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Multi-criteria evaluation applied to a pilot sustainable neighbourhood project in Algeria: The El Ryad neighbourhood concerning sustainability indicators

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Abstract: In the face of the global climate crisis, sustainable urban development became the essential means to the application of sustainability in urban areas. It presents itself as one of the major issues within urban planning and development. To guide these policies, the evaluation represents a critical step to implement sustainability actions. A series of indicators are available in the form of methods and decision-support software. In Algeria, this process is still brand new; and with this in mind, the exchange of experience from the northern countries needs to have a framework and be "contextualised" so that it is as relevant as possible, to answer the needs of sustainability. In this paper, a reflection is undertaken on the adaptability of an evaluation method—originally developed for a different context—when applied to the Mediteranian setting. This study also looks at a system for repositioning objectives by weighting them according to the importance of each objective selected from among those targeted by existing sustainable development assessment tools in a given context. The application of this method to the case study enabled us to observe a reduction in the gap between the profile obtained and the actual on-site reality, compared with the 'crude' application of pre-established imported methods, and consequently to take a more concrete look at the project being assessed. At the same time, the case study, which is a 'pilot sustainable district', has a fairly satisfactory sustainability profile in terms of the local context. A few improvements could be made to enhance its sustainability profile, mainly by optimising the use of non-renewable energy and using new technologies for the promotion of renewable resources and renewable energy.

Keywords: eco-neighbourhood, evaluation, sustainable development indicator, sustainable urbanism, Oran

INTRODUCTION

The global building sector alone consumes approximately 40% of natural resources and the energy produced, it is also "the source of 40% of global greenhouse gas emissions", particularly following the exploitation of constructions after completion of the work, and throughout their life cycle. Faced with this problem linked to the sustainable development of human societies and the way of approaching the sustainability of cities (Emelianoff, 1999, 2007) and following the conclusions resulting from the work of the Rio summit in 1992, the city is today questioned in its different dimensions: material, functional, social, economic and political (Holden et al., 2014). Sustainable urban planning presents itself as one of the major means of implementing sustainability in the urban areas. The implementation takes place within urban planning policies, through territorial political sustainability tools such as Agenda 21 for example, or more rarely, it can come from civil society. From then on, sustainability is implemented in the form of public policies based largely on citizen participation practices. A series of questions surfaced. These questions concern the physical support of human development; the city as a concentration of the development of society, relies heavily on its natural environment to meet its needs (in soil, food, water, energy...). Can the city, at that time, be approached in its sustainability within its administrative limits only (Mori and Christodoulou, 2012)? The sustainability of "the city" then appears a utopian concept. That said, this utopia nevertheless makes it possible to constitute an ideal reference (even inaccessible) that can mark a benchmark around which cities can be located (Verhage and Leroy, 2014).

The concept of sustainability actually implies a value judgement as to the objectives targeted, in relation to the territories concerned (Thore and Tarverdyan, 2021), and to the time scale chosen (long or short term). The SUBJECTIVE value of sustainable development around an urban project (negotiations between stakeholders around a project), combined with its NORMATIVE value (relating to the will of governance), gives rise to the need for a sustainability assessment process using a battery of indicators (Gallopín, 1997; Levrel, 2008; Perret, 2009), which relate to the environmental, social and economic parameters of the projects concerned. These indicators are variables whose value reflects the state of a phenomenon. Progress in measuring the contribution to the Sustainable Development Goals (SDGs) is one of the crucial issues highlighted in academia (Bidarbakhtnia, 2019). These approaches can help strengthen the role of univer-

sities in achieving the SDGs while improving their social and environmental impact.

Urban indicators for sustainable development

Urban sustainability indicators constitute a combined system in the sense that using an isolated indicator is not sufficient to analyse a project. They must be approached in their entirety in order to answer all the questions relating to sustainable development targets and the existing or potential interactions between the objectives targeted in producing a diagnosis of a district or, more broadly, an area. We will use the classification of Philipe Outrequin and Catherine Charlot-Valdieu (2005) of urban indicators for sustainable development. The authors have divided them into four main parts, which can be used separately or in combination, depending on the appropriate context or the stage at which the various players are involved: indicators for analysing a situation, indicators for defining an action plan, indicators for aiding decision-making and indicators for implementing and monitoring an urban project. Jégou et al. (2012) refer to 'composite' monitoring indicators, each of which reflects several objectives on the same time.

