

Creating of urban spaces: between legislation and application. A case study of land use plan N°06 in the city of Batna

Rafika Senouci¹,   0009-0002-9933-0896

Belkacem Dib¹  0009-0009-7918-3105

Salim Dehimi²  0000-0002-2888-2397

¹ Institute of Architecture and Urbanism, University of Batna 1, Child, City and Environment Laboratory, Algeria

² Department of City and Urban Planning, University of M'sila, Laboratory of City, Environment, Society, and Sustainable Development, Institute of Urban Technology Management, Algeria

 Corresponding author: rafika.senouci@univ-batna.dz

Summary

The illegal and disorderly practices committed by the IUC (inhabitants/users/citizens) have introduced chaos into urban spaces at different levels. The aim of this study is to examine how the practices do not comply with urban legislation impact urban spaces. It applies a socio-spatial analysis using three methodologies: the first is a social survey through questionnaires, the second is a field survey of the area studied, and the third is a spatial configuration modeling using space syntax analyses. The results show the dysfunctionalities caused by the unplanned interventions of IUCs within the study area, specifically land use plan N°06 in the city of Batna. Disobeying urban planning principles leads to compromised accessibility and visibility according to spatial syntax measures. Additionally, the results of the questionnaire and the survey highlight the inadequacy of legislation without effective enforcement mechanisms. Furthermore, the study contrasts the findings of field survey with spatial configuration analyses, indicating the disadvantages of the created urban space.

Keywords

urban space • urban legislation • space syntax analysis • LUP N°06 • Batna city

1. Introduction

The pace of global urbanization is accelerating rapidly, with 54% of the world's population currently residing in urban areas; a figure projected to rise to 66% by 2050, according to the Department of Economic and Social Affairs' Population Service as cited in the 2014 edition of the report on urbanization prospects [Satterthwaite 2007]. In Algeria, urbanization is even more significant, with over 70% of the population living in urban areas, a percentage that is expected to rise to 85% by 2050, according to the National Office of Statistics [National Office of Statistics 2011].

At the same time, housing and service needs are increasing while urban management problems are recurring. In fact, the image of contemporary urban landscapes demonstrates the inadequacy of our methodologies, tools, and management systems, despite the longstanding implementation of urban planning legislation aimed at creating harmonious and suitable urban environments, and meeting the aspirations of the inhabitants/users/citizens (IUC). The creator of this concept, the Swiss sociologist Michel Bassand, has been emphasizing since 1996 the interdependence of the three social roles: inhabitants, who seek to shape urban spaces to their liking; users, who are defined by their use of public facilities; and citizens, who engage in social life and urban governance. This semantic innovation sheds light on the complexities of nomenclature systems and people categorization [Marcel 2017].

One of the main challenges of sustainable development is to improve the living conditions of the IUCs and/or the local development of their cities. Urban legislation aims to establish regulations that meet to their needs and establish a framework of rules and institutions designed to carry out spatial planning in accordance with the development objectives of the public authorities [Henri et al. 1989]. Nonetheless, urban areas are witnessing social and spatial degradation, in which non-compliance with urban regulations plays a significant role.

The involvement of the IUCs in sustainable urban projects and the design of urban spaces has become a focal point in contemporary public discussions. However, when the balance tilts towards citizens or users becoming the creators of urban spaces without an understanding of urban planning law, as observed in our case study, it suggests that a new spatial paradigm can be emerging.

Urban space corresponds to small scale socio-spatial classes: obvious for the city, limited to a few tens to possibly a few hundred square kilometers, they represent the lower levels of spatial hierarchy, that is 'elementary parts' [Raynaud 1981]. It is also 'a geographical space, understood both as terrestrial reality and its psycho-social representation, that does not constitute a natural fact, like time, but is a collective construction of societies' [Jacques and Michel 2013].

Numerous studies deal with urban space across disciplines, such as geography, urbanism, and architecture. However, interdisciplinary studies, such as legal geography are rare [Irus et al. 2014].

