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Urban Planning Violations in the Planned Districts: The Case of the District of 120 Dwellings in the City of Tebessa, Algeria

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Abstract

Violations of the building rules and urban planning are what we call urban violations, and they are one of the biggest problems that the Algerian city suffers from, and take many forms, which have distorted the urban landscape. It was associated with various serious social ills; it is the result of multiple factors, social, cultural, economic, political and other related to the urban legislation itself.

This work aims to diagnose construction violations in the neighborhood of 120 dwellings located in the southwest of the urban perimeter of the city of Tebessa. Is one of the regular planned neighborhoods in advance, however, it has been affected by construction violations in its various forms and images in light of the lack of feasibility of legal procedures in the face of the phenomenon .

Through our field work as well as using geographic information systems and by Comparison of land uses in 2003 and 2021, It became clear to us the picture of these irregularities represented in the expansion of the dwellings horizontally and vertically and any change in (COS: coefficient d'occupation de sol, CES coefficient d'emprise au sol) and the work ended with suggestions to alleviate the problem.

Key words: Tébessa, Construction Violations, planned district, COS, CES.

INTRODUCTION

The field of construction reflects the extent of the progress of civilizations [1] and the level of their sophistication. The more advanced the state is, the more efficient, organized and more inspiring the construction level is [2]. In the end, we get an urban mosaic consisting of buildings, a network of roads, parking lots and service facilities. On the contrary, backward countries witness a state of chaos in the urban area.

Research Importance

This work is of great importance in the field of urban planning in view of its social repercussions due to the association of urban chaos with various pests, and also its great impact on the general landscape of the city, as it changes the dimensions of construction and engineering, which means affecting exposure to light (insolation, ventilation), construction irregularities also affect the efficiency of access To the neighborhood during the intervention of civil protection mechanisms and rescue operations in the event of a natural disaster or emergency.

In Algeria, the constitution guarantees the owner the freedom to dispose of real estate ownership, including carrying out construction operations, but it is subject to the legislation related to urban planning, especially Law 90-29 and the decrees that followed it in 1991[3]. The construction process in land suitable for urbanization is also carried out according to the designs of the expert engineer [4], The use and management of land suitable for urbanization, the formation and transformation of the built environment are carried out within the framework of the master plan for town planning PDAU and land use plan POS, and in the absence of them, they are subject to the general rules RGAU, This is what is included in (Articles 2 and 3 of Law 90-29). Despite the legal arsenal of controlling the growth of cities, and making it according to predetermined criteria, it suffers from the violation of building and construction laws that are

steadily increasing; these violations are no longer limited to a specific urban form, because the urban landscape shows that it is global.

Research Aims

Through this work, we want to diagnose this phenomenon in one of the regular district of the city of Tébessa, by comparing its initial status with the current situation 2021, And distinguish the modifications and violations committed by its residents, That is, through the housing density, which is expressed by the evolution of the (COS : coefficient d'occupation des sols) and (CES : coefficient d'emprise au sol), based on field work and with the help of geographic information system (GIS), What distinguishes our study is that it explains horizontal and vertical changes across time and space in three dimensions.

Previous Research

What distinguishes previous studies from our work is that most of them are of a legal nature, these studies focused on highlighting the causes and factors of construction violations, as well as their types, using a descriptive approach in the first place, as for our work, we used a descriptive and analytical approach on the one hand, and a mapping approach using geographic Information systems (GIS) for diagnosing building violations, with the use of satellite images for successive periods, and thus realizing spatial changes through plans instead of being satisfied with the descriptive aspect

MATERIALS AND METHODS

In this research, we used the descriptive analytical method in the study of land uses, and construction violations, with the adoption of a historical cartographic approach, to diagnose and highlight construction violations between the two situations: the initial (2003) and final (year 2021), using geographic information systems (GIS) Represented in various softwars such as Google Earth pro and Arcgis10.3/ (arc map- arc scene), surfer... To be used in drawing the site map see (Figure 1), and other plans (land uses, and spatial changes for residential buildings in the neighborhood), data collection through a set of questions that were asked to the population through a form, and a preview of the field of study, included work methodology used in this research some quantitative methods, such as the use of central tendency.