The holistic attribute of the "combined system" of sustainable urban development indicators

Numerous indicator-based evaluation systems are in use (Brédif, Arnould, 2004); by 2008, more than 1,200 sustainable development benchmarks had already been identified worldwide (Dahl, 2008). Their development approaches differ (Joumard, 2018), but they are not all based on a holistic approach (Charlot-Valdieu and Outrequin, 2002, 2005), which means that they cannot consider the specific characteristics of the urban situation to be assessed. Bell & Mores confirm that an integrated assessment model must take into account the overall strategy defined by the local policy (Bell and Morse, 2008), the actions performed upstream and the local issues at stake, which means that the shared objectives (of the other grids) can then be weighted according to the importance and priority given to each in terms of the local policy (after a specific inventory and diagnosis).

In the end, the local decision-making tool should be able to specifically assess the quality of the urban whole, and the actions to be taken that are specific to the case under study. More significantly, an integrated approach, unlike an isolated environmental or social approach, allows action to be taken at every stage. It is considered to be an equitable and more representative approach in that it articulates the three dimensions of the concept of sustainable development at the same time (economic growth, social equity, and environmental quality) (Charlot-Valdieu and Outrequin, 2009). It therefore covers the other two approaches, which is why it is often chosen as the basis for evaluating sustainable neighbourhood projects.

Urban development strategy in Algeria

In Algeria, a new political will is emerging to integrate the concept of sustainability into urban planning. Since the establishment of the Ministry of Spatial Planning and the Environment (MATE) in 2000, the sustainable development strategy has been implemented through two action plans: a three-year plan (2001–2004) and five-year plans (2005-2009) (2010–2014) and (2015–2019) (Bouacida, 2016, Bérass, 2020, Mesbahi, 2021). This policy was initially endorsed by the National Action Plan for the Environment and Sustainable Development (PNAEDD) developed by the Ministry of Spatial Planning and the Environment, followed by the National Spatial Planning Scheme (SNAT) and the Renewable Energy and Energy Efficiency Development Programme (PDEREE) covering the period 2010–2030. These programmes are a continuation of the previous ones.

In this approach, the case of the city of Oran is one of the most representative. This large and largely urbanised conurbation represents a complex system of interrelated urban fractions, but also a polarising centre of a regional urban composition. Furthermore, in recent years, Algeria's second-largest capital city has seen the emergence of a real desire (on the part of public players, private developers and citizens) for a sustainable vision of the city. This desire is expressed through membership of the R20 MED (Regions of Climate Action) through pilot actions to recycle waste at source, for example, in three pilot districts in Oran (the 'Akid Lotfi', 'AADL pépinière' and 'RYADH' districts), as well as the emergence of the first district designed on the basis of sustainable development objectives, namely the 'El Ryad' district, the sample chosen for our study.

However, this approach to sustainable urban development reveals the need for a support system for the approach, to frame the actions in terms of know-how, tools, institutions, and financial and human resources, which has not yet been fully put in place (Berezowska-Azzag, 2011). A number of researchers have examined this issue. Some (without being exhaustive) have discussed the development of an environmental policy in Algeria, questioning the sustainability of buildings (Tebbouche et al., 2017), while others (Bourahla et al., 2024) have tried to apply pre-established models to the context of local neighbourhoods (Chaguetmi and Derradji, 2019; Roula and Bouchair, 2021), informal settlements (Lamdjad and Khalfallah, 2022) or historic sites (Sehili, 2016).

The factors influencing the various indicators are another subject of debate that has attracted particular attention from researchers who have investigated the subject (Lamari, 2011). The work of M. Srir (Srir, 2013) on sustainable development benchmarks for the city of Algiers demonstrates that it is entirely possible to create a benchmark adapted to local sustainable planning needs by developing 'a grid of urban quality criteria'. Y. Bouacida (Bouacida, 2016) classifies these sustainability indicators for Algeria in three categories: flagship indicators (such as greenhouse gas emissions, rational use of energy and promotion of renewable energy, access to wealth, etc.); composite indicators that combine several components at once (such as the Human Development Index (HDI), which captures the social dimension of sustainable development through its three components, which are: health and longevity of individuals, their level of education, and the decency of their standard of living), and finally global indicators such as adjusted net savings or the ecological footprint linked to human activity. In line with this impetus, and to complement the limited existing work on this approach, this study proposes a new multi-criteria evaluation and decision-support method that combines two methods for assessing sustainability at the urban level.

MATERIALS, DATA AND METHODS

The aim of this research work is to create a local evaluation grid that allows the object to be seen in its true value through its 'contextualisation'. Experience observed in other contexts cannot necessarily be imported in their 'raw' form, and their reproduction cannot guarantee similar results. For this reason, we have turned our attention to a composite tool that aims to superimpose the data used by two evaluation systems at the same time, namely the indicators in the grid of the University of Quebec's eco-counselling charter and those in the INDI (INDicators Impact) software of the ISDIS system developed by the SUDEN association.