The explosion of legislative texts in recent decades was discussed by Jean [1994], who highlighted the inequal effectiveness of their implementation in the field. The

Algerian sociologist [Sidi Boumediene 1996] provoked a debate on the legislative texts in Algeria that were widely criticized as outdated or dysfunctional.

2. Methodology

This work is founded on Henri Lefebvre's approach, which posits that the concept of space comprises three dimensions: the perceived space (spatial practices), the lived space (spaces of representation) and the conceived space (representation of space) [Sangla 2010]. The conceived space in our case study is presented by a regulatory instrument LUP N°06, this space is perceived by the IUC through various factors: social, cultural, etc., including their understanding of urban legislation; finally, in result the actual lived space is produced.

In order to study the interactions and behaviors of IUC, two surveys were conducted in an urban space governed by a land use plan LUP N°06 in Batna. The first survey, which was social in nature, involved distributing questionnaires to the inhabitants to collect their opinions. This survey took place in January 2024, it applied a random sampling method that resulted in 192 respondents, all heads of households, representing 10% of the neighborhood's population. The second survey, which was spatial in nature, involved field investigations to assess practices and identify any malfunctions resulting from random interventions in the study area, including the techniques of space syntax.

Space syntax analysis was chosen for its effectiveness in socio-spatial studies. As stated by [Hillier 2001], 'was distinguishes its approach is the convergence between the social and the spatial dimension' [Ortega-Andeane et al. 2007].

Space syntax offers a method of configuring space to analyze its usability, In this framework, space is conceived as occupiable void (streets, squares, rooms, parks etc.), defined by obstacles that can hinder access or obstruct vision (such as walls, fences, furniture, partitions and other obstacles). Buildings are composed of a series of spaces; each space has at least one connection to another space. The structural properties that make up these spaces and their connections can have an intrinsic social significance that impacts the general behavior of a human habitat [Al Sayed et al. 2014].

Bill Hillier and Julienne Hanson developed the method of space syntax following the neo-empiricists Kevin Lynch and Christopher Alexander, who considered architecture as a universal language [Perin 2001].

These interactions gave rise to a certain form of space, which we tried to configure it through the techniques of space syntax, using its most common modeling tool 'Depthmap' (an open source spatial analysis software developed by Alasdair Turner) [Turner 2004]. This analysis included both the Visibility Graph Analysis (VGA) and the All Line Analysis (ALA) techniques, fundamental to spatial syntax. VGA focuses on visibility, while ALA centers on accessibility. These techniques offer various syntactic measures, concentrating on three key indicators: connectivity, integration, and intelligibility.

Visibility refers to the maximum linear distance a pedestrian can traverse without encountering visual stress limits and serves as the primary parameter in the VGA tech-

nique, considering that a space that is not visible cannot be equally accessible or usable, we speak of visual accessibility [Joao and Alasdair 2010].

Physical accessibility allows us to go directly from space A to space B without physical obstacles. Accessibility is the main parameter in the ALA technique, because an inaccessible space cannot be used.

Connectivity refers to static local measurements that express the number of connections a space has with other spaces in its environment [Al Sayed et al. 2014]. It is a measure of space that can be spatially described through the identification of all the connections that a space can have with neighboring spaces. Jiang and Claramunt [2002] provide the following formula for connectivity:

$$C_i = K$$

where: k – the number of i connections.

Integration serves as a measure for understanding the capacity of a space to be integrated within a spatial system or to be ‘segregated’ [Laouar and Mazouz 2017].

Global integration analysis assesses the spatial integration of a space based on the total number of directional changes compared to other spaces in a city – spaces with fewer directional changes exhibit higher integration values. Conversely, streets with many directional changes compared to others tend to have lower integration values, indicating spatial segregation [Rejeb Bouzeggarrou 2019]. Integration values were used for several models of urban phenomena [Hillier and Vaughan 2007], cite models of urban movement, crime, land use, social segregation, and others.