The Study Area

The neighborhood of 120 dwellings occupies an area of 5.024 hectares, at the beginning (that is, in the initial situation in 2003). It is located on the southwestern side of the city of Tebessa. It is bordered on the north by the March 04 Stadium and the Social Center for Girls' Welfare, and on the west we find a project for the completion of a judicial police station and the East, Programmed lands in the new pole for the city's future expansion in the short and medium term, according to what was stated in the master plan for the town planning 2012 [5] , that is, to the borders of 2018., Al-Anba, and bordered on the south by agricultural lands. The population of the district is 720 people (6 people / dwelling), the neighborhoods extends between latitudes 35, 41172977° and 35, 41455688° north, and between the

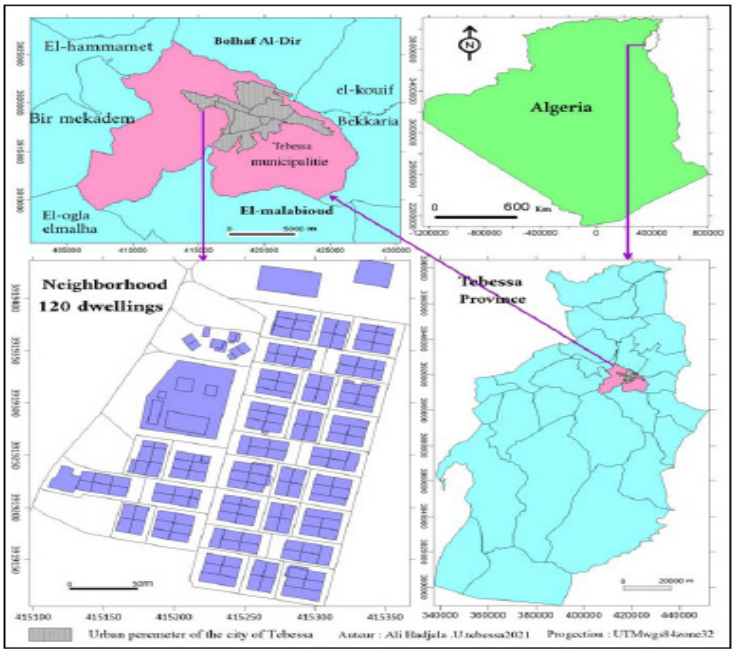

Figure 1. The situation of study area

longitudes 8, 06487330° and 8, 06782305° east, see (Figure 2).

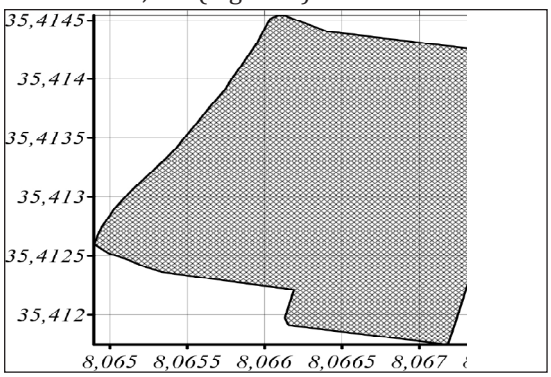

Figure 2. Location in relation to geographic latitude longitude.

Satellite Images (Rvb) Used

To study land use and construction violations in the neighborhood and after we determined the field of study, we cut out the part of the studied neighborhood from the two satellite images dating back to 2003 and 2021 see (Figure 3), with the help of "Google Earth Pro" and "ArcGIS 10.3", the objective of this process is to compare the uses of residential land between the two periods to discover and diagnose registered construction violations. This requires converting of raster images to shape files so that we can calculate areas and extract relevant statistics.

