Analytical Study between Human Urban Planning and Geographic Information Systems: "The Case of the City of Casablanca"

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Abstract—**Since the early 1910s, the city of Casablanca has experienced urban and civic expansion so that its population has become a regional center, but this expansion has not been achieved in an organized and equal manner. This has resulted in significant overlap between systematic and structured reconstruction and random reconstruction, and if the geographic researcher is able to study this transformation by observation in the field where he described the phenomena and visualized them with the naked eye, then urbanization of information systems is one of the methods of expression that allows him to study it successfully and more precisely. The study of the stages of urbanization that the city of Casablanca has gone through using urbanization of information systems will give actors and researchers a clear vision of how this expansion can be achieved, it's positive and negative implications, and its prospects, and will thus help to prepare and manage the urban area of the city. This study period extended from 1910 to 2020, and we relied on a set of documents, satellite photos, aerial photos and old maps.**

Keywords—*Casablanca; human urban; urbanization of information systems; urban expansion*

I. INTRODUCTION

Urban planning is a system created at the beginning of the 20th century to establish scientific, economic, social and technical foundations which make it possible to "tell the truth" about the design and development of cities and to discuss, arbitrate and manage challenges, conflicts and urban conflicts. Urban planning has always been at the service of urban policy. It is therefore the main tool for implementing any city policy.

Casablanca is characterized today by the absence of urban policy. Since the "decisive" colonial policy of the beginning of the 20th century, and after the policy of reaction, not to mention reaction, in the 1980s on the basis of forced urban planning, no coherent alternative policy has been proposed.

Colonial urban policy, based on the cultural and social ideology of Lyautey's "calm" ideology, was developed in the first phase of Dual Cities based on the doctrines of modern urban planning and allows, with modern cities to high quality, designed according to the rules of the avant-garde, to preserve traditional urban forms and especially Medina. In the second phase, which corresponds to the management of city affairs and urban planning by Michel Euchar, I tried to cope with the pressure of urbanization and the negative impacts it could have on the city, especially in terms of social housing and the prevalence of slums.

The politics of the 1980s, for its part, simply confused the causes and the effects of structural socio-economic failure. He considered that urban planning contributed greatly to the imbalances of cities and Moroccan society. This led to the political decision, crucial for the future, and placed it under the supervision of the Ministry of the Interior. Urban planning has thus become, on the one hand, a tool for political and economic organization, and on the other hand, a means of coercion based on very strict urban regulations.

II. PROVIDE THE FIELD OF STUDY

Casablanca is the largest city in Morocco, located about 90 km south of the capital Rabat. The city stretches on the Atlantic coast. It moved from a small port at the beginning of the twentieth century to a sprawling city that made it take the lead in relation to Moroccan cities in economic, commercial and services activities.

Casablanca occupies the first place in Morocco in terms of population and the third in Africa after Lagos and Cairo, with a population of about five million people.

The economic capital of Morocco is distinguished by its architecture, between the old mixture of the old city, the popular neighborhoods, its buildings and villas that date back to the era of protection, then the architecture of the independence period during which the city witnessed a rapid development in architecture and architecture in its modern and modern shape represented in building high-rise buildings and Luxurious, large commercial centers, classified hotels, and excellent social, touristic and sporting facilities.

III. WORK METHODOLOGY

To study the urban expansion of Casablanca, we will rely on a set of documents and geographical tools.

Which is mainly manifested in satellite imagery and ancient maps from the year 1910 to 2020 and we use geographic information systems as a tool for work, and we will try to track and draw the urban area of the city in every thirty years, according to the documents available, and track the urban path of the city during these periods.

IV. URBANIZATION AND URBAN GROWTH

Urbanization is defined as a process of population concentration that is carried out in two ways, either by increasing the number of population gathering places, or the growth of population gatherings. In this regard, sociologists and the human environment have unanimously agreed that this simple definition is the most obvious and far from ambiguous definition because it distinguishes between the urbanization process itself, And what may be accompanied by positive effects or natural conditions. In line with this convention, cities are defined as centers of urban agglomeration, and with a variation in the minimum number and density of the population that makes a place a city, as urbanization is defined as a process of radiating ideas and experiences from an urban center to the surrounding areas, because this definition means that the city is a source of urbanization, not a result. The process of urbanization does not give an explanation of the emergence and growth of cities, in addition to that there is another definition that states that urbanization means increasing certain problems and characteristics related to living in the present, because this definition confuses cause and effect, or cause and effect because it also assumes the existence of cities before the process of urbanization , And any definition confuses The concept of urbanization and the city is wrong because the urbanization process culminates in the city.

Any human society is the outcome of the interaction of different factors, affecting each other as the process of urbanization itself is caused by the effect of social change on the distribution of the population within this human community, and then the main entrance to the study of urbanization is to study the population distribution. Cities do not automatically emerge into existence, but they are the result of population growth in society, and there are two factors inherent in the process of urbanization, population and technology or scientific progress, and population concentration is the result of the transfer of the surplus number uttered by agricultural land to urban communities, while the scientific progress paves the way for the concentration of large numbers of Population somewhere. That is, overpopulation, scientific progress, and the process of urbanization are interlinked factors, one of which affects the other, although there is nothing to prevent the civilization of a society without reaching a large degree of population density, or technology may advance without being accompanied by a high population density. The definition of the concept of urbanization varies from country to country

V. RESULTS AND DISCUSSION

The image of the "new city" promoted by pioneers and settlers at the beginning of the century attracted a group of architects of different origins to Casablanca in the early twenties. The number of engineers in Casablanca exceeded three times their number in Tunisia.

Casablanca's 2020 population is now estimated at 3,752,000. In 1913, the population of Casablanca was 78,000 (Table I). Casablanca has grown by 159,282 since 2015, which represents a 0.87% annual change. These population estimates and projections come from the latest revision of the

UN World Urbanization Prospects (Fig. 1). These estimates represent the urban agglomeration of Casablanca, which typically includes Casablanca's population in addition to adjacent suburban areas.

A. Urban Expansion in Casablanca between 1910 and 1930

From 1912, with the signing of the Protection Treaty, the first major constructions appeared outside the walls of the Old City. Speculation on the ground is fierce and the need for regulation is urgent. After the first plans to develop the surveyors, including Tardif, which charts the grip of the new city bounded by the circular avenue (boulevard de la Résistance and boulevard Zerktouni), the first general resident in Morocco, Maréchal Lyautey, "Urban Planner Henri Prost," Director of the Special Service for Engineering Architecture and Town Planning ", in February 1914.

Henri Prost, who is still 8 years in Morocco, submits his first plan to develop Casablanca in 1915 (Fig. 2). It will categorically record Casablanca in the history of modern cities, and implement it, the talented "economic capital" of a large port by General Lyautey, organized Original and innovative in matters of city planning (new science).

TABLE I. SHOWS THE SCALE OF CASABLANCA'S EXPANSION BETWEEN 1913 AND 2020

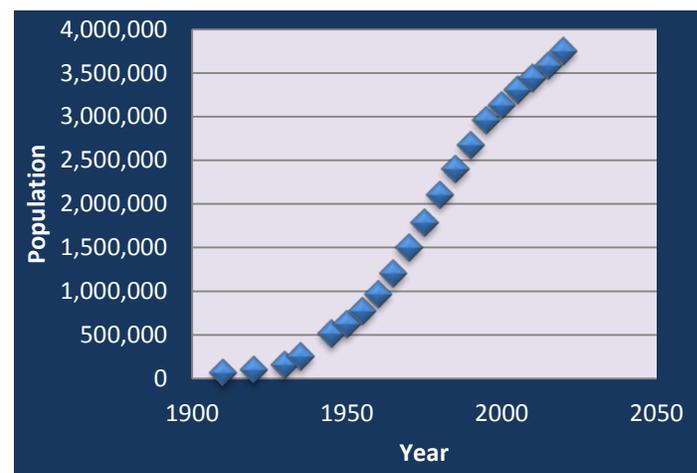| Year	Population
1913	78 000 (of which 31 000 Europeans)
1920	100 000 (of which 40 000 Europeans)
1932	165 000 (of which 50 000 Europeans)
1936	257 000 (of which 80 000 Europeans)
1947	550 000 (of which 100 000 Europeans)
1950	658 000 (of which 158 000 Europeans)
2005	3 002 700
2010	3 197 000
2015	3 460 000
2020	3 752 000

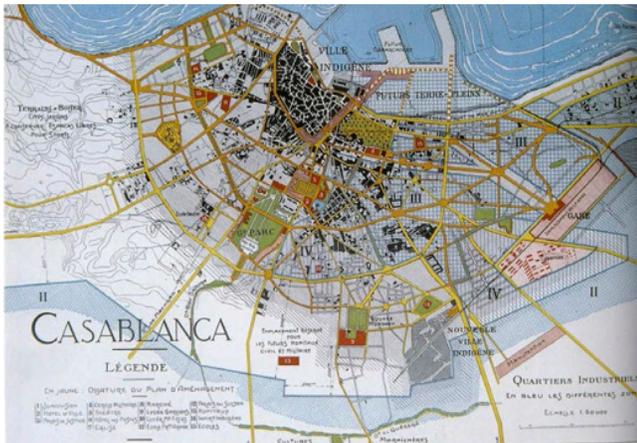Fig. 1. The Population of Casablanca Developed from 1910 to 2020.

Fig. 2. The Henri Prost Development Project (1915) for Casablanca.

B. Urban Expansion in Casablanca between 1930 and 1960

The thirties, the break will begin with the use of the new Moorish character, characterized by the abundance of its motifs. The concern for the new generation of architects coming to Casablanca was to employ modern theories that were studied at the School of Fine Arts in Paris. Thus the importance was given to the space and sizes instead of decorating on the level of the facades that left its place for the terraces and prominent windows that took over the space, then extended to the facades of the buildings that took an upper direction. For the luxurious bourgeois oriented buildings, the factor of comfort and luxury was present, as they were equipped with elevators and Household waste fuel, garages, cars, and bathrooms inside the apartments. As artistic architectural masterpieces, it bore the names of its owners as it constituted a heritage reference for this new city, but the architects excelled especially in building villas at the level of architecture, or the comfort and luxury required, and so with the rapid pace of construction in Casablanca and the abundance of workshops, it was described by specialists as the capital of engineering Contemporary architecture.

(Levi Pendion Building) This building was built in 1928 by the architect Marius Puyer, and it is considered the start of the modern movement that characterized the thirties, as it was considered a strong transformation of modern and contemporary architecture in the city.

(Moretti Melon Building) This building is located in the middle of the United Nations square, with its eleven floors. It was built by Pierre Jabban, and was inaugurated in 1934; the luxury of the architecture is represented by its distinctive façade with its vertical and horizontal lines and its high windows in addition to the quality of its equipment and the number of elevators in it.

The regulation of Henri Prost's plans remained in force until the end of the 1940s. Although in 1943 Alexandre Courtois was responsible for their redesign, it was not until the arrival of Michel Ecochard in 1947 that a new development plan will be put in place.

The 1950s witnessed a period of economic prosperity that would be reflected in architecture during this era. Thus, the oval bourgeoisie, influenced by American culture, found the Californian character of the architecture of its "villas" lost, which resonated with the new generation of architects.

Due to its very modern character, the "villas" of the 1950s acquired the personality of its designers. As a personal masterpiece, the latter dazzled its daring architecture in its details and innovation in its design and engineering. But this difference in style will accompany the difference between social groups. The petty bourgeoisie resorted to building "mixture" villas, inspired by the architectural details of southern France, such as "Sial".

But the 1950s will also define the creation of "housing for large groups". By Eng. Euchar and his team in 1950. The development of public housing programs gave birth to large housing groups with encouraging prices intended for Muslim Jews and Europeans [1].

Thus, for example, the residential city of Karyan Centrale has been programmed to accommodate residents of shanty houses, which offer Muslims traditional residential shops. With regard to "neck" residences, it was intended to house 18,000 Jews from the Old City as well as for the buildings of Burnaziel (1954) intended for European customers of very medium classes.

Parallel to this, collective hobbies emerged that led to the development of private clubs on the Corniche. Building new cinemas such as "Luticia" cinema 1950 or the emergence of service stations and garages, as is the case with the Volvo garage 1950, which is an amazing architectural landmark.

The architectural culture of the fifties will continue after independence until the borders of the eighties, which will define the emergence of postmodern issues.

C. Urban Expansion in Casablanca between 1960 and 1990

In 1965, Casablanca experienced a riot which now included the urban movement in a new type of social dynamic. The latter depicts new social actors (young people), from the process of modernizing the country, about an equally new cause (education), the fruit of the policy of economic and social development. Originally, young people went on strike over education claims. This urban movement was quickly repressed very quickly, but it led to a reorientation of spatial planning, with a view to better matching between rural and urban planning. The awareness is all the more marked as the lack of consideration of the social costs of urbanization (which prevailed, in part, in the choice of a priority for rural development, shortly after the independence) finds echo in the results of the 1971 census: the average annual growth rate from 1960 to 1971 is 3.5% for Casablanca, when that of the same period for the whole of Morocco reached 4.3%, making increase the urbanization rate from 29.15% (1960) to 35.2% (1971) [2].

The 1970s [3] saw the creation of a ministry of housing and town planning, and this period enabled the Moroccan state to implement a housing policy from its land base. It is intended mainly for the middle strata, which he says carries a driving force for development. But this policy, as ambitious as it is, once its achievements have been translated into the number of homes provided, ultimately only affects part of the

average social category [4]. Why? Despite the fact that at the same time there was a fairly strong access to land offered by the State, it is the first arrivals who are the first served, and the "illegal's" are the inhabitants who could not benefit from lots of land. Then, access to official funding methods concerned only a fraction of the middle layers, the upper middle class. Finally, the official acquisition of land or built housing goes through a long and complex procedure [5], which cannot therefore affect a majority of the middle classes, the lower middle class. The latter and the upper poor class prefer to go through other construction sectors, for reasons of financing, availability of land on the market, or circumvention of the authorization procedure, in particular for migrant workers. The speed of the mode of access to housing, and the ease of the mode of financing demonstrate a certain adaptation to urban socio-economic conditions.

The 1970s was doubly important from the point of view of the housing question since it saw, at the same time as a real estate promotion encouraged by the State, the birth and development of a massive urbanization known as "clandestine" on a short period. The 1970s generally remain the time frame in which a massive phenomenon of state production of housing began and ended. This period corresponded, for the Third World countries resulting from the political independence of the 1950s and early 1960s, to the effort of young states to establish a social base from their action towards the middle strata of the population. Social policies are no longer seen as unproductive, especially since they do not concern the poorest of the city's inhabitants. And if the significant effort that has been made by the State has proved insufficient to avert the housing crisis in Moroccan cities, it is on the one hand the magnitude of the housing deficit to be filled, and on the other hand, certain preferential choices of official town planning which can explain it.

From 1981, Casablanca was administratively divided into five major prefectures (Ben M'sik-Sidi Othman, Aïn Chock-Hay Hassani, Casablanca-Anfa, Aïn Sebaa-Hay Mohammadi and Mohammedia Zenata [6]), and from 1984, the city is controlled at the urban level by a control and decision center, the Urban Agency of Casablanca. The challenge is ambitious: to create emulation between the different prefectures for better urban management and at the same time to control urban development as absolutely as possible thanks to the "orchestration structure" of the Urban Agency. The ultimate goal of this Casablanca restructuring is to give a new image of the city, consistent with that of the Moroccan political order.

The master plan proposed by the Pinseau team is a document presenting the main options for urban development valid for a period of twenty years. 98,000 hectares have been retained for the growth of the city, according to the linear scheme previously defined by eochard. The most important points of this document are the urban extension towards Mohammedia (rather than towards El Jadida), the improvement of transport, the distribution of central equipment (universities, hospitals), finally the installation of a tool of management and control of urban development.

In the context of the supporting report for the Casablanca master plan, the identification of urban problems is quite convincing. First of all, it is noted that urban facilities are insufficient. The delay in road equipment (mainly road works and sanitation networks) compared to the extension of the urban perimeter results in a land deficit. The shortage of equipped land is also reflected in a gradual densification of urban space [7]. However, this densification mainly benefits the main producers of housing: landowners, developers and public authorities [8]. The insufficient production of housing and the inadequacy of the method of financing for access to housing [9] are also among the findings noted in the report supporting document.

At the level of urban activities, the master plan notes the deficiency of public transport [10]. With a car for 20 inhabitants and a bus for 4,000 inhabitants, cars and buses each provide 17% of total mobility. And 75% of trips are for work or school. Almost 50% of school trips and 25% of trips to workplaces are pedestrian. This is why the recommendations of the master plan provide for the construction of a light metro in the medium term, an appropriate solution for a city which will have 4 million inhabitants in 2000. With regard to urban planning documents, the report notes their "obsolescence" and "inconsistency", hence the need to reunify urban regulations with the good offices of the Urban Agency.

Finally, concerning the land problem, a central aspect of Casablanca's urbanization, the creation of a Land Agency is envisaged, coupled with the Urban Agency. In this regard, it should be recalled that the master plan had programmed the equipment of 12,000 hectares from 1982 to 2000, including 4000 hectares for the period 1982-1990. However, it should be noted that the Land Agency in question never saw the light of day, its mission having finally been linked to that of the Urban Agency. However, in 1990 (Fig. 3), the Urban Agency had been able to urbanize only a thousand hectares out of the 4000 recommended by the master plan. The bankruptcy in the land sector is obvious. So when agency technicians try to reflect on the means of achieving the objectives set by the master plan, they end up with an annoying observation [11]: the means of public appropriation of the soil (especially the right of preemption) are not effectively legally supported. Although provided for this purpose, a law has still not seen the light of day. By the admission of its main managers [12-14], the agency, however powerful, confines itself to a passive attitude towards speculation. Because in this area, the Urban Agency (which plays the role of Land Agency) has no real authority in the matter. During its existence, it has only had recourse to the declaration of public utility only twice: the first time for the construction of a large avenue to link the Grand Mosque of Casablanca to the business district, a second time to clear a resettlement site outside the Casablanca agglomeration (South-East of Dar Bouazza). But in reality these two expropriation procedures could only take place because of the (par excellence) transcendental nature of the enterprise: the construction of one of the largest places of worship in the Muslim world [15-17].

D. Urban Expansion in Casablanca between 1990 and 2020

Between 1994 and 2004, the average family size decreased. As a result, the number of families increased by 2.9% per year, while the population increased by only 1.5%

per year. The growth in the number of families is fueling demand for housing, which remains strong as before. This has led to a critical housing situation in the region and the spread of slums and the difficulties of reducing them given the gap between family income and property prices. However, in recent years, a major effort has been made in favor of housing, which has resulted in a record for housing construction, with an average of 24,000 units authorized each year between 2001 and 2004, against 16,000 additional units. Per year in the 80s and 90s, and this revival is the result directly for the "200,000 housing" program, the release of a large amount of land by non-compliance [18].

Despite its drawbacks, urban development in Casablanca remains somewhat well controlled compared to other capitals of the same size in countries with a similar level of development. This translates into the relative agglutination of urbanization, a clear transport network structure, good urban installations, and readable functional organization. This is the result of a long-standing tradition in city planning, which somehow tries to reconcile with the available means and emergencies to be met [19-20].

Fig. 4 presents the Casablanca city development plan between 2010 and 2020.
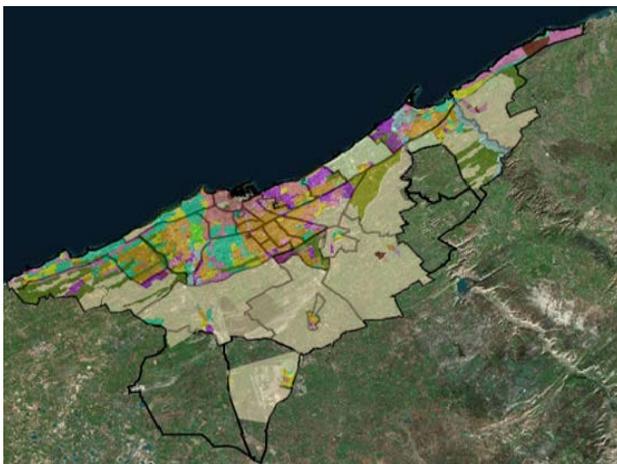

Fig. 3.   Casablanca City Development Plan (Source Agence Urbaine de Casablanca).

Fig. 4.   Urban Expansion in Casablanca in the late 1990s.

VI. CONCLUSION

The problem that we addressed in this research is no less important than any other topic, because it is one of the important and thorny issues, especially if applied in a city that needs urban treatment such as the city of Casablanca, which today suffers from the problem of urban growth and urban expansion due to the saturation of its urban fabric and high rate Population growth. This made her a victim of increased demand for housing and land use, and this has led to several results that negatively affected the city as excessive exploitation of the field, random expansion and imbalance in urban fabrics. Our study of urban expansion came as a result of the requirements of the population for the various urban functions of urban life, and from it the need to conduct in-depth studies to analyze the living reality and determine the future needs of housing, facilities and equipment, roads, spaces for the necessary employment as well as the best and optimal direction for city expansion taking into consideration Consider that the city of Casablanca faces a set of barriers that stand in the way of its expansion and the continuity of its urban fabric.

In our study of the reality of urban growth and the phenomenon of expansion in the city of Casablanca, we first analyzed the city from the economic, urban and demographic historical side to determine the characteristics that characterize the city and the problems it suffers from, and an attempt to find solutions for its direct urban expansion based on all the conclusions obtained from the analytical study. We found that reality is completely different from statistics, which conceal a different reality from the reality in which you live. This fact is the result of data inconsistencies between the first stage, the diagnostic phase of the planning plan for the preparation and construction and the last stage of the preparation phase, and therefore it can be judged that it was not programmed tightly to solve the problem of real estate and land consumption.

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