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Master thesis in urban studies and planning

**Urban project lever of local economy in bousaada .
The proposition of an aquaculture complexe in Bou Saada .**

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Dedication:

To my father and mother,
Meriam and Ikram
Abdelrahman and Mohamed.
I love you ...

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Abstract:

The city of Boussaâda's beauty and wealth of landscapes and nature have a major influence on its tourist life. In addition, an economy based on tourism only is not a profitable one, especially after the Covid 19 pandemic. To make the most of our city's wealth, we're proposing an urban project with a guaranteed urban economy that will address one of the major problems facing Algeria today. We'll be working to create a second economic dimension in the city, for commercial purposes or simply to create jobs for young people, who make up 48.49% of the population (according to the official PDAU report). Our project consists of exploiting and benefiting from the wealth of underground water and aquifers in Boussaâda, where our intervention takes the form of an aquaculture project, also known as Fish Farming, as a concept similar to agriculture. The aim is to produce aquatic species in the water resources. Aquaculture is both a source of nutrition and an additional source of income for those living in these regions. It increases the number of possible jobs on the market as it both provides new products to the market and creates employment opportunities due to the labor required to maintain the fish tanks and harvest the production.

The advantage in Boussaâda is that the water will be turned into an ecological cycle where it will be reused to irrigate the palm grove, which is located just beyond an ecological green urban economy project. Our vision is to create new jobs in our city and contribute to an efficient urban economy in the zone.

Key words:

Bou Saada, employability, aquaculture, urban economy, urban activities.

Résumé :

Dans la ville de Boussaâda, sa beauté et sa richesse paysagère et naturelle ont une grande influence sur la vie touristique de cette ville. S'ajoute à cela qu'une économie basée seulement sur le tourisme, n'est pas rentable notamment après la pandémie de Covid 19. Pour profiter de la richesse de notre ville, on propose un projet urbain d'une économie urbaine garantie qui va reprendre un des grands problèmes que l'Algérie aujourd'hui souffre. On va interagir pour la création d'une deuxième dimension économique dans la ville, pour un but commercial ou tout simplement à des fins de création des postes d'emplois aux jeunes qui représente 48.49 % de la population (d'après le rapport écrit de PDAU). Notre projet consiste à exploiter et bénéficier de la richesse souterraine hydrauliques et des nappes phréatiques de Boussaâda où notre intervention se matérialise dans le projet aquaculture aussi appelé pisciculture en tant que concept similaire à l'agriculture. On vise la production des organismes aquatiques dans les masses d'eau. L'aquaculture constitue à la fois une source de nourriture et une source de revenus supplémentaire pour compléter ceux qui vivent dans ces régions. Elle augmente le nombre d'emplois possibles sur le marché car elle fournit à la fois de nouveaux produits sur le marché et crée des possibilités d'emploi en raison de la main-d'œuvre nécessaire pour entretenir les piscines et récolter les produits.

L'avantage dans Boussaâda est que l'eau va tourner dans une boucle écologique où il va être réutilisée pour l'irrigation de la palmeraie qui se situe juste après un projet d'économie urbaine vert écologique. On vise la création d'emplois dans notre ville et participer à l'économie urbaine efficace de cette zone.

Les mots clés :

Bou Saada, employabilité, Aquaculture, Economie urbaine, activités urbaines.

ملخص

مدينة بوسعادة ، جمالها ومناظرها الطبيعية وثراتها الطبيعي لهما تأثير كبير على السياحة . فالإقتصاد الحضري الذي يعتمد فقط على السياحة ليس مربحًا تمامًا، و هذا خاصة بعد وباء كوفيد19 . للاستفادة من ثروة هته المدينة، نقترح مشروعًا حضريًا اقتصاديًا مضمون سيستأنف أحد أكبر المشاكل التي تعاني منها البلد الجزائر اليوم. سوف نتدخل من أجل خلق بُعد اقتصادي ثانٍ في المدينة ، لأغراض تجارية أو ببساطة لغرض خلق فرص عمل للشباب الذين يمثلون 48.49% من السكان (وفقًا لتقرير المخطط الرئيسي للمدينة). مشروعنا يتمثل في استغلال الثروة المائية التحتية والمياه الجوفية لمدينة بوسعادة والاستفادة منها بحيث يتجسد تدخلنا في مشروع الاستزراع المائي المسمى أيضًا الاستزراع السمكي كمفهوم مشابه للزراعة. اين يكمن الهدف في إنتاج الكائنات المائية في المسطحات المائية. اذ سيوفر الاستزراع السمكي مصدرًا للغذاء ومصدرًا إضافيًا للدخل لاستكمال أولئك الذين يعيشون في هذه المنطقة. حيث انه سيزيد من عدد وظائف الشغل بالسوق لأنه يوفر منتجات جديدة في السوق البوسعادي ويخلق فرص عمل بسبب العمالة المطلوبة للحفاظ على المجمعات وحصاد المنتجات.

الميزة في بوسعادة هي أن المياه ستتحول في حلقة بيئية حيث سيتم إعادة استخدامها لري بساتين النخيل و الاراضي الزراعية التي تقع مباشرة بعد مشروع الاقتصاد الحضري البيئي الأخضر.بذا نهدف إلى خلق فرص عمل في مدينتنا والمشاركة في الاقتصاد الحضري الفعال لهذه المنطقة.

الكلمات مفتاحية :

بوسعادة ، التوظيف ، تربية الأحياء المائية ، الاقتصاد الحضري ، الأنشطة الحضرية.

General purpose of the workshop (Urban Project)

The optimal planning and habitability of new or old towns, in their climatic and geographical contexts, are taking center stage in the new Urban Project vision. By declaring the old functional urban planning methods obsolete, this optimal vision has adopted the urban project approach in a large-scale context. Algeria has become involved in all the international commitments it has made by signing conventions and protocols to deal with the difficult environmental situation, with sustainability as its guiding principle.