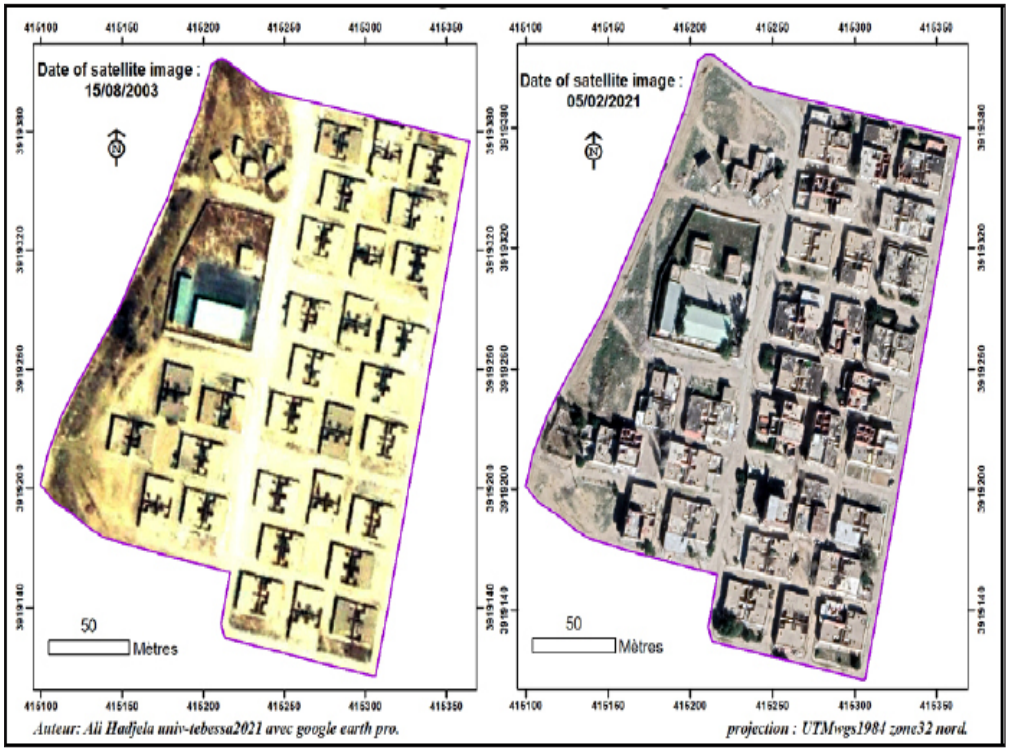

Figure 3. Map images used to study land use and construction violation

RESULTS AND DISCUSSIONS

The district of 120 housing units is part of a construction project of 2000 individual housing units, which was completed by the Office for Promotion and Real Estate Management of the wilaya of Tébessa in 1996.

Study of Land Uses in the Neighborhood of 120 Dwellings in 2003

The neighborhood of 120 housing is a pre-planned neighborhood, which includes 120 individual housing with a ground floor, where all housing are of homogeneous dimensions and area in terms of length and width, With some slight differences in dimensions, and the neighborhood also includes several equipment, which is an primary school "Hasnawi Rabah ben Hamouda School" and Some retail Stores, Residents buy their needs from the city center or from

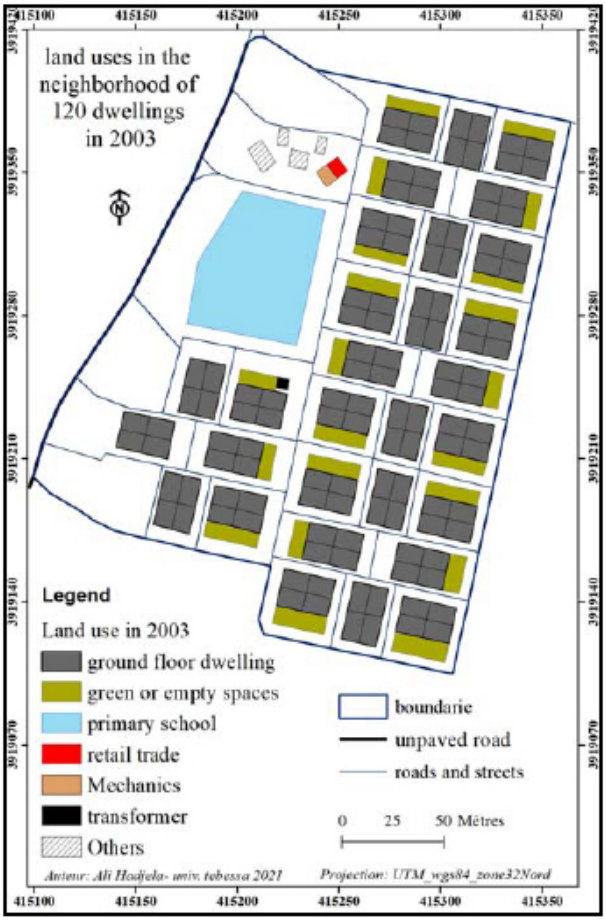

Figure 4. Land uses in the neighborhood of 120 dwellings in 2003.