Combining two methods to create the analysis grid

To make this choice (of the two tools mentioned above), we first tried to review the main evaluation tools developed in this area, then the selection was narrowed down to those targeting global issues, in other words those that touch on environmental, societal and economic indicators at the same time. The second filter was the scale of intervention, i.e. the neighbourhood scale.

The first is the HQDIL grid with the sustainable development grid from the Chaire de recherche et d'intervention en Éco-conseil (Villeneuve et al., 2009). This tool has been tested, used and taught in several countries on various types of economic, social and environmental policies, strategies, programmes and projects. In addition, this tool has been the subject of a collaboration with Algeria, as part of the training given to CNESE expert analysts in 2019. The 'SD Analysis Grid' was used to assess sustainable development objectives in the light of the country's local policies in various sectors (National Biodiversity Strategy, Climate Plan, National Cancer Control Plan, National Land Use Strategy, Five-Year Agricultural and Rural Development Plan).

We also find this second model interesting because it is based on an integrated approach (i.e. it includes all three evaluation components at the same time). In fact, the grid is built around human needs, it also focuses on goals that can be interpreted as indicators, and the explanation of goals through comments (especially directives) follows the same operating logic as that developed in the INDI model. It can be used in two ways: summary and exhaustive, and the approach is intended to be evolutionary. The grid is made up of 4 tables relating to the 4 dimensions of sustainable development, each of which targets a series of sustainability objectives to be achieved (16 objectives in all).

The model for evaluating urban projects using SD (sustainable development) indicators developed as part of the HQ2R approach, or the INDI model, for its part, is a tool illustrated with a radar diagram that links the qualitative performance of an area (neighbourhood) to the overall objectives of sustainable development. These objectives are expressed in the form of sustainability targets and sub-targets (21 in all), which are analysed. These 21 targets are translated one by one into indicators (61 in all), which enables us to 'quantify quality'. Each indicator is given a value ranging from -3 to +3 depending on the extent to which the target has been achieved, with the higher the score the better. At the end, they are used to situate the district on a sustainability scale (the scale given is from -3 as the lowest score to +3 for a sustainability target achieved with excellence).

To pass the evaluation, the project should cover the entire radar drawn by connecting the points relative to each target. With this tool it is also possible to measure the evolution of the neighbourhood for each action to be developed, i.e. to visualise the future scenario by modifying the impact of the imagined actions (actions to be developed according to the evolution of the project). The different profiles were developed to make it possible to develop the most relevant action plan scenario concerning the sustainable development of the district. We chose this tool for the fact that its scale of analysis is the only one of the methods selected by Bui To Uyen (Uyen, 2012) specific to the "district". Then, the tool offers the advantage of drawing a graph that allows an easily assimilated reading of all of the sustainability profiles of the analysed district.

The tool is rather intended for redevelopment and rehabilitation projects of already existing districts, this does not change the nature of the objectives but rather calls into question the positioning of certain objectives in the grid of analysis before the radial graph of the profile (especially the economic aspect). Some indicators pose measurement application limits in the Algerian context and are therefore eliminated from the evaluation process. INDI reference values that are not adapted to the Algerian context may also distort the evaluation result and the radar image obtained at the end (Chaguetmi, Derradji, 2019; Roula and Bouchair, 2021). The operation of repositioning the objectives according to the priority given to them (method mentioned above) can be expressed through the 'objective weighting' box on this grid, which allows us to give a 'coefficient' to each objective according to its order of priority in the context studied. In this way, we will be able to draw up an analysis of the district using 'weighted indicators', which we will then try to superimpose on the graph of the HQE2R INDI model. The indicators in the two grids therefore seem to us to be complementary.

We believe, therefore, that we are moving closer to a model adapted to the very specific context of Algeria. Despite the efforts of a number of researchers, the country still lacks this type of assessment tool, which is nevertheless necessary to support public policies and other players in the decision-making process, in integrating sustainable development as an approach, particularly in urban projects. On the basis of this classification and the indicators of the two models we have selected, the work consists in classifying a certain number of those previously selected according to the actions targeted by the national policy undertaken. The table we have been able to draw up classifies the objectives into four categories of overall sustainable development objectives, dealing with the ethical, social, economic and environmental dimensions, as in the two evaluation frameworks we have selected (i.e. the Canadian eco-counselling charter grid and the ISDIS system). For each overall objective, we will find guidelines (targets) which will be interpreted as indicators. We have therefore obtained 18 targets which are divided into 47 indicators as shown in Tab. 1.