The integration values are conventionally calculated by the formula of the relative asymmetry as follows [Jiang and Claramunt 2002]:

$$RA_i = \frac{2(MD_i - 1)}{n - 2}$$

where:

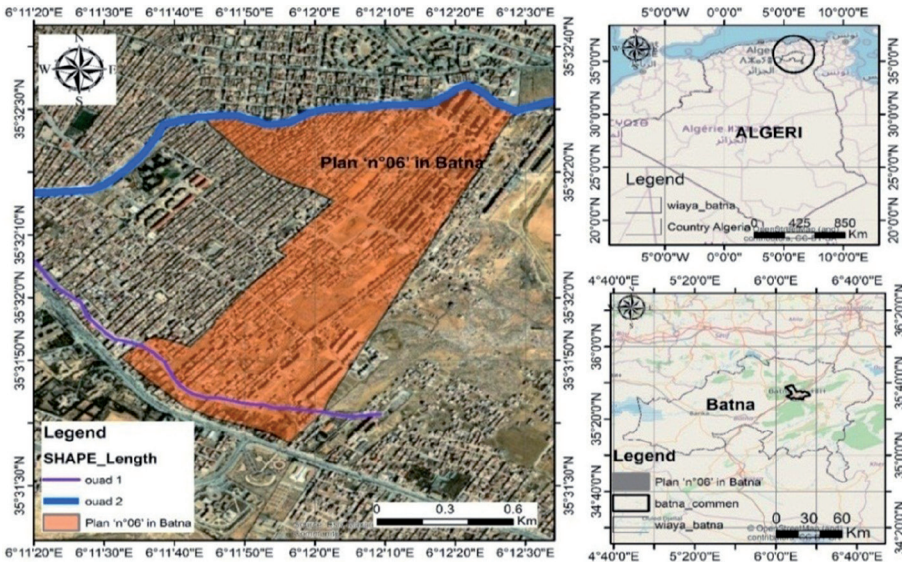
- MD_i – the average depth from a node I (space),
- N – the number of nodes in the system.

Relative asymmetry gives values that vary between 0 and 1. The most integrated spaces are closer to 0, while the most segregated are closer to 1.

Intelligibility is a ratio between the measurement of integration and connectivity [Djenaihi et al. 2021]. This ratio is calculated for each space, and is represented by a diagram. An R^2 correlation coefficient is calculated. If greater than 0.50, the resulting scatter is close to a 45° angle. A system is considered intelligible when each space with good connectivity at the local level is at the same time integrated into the whole system. The whole system becomes intelligible with its constituent parts (if R^2 is less than 0.50, the system is said to be unintelligible – the global scale cannot be deduced from the local scale).

3. Presentation of the study area

The municipality of Batna is located in the eastern part of Algeria between 4° and 7° east longitude and 35° and 36° north latitude, 435 km southeast of Algiers and 113 km southwest of Constantine. It is the country's fifth largest city with 375,000 inhabitants. The LUP N°06 covers a peripheral district, located in the east part of the city, and after a revision its area is 105 Ha (Fig. 1).



Source: Authors' own study

Fig. 1. The study area of LUP N°06













4. Results and discussion of the social survey – the questionnaire

The survey was carried out in January 2024 by selecting a random sample of 92 respondents, who are heads of households. They represent 10% of the population of the neighborhood. The results in terms of the knowledge and perception of IUCs of their rights in urban planning are summarized below (Table 1).

The urban planning instruments, which include the Urban Master Plan (UMP) and the Land Use Plan (LUP), remain in force since their creation in 1990 by Law 90/29 [Official Journal N°52 1990] until today. Theoretically, they are the primary instruments of spatial planning and organization, and the only operational tools for the management of urban territories. The results show that the majority of IUCs (87.5%) are no longer familiar with urban planning instruments.