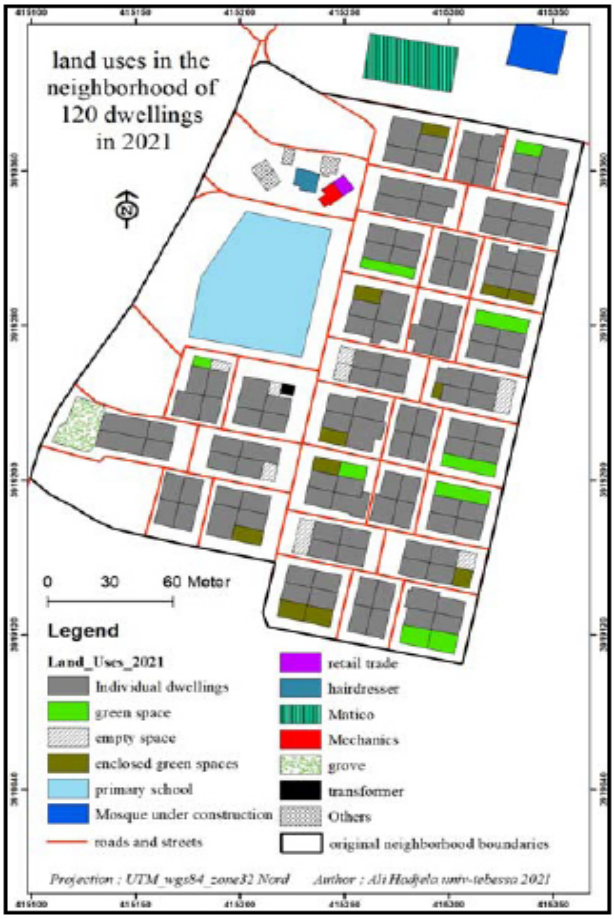

Figure 5. Land uses in the neighborhood of 120 dwellings in 2021

neighbouring neighbourhoods to the west of the city, such as Ali Mhenni's, and we point out that there are other unused buildings that were supposed to be used as shops for retail trade, and because there are no other educational, health or other structures, it depends entirely on the services provided by the structures of its neighbouring neighbourhoods as we mentioned, such as CEM Mohamed Boudiaf in the neighbourhood of 600 housing units, and the city center.

What matters to us about land uses are the residential uses and the changes that have occurred to them, which were at the expense of green spaces and vacant or parking spaces, The area of residential use is estimated at about 1,43 hectares, while the green areas and parking spaces are estimated at 0,35 hectares, as for educational facilities, they are limited to a primary school with an area of 0,36 hectares.

Study of Land Uses in the Neighborhood of 120 Dwellings in 2021

What we notice at first sight is the density of residential buildings in 2021 and its complexities due to the changes made by the residents to the construction, which is evident in the satellite image taken on March 02/2021 in the previous figure No. 03, and although the number of residential buildings has not changed "120 homes", the horizontal expansion It is clearly visible, and this is also evident from the map of land uses in 2021 (Figure 5).

The residential job occupies an area of 15786,22 square meters, an increase of 1477,50 square meters compared to what it was in 2003, which is equivalent to (10.33%), and this area represents the horizontal expansions associated with construction violations committed by the residents of the neighbourhood see (table01)

The green spaces, and the empty spaces represent 2744,54 square meters, of which 951,64 square meters are fenced green areas, meaning that they are then taken over by the residents, and accordingly, the remaining green and vacant spaces do not exceed 1792,90, knowing that they were estimated at 3476,76 meters square in 2003, and from it we conclude that green spaces and parking spaces no longer represent only 51,56 % of what they used to be.

Table. 1. Distribution of land uses by area in the years 2003 and 2021.