Tab. 1. Local analysis grid by sustainability indicators. (Source: Authors, 2024)

OBJECTIVE 1 : EQUITY

TARGETS	INTERPRETATIONS OF THE OBJECTIVES INTO INDICATORS	WEIGHTING	EVALUATION
Elimination of precarity conditions	1.1 Reducing individual inequalities through local recruitment operations 1.2 Solidarity actions		
TARGET AVERAGE OBTAINED			
2. Responsibility/ Implications	2.1 Involvement and consultation of the various stakeholders for the relevance of action (involvement in decision-making) 2.2 Personal or joint initiatives engaged in the sustainable development process 2.3 Participation of users in the development of a local economy		
TARGET AVERAGE OBTAINED			
3. Coherence of the project with the common values of the group	3.1 Adaptation of housing architecture to local culture 3.2 Adaptation of collective use to the practices of group customs		

TARGET AVERAGE OBTAINED			
4. Exchange value versus wealth creation	4.1 Access to housing and commercial premises by the greatest number of people 4.2 Access to neighbourhood infrastructure		
TARGET AVERAGE OBTAINED			
OBJECTIVE 2: SOCIO-CULTURAL NEEDS AND INDIVIDUAL ASPIRATIONS			
5. Health	5.1 Levels and quality of maintenance of common areas (prevention through hygiene) 5.2 Access to care (health structures present in the district) 5.3 Sanitation of housing (ventilation/sunshine) 5.4 Exposure of the assembly to sources of atmospheric pollution		
TARGET AVERAGE OBTAINED			
6. Security	6.1 Presence of urban security equipment or private security organisation (security of goods and people) 6.2 Level of crime/ theft in the neighbourhood 6.3 Road safety devices put in place 6.4 Level of traffic accidents in relation to the number of inhabitants per year 6.5 Natural and technological risk management measures		
AVERAGE OBTAINED			
7. Diversity	7.1 Diversity of socio-professional categories 7.2 Intergenerational diversity (distribution of inhabitants by age group) 7.3 Events, spaces and structures for social exchanges and collective life		
TARGET AVERAGE OBTAINED			
8. Diversity of housing supply according to social needs	8.1 Type and size of housing in the neighbourhood 8.2 Cohesion of the spatial organisation of housing to practices		
TARGET AVERAGE OBTAINED			
9. Building enhancement	9.1 Aesthetic quality of building materials 9.2 Quality of thermal comfort (insulation capacity) 9.3 Sound comfort quality (insulation) 9.4 Architectural quality and enhancement of the landscape (quality of facades and exterior fittings)		
TARGET AVERAGE OBTAINED			
10. Functional diversity	10.1 Presence of economic activities 10.2 Service equipment		
TARGET AVERAGE OBTAINED			
11. Balance between intimacy and "community"	11.1 Individual freedoms (hierarchy of spaces, vis-à-vis) 11.2 Arrangements for managing relations within the group (neighbourhoods)		
AVERAGE OBTAINED			
OBJECTIVE 3: SAVINGS AND RESPONDING TO MATERIAL NEEDS			
12. Economic viability and profitability of the project	12.1 Field / program profitability 12.2 Rate of housing sold 12.3 Economic viability of the management bodies created 12.4 Economic viability of businesses created in the neighbourhood (amortisation of the investment)		
TARGET AVERAGE OBTAINED			
13. Job creation through the project	13.1 Through the construction site 13.2 After completion of work		
TARGET AVERAGE OBTAINED			
OBJECTIVE 4: ENVIRONMENT			
14. Priority use of renewable resources	14.1 Implementation of techniques and technologies that ensure this objective 14.2 Labels and certifications received or equivalent		
TARGET AVERAGE OBTAINED			
15. Thoughtful use of non-renewable resources	15.1 Water management/reuse mechanisms 15.2 Regeneration of resources and/or consumption savings (electricity or other)		
TARGET AVERAGE OBTAINED			
16. Rationalisation of spaces	16.1 Urban density (eviction of urban sprawl and building management) 16.2 Urban requalifications within the district (case of rehabilitation) 16.3 Support for the environmental dimension in local planning documents (POS/PDAU)		
TARGET AVERAGE OBTAINED			
17. Biodiversity and management of natural areas	17.1 Spaces or species preserved in the neighbourhood 17.2 Means implemented for the preservation of natural spaces (plantations, maintenance, watering, etc.)		

TARGET AVERAGE OBTAINED			
18. Reduction of nuisance related to occupation	18.1 Waste management 18.2 Reducing the impact of travel/traffic (presence and relevance of the public transport network) 18.3 Promotion or not of soft mobility inside the neighbourhood		
TARGET AVERAGE OBTAINED			

The second stage of evaluation consists in weighting the objectives (assigning them a coefficient), and consequently the indicators, according to their importance in the spatio-temporal context. Indeed, the objectives of sustainable development must be flexible according to the ecological reality specific to a specific area, the values of a society, and its state of development at the time of the study. A project analysis that takes place in a developing society where the poverty line is to be taken into consideration will naturally give much more importance to objectives aimed at meeting material needs or societal needs, for example. The weighting of objectives is a priority exercise, intending to measure, as objectively as possible, the importance of each objective in the different situations. Numerical values from 1 to 3 are used to determine the importance to be given to each objective (target) for the project in question:

- The number 1 corresponds to a “desirable” objective for implementing the project
- The number 2 corresponds to a “necessary or important” objective for implementing the project
- The number 3 corresponds to an “essential” objective for the realisation of a project

It should be specified that the null value (0) cannot be granted during the weighting because each of the targets of the grid is relevant. Therefore, all targets are subject to evaluation. The third stage of assessment constitutes a “raw quantification of quality”, in other words, a “raw” score given to the indicator. The latter are scored according to their degree of response of the project to the target. Numerical values from 0 to 10 are used to determine the performance of the project against a given objective:

- An objective that the project did not consider is scored 0
- An objective to which the project responds weakly is rated 1 to 3
- An objective which is considered, but to which improvements can be suggested, is scored 4 to 6
- A very well processed objective is rated 7 to 9
- A “perfect answer” objective is scored 10

It is important to note that the "assessment" stage is subject to the opinion of the residents of the district to have the most representative values possible of the phenomenon. The scores that appear in the final evaluation table (Tab. 2) represent an average of the evaluations provided by the inhabitants. The fourth stage of the evaluation consists, as for the INDI model, in calculating the average of each target by taking into account the coefficient obtained by the weighting (coefficient) of each indicator. The mathematical translation of this reasoning is expressed by the following formula:

$$\text{Target average} = \frac{\sum (\text{raw score indicator} \times \text{indicators coefficient})}{\sum \text{weighting coefficients}}$$

The general average of each register (global objective) is calculated using the following formula:

$$\text{Average overall objective} = \frac{\sum \text{average of each target}}{\text{N° of targets classified in the overall objective}}$$

The fifth step interprets the results obtained in pictorial form, we will use the principle of the INDI model graph which consists in graphically representing the evaluation of the indicators of the ISDIS system of the same "mother" method HQE2R. In this way, the model makes it possible to have a simple vision of the quality of life in the studied district, in other words, a profile of sustainable development of the district. The objective is to have a profile that is furthest away from the centre (Fig. 1).

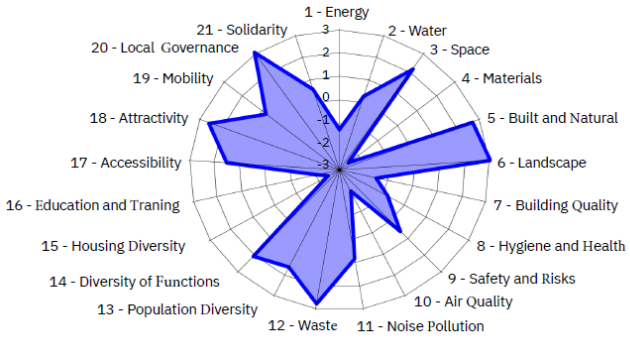

Fig. 1. Example of a profile established by the INDI model. (Source: Charlot-Valdieu and Outrequin, 2004)

The El Ryaad district (case application of the method)

The case study approach was implemented to test the applicability of the method. Similar studies have used the same approach, we can cite those of M. Seddiki (Seddiki et al., 2016), and that of F. Chaguetmi (Chaguetmi, Derradji, 2019) as examples. The selected case study is the El Ryaad district, a new district located in the eastern part of the city of Oran (Bir El Djir commune), which was completed and approved for use in 2013. Initiated at the request of the former wali of the city of Oran as part of a political commitment to sustainable regional development, it covers an area of 450,000 m2. The site was designed as part of a property development project managed by the Hasnaoui group of companies, and includes 1,772 promotional homes.

Fig. 2. An overview of the ERRIADH district. (Source: Groupe des sociétés HASNAOUI, 2020)

The profile we are going to illustrate was developed the basis of an empirical survey combining two methods, the first being the involvement of users in the assessment of their neighbourhood via a self-administered questionnaire to a selected sample of the target population; and the second being participant observation for the points that cannot be dealt with by an ordinary user. The questionnaire distributed to the target population initially involved 500 people, but because 138 questionnaires were not completed, a total of 362 respondents (owners of single-family dwellings in the neighbourhood in question) participated in the study. The stratified random sampling method was applied to improve the accuracy of the data processing (Hervé and Marois, 2000). (Stratification concerns the percentage of flats compared to villas). We considered this sample size to be appropriate, since with an average margin of error of 5% and a confidence interval of 95% (common values predefined by the calculator), DATAtab's calculation of the sample size gives us a value of 316 participants out of a total number of 1,772 (taking into account the factor of exclusion from the sampling: belonging to the same cell, which can distort the results by redundancy of information).

The questionnaire involved questions relating to the objectives targeted by the proposed local evaluation grid (Tab. 1), i.e. socio-economic factors (e.g. education, age, income, ascendancy and form of ownership, subsequent appropriation of spaces, participation in community activities, presence or involvement in activities linked to the local economy, etc.) and environmental factors (e.g. travel patterns, appreciation of landscapes, sunlight in dwellings, consumption behaviour, waste management, etc.). It offers responses at different levels of assessment (judgement of the attribute by: mediocre, average good, very good). In this way, the results of the questionnaires can be translated into numerical values (0–3 for mediocre, 4–6 for average, 7–8 for good and 9–10 for very good), and the statistical functions are obtained by calculating the average of the digitised data using SPSS software (keeping the decimal value and considering the subjectivity of the rating). The results obtained are superimposed on the 0 to 10 sustainability scale initially established by the INDI model, and each value on this INDI sustainability scale is then weighted (using a coefficient) to obtain the average score for the target.

RESULTS

Neighbourhood sustainability profile

El Ryad was launched with the aim of creating a pilot model of sustainable neighbourhoods offering quality housing and a pleasant living environment, while respecting the Algerian way of life. The project was designed to ensure that the development was both user-friendly and safe, by introducing measures to ensure compliance with environmental standards and the sustainability of the buildings: thermal insulation, quality materials, selective waste sorting, harmony between buildings and green spaces, service infrastructures, etc. The whole is divided into three groups of different densities: high buildings (R+6 to R+8), other intermediate (an average of R+4), and another of low height constituting the villas (R+1). The purpose of this distribution is to provide the neighbourhood with a low density felt by the user, and also to ensure a social mix offering housing for the people of average income (in the form of collective housing) and for the wealthier in the form of individual houses.

The plan was to build a range of ancillary facilities to provide a comprehensive urban solution. These facilities include three schools (two of which are already operational), a CEM, a lycée, a technicum, a sports hall, a sports complex and a swimming pool (both operational), a health centre, an urban security centre, a hotel (under construction), an administrative tower, a mosque (operational) and a fitness centre (operational). To support the project, the Group set up a management company, GIRYAD, to manage the site. A few years after the sale of all the homes, this company was transformed into a joint stock company owned by the co-owners, in accordance with the law governing property development. This company employs 150 people and is responsible for the security, upkeep, hygiene and maintenance of the complex.

Fig. 3. View of the different parts of the project at different densities. (Source: Authors, 2024)

Application to the assessment grid

The results obtained by applying the evaluation method developed in this study to our case study (the El Ryad neighbourhood) are summarised in Tab. 2. On the basis of the results we have obtained (shown in Tab. 2), applying these average scores for each target to the INDI model will give rise to following graph (Fig. 4).

On the graph above (Fig. 4), we have the opportunity to see the results of the assessment of the "El Ryad" district with the advantage of clear legibility offered by the "INDI" tool of the ISDIS method. The attribute "WEIGHTED objectives" of the new indicators of the grid created by this study, allows its use in a local context and having better representativeness of the evaluation. The segmentation of the objectives grouped into 18 targets allows us to see the flaws numerically: We can see that the graph shrinks at the level of target 10. In fact the functional diversity component remains insufficient, even if shops are located at the foot of the buildings and some facilities have been installed in the neighbourhood, such as a sports hall, three primary schools and a middle school. Let us note, however, that there are still empty lots and that there has recently been talk of a hotel and sports field project. This dynamic could be beneficial for the project, even if the process of creating this equipment was not part of the overall thinking around the project (upstream).

The safety and hygiene part has, from the start, been one of the major objectives for the project promoter, who wanted to create a neighbourhood where life is "good". An ultimately limited gap remains perceptible (targets 5 and 6) if we take into consideration the management of flows of people from neighbouring areas, who access to take advantage of the service facilities present in the neighbourhood. The sale prices of housing were affordable to the middle class (apartments) and more affluent categories (villas) of society. Consequently, the component of the diversity of social categories (target 7) was moderate. It should be noted that the sale was "selective", with the aim of ensuring the group's adherence to the concept of the "sustainable neighbourhood" (pilot project).