The right to build is attached to the ownership of the land. It is exercised in strict compliance with the laws and regulations relating to the land use. It is subject to the laws and regulations relating to the land use, as well as to a building, subdivision or

Table 1. The results of the survey

IUC rights in urban planning	The level of knowledge [%]		
	Yes [%]	No [%]	■ Yes (%) ■ No (%)
The perception of urban planning instruments by IUC	12.5	87.5	
Knowledge of the certificate of urbanism by the IUC	51.38	48.61	
Knowledge of the certificate of conformity by IUC	48.61	51.38	
Knowledge of IUC related to the split certificate	6.94	93.05	
Knowledge of IUC related to building permit	97.22	2.77	
Knowledge of IUC for demolition permit	83.33	16.66	
Knowledge of IUC related to subdivision permit	52.77	47.22	
Perception of Law 08/15 laying down the rules for conformity of buildings	58.33	41.66	
Perception of the mission of urban inspectors	41.66	58.33	
Perception of the mission of the urban police	56.94	43.05	
The IUC participation in the public inquiry procedure	6.94	93.05	
Concertation with the IUC related to the revision of LUP N°6	00	100	

Source: Authors' own studies

demolition permit. The results show that the IUCs lack knowledge regarding the planning acts, with the exception of the building and demolition permit (between 80% and 97% of positive responses). These results can be interpreted in terms of applied sanctions. The sanctions on illegal construction and demolition are applied the most frequently because these operations are visible and easy to track, unlike subdivisions that are carried out in a clandestine manner, where the landowner illegally divides his plot by selling it beyond the control of the state.

In 1990, the Law only entrusted the judicial police with the control of the urban planning offences, but the Law 04–05 of 15 August 2004 supplemented the previous law and added civil administrative officers to improve the mechanisms of this operation [Official Journal N°3 2004]. The results indicate that the mission of the municipal police is better known than that of the urban inspectors, because the municipal police's report of an infringement of the urban planning leads to a legal action that penalizes the person concerned, whereas the report of the urban inspectors is only valid on paper. The IUC's do not know that the demolition sanction is a prerogative of the administration under the auspices of the urban planning inspectors.

The principles of urban planning instruments, in particular, the land use plan 'LUP', include consultation. Thus a public inquiry procedure must be established with a 60 day notice by the commissioner-investigator, who takes account of all opinions and objections issued by citizens. In reality, however, IUCs are not aware of their right in this matter. The survey results show 93.05% of negative responses.

The LUP N°06 is currently being revised, but no participation of the IUCs was noted, although the law stresses the importance of giving a notification to the various local associations to participate in the study [Journal officiel N°26 1991].

The objective of the Law 08/15 was to lay down the rules for conformity of buildings and their completion, regularize and complete the constructions, regardless their situation (with or without a building permit) [Official Journal N°44 2008]. The level of knowledge of this law reached 58.33%, which indicates that it is quite widespread, considering the awareness of other laws and its novelty. The reason for this is that Law 08/15 gives the owners with illegal construction a chance to regularize their situations. So, the main purpose of this law – that is the aesthetic side and the completion of constructions – is not of the same concern of the IUCs as the regularization of their legal status.

5. Results and discussion of spatial survey – the field investigation

Figures 2, 3, 4, 5 show the unsightliness of the urban landscape: solid waste and debris of building materials thrown into the wadi, cause a flooding problem; very limited access to the main track, illegally created with two small bridges; rural practices in the neighborhood (grazing); a construction site open without a precise deadline for completion; all types of construction dependent on the financial capacity of the inhabitants; non-homogeneous heights from the ground floor to the fourth floor; facades not completed and not even considered among the concerns of the inhabitants; the corridors of servitudes are not respected.