Type of Use / Year	Residential Buildings (m^2)	%	Green Spaces and Empty Spaces (m^2)	%	Grove (m^2)	%	Equipment (m^2)	%	Other Spaces (m^2)	%	Sum
2003	14308,7	65,77	3476,76	15,98	/	/	3562,21	16,37	406,49	1,87	21754,2
2021	15786,2	64,20	2744,54	11,16	436,7	1,78	5123,46	20,84	496,98	2,02	24587,9
the difference	1477,5		-732,22	- 4,82	436,7	1,78	1561,25	4,47	90,49	0,15	2833,7

Researcher account using ArcGIS 10.3

Table. 2. Some statistical parameters related to the residential area.

year	Number of dwellings	Housing surface average	standard deviation	Coefficient of variation
2003	120	119	04,58	3,85 %
2021	120	131	26,79	20,45 %

Researcher account using ArcGIS 10.3

Analysis of the Horizontal Expansion of Residential Land Uses (2003-2021) and the Resulting Violations

By comparing the uses of residential land between 2003 and 2021, it is noted: the increase in the area occupied by housing moved from 1,43 hectares to 1,57 hectares see (Figure 7.) , an increase of 10,33%, In contrast, there is a decrease in green spaces and parking spaces, which moved from 3,48 ha to 2,74 hectares, or about 21.06% and if we remove the fenced green spaces (reserved) for the purpose of expanding at their expense, estimated at 951,64 m^2, then their area will decrease by 49.54%.

We previously referred to the complexities that characterize the residential use area, due to the changes made by the residents to the buildings see (Figure 6.),This is confirmed by the increase in the average area of one house in 2021 to reach 131 m2 on average, compared to 119 m2 for one dwelling on average in 2003, which is evidence of the expansion process that Residential buildings define illegally, as well as the high value of the standard deviation [6] of housing areas in 2021, which is estimated at 26.79 m2, compared to its value in 2003,

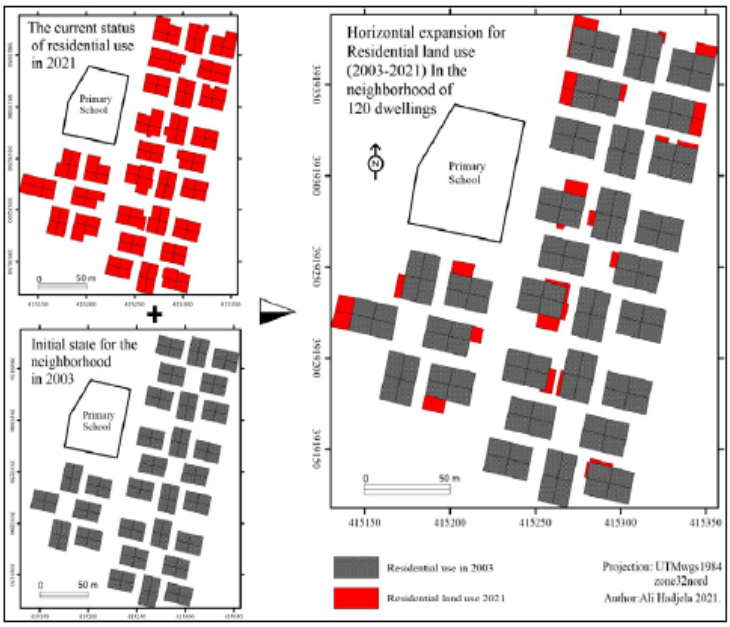

Figure 6. Horizontal expansion for residential land use (2003-2021).

estimated at 4.58 m2, which confirms the state of heterogeneity that residential buildings have become in terms of area, in addition the coefficient of variation (20.45% in 2021 compared to 3.85% in 2003) clearly confirms what we have mentioned see table n ° 02.

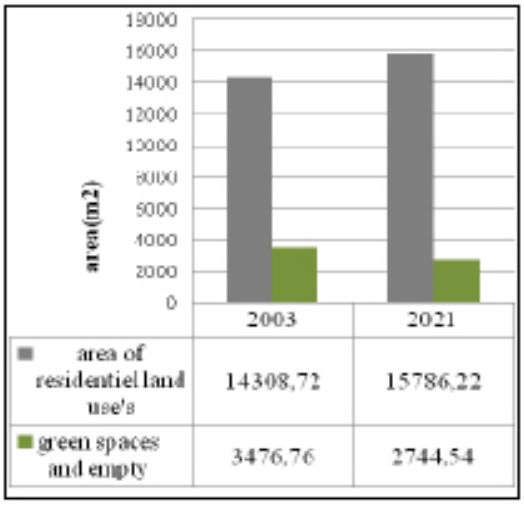

Figure 7. Increasing residential area and decreasing green and empty spaces

Change of Coefficient of Land Acquisition and Coefficient of Land Occupancy: CES, COS

Land Acquisition Coefficient or CES

The ratio of the built-up area, Sb, to the real estate area, SFr, and its value does not exceed one [7].

