Table 4 shows the sustainability level of “Beach” district using INDI model with reference to 73 indicators.

Table 4 Sustainability level of “Beach” district using INDI model according to 73 indicators.

| | |
|---------------------|--|
| High sustainability | 2A, 3C, 8D, 9A, 10B, 10C, 11A, 13A, ,13C, 14B, 14C, 16A, 16B, 16C, 17A,18A, 18B,19B, 19D |
| Medium | 2E, 3A, 8A, 8B, 11B, 13B, 14A, 18C, 19C, 19F |
| Low sustainability | 1A, 1B, 1C, 1E, 1F, 1G, 1H, 2B, 2C, 3B 2D,3D,4A,4B,5A,5B,6A,6B,7A,7B,7C,7D,8C,9C,9D,10A,11C,12A,12B, 15B 17B,17C,19A,19E,20A,20B,21A,21B,21C,21D |

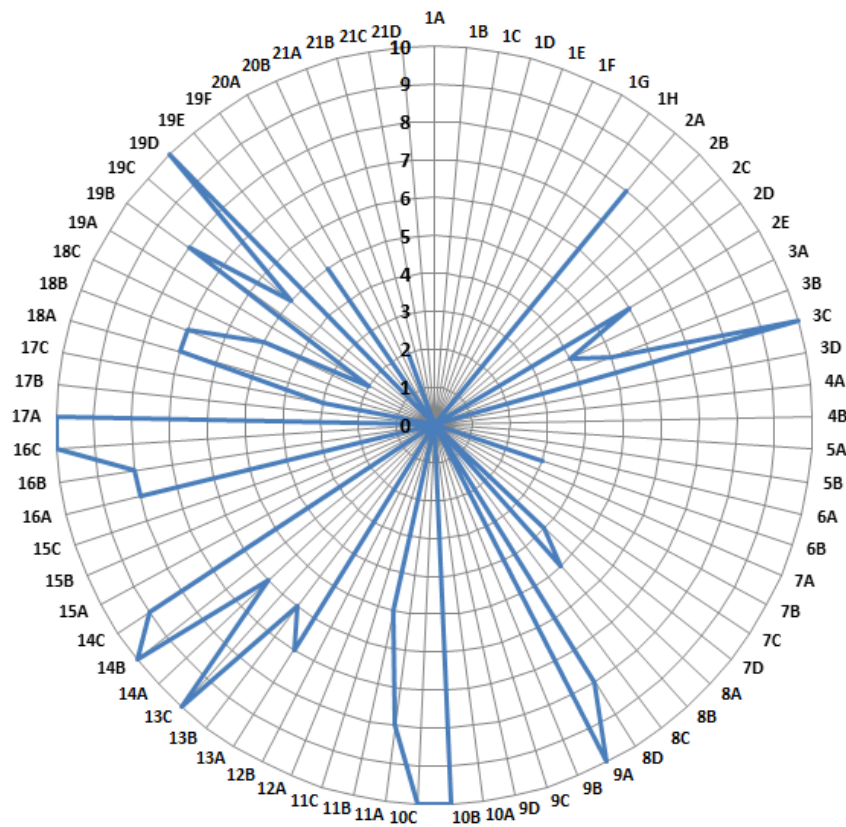


Figure 5 Radar diagram for the analysis of the “Beach” district in relation to the 73 indicators.

It should be noted that if certain indicators are not taken into consideration in the evaluation, it is because they may not be an object of thinking. Figure 6 shows the sustainability profile of the neighbourhood by the 21 INDI model targets. It can be noted that the targets: energy management, water management, space management, materials management, heritage preservation, landscape preservation, housing quality, hygiene

and health, safety, waste management, employment, social cohesion, solidarity, are low sustainability targets (less than 4). Therefore, we must act on them. While the targets for medium sustainability between (4-6) are: noise pollution and mobility. On the other hand, the targets: air quality, population diversity, function diversity, education and attractiveness are of high sustainability.

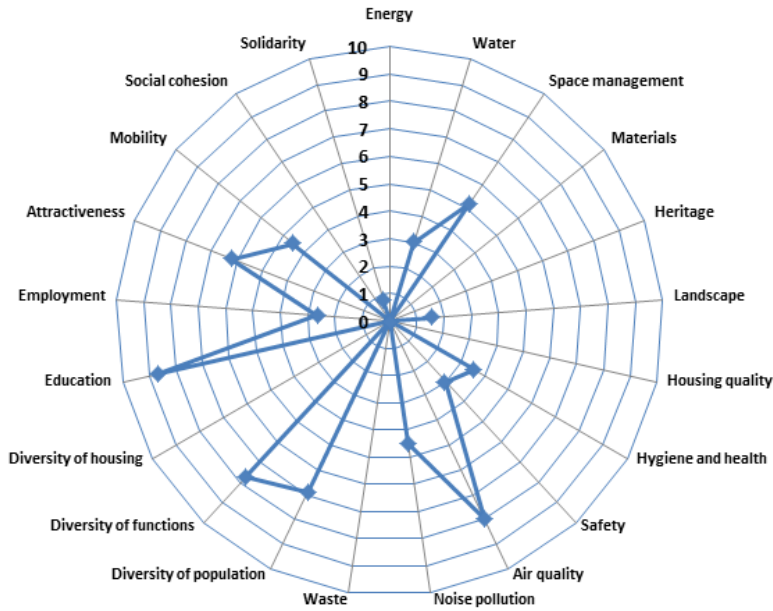


Figure 6 Radar diagram of the “Beach” district analysis with respect to the 21 SD targets.

Figure 7 and table 5 show the assessment of the neighbourhood in relation to the five objectives of sustainable development. It is noticeable that social cohesion is the first objective to be achieved. To achieve this, social cohesion must be strengthened by involving the population in the management of their district. The second objective is to preserve and enhance the heritage and

conserve resources. Therefore, it is necessary to carry out actions for the preservation of the historic built heritage of the district. The third objective is to improve the quality of the local environment, since the neighbourhood does not perform sufficiently well in terms of environmental resources and does not meet urban management criteria.

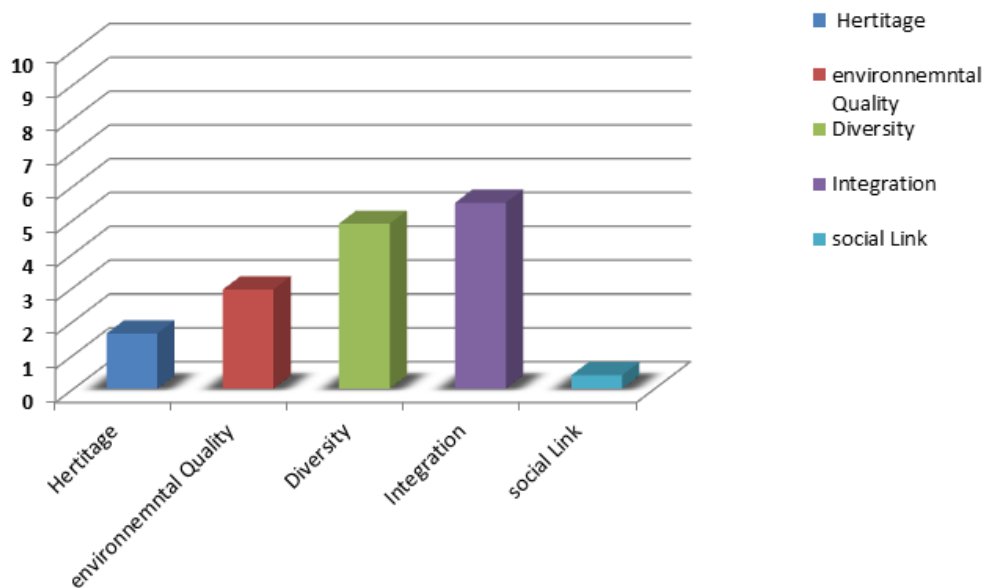


Figure 7 Analysis of the “Beach” district with regard to the 5 objectives of sustainable development.

Table 5 Weaknesses and potentialities of the "Beach" district according to the 5 aspects of SD

| Aspect | Weaknesses | Potentialities |
|---------------|---|---|
| Resources | <ul style="list-style-type: none"> -Total lack of use of renewable energy sources -High residential water consumption and poor storm-water management. -Insufficient surface area of public green spaces for inhabitants -Absence of an environmental quality approach for building materials -Natural and architectural heritage set aside | <ul style="list-style-type: none"> Programming the use of solar energy for educational buildings |
| Environmental | <ul style="list-style-type: none"> -Poor visual quality and maritime pollution caused by <i>the wadi el kantara</i> flowing directly into the sea. -Existing housing stock of poor quality -Neglect of PMKs in neighbourhood developments -Public space poorly maintained -Noise pollution during the summer season (RN43 and avenue Benboulaïd) -Poor waste management and lack of selective sorting | <ul style="list-style-type: none"> -Good accessibility to the site from several entrances. - The proximity of our study area to the city and its opening to the sea (attractiveness) - Security and medical supply |
| Diversity | <ul style="list-style-type: none"> -Low employment rate | <ul style="list-style-type: none"> -Presence of commercial activity -Good distribution of equipment and utilities |
| Integration | <ul style="list-style-type: none"> -High unemployment rate -Modes of transport not compatible with social and environmental concerns | <ul style="list-style-type: none"> -Population diversity by age groups -Presence of equipment of communal interest -Use of public transport |
| Social | <ul style="list-style-type: none"> -A lack of coordination and consultation between the authorities and the inhabitants. - Lack of involvement of residents in community activities -No solidarity association in the district | <ul style="list-style-type: none"> -A strong willingness on the part of the inhabitants to commit to sustainable development initiatives. |

3.3 Comparative Study of The Proposed Development Project with The Neighbourhood Situation

Figure 8 illustrates the results of a comparative study of the proposed development project (in the land use plan study) with the neighbourhood situation, on the one hand, and with the sustainable development targets on the other.

From an initial coverage of sustainable development targets in the "Beach" district expressed by a blue line, the red surface corresponds to the expected impacts of a proposed development project for the district. This has enabled us to demonstrate the project's contribution to the expected improvement of the neighbourhood (comparison between the initial state and the proposed project) in order to have a prospective vision of the later.

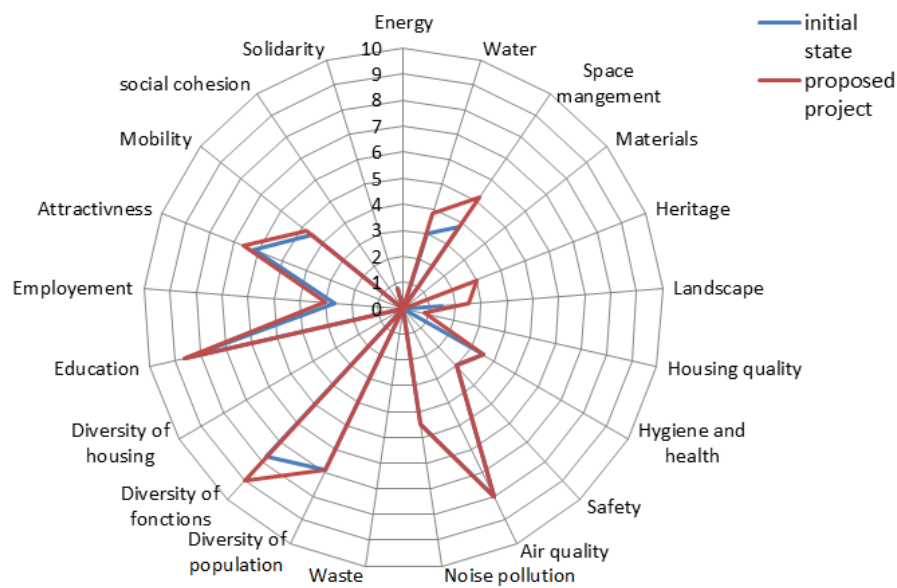


Figure 8 Assessment of the project with regard to the 21 sustainable development targets

In addition to the previous figure, figure 9 illustrates the improvements expected for the neighbourhood thanks to the project for each of the 21 sustainable development targets: for the buildings in the neighbourhood as well as for the

development of the district. Project gains or expected improvements concern the following targets: water, land management, heritage, landscape, quality of housing, diversity of functions, employment; attractiveness and mobility.

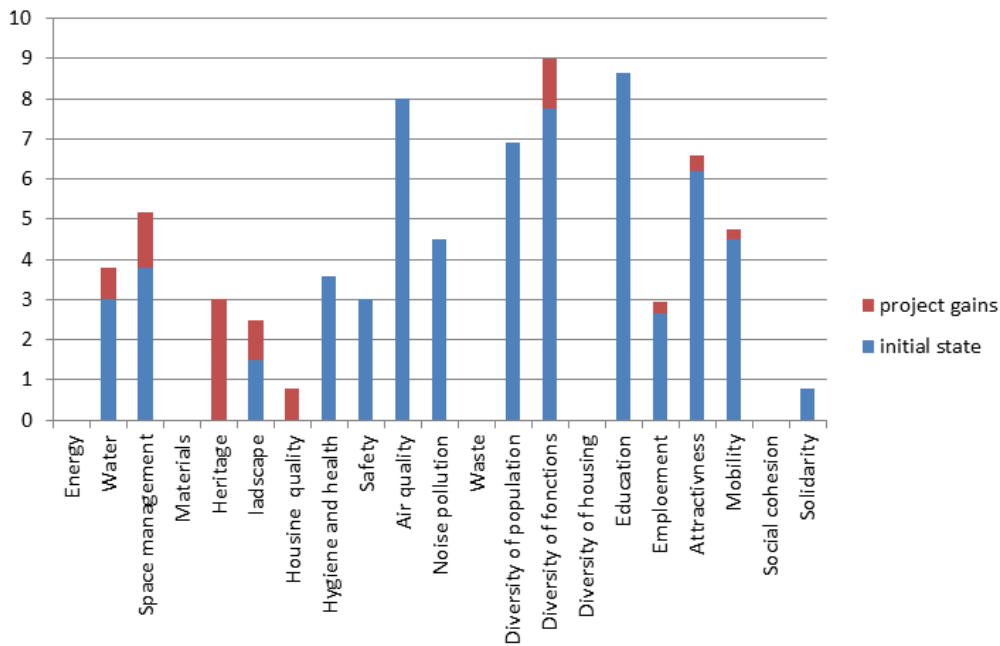


Figure 9 The gains of the improvement project for each of the sustainable development targets

Figure 10 is a representation of the results of a comparative study of the proposed development project (in the land use plan study) with the neighbourhood situation, on the one hand, and with the objective of sustainable development on the other.

In terms of sustainable development objectives, the project proposed during the revision of the land use plan study does not really bring a significant improvement. The planned actions remain one-off and only bring superficial gains.