Source: Authors' own studies

Fig. 2. Debris of building materials thrown into the wadi



Source: Authors' own studies

Fig. 3. Two small bridges created illegally



Source: Authors' own studies

Fig. 4. Grazing in the neighbourhood



Source: Authors' own studies

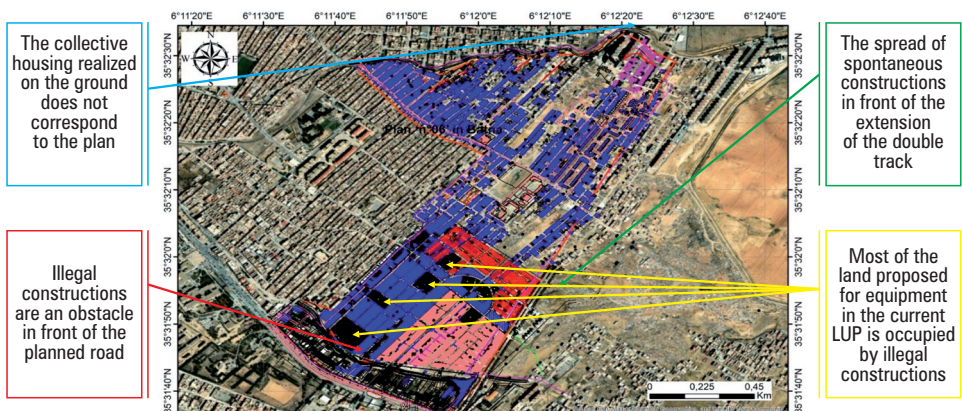
Fig. 5. Non-homogeneous heights



Source: Authors' own studies

Fig. 6. Servitudes are not respected

The field investigation has allowed us to detect all the irregular constructions that prevent the realization of the plan in terms of roads, equipment and housing. 'The illegal constructions inhibited and blocked a project for a double track, the land proposed for equipment is occupied by illegal constructions. The collective housing realized on the ground does not correspond to the plan, the planned road is not respected ...' (Fig. 7).



Source: Authors' own studies

Fig. 7. Non-compliance with current land use plan

6. Results and discussion of space syntax analysis

Syntactic analysis involves configuring space by applying the techniques and measurements of space syntax to the LUP N°06 object of our study, which covers an urban space full of presented earlier illegal and spontaneous constructions and waste discharges.

The method of space syntax differs from other methods that belong to the same morphological paradigm by its morpho-mathematical approach. Its objectives are to build a theoretical and methodological framework to study the shape of the city and the functioning of urban space. The analytical techniques and their statistical comparisons with empirical social data [Laouar and Mazouz 2017] of space syntax are a response to the failure of many redeveloped urban areas, which did not recreate the spontaneous informal liveliness that characterized the habitat they had replaced [Ralph and Stephen 2003].

It is important to remember that this study is based on three measures: connectivity, integration and intelligibility. They allowed us to evaluate the visual fields of LUP N°06 with the VGA method, and to assess accessibility in the study area with the ALA method. The measurements of both techniques can assess the usability of a space according to the spectrum color scale – red and yellow colors indicate that the space is usable and appropriate in terms of essential standards of open urban areas.

The two techniques, VGA and ALA, give almost similar results in respect to the colors of the spectrum that range from blue to red (Table 2) (blue represents the lowest values, green and blue-green indicate fairly high values in a spatial system, red and yellow – the highest values).

The visibility graph (the VGA map) and the axial map (ALA) show that the connectivity in the study area is almost zero (the dominance of the blue color), while the two parts that represent high values in the northeast and southeast are bare ground. These lands are not yet developed or occupied, while receiving the highest values (849) for VGA (2060) for ALA (Table 3).

Table 2. VGA and ALA analysis results


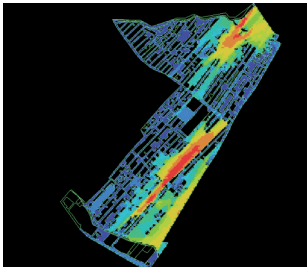
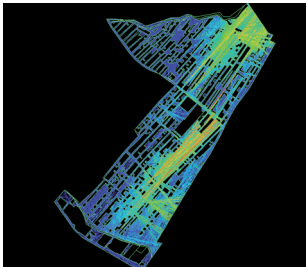
Measures	VGA	ALA
	Lower values	Higher values
Legend		
Connectivity		

Table 2. cont.

Measures	VGA	ALA
	Lower values	Higher values
Legend		
Integration (HH)		
Intelligibility		

Source: Authors' own studies

The visibility graph (the VGA map) and the axial map (ALA) show that the connectivity in the study area is almost zero (the dominance of the blue color), while the two parts that represent high values in the northeast and southeast are bare ground. These lands are not yet developed or occupied, while receiving the highest values (849) for VGA (2060) for ALA (Table 3).