Land Occupancy or Cos

Is a relationship that allows the measurement of land use intensity in city planning. It is obtained by dividing the sum of the surface areas of **SPHO** by the area of the receiving land, its **SFr,**(COS= Sp/Sf = surface plancher /surface foncière) [8] its value can be more than one [9], see (Figure 8.).

By determining the possibilities of vertical expansion, the land occupancy coefficient controls the density of construction and also reflects the importance of the land for construction and thus its commercial value.

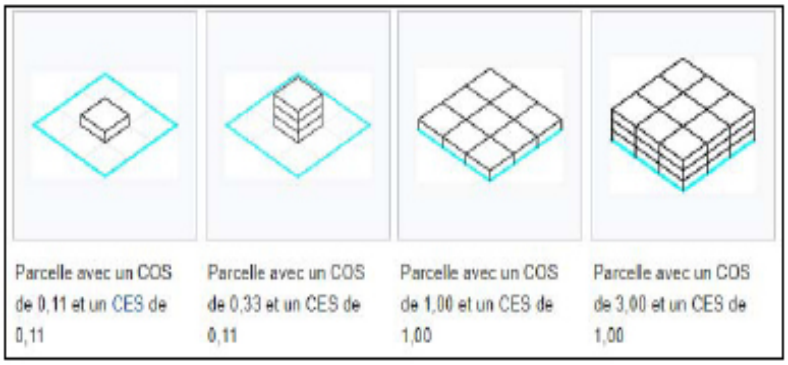

Figure 8. COS and CES

Change of the COS and CES in the Neighborhood of 120 Dwellings

When calculating the coefficient of land acquisition(CES) for a plot of land (the figure below), we found that it is equal to 0.6 according to the initial situation for the year 2003, bearing in mind that the characteristics of this plot are: The number of dwellings is 04, the built-up area of the four dwellings : 328 m^2 The vacant area of the four dwellings is 124 m^2 The vacant or green area of the land plot: 64 m^2, the sidewalk area: 30 square meters, and from that, the total area of the plot is 546 $m^2$and the CES is equal to: 328/546 and given that the horizontal change in residential areas amounted to 10.33%, CES = 0.66 in 2021. As for the coefficient of soil occupancy COS, it was equal to 0.6 in 2003 and it has known a change of up to 1.05 in some plots of land that include three-storey buildings.

Figure 9. Components of a plot of land built in the neighborhood of 120 dwellings.

The following figure (the neighbourhood of 120 dwellings in three dimensions: 3D) shows us the vertical changes in residential buildings during the period between 2003 and 2021.

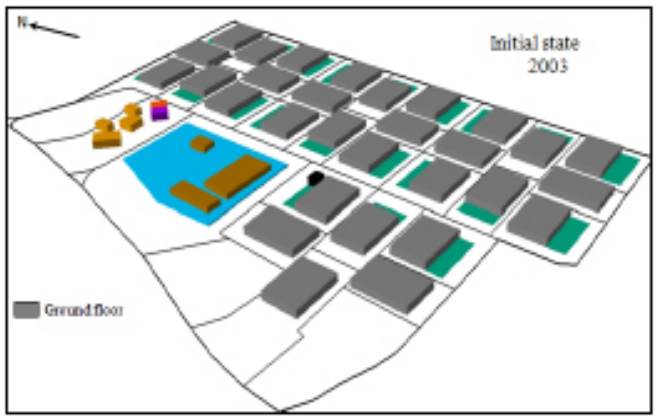

Figure 10. 120 dwellings Three-dimensional (3D) in2003 ground Building (COS = CES = 0,6)

Figure 11. 120 dwellings in 2021, Vertical expansion (3D) (CES [0,6 – 0,66], COS [0,6 – 1,05])

Through)Figure 11. (We recognize changes in residential buildings during 2003 - 2021 in three dimensions (horizontal and vertical expansions), which represent reconstruction violations.

The Nature of the Construction Violations in the Neighborhood of 120 Dwellings and their Causes

To see the nature of the violations, we have previewed the neighborhood and distributed a questionnaire on this subject in March 2021 on the population after dealing with the data, it turns out

Table 3. The most important urban irregularities and their spread in 2021.

Type of Reconstruction Violations	Frequency	Percent %
Add a garage	33	27,5
Modification in the number of rooms	27	22,5
Modification in the kitchen	8	6,7
Created new windows	27	22,5
Change the interface	2	1,7
Add a floor or several floors	21	17,5
Integrate and build the side space	17	14,16
Fence mode in front of the house	22	18,3
Add a shop	6	5
Source: field investigation: March 2021		

It should be noted that out of the 120 dwellings, we found 31 dwellings that were untouched by any modification or change and remained in the same original condition. As for the rest of the dwellings, 89 dwellings have Undergone modifications, as 10 different types of violations were recorded in the neighborhood, Even if the law prohibits building without a permit [10], and their recurrences vary, the most important of which are:

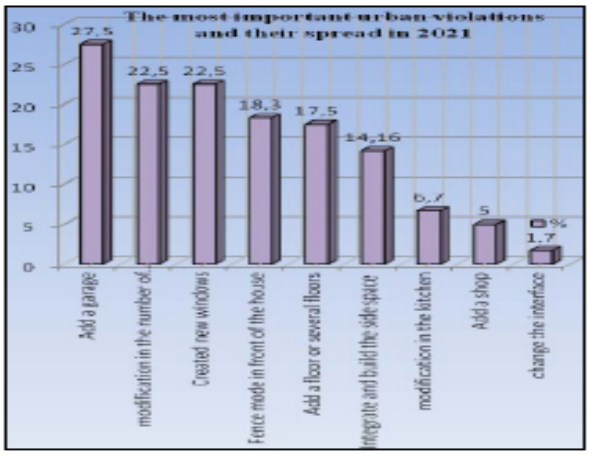

Figure 12. the most important urban violations in 2021

- Adding a garage for 33 violations, due to the residents' lack of confidence in placing their cars outside the residence in the car parks in the neighborhood.
- An amendment in the number of rooms and the creation of new openings, as we recorded 27 cases of these two violations, and the residents justified their violations by their dissatisfaction with the architecture of the housing
- 21 cases were recorded regarding vertical expansion (adding one or more floors) and 17 cases regarding horizontal expansion (joining and building side space) due to an increase in the size of the family, while small numbers of other violations were recorded, note that every construction or change in construction is subject to the law [11]. We asked the residents what was the reason for these changes, and the answer was as follows:

Table 4. The main causes of violations

Reason for change	Number	Percentage %
Increase in family size	28	23,3
Dissatisfaction with the architecture of housing	41	34,2
Other reasons	35	29,2
Source: field investigation: March 2021		

Through the table, we note that the large percentage of the population 34.2% expressed their complete dissatisfaction

with the architecture of the housing, while 23.3% attributed the change to an increase in the size of the family, with most of the population not knowing that these changes are illegal (see figure13.), which increases the persistence of the population and the desire to make these changes.

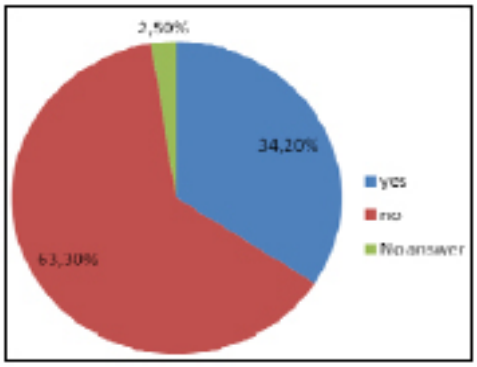

Figure 13. Population knowledge of the legal side

Through the field investigation, we noticed the residents' persistence through the spread of construction violations that affected most of the neighborhood. It is now an open workshop. The billing of construction and the occurrence of violations are constantly escalating, and this is all in light of the complete absence of supervision by the competent authorities and no social actor is challenged or even disturbed by the competent,

Figure 14 . Vertical and Horizontal expansion and violation of COS and CES (photos taken: March 2021).