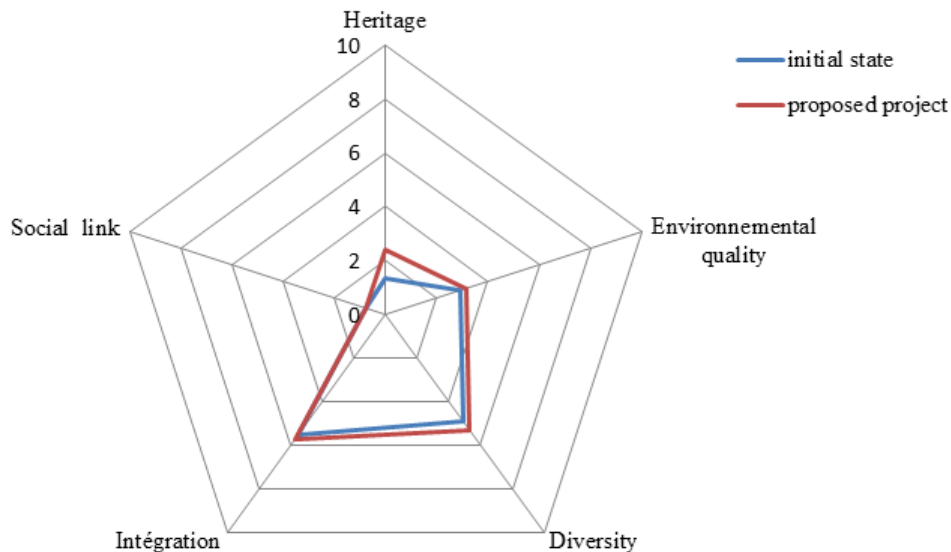


Figure 10 Analysis of the improvement project with regard to the 5 objectives of sustainable development

4. Stakes and Actions

After having established a shared diagnosis of the neighbourhood and defining the local issues in order of priority, the next phase (phase 4 of the HQE²R approach) consists in establishing a program or an action plan with the strategic orientations and the measures to be taken, as well as the constraints to be respected. Then, specific recommendations will be proposed in order to take into account sustainable development in urban planning.

4.1. *Preserve And Enhance The Heritage And Resources*

4.1.1. Moving Towards Renewable Energies

The aim here is to preserve exhaustible resources and reduce greenhouse gas emissions by using renewable energy sources such as solar, wind, etc. These ambitious objectives require a solid reflection towards a policy of energy efficiency and a bioclimatic approach during development and renovation.

4.1.2. Sustainable Management Of Water Resources

Sustainable management of potable water at the neighbourhood level involves a number of techniques: individual metering, double water meters (rainwater meters), and water-saving devices, use of a separate system for rainwater and household water... etc.

Rainwater harvesting present also a growing interest to cope with increasing soil sealing and flooding problems. Potholes, ditches, vegetated flat roofs; drainage and infiltration trenches; basins, underground tanks, porous materials (concrete paving, grass slabs);.Etc. are all techniques available today to promote rainwater collection and preserve the permeability of the soil in relation to the characteristics of the site and its potential on the environmental level..

4.1.3. Reconciling Density And Quality Of Life

Density should be studied at the neighbourhood level in order to reduce space, and energy consumption. Indeed, better density refers to a controlled architectural design, social mix, functional diversity, and enhancement of public or private outdoor space.

4.1.4. Differentiated Management Of Green Spaces

Within a district, the vegetation of residual areas and the implementation of facilities that are favourable to the fauna and the flora improve the living environment of the occupants. In addition, preserving existing natural areas and linking them together by ecological corridors allow different biotopes to develop and maintains biodiversity and landscape quality.

The majority of the roofs in the "Beach" district favour the use of vegetation. In this context, roof vegetation should be considered for any non-accessible flat roof of more than 50 m². Thanks to their composition, green roofs make it possible to

delay rainwater runoff and reduce ventilation needs by 20% to 30%.

4.1.5. Ecomaterials

An eco-construction also aims to integrate and optimize the use of local and renewable materials throughout the life cycle of the building while respecting the environment and public health. Materials that require a minimum of exhaustible resources and generate the least amount of waste are preferred.

4.1.6. Preserving the Built And Natural Heritage

A process of a redevelopment or urban renewals of an old neighbourhood must take into account the particularities and specificities of the existing heritage. Indeed, the urban layout of the colonial period in the northern region is an added value for the district, thus improving its attractiveness. This includes: improving the technical quality of historic buildings, rehabilitating the built and natural heritage with tourist and cultural attributes, and improving the visual quality of the facades and the urban landscape.

4.2. *Improving the Quality Of The Local Environment*

4.2.1. Improving the Quality Of Housing:

The quality of housing depends largely on: the choice of non-polluting and ecological materials, the thermal and acoustic comfort of the buildings, the energy performance and insulation of facades, etc.

4.2.2. Fight Pollution

The challenge is to combat pollution without compromising the pursuit of economic and social development. This problem goes well beyond the boundaries of the district, since its impact is on a larger scale, but the solutions begin with the ordinary citizen, the person primarily responsible for the pollution.

4.2.3. Sustainable Waste Management

The aim is to reduce the amount of waste produced within the neighbourhood and to ensure better waste management by raising awareness among the population. At this level, waste must be thought of in terms of selective collection, sorting, treatment and recycling.

4.3. *Improving Diversity*

4.3.1. Diversity of Functions

The mix of functions (housing, work, entertainment, etc.) at the district level clearly justifies the concern of the density and for limiting transportation needs, on the one hand, and reducing energy consumption on the other. This implies strengthening

local services and linking the centres around soft modes of transport.

4.3.2. Quality of Equipment

Ensuring a balanced supply of local facilities is a prerequisite for maintaining social cohesion. Moreover, the quality of facilities within a neighbourhood goes hand in hand with meeting the needs of its inhabitants.

4.3.3. Housing Diversity

Offering a varied typology of housing in terms of size, use and occupation contribute strongly to the development of social links and solidarity between the inhabitants. Of course, a balanced housing offer must be able to address all social categories and meet their needs and aspirations.

4.4. Improving Integration

4.4.1. Unemployment and Employment

Like the environmental aspect, social and economic issues need to be given special attention at the district level. Providing employment for people in difficulty is an indicator of better integration of the neighbourhood into the dynamics of the city. The aim here is to ensure social reintegration with a view to an appropriate distribution between the active and inactive populations.

4.4.2. Quality Public Spaces

The challenge in the design of public spaces is to offer places for sharing and social mixing by excellence. The district's public spaces must offer a multiplicity of uses, quality, comfort, and attractiveness while taking into consideration the needs of the inhabitants and particular modes of appropriation.

4.4.3. Encouraging Soft Mobility

The need to control individual motorized travel and to promote soft modes of transport is no longer in evidence. Admittedly, the organization of the neighbourhood must be based on a global transport policy favouring urban renewal, the diversification of functions, and a good interconnection of non-polluting means of transport (alternative fuel vehicles), although this implies greater coordination of the actors involved in planning and transport service.

4.5. Strengthening Social Bond

4.5.1. Promoting "Living Together"

Based on the design of collective spaces, green spaces, meeting spaces, etc., we must take into account ensuring social cohesion, symbolic meaning, local identity, and urbanity while promoting "living together" between the individual and others.

4.5.2. Participation and Local Governance

The success and the acceptance of a sustainable development project by its inhabitants refer to the integration of the latter in all the studies and design stages as well as in the process of post-occupational management. Certainly, the development of a culture of participation and co-decision are the conditions for the establishment of a climate of trust between the inhabitants and the decision-making sphere.

The sustainability of this approach is encouraged by the creation of a "participation plan" for associations, training, information, and awareness workshops.

5. Conclusion

The assessment of urban sustainability is a key element upstream of any urban development or renewal operation. In addition, ensuring the effectiveness of the implementation of urban policies at the district level must be supported by sustainability assessment tools. The main objective of our work was to assess the "Beach" district in terms of sustainability by defining its weak points, its strengths and the action plan to be taken into account during a sustainable intervention. The results showed that the degree of sustainability of our case study is relatively low. Of the 21 Sustainable Development Goals, 13 are considered unsustainable. On the other hand, the evaluation of the scenario of the proposed project against its current state brought only superficial gains. On the basis of these results, we are able to identify the priority action areas and recommendations for urban actors in order to contribute to the decisions taken for each urban development or renewal project. This study outlines the urban policies that should be applied. These results have vast advantages for the development of reflections on the integration of the principles of sustainable development and assessment tools in the urban domain. From an empirical point of view, the contribution of this study is to pay particular attention to the future of Algerian cities and their districts, in order to solicit the thought to find adequate alternatives. It is important to review and rethink the current planning policy in concrete terms in order to come up with new forms of "living differently", which is part of a logic of continuous improvement; open to evolution and local democracy.

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