Table 3. VGA and ALA analysis values

	Connectivity			Integration HH			Intelligibility R ²
	Minimum	Medium	Maximum	Minimum	Medium	Maximum	/
VGA	1	271.8	849	1.11	3.53	5.45	0.44
ALA	2	435.72	2060	1.58	4.53	7.58	0.52

Source: Authors' own studies

In fact, the acceleration of illegal housing makes us think that both parts of the land, which normally represent more important connectivity values, are doomed to failure due to the same spontaneous urbanization [El Kadi 1988]. They do not represent real

connectivity, in which case we would have completely zero connectivity. This is the result of an unregulated habitat that undergoes degradation without any urban structure.

Regarding integration, the maximum values are oriented towards the same spaces that represent good connectivity (values reach 5.45 in the VGA board, and 7.58 in the ALA board). They are bare ground that does not indicate real integration, except in the part where the collective habitat is located. The latter is structured around a main axis surrounded by secondary axes that allow good accessibility and visibility. The rest of the spaces are moderately integrated until they reach the most segregated spaces, where the minimum integration HH is 1.11 (spaces colored in blue). Such segregation is the consequence, on the one hand, of the disorderly distribution of individual dwellings, and, on the other hand, the natural constraints that limit the accessibility to the area (e.g. the two wadis to the north and south).

Intelligibility is the ratio between the measurement of integration and connectivity. The results show that intelligibility is low in the VGA analysis, ($R^2 = 0.44$), while it reaches the mean value ($R^2 = 0.52$) in the ALA analysis. These small measurements confirm that the studied space is unintelligible.

The above considerations suggest that according to the measures of connectivity, integration and intelligibility – recorded by the two techniques VGA and ALA – the urban space studied is characterized by low visibility and average accessibility. The latter drops to a low accessibility in the northern and southern parts which are limited by wadis. These reduced values prove the impact of IUC practices and the failure of the LUP program on the disadvantaged character of the space studied.

6. Conclusion

The creation of urban space has devolved into a haphazard use of land that disregards urban planning norms. There are many causes that contribute to this phenomenon, especially the practices of IUCs who disregard urban legislation and planning laws, whether intentionally or unknowingly.

In our study of LUP N°06, Batna served as an example of a ‘conceived space’ that aimed to establish a development program aligning with the aspirations of IUC. However, this program was not implemented, resulting in the illegal constructions and disorderly exploitation of common spaces (including incomplete buildings not complying with urban standards, proliferation of solid waste, especially in wadis, causing floodings, and rural practices in outdoor areas, among others). Even the revision of the LUP may not address the issue, as the obstacle lies not in the plan’s content but in the management mechanisms and systems that fail to engage IUCs. Their lack of involvement stems from various factors, such as unfamiliarity with urban legislation, marginalization during public inquiry phases, and the lack of urgency on the part of the state in enforcing sanctions for the demolition of illegal dwellings.

The studied area is an open site with no set completion timeline, where citizens intervene to construct various structures based on their perception of space and their

financial capacity. This scenario is not unique to the study area; approximately 80% of Batna's neighborhoods suffer from similar problems.

In order to analyze the resulting layout, we employed space syntax techniques, particularly VGA and ALA, which are popular in socio-spatial studies. The results provided by these techniques indicate a lack of connectivity in the study area, with integration and intelligibility values ranging from low to medium. These reduced values underline the disadvantaged nature of the space, making it neither accessible nor visible according to space syntax measures. This situation a consequence of dysfunctions due to arbitrary interventions by the IUCs and a lack of compliance with urban planning laws.

References

- Al Sayed K., Turner A., Hillier B., Ida B. 2014. Space syntax methodology. Berlet School of Architecture, UCL, London, 7–15.
- Di Meo G. 2003. Dictionnaire de la géographie et de l'espace des sociétés. Belin, Paris.
- Djenaihi W. et al. 2021. Noise and Spatial Configuration in Biskra, Algeria: A Space syntax approach to understand the built environment for visually impaired people, Sustainability, 4.
- El Kadi G. 1988. Market mechanisms and spontaneous urbanization in Egypt. International Journal of Urban and Regional Research, 22–37.
- Henri J., Soazik M., François P. 1989. Droit de l'urbanisme. Dalloz.
- Hillier B. 2003. The theory of the city as object or how spatial laws mediate the social construction of urban space. <https://link.springer.com/journal/41289>. Urban Design International, 153–179.
- Hillier B., Vaughan L. 2007. The city as one thing. Progress in Planning, UCL, 67, 205–230.
- Irus B., Nicholas B., David D. 2014. The expanding spaces of law: A timely legal geography. Stanford University Press, 296 p.
- Jacques L., Michel L. 2013. Dictionnaire de la géographie et de l'espace des sociétés. Bélin, Paris, 746–747.
- Jacquot H. 1989. Droit de l'urbanisme. Dalloz, p. 712.
- Jean M. 1994. Pour une géographie juridique. Annals of Geography. Persée, 520–526.
- Jiang B., Claramunt C. 2002. Integration of Space Syntax into GIS: New Perspectives for Urban Morphology. Transactions in GIS, 295–309.
- Joao P., Alasdair T. 2010. Introduction to Depthmap. Version 10. UCL, 60 p.
- Lanthenmann K. 2001. De l'abri à l'habiter. Rhizome, p. 8.
- Laouar D., Mazouz S. 2017. The axial map as an analysis' tool for the spatial accessibility: Case of Annaba City. Rev. Sci. Technol., Synthèse, 35, 111–123.
- Marcel J. 2017. L'implication des HUC (Habitat, Usager, Citoyens) dans la recherche. Vie Sociale, 20, 11–29.
- Office National of Statistics. 2011.
- Official journal n°52. 1990. Law 90/29 of December 1th, 1990 relating to urban planning. People's Democratic Republic of Algeria.
- Official journal n°26. 1991. Executive decree n°91.178 of May 28th, 1991, laying down the procedures for the preparation and approval of the lup. People's Democratic Republic of Algeria.
- Official journal n°3. 2004. Law 04–05 of August, 14th, 2004 amending and supplementing law n°90–29 of 1th December 1990 on urban planning. People's Democratic Republic of Algeria.

- Official journal n°44. 2008. Law n°08-15 of 20th July 2008 setting the rules for the compliance of constructions and their completion. People's Democratic Republic of Algeria.
- Ortega Andeane P., Jiménez Rosas E., Mercado Doménech S., Estrada Rodriguez C.** 2007. Space syntax a determinant of spatial orientation perception. *Journal of Instructional Psychology*, 11-18.
- Perin L.** 2001. La syntaxe spatiale entre dans le vocabulaire des urbanistes. *Diagonal*, 23-24.
- Porter G.** 2011. I think a woman who travels a lot is befriending other men and that's why she travels. *Journal of Feminist Geography*, 18, 65-81.
- Ralph H., Stephen E.** 2003. Conception, organisation et évaluation de réseaux de transport locaux durables. *International Journal of Social Sciences*, 2(176), 243-260.
- Raynaud A.** 1981. Les degrés inférieurs de l'échelle spatiale: Espace urbain et espace rural. *Journal of Society, Space and Justice*. University Press of France, 131-156.
- Rejeb Bouzeggarou A.** 2019. Analyse des formes morpho-fonctionnelles urbaines. Doctoral dissertation. University of Western Brittany, 120 p.
- Sangla S.** 2010. Politique et espace chez Henri lefebvre. Doctoral dissertation in philosophy. University of Paris, 28 p.
- Satterthwaite D.** 2007. The transition to a predominantly urban world. *Human Settlements, Discussion Paper Series*. The transition to a predominantly urban world, 1-42.
- Sidi Boumediene R.** 1996. La recherche urbaine en Algérie un état de la question, 365. *Urbama*, 36 p.
- Turner A.** 2004. *Depthmap. A Researcher's Handbook*. Bartlett School of Graduate Studies. University College London. <https://discovery.ucl.ac.uk/id/eprint/2651/1/2651.pdf>