Figure 15. Vertical and horizontal expansion, Created new windows, and Putting building materials on the road when building workshops are opened (Photos taken: March 2021).

Figure 16. Fence mode in front of the house, Integrate and build the side space (Photos taken: March 2021).

Figure 17. Extension on the sidewalk, change of facade, construction near the electric pole(Photos taken: March 2021).

services this can necessarily only lead to wild and anarchic urbanization [12]

CONCLUSION AND RECOMMENDATIONS

In this work, we diagnosed the modifications made to residential buildings, or what we call construction violations in a pre-planned neighbourhood (120dwellings) in the city of Tebessa, as it became clear to us through the study of land uses, especially residential ones, it suffers from this phenomenon similar to unplanned neighbourhoods, and we realized that:

Statistically by comparing the land uses between the two (primary situation the satellite image 2003, and the final situation embodied in the satellite image 2021), where the average housing area moved from 119 square meters to 131 square meters, and the standard deviation changed from 4,58 to 26,79 square meters, which is what reflects the heterogeneity that occurred as a result of the modifications made to the residential buildings, and what confirms this more is the coefficient of variation (it moved from 3,85% in 2003 to 20,45% in 2021, and this means that there are large discrepancies between housing areas in 2021 as a result of urban chaos and the demise of the homogeneity that prevailed year 2003).

Spatially, the recorded violations included the expansion horizontally, as the coefficient of land acquisition (CES) moved from 0,6 to 0,66 between the years 2003 and 2021 (an increase of 10,33%), or the equivalent of 1477,50 square meters, and vertically by an increase in the number of floors, where some of them reached 3 floors, where the coefficient of land occupancy (COS) ranges between 0,6 and 1,05 in some buildings.

As for the nature of the violations, 9 types were listed, on top of which is the construction of a garage (33 cases out of 120 houses, or 27,5%) for security reasons related to protecting the car from theft, the increase in the number of rooms in the dwelling, 22,5% and the same percentage of new windows being created , seizing parking spaces or Green spaces and their incorporation into the dwelling 18,3% , and other violations described in the analysis.

Regarding the reasons for the violations, most of them were related to the residents' dissatisfaction with the building architecture (34,2%), as well as due to the increase in family size (23,3%), the remaining percentage were other reasons previously explained.

Violations of urban planning rules remained without specific penalties, and Algerian law showed its impotence in the absence of its application, the quality of the production of the built environment and the environment always remains from the point of view of the Law a pipe dream. [13]

In order to reduce urban violations that had negative repercussions on the urban space and caused problems related to the social relations of the population (conflicts) both in our cities and neighbourhoods, and based on our study, we put some recommendations, including:

- Proceeding from the increase in family size and the population's need for housing, providing housing for citizens contributes to reducing construction violations.
- Reviewing the architecture adopted in the building in line with the sociology of the community related to the size and shape of the dwelling, this reduces the modifications committed.
-In addition to the need to review the nature of the legal penalties, which are considered trivial (according to article 50

of executive decree 94-07 of May 18, 1994, relating to the conditions of architectural production and the exercise of the profession of architect ,Penalties range from 200 to 900 dinars) [14] in comparison to the violations committed, the laws were then strictly applied.

- Educating the citizen about the need to adhere to the urban laws and to respect what is stated in the content of the building codes.
- Activating the work of the certificate of conformity and making it a mandatory document in every transaction related to the real estate and adopt prospective reconstruction plans to better control the space.
- Use modern means to monitor construction operations, such as geographic information systems as a decision support tool.
- Activating the role of the urban police in accordance with the powers entrusted to it by the law to eliminate urban violations at its inception by issuing legislation related to this matter.
- Immediate field follow-up of reconstruction operations by the competent authorities, the field of suggestions related to combating construction violations remains open, and solutions to this problem require further multidisciplinary studies.

ABBREVIATION

COS: coefficient of land occupancy, (coefficient d'occupation de sol).

CES : Land acquisition coefficient, (coefficient d'emprise au sol).

GIS : geographic information system, (system d'information géographique).

POS : land use plan, (Plan d'occupation des sols).

PDAU : the master plan for town planning, (plan directeur d'aménagement et d'urbanisme).

RGAU : the general rules for town planning (règles générales d'aménagement et d'urbanisme)

CEM : Middle education college, (collège d'enseignement moyen).

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