With regard to the rationalisation of non-renewable energies (target 15 and target 16), the results of the survey show that the objective is only moderately achieved. A number of considerations could have been added to ensure more sustainable consumption, such as the sharing of space between cars and pedestrians, water management, rainwater recovery, and the presence of green roofs. With regard to the use of renewable energies (target 14), no effort has been made in this area. Yet the integration of a few new technologies could have added tangible value to the project, raising it to the level of a sustainable district at an international level.

Furthermore, the El Ryad project demonstrates good performance in terms of sharing spaces, through the creation of shared gardens, relaxation and meeting spaces and play areas for children. This is also true for local governance (areas located on the graph between target 11 and 13), thanks to the establishment of the management company called "GIRYAD" which works in collaboration with the neighbourhood committee. The group's adherence is considered quite efficient (targets 2 and 3). Even if the decision-making process has not started since the reflection phase of the project and its construction, but the owners are people who adhered, basically, to the concept of a "sustainable" neighbourhood. These are regularly consulted by the manager via a page created on social networks, and through the neighbourhood committee. The quality of the landscape and the variety of housing typologies are strong points of the project (targets 8 and 9). The whole is pleasantly arranged, the facades punctuated by random openings create a pleasant dynamic, and the urban size of the buildings (average R+6) reveals the anthropomorphism expressed in base, body and crown.

DISCUSSION

From the results of our case study, it appears that the developed cross-evaluation model presents fewer application problems compared to models directly derived from different contexts. In fact, studies—such as those by Chaguetmi (Chaguetmi, Derradji, 2019) and Roula and Bouchair (2021)—where imported models were directly applied to local contexts, encountered difficulties in applying the evaluation to certain indicators. For the sake of applicability, these indicators were assigned a zero value (ZERO) or the maximum score (10), even though these values do not reflect the real state of the phenomenon, which distorted the results. The discrepancy with the actual profile of the neighbourhood presented as a case study is smaller, given that the targets have been pre-selected and/or interpreted into several indicators that can be accessed and therefore assessed more easily. The indicators of the two models of the HQE2R approach and the eco-counselling chair were superimposed on those identified in the local literature review—in particular in the study by Lamari (2011); Serir (2013) and Bouacida (2016)—to arrive at the selection of indicators used in this method.

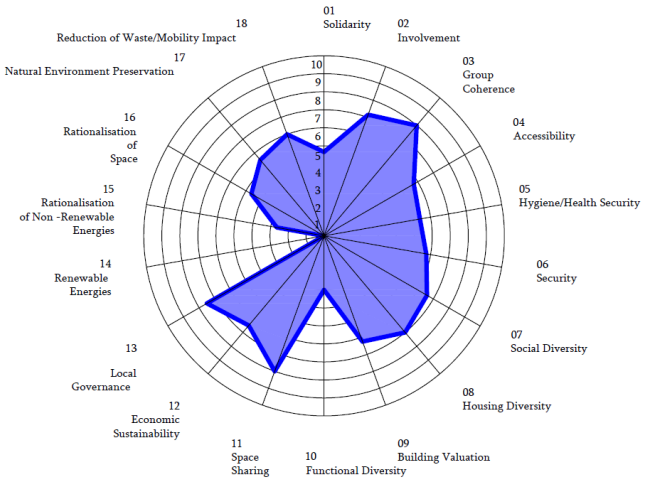

Fig. 4. Profile of the El Ryad district established by the new model designed. (Source: Authors, 2024)

Tab. 2. Summary of the assessment using the LOCAL analysis grid by sustainability indicators relating to the El Ryad district (application of the assessment to Tab. 1). (Source: Authors, 2024)

OBJECTIVE 1: EQUITY									
TARGETS	1		2			3		4	
INDICATORS	1.1	1.2	2.1	2.2	2.3	3.1	3.2	4.1	4.2
WEIGHTING	2	1	3	1	2	3	3	1	3
EVALUATION	5	4	7	8	7	8	8	5	6
AVERAGE SCORE PER TARGET	4.66		7.16			8		5.75	

OBJECTIVE 2: SOCIO-CULTURAL NEEDS AND INDIVIDUAL ASPIRATIONS																						
TARGETS	5				6					7			8		9				10		11	
INDICATORS	5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4	6.5	7.1	7.2	7.3	8.1	8.2	9.1	9.2	9.3	9.4	10.1	10.2	11.1	11.2
WEIGHTING	3	2	3	2	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2
EVALUATION	6	3	6	6	7	5	7	1	8	4	7	9	7	7	6	6	6	7	4	2	8	8
AVERAGE SCORE PER TARGET	5.40				5.76					6.66			7		6.25				3		8	

OBJECTIVE 3: SAVINGS AND RESPONDING TO MATERIAL NEEDS						
TARGETS	12			13		
INDICATORS	12.1	12.2	12.3	12.4	13.1	13.2
WEIGHTING	3	2	3	2	2	2
EVALUATION	9	10	4	3	8	7
AVERAGE SCORE PER TARGET	6.5			7.5		

OBJECTIVE 4: ENVIRONMENT												
TARGETS	14		15		16			17		18		
INDICATORS	14.1	14.2	15.1	15.2	16.1	16.2	16.3	17.1	17.2	18.1	18.2	18.3
WEIGHTING	1	2	2	2	2	2	2	2	2	3	2	1
EVALUATION	0	4	0	0	7	3	4	4	7	8	3	6
AVERAGE SCORE PER TARGET	2.66		00		4.66			5.5		6		

This study aligns with the aforementioned studies, which emphasised that future work should prioritise developing an evaluation framework specific to Algeria as a critical decision-making tool for implementing a sustainable development strategy. Additionally, the weighting of the objectives derived from the selected indicators made it possible to adapt them to the local priorities of the context of the study (Algeria), and, in this way, to regulate the evaluations so that they are appreciated at their true contextual value, and to absorb the unsuitability of the reference values to the Algerian context. Thus, the results obtained are more representative in relation to the spatio-temporal context.

It should be noted that despite the two stages mentioned above, it is clear from the application to the case study that the targets relating to the environmental aspect are far from the average level of sustainability required to pass the assessment. This can be explained by the lack of resources dedicated to this aspect (Tebbouche et al., 2017), the high cost of the technological devices that need to be used to achieve the objective—to echo the opinion of Seddiki (2020)—, a weak legislative framework in this area (Tebbouche et al., 2017), or an order of priorities established by local governance. In fact, other needs, particularly those relating to the economic and social aspects of sustainable development, are considered to be a 'priority' in a developing country. Efforts on the technical and technological side of sustainable development would tangibly improve the results of the profiles produced with regard to urban sustainability.

CONCLUSION

Sustainability assessment, as set out in chapter 40 of the United Nations' Agenda 21, is now synonymous with the implementation of sustainable development in projects. It is now present at the crossroads of environmental approaches, whether on a territorial scale or, more narrowly, as part of an urban project. In Oran, and more generally in Algeria, the approach to evaluating urban development operations is only a small part of recent cultures concerned with integrating the concept of sustainability into urban planning, and therefore has many limitations. It needs not only a political administrative foundation, but also a technical one. A global debate will help to anchor the results of the evaluation in the minds of all those involved in urban planning, and provide a better platform for dialogue with land users. In this sense, this study attempts to compensate for the glaring lack of scientific contributions in terms of evaluation tools, and to support previous studies in the drive for evolutionary input.

Based on the experience of El Ryad, the article firstly reflects the need for a debate on the importance of evaluation in a 'sustainable' urban development approach, and secondly on the relevance of evaluation using sustainability indicators in this sustainable urban development. Subsequently, the study attempts to interpret the question of preparing this evaluation that would use sustainability indicators in relation to a given spatio-temporal context. Analysis of the case study in the light of the selected indicators has enabled us to partially situate Algeria's position in the drive towards sustainable urban development. Indeed, as a pilot project, the district displays a number of appreciable sustainability features, particularly in terms of landscape quality, the quality of housing and materials, waste sorting and management, local governance and the strengthening of social ties. That said, for a sustainable district, the use of new technologies to promote the use of renewable energies would be desirable in future operations. We can therefore confirm that the profile obtained is closer to the actual profile observed using the method used than a 'crude' application of an imported method.

It should be noted that the transition from raw information to indicators is an interpretation of information that cannot be one hundred per cent objective, and the exercise of weighting the objectives is another degree of subjectivity. That said, we believe that this degree of subjectivity is necessary to enable the objectives to be adapted to the needs of local stakeholders and also to the timeframe of the project. We should also point out that the evaluation is subject to a third subjective value (that of the assessment of the objectives and its transformation into a numerical value), but the collective evaluation (via the questionnaire) enables us to get as close as possible to certain objectivity. Finally, the case study we have taken as an example of the method's application is a pilot sustainable neighbourhood. The profile obtained cannot reflect the state of implementation of real sustainability in Algeria; the methods of access to information (more structured in this specific context) could also be a limit to the generalisation of the method to other urban areas. Case studies in other Algerian contexts would provide further support for the proposed method and enable it to be developed progressively according to the shortcomings encountered.

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