This urban project is a continuation of a dead-end conceptualization process. Architecture encourages the mastery of design and its implementation via operational tools for an optimal systemic design dreamed close to a being as a living and human system.

Our Master 2 "Urban Project" workshop has identified three research themes: the first revolves around the renovation of the old town, the second around the recovery of the potential of the Oasis and the third is the proposal for an urban extension based on a programmatic and real approach. Our workshop took place in a climate where the search is on for alternatives in terms of master plans for cities to build on themselves. This is a pressing need.

Tourism plays a key role in this vision, given the tourist nature of the Boussaâda area. We worked in the field as a single group, carrying out questionnaires in collaboration with local services, particularly after signing an agreement between our university and the APC of Boussaâda. For this reason, we found that the history is full of information and lessons for a broader and deeper urban vision by adopting scientific methods such as those of Alain Borie, P Panerai and others.

In this optimistic vision, we have proposed three urban projects worked on by the workshop as a whole and in sub-groups, given the size of the task. Our overriding objective is to propose an extension project with the participation of half the workshop and others by the other half. This led us to come up with layout plans shared by all the workshops.

The work of writing the briefs took place in two stages: a collective stage, involving the parts that were written with all the members of a group or sub-group, such as the methodological approach, the context of the questions, the urban project part and the

analysis of the city; and a second individual stage, such as the study of examples, the specific problem and the specific project. The common part is carried out in a climate of mutual aid and partnership, teaching our students how to work in a group by building a "project".

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Chapter 1: introductory

1.1 Introduction & Problem Formulation:

Cities have always been the fire places of civilization, whence light and heat radiated out into the dark. —Theodore Parker.

"First life, then spaces, then buildings – the other way around never works." —Theodore Parker

There is a strong relationship between social and economic life. It has been expressed in theory and visions through contextual objectives, where each society seeks to adopt a model. But there are commonalities in the division of activities between the primary, secondary and tertiary sectors.

"The great cities are the creations of industry." (The Condition of the Working Class in England, 1845)

This sentence reflects Engels' perspective on the interdependence of industry and urban development. According to Engels, the growth of industry led to the rise and urbanization of cities, while laying the groundwork for the eventual rise of the working class and its potential for revolutionary change.

Since the origin of cities they were centres of commerce and public administrations ,they were offering personal services that rural areas cannot, by time and especially after the industrial revolution peoples were moving in cities that have locational advantages; crossover points of transport linkage ,presence of power or close to mineral resources ,the number of city citizens started highly increasing with the availability of more better means of living ,and close to economic places markets and good production which made living easier ,near to plants that will offer job places ,so the main reason human lived in cities after services is the economic stability .¹

Urban planning has the capacity to foster the way in which city architecture helps to create conditions for a better lifestyle for inhabitants on every scale: neighborhood, city or territory. The socially and economically uncontrolled city is an urban space that creates social problems that are sometimes very difficult to solve. "Urban planning by defining the

¹ Colin Jones, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :10.

components of the city and their operating requirements makes it possible to meet the requirements of city dwellers in their urban practice”² where the French urbanist cited the main planners’ purpose from designing the container of the city and not the content.

As the American economist Michael Cohen (Ph D, University of Chicago) the Director of the International Affairs Program *cited: “I’m interested in the question why have we the urbanists are spending so much time focusing on housing and infrastructure ,and not thinking about the city as a place where we generate jobs and incomes and...the basics of urban life itself, the world is becoming more urban and as we learn about that we have to understand much more, about the possibilities of generating jobs and incomes as a part ,of how the city in fact develops and supports global development and national development”*³. In Algeria, the employment crisis is the topic of the moment, and for years the government has been trying to provide as much housing as possible for citizens, rather than urban activities that provide jobs. We tend to propose urban fabrics that prioritize employability in the same way as housing. Employment is a necessity for a decent, healthy social life.

1.2 General problematic:

Algeria's vast territory is characterized by the diversity and wealth of its natural resources. This is reinforced by a large portion of the working population. Exploiting this natural and human wealth is bound to boost the national economy and improve the well-being of its inhabitants. Our society is also characterized by the major presence of youth. Citizens aged between 15 and 34 accounts for 38.65% of the population, or around 14.3 million young people. Added to this, as we have already mentioned, is the presence of natural potential, sometimes unique in the world, from desert oases to those of the High plateaus, plains, mines, sand, fertile land, energy in all its possible forms.... We are more precisely interested in the town of Bou Saada.

² Jacques lécureuil, 2001 Urban programming needs and challenges methods and applications, Paris, moniteur Group.

³ Michael Cohen ,22 January. 2016, urban economy in the new millennium 2016, YouTube video.URL: [Michael Cohen - Urban Economy in the New Millennium - YouTube](#)

Unemployed population of the city of Bou-Saada in 2018 is 26,198 people, near Oued of Bou Saada, is the palmery, place where the Bou-Saadians practiced agriculture, for centuries, it was the reason for their self-sufficiency in agricultural products but also, they practiced marketing towards the cities and even the neighboring wilayas⁴.

"Cities are not just concrete and steel; they are living organisms driven by the pulse of their economic activity." - Richard M. Daley.

The theme of our research concentrated on job seekers who had no success finding work. According to the preceding facts, Bou Saada's unemployment rate is a significant issue. Investopedia 2017 P1 defines unemployment as a phenomenon that occurs when a person who is actively looking for employment is unable to find work.⁵

According to our questionnaire with residents of this town, unemployment is high, and opportunities for stable employment are not always available. The number of jobseekers increases every year, complicating social life. Urban planning should be a living space and therefore a space that encourages employability. In this sense, understanding the social and economic context, understanding the geographical and historical context, will help us to study this city through the opening up of jobs in the three sectors: primary, secondary and tertiary. To address this topical issue, we posed the following questions:

What is the influence of planning on the urban and local economy? How urbanism answers to the question of unemployment?

1.3 Specified problematic:

The value of employability is important for creating urban extensions. Every inhabited city never ceases to grow and grow. The increase in population will automatically generate more urban space to be developed and prepared for future inhabitants, as well as an adequate number of jobs in relation to the active population and the type of activity.

"Work liberates, it is unemployment that alienates". Nicolas Sarkozy

"The health of the city is directly related to the health of its economy." - Richard M. Daley

Our theme of research interests about the urban economy of the city of Bou Saada, therefor

⁴ Youssef Nacib, 1986, Oasis cultures: essay on the social history of the oasis of Bou-Saâda. Algeria. ENAL.P:451

⁵ [What Is Unemployment? Understanding Causes, Types, Measurement \(investopedia.com\)](https://www.investopedia.com/what-is-unemployment-understanding-causes-types-measurement/)

creating urban activities that suits the Bou Saadian society, Bou Saada, has experienced a significant urban development and economic growth over the years. The urban economy of Bou Saada is characterized by a diverse range of sectors that contribute to its overall prosperity. At first the oasis by the primer activity of agriculture and in the old kesar where we found touristic activities and cultural activities on the head the craft house that attracts thousands of visitors each month, indeed in the north Est extension of El Safsaf exactly, where wholesaling warehouses are located, and factories for production of construction materials (ceramic and concrete and marble ...).

One of the key drivers of the urban economy is trade and commerce. Added to this is the oasis, which plays an important role in water supply and as an ecosystem, guaranteeing the presence of vegetation in the city. The city serves as a regional commercial hub, attracting traders and merchants from neighboring areas. Local markets, souks, and trade fairs are bustling with activity, offering a wide variety of goods and products. Bou Saada's strategic location on major transportation routes also facilitates trade with other cities and regions. Additionally, industries such as manufacturing, construction, and services have emerged, providing employment opportunities and fostering economic stability. The city's urban economy is dynamic.

The question is: how can extension and urban design develop the local urban economy in Bou Saada?

1.4 Objectives:

The objectives of this research are based on the following points:

- Propose business and housing zones in keeping with the nature and culture of the town of Bou Saada, in order to create an economically balanced town in a context of social equity.
- Offering more jobs for young people through a proposed approach to making better use of town and area resources.

1.5 Hypothesis:

- Plan a new job-creation zone in a new extension to Bou Saada that will meet the needs and expectations of local residents by exploiting the town's natural resources, based on a market study.

- Providing facilities that support agricultural, aquacultural and urban activities will contribute to the diversity of employment opportunities in the town.

1.6 Site selection:

we choose the department of Bou-Saada because of its strategical situation considered as the closest desert to Algiers, also because of its geographical diversity and the special culture of its population, and mainly cause of the future Upgrading as an independent province on its own.

1.7 Methodology:

In order to complete our research work, the dissertation is divided into two chapters and an introductory section in accordance with university guidelines. We have adopted two methodological approaches: theoretical and practical.

The theoretical section is based on bibliographical research by reading books, master's theses, doctoral dissertations, articles and websites to deepen our understanding of the key concepts guiding our research, as well as information on the city of Bou-Saada, urban activities, urban economies and urban employment opportunities. This enabled us to fully understand the subject and the main ideas of the survey at the same time.

The practical part is based on a Synchronic and diachronic analysis of the city of Bou Saada. To carry it out, we made study trips, SWOT analysis, collected data from the technical departments concerned (NICT (National institute of cartography and telecommunication), ANRH (National agencies of hydro Lique resources), MFPP (Ministry of Fisheries and Pharmaceutical Products), Department of the Environment, DUAC (department of urban planning, architecture and construction), and aquaculture design offices. ...), and all interviews with administrative, aquacultures and technical staff during the study trip to confirm the technical solutions required for the urban intervention and the aquaculture complex.

1.8 Structure of Thesis Report:

The dissertation is structured into three chapters and a general conclusion:

- Introductory chapter:

Consisting of a general introduction to the work, a general problematic, specific problematic, objectives, hypotheses, site selection, methodology and the structure of the Thesis Report.

- conceptual framework chapter:

Considered as a theoretical descriptive phase in which the concepts and definitions involved in the study of the local urban economy are reviewed, as well as the way of working and the creation of jobs (urban project, employability, urban extension, local urban economy,), as well as examples of financial arrangements (Hauts de Sains department and the new district of Senart) with the aim of bringing out the concepts to be followed. And finally, thematic research on the theme of aquaculture.

- Case of study chapter:

Conceptual part: includes the analysis of the site of urban intervention, the programming of employment in the urban project and the quantitative data on employability and urban activities in the town of Bou Saada and at last the principles of the urban proposal of our development plan.

- General conclusion:

Includes the overall synthesis of our research from start to finish.

- Appendices:

Includes a brief summary, example analyses of a fish processing plant and an aquaculture learning unit, as well as the design of the aquaculture complex units; and project genesis, program, plans, sections and facades.

Chapter 2
State of art.

II.1 Introduction:

The aim of this chapter is to assess the state of knowledge concerning our research theme, defining and explaining the key concepts that are relevant to our topic in order to understand the theme and master our intervention in the field. This chapter contains bibliographical research on the notions of urban planning, economic activities, urban economy and employability.

II.2 The neighbourhood unit:

a) Definition of the neighbourhood unit:

“Cities have always been the fire places of civilization, whence light and heat radiated out into the dark.”—Theodore Parker

The French urbanist Alberto Zucchelli defined it as the following: *“the neighborhood unit is a residential complex, to program, plan, organize spatially in such a way as to ensure a determined population, the correct development of the various functions of living, recreation and leisure possibly accompanying other activities, productive and tertiary, compatible with the dominant residential function.”*⁶.

From the 1900s, urban planners (Le Corbusier, Wright, Gropius, Park, Burgee, Perry and Stein) defined the neighborhood unit in terms of; land use, density, street pattern, natural or artificial barriers, type of housing and amount of green space, which was criticized by sociologists in 1950, by the fact that the conception did not take into account the people who lived there.

Then in 1978,” small permanent geostatic units were established in large cities with the help of local specialists interested in social science and urban planning research. Census tracts were delimited and approved by Statistics Canada according to the following criteria:

- 1: boundaries that coincide with permanent lines that are easily recognizable on the ground
- 2: a population of between 2,500 and 8,000, except in the case of central business districts, industrial zones or outlying rural or urban areas where the population may be lower or

⁶ Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. p :124.

higher: as homogeneous as possible from an economic and social point of view, and as compact as possible (Static Canada, 1978).”⁷

The term "unit" means that this whole entity is designed as an organic whole where its components, such as houses, accompanying housing facilities, streets, and developed green spaces, are considered in terms of their quantity and quality. They are interconnected in a way that creates a spatial framework and ensures the proper functioning of residential activities.⁸

The term "neighborhood" refers to the spatial and social aspects of a community. From a sociological standpoint, it means having closer relationships and more direct interactions with people nearby. This helps individuals and groups connect and share with each other while still maintaining their own identities. It can create a sense of togetherness and community spirit, which is different from the impersonal relationships found in larger cities.⁹ These relationships between people in a neighborhood are influenced by the physical space around them. That's why it's important to understand and determine the practical and emotional aspects that make a neighborhood work well. Different factors are considered to figure out what people living in a neighborhood need and want in order to feel satisfied.

When looking at the basic needs of a neighborhood, we focus on things like having access to food and health services, such as clinics and places for check-ups. It also means having schools nearby for children. Additionally, there are other needs that come from living in a community, like having places for activities and relaxation, such as parks, playgrounds, and spaces where people can meet and socialize.

b) The size of the neighbourhood unit:

Neighbourhood sizes vary between countries based on specific conditions such as urban shape, growth, and organization. In France, neighbourhoods have 800 to 1200 homes (3200

⁷Soubrier, R. (2000). Planification, aménagement et loisirs, 2e édition. Canada : Presses de l'Université du Québec. Page :309.

⁸ Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. p: 120.

⁹ Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. P :120-121.

to 4800 residents), while in Great Britain, there are no strict guidelines, but neighborhoods typically have around 2500 residents.¹⁰

The criteria used to determine the size of a neighborhood can change and be adjusted based on an amenities grid. These criteria can be applied to a general model used by planners and urban designer-architects for organizing residential areas in cities. This model may include principles that have implications for the size and layout of housing zones. Examples of these principles include differentiating traffic flows, having a highly organized road system, implementing a well-structured transportation system, and creating varied centers within the neighborhood.¹¹

c) The role of the neighborhood unit in the structuration and urban planning:

The management of urban growth involves strategic measures such as the distribution and implementation of urban activities and the development of housing. These initiatives are designed to empower the residential function and actively shape the organization of urban space.¹²

the strategic control of agglomeration growth through the thoughtful distribution of urban activities and housing, along with the active involvement of the residential function, has far-reaching benefits. It establishes an open and adaptable circulation system, ensures the spatially hierarchical distribution of facilities and services, and integrates small-scale industries and crafts into the urban fabric. This approach promotes a well-structured and livable urban environment that caters to the needs and aspirations of its residents while fostering economic vitality and community cohesion.¹³

II.3 Definition of the urban extension:

¹⁰ Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. P :120-121.

¹¹ Fey, R. C. (1958). Citizen Reactions to Alternate Neighborhood Unit Designs. United states: University of California, Berkeley.

¹² Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. Page :131-132-133.

¹³ Alberto Zucchelli. (1984) Introduction to Operational Urbanism and Urban Composition. Collection of Urban Planning Notebooks 3 Volume 03. Algiers, Office of University Publications. Page :131-132-133.

The increasing size and development of cities, known as urban growth, mainly happens because more people are moving from rural areas to urban areas in search of jobs and convenient services. This leads to a need for effective urban laws that focus on expanding cities, increasing population density, planning urban areas, and managing finances.¹⁴

II.4 The urban planification:

a) Definition:

Jacques Lecureuil, the architect urbanist, defined it as “a predetermination of the characteristics of a future urbanization in the long term and during its evolution, that is to say, to provide a container that takes up the needs of content and which is harmonious in its form” Where **The contents** represent **morals**; the citizens with their practiced activities in the future urbanization which

are necessary in life: habitat and all the services they need, economic activities, transport, and transport of people and goods. The contents (moral) are included in **the containers (material)**, which represent the spatial urban places; urban places are organized based on good spatial relations and an aesthetic quality.¹⁵

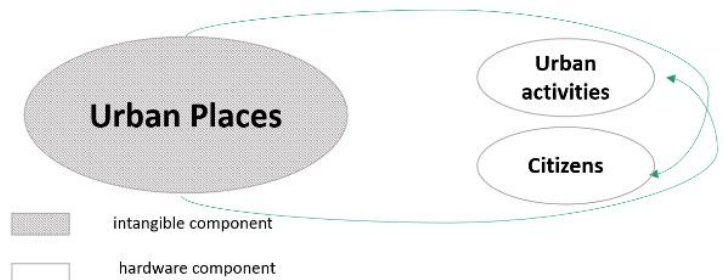


Diagram 1: representation of the relation between the content and the containers. Source : authors 2023.

Also, urban planning is one of a number of designations for forms of spatial planning that encompass ways in which land, land use, spatial morphologies, resource distributions, and social interactions may be planned and managed. Spatial planning involves attempts to plan socioeconomic processes to bring about certain ends, together with drawing up plans, maps, or diagrams that indicate where these activities should take place. Urban planning more

¹⁴ Hassani.L and Kaddou.L, 2020/2021. Creation of a densely populated set of individual habitats based on intimacy and density in an arid environment. Master's thesis in architecture, Algiers. Page 08 (published online).

¹⁵ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :21

specifically has as the objects of its concerns, metropolitan areas, towns, and localities (e.g., residential neighborhoods).¹⁶

b) Definition of the urban project:

The urban project is not an action, it is an attitude, an approach, a strategy. A new language between the city and its inhabitants. The urban project is realistic, it is the response to a social issue as a conceptual and operational tool for formulating urban fabrics. It is a local project in response to a specific situation. (Djellata A)

The urban project responds to a logic of design and intervention scale, following the organisation of the urban space from its macro scale (conurbation), meso scale (city, district) to the micro scale (town).¹⁷

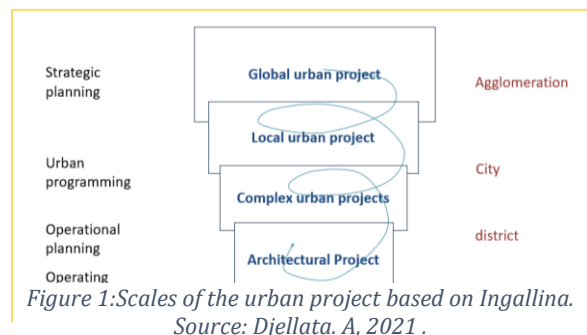


Figure 1: Scales of the urban project based on Ingallina. Source: Djellata, A, 2021.

of the urban space, from the macro (conurbation), meso (city, district) to micro (building) scale. Ingallina (2001) explains how these scales fit together and complement each other when it comes to spatial and urban planning objectives, following a top-down logic. Presenting 4 types of urban project with multiple but complementary actions.¹⁸

c) The process of Studies of the urban design:

Urban planning requires an **interactive process** between the programmer and the urban architect, starting from the programming stage, where it should be tested in space by the architect urbanist. According to the French urbanist lecureuil the process describes as the following:

¹⁶ M. Huxley, in International Encyclopedia of Human Geography, 2009. URL: [Urban Planning - an overview | ScienceDirect Topics](#)

¹⁷ Djellata, A. (2021). Project course and urban context M2 Architecture Dr Djellata. Project And Urban Context. Page :71.

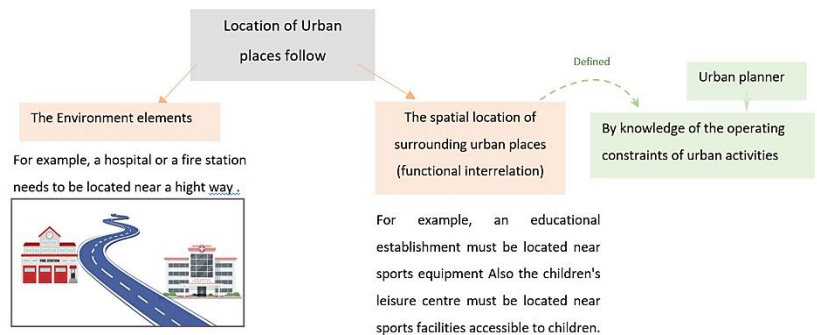
¹⁸ Djellata, A. (2021). Project course and urban context M2 Architecture Dr Djellata. Project And Urban Context. Page :71.

1. Definition of the contents:

First, we define the intangible elements and their attributes - the population and the activities that we aim to observe in future urban development. This includes the anticipated requirements for public and private collective services, as well as transportation, traffic, and parking.¹⁹

2. The translation of the content into the container:

The most important idea now is to define the urban places where activities are practiced, their nature and main elements of dimensioning, and their spatial and functional interrelations.²⁰



BASED ON JACQUES LECUREUIL, 2001, URBAN PROGRAMMING, P. 202.

3. The spatial organization of the containers:

The programmer-urbanist defines the spatial organization of urban places in terms of functional interrelations, while the architect-urbanist defines the aesthetic qualities of the urban framework.²¹

d) variation of the urban programming:

Housing, economic activity, communal facilities, traffic and parking infrastructure are the first aspects of urban programming that vary from one urban place to another, both in terms of their identities and in terms of the logic used by decision-makers to create these places. Second, these urban locations can be classified as either public or private, depending on the sector they belong to. While programming is easier in the public sector because establishments there serve the needs of populations that adhere to more codified rules, it is

¹⁹ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :21

²⁰ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :21

²¹ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :21-22

more difficult in the private sector because initiative comes from individuals and decisions are frequently made solely on a personal basis.²²

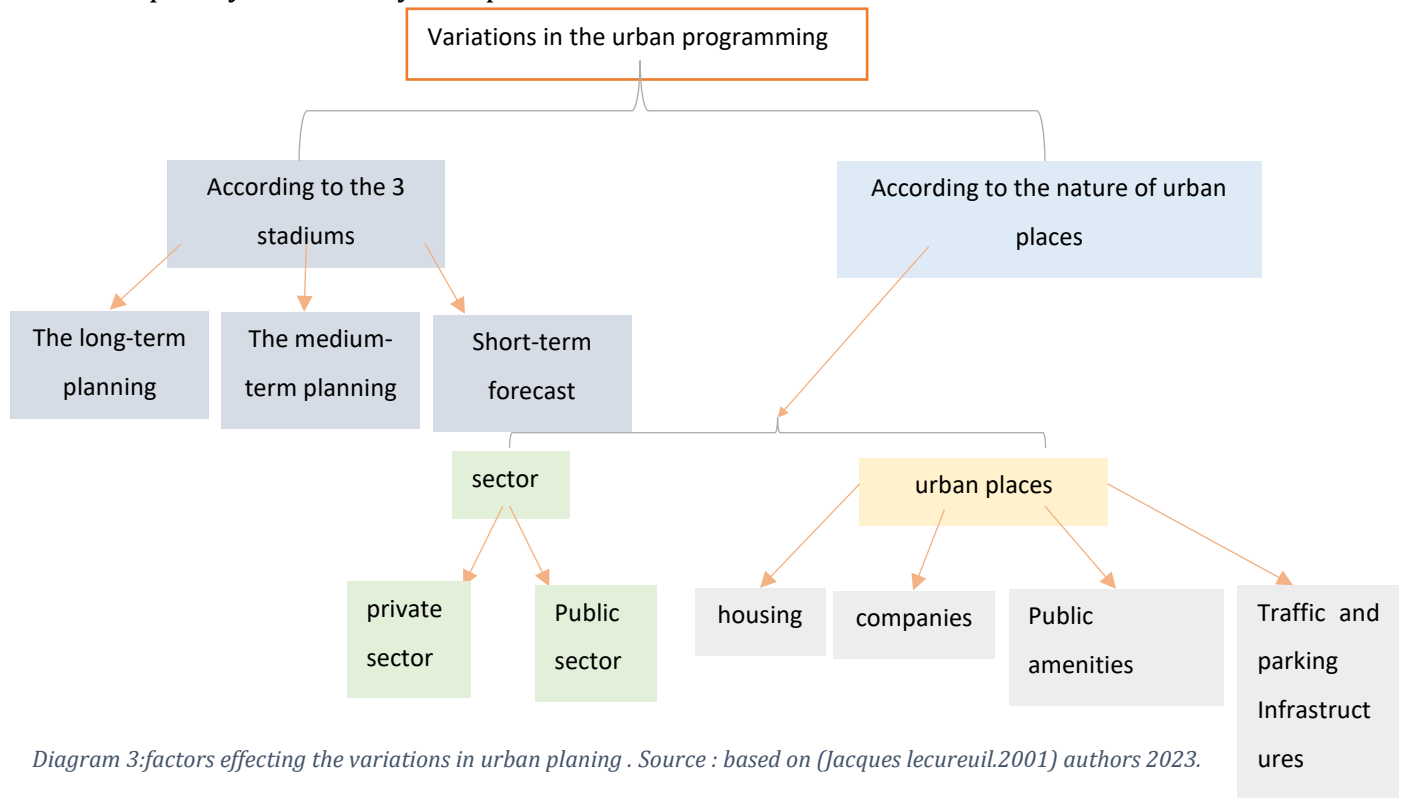


Diagram 3: factors effecting the variations in urban planing . Source : based on (Jacques lecoreuil.2001) authors 2023.

II.5 Urban activities:

a) The approaches of classification of urban activities:

The key here in urban economical planification is all about the understanding of the right activities practiced in the bottom of the city, as we've mentioned in title above urban places are a material, representation or projection, of the immaterial contents of that city in our case Bou-Saada. These activities can be considered in a broad sense, including individual human activities such as housing or recreation, as well as economic or socioeconomic activities that affect the collective functioning of society. There are many possible methods for understanding these urban activities.

²² Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :21-22

Method 1:

This approach starts by counting the individuals needs of activities practiced.

Then, the society needs of activities practiced in Bou Saada's society, basically the public and private activities ensure the following:

-the production and distribution of material goods (secondary and tertiary sector of distribution).

-the production and distribution of immaterial goods; services.

Method 2:

This method fits more in long term planification.

By separating between the public and private activities founded on the classification of INSEE of economic activities, we take the activities practiced in the urban area then separate between those of public and private activities.²³

b) Classification of urban activities:

The list of activities arising from the INSEE classification that are in urban regions, together with instances of comparable urban locales, are listed in appendix 1 to provide a more tangible picture of the urban activities.²⁴

the Main categories of urban activities:

according to the French architect urbanist, Jacques lecoreuil the main urban activities are:

1) Housing.

2) **Industrial and craft activities;** refers to the production of public and private material assets/ goods (national companies and individual companies).

3) **Commercial activities;** refers to the distribution of material goods private or public into companies (wholesale) or into private (retail trade).

4) **Services;** refers to the production and distribution of immaterial assets/ goods, private or public. Here there is 3 different types of services differs depending on their user:

²³ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :31

²⁴ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :31

- First, public and private services aimed mainly at companies such as investment banks, various study and consulting firms, rail or road transport of goods, etc.
- Then, public and private services aimed mainly at companies and individuals such as deposit banks, insurance, administration, etc.
- And, public and private services aimed mainly at individuals such as private collective amenities (liberal medicine, cinema, etc.) or public collective amenities (education, hospitals, rail passenger transport, etc.).²⁵

The urban activities

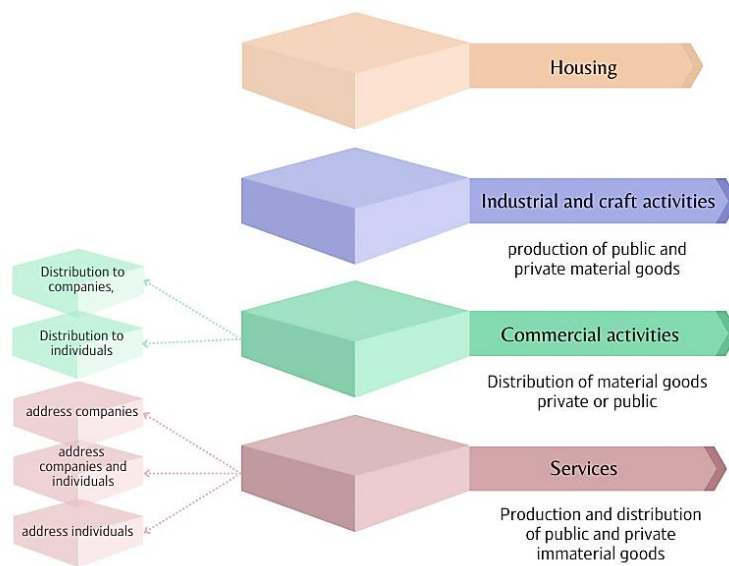


Diagram 4 :The Layers of Urban activities. Source: authors 2023.

²⁵ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :31

II.6 Economics:

a) Definition of economics:

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." Adam Smith, the father of modern economics.

According to Blaug .M in the encyclopedia Britannica, No one has ever succeeded in neatly defining the scope of economics, Many have agreed with the British economist Alfred Marshall, that economics is *"A study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment, and with the use of the material requisites of wellbeing"*—ignoring the fact that sociologists, psychologists, and anthropologists frequently study exactly the same phenomena, In the 20th century, the British economist Lionel Robbins defined economics as *"the science which studies human behaviour as a relationship between (given) ends and scarce means which have alternative uses."*²⁶

In other words, Robbins said that economics is the science of economizing, while his definition captures one of the striking characteristics of the economist's way of thinking, it is at once too wide (because it would include in economics the game of chess) and too narrow (because it would exclude the study of the national income or the price level).²⁷

II.7 Urban economy:

a) Definition of the urban economy:

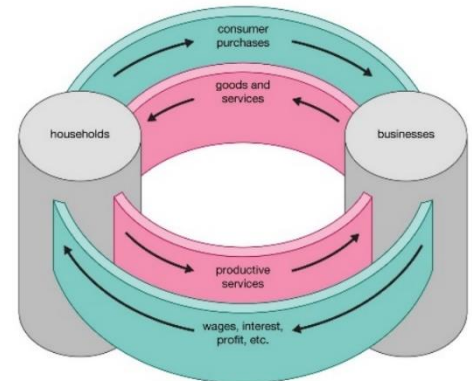


Diagram 5: In and out relation between Households and Businesses.

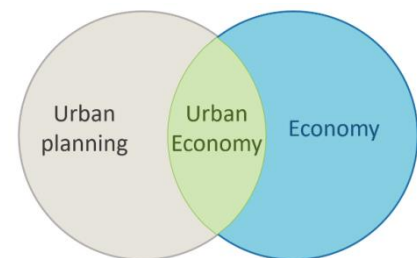


Diagram 6: Illustration on the definition of the urban economy. Source: authors 2023.

²⁶ Blaug, M. (2023, May 17). economics. Encyclopedia Britannica. <https://www.britannica.com/money/topic/economics>

²⁷ Blaug, M. (2023, May 17). economics. Encyclopedia Britannica. <https://www.britannica.com/money/topic/economics>

«The city is a total phenomenon where the economic and the social, the political and the cultural, the technical and the imaginary are condensed». The historian Jean-Luc Pinol.

The American economist **Arthur O'Sullivan** has defined in 2012 (The appendix provides the details on the citer) the urban economy as the following “*The discipline of urban economics is defined by the intersection of geography and economics. Economics explores the choices people make when resources are limited. Households make choices to maximize their utility, while firms maximize their profit. Geographers study how things are arranged across space, answering the question, where does human activity occur? Urban economics puts economics and geography together, exploring the geographical or location choices of utility maximizing households and profit-maximizing firms. Urban economics also identifies inefficiencies in location choices and examines alternative public policies to promote efficient choices.*”²⁸

This citation explains urban economics as the intersection of geography and economics. It focuses on choices made by individuals and organizations with limited resources. Households seek to maximize utility, while firms aim to maximize profits. Geographers analyze spatial arrangements and human activity locations and implantation. Urban economics combines economics and geography to study location choices within cities, identifying concentration patterns and efficiency. It also examines potential inefficiencies and suggests public policies for improved decision-making in urban areas.

Urban economics takes up the reasoning and results of traditional economic theory by adding a spatial dimension. It thus introduces the fundamental question of the distribution of economic activities and actors in space, its causes and its dynamics.²⁹

b) The definition of the city from urban economists’ perspective:

Urban economists define an urban area as a geographical area that contains a large number of people in a relatively small area, the definition is based on population density because an essential feature of an urban economy is frequent contact between different economic

²⁸Arthur O’Sullivan. (2012) Urban economics,8th edition, New York, The McGraw-Hill/Irwin companies.

²⁹ Vignolles, B. (2011). A brief introduction to urban economics. Regards croisés sur l’économie, 9, 159-161. <https://doi.org/10.3917/rce.009.0159>

activities, which is feasible only if firms and households are concentrated in a relatively small area, Urban economists distinguish 5 types of cities following their density.³⁰

c) Definition of the city from geographers and urbanist's view:

*"The city is an artificial place which brings together a concentration of inhabitants and various and specialized activities. It is the expression of social diversity creative, which granted the production of buildings prejudice to the know-how, the technique and culture of an urban way of life."*³¹ (Djellata, A).

d) Brief history of urban economy:

From 1970 onwards, urban economics gradually emerged as an autonomous discipline, but it was still heavily influenced by the Anglo-Saxon analyses of ALONSO, WINGO, and MUTH in the United States, then the 1980s and 1990s witnessed further development and cross-fertilization with related disciplines such as land and real estate economics, industrial economics, local public economics, new economic geography, and the economics and geography of networks, finally between 1995-2000, new issues emerged, reflecting the attractiveness or desertification of territories, globalization or local production, urban governance or globalization, metropolization, social segregation in urban or peri-urban areas, thus opening up new frontiers.³²

"Creativity lies in the ability to see things from a new angle." Albert Einstein.

e) Definition of local urban economics:

Local urban economics is a branch of spatial economics that studies the economic activities of cities, (in the cities scale) it focuses on the economic interactions between firms, households and local governments in an urban context.³³ Research in local urban economics covers topics such as economic growth, employment, innovation, productivity, competitiveness, governance and urban planning.³⁴ Local urban economists are also

³⁰ Colin, J, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :2.

³¹ Djellata, A. (2021). Project course and urban context M2 Architecture Dr Djellata. Project And Urban Context.

³² Derycke, P. (2009). Regards sur l'économie urbaine 40 ans de recherches francophones (1965-2007). Journal of Regional & Urban Economics, 239-266. <https://doi.org/10.3917/reru.092.0239>

³³ Douglas, C. (2005). Economic theories of the city. Political Economy, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

³⁴ Linternaute dictionary: <https://www.linternaute.fr/dictionnaire/fr/definition/economie-urbaine/>. Updated in :01/01/21.

interested in the effects of public policies on the urban economy, such as economic development policies, transport policies, housing policies and environmental policies.³⁵

Following the urbanist Davezies, he defined it in his article as, that urban local economy refers to the economic activities and systems that exist within a specific urban area or city. It encompasses various sectors such as manufacturing, services, trade, tourism, and other productive activities that generate income and employment within the urban setting he urban local economy also includes the flow of resources, goods, and services, as well as the interactions between businesses, residents, and institutions within the urban environment, it is influenced by factors such as local policies, infrastructure, market conditions, and the availability of resources.³⁶

II.9 Economic activities zones:

a) Definition of economic activities zones:

A location in the heart of the city, specially designed and equipped to accommodate businesses, the improvements it provides (earthworks, networks, roads, etc.), which are usually carried out by a public authority, are designed to attract businesses and are therefore a source of tax, social and environmental benefits, attract businesses, and as such are a source of tax revenue, job creation and economic development for local areas.³⁷

b) The development history of economic activities zones:

The first, business parks appeared at the beginning of the 20th century in England at Trafford Park near Manchester (Merlin & Choay, 2010), but they really began to develop in the 50s and 60s in the form of artisanal or industrial zones, from the 70s and 80s, as the economy became more service-oriented, they gradually diversified into commercial zones, technology and science parks, and even technopoles, bringing together training and research centers and innovative companies. In the 90s and 2000s, new activities emerged, such as transport and logistics, wholesale trade and business services, leading either to a specialization of these

³⁵ Douglas, C. (2005). Economic theories of the city. *Political Economy*, n°<sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

³⁶ Davezies, L. (2009). L'économie locale « résidentielle ». *Géographie, économie, société*, 11, 47-53. <https://www.cairn.info/revue--2009-1-page-47.htm>.

³⁷ Lejoux P., 2018, "What place for the economic activity zone in the fabric of the city contemporary ? ". In Baudelle G., Gaultier G., *The new factories of the city. Objects, repositories and, Rennes methods*, University Press of Rennes, p. 25-32

economic activity zones (business parks, logistics platforms), or to diversification with the development of mixed activity zones (Cerema, 2014).³⁸

Finally, with the emergence of environmental concerns, a new generation of economic activity zones has appeared with the development of eco-parks, eco-zones and other eco-industrial parks (Gibbs & Deutz, 2005; Thiard, 2007).³⁹

c) Definition and classification of economic activities:

Economic activities can be anything that makes money. Across the whole economy, we usually separate it into primary, secondary, tertiary and quaternary:

- a. **Primary:** retrieving raw materials from the environment including, fishing, forestry, mining and farming.
- b. **Secondary:** manufacturing and processing these materials into products that can be used. This includes the transport and storage of materials.
- c. **Tertiary:** the provision of services to customers. This includes shops, entertainment and intellectual services such as legal and financial.
- d. **Quaternary:** innovation, research and development of new products and services.⁴⁰

economic activities are classified into three main sectors: retail, commercial, and industrial.

Retail involves the sale of individual products to individual customers. This predominantly occurs in the city center, also known as the 'Central Business District,' but can take place anywhere in the city, including the rising trend of online retail.

Commercial refers to the provision of services to the general public and businesses, typically conducted in office settings. This encompasses legal services, banking, logistics, and technology support such as website design. It's important to note that this definition of commercial activity is specific to this page, as most sources include retail within the broader scope of commercial activity.

³⁸ Lejoux P., 2018, "What place for the economic activity zone in the fabric of the city contemporary ? ". In Baudelle G., Gaultier G., The new factories of the city. Objects, repositories and, Rennes methods, University Press of Rennes, p. 25-32

³⁹ Lejoux P., 2018, "What place for the economic activity zone in the fabric of the city contemporary? ". In Baudelle G., Gaultier G., The new factories of the city. Objects, repositories and, Rennes methods, University Press of Rennes, p. 25-32

⁴⁰ Matt Burdett, 17 March 2019. Urban economic activities. consulted in 20/05/2023. Algiers. Available at: Urban economic activities - GeographyCaseStudy.Com

Industrial entails the manufacturing, processing, transportation, and storage of goods. ⁴¹

d) Factors affecting the location of urban economic activities:

The choice of location involves a combination between various factors which is the reason why every urban area has its unique characteristics and distinctions.

i. Physical factors:

Are the following; the land, whether it is flat or hilly, water supplies, proximity to coastlines and rivers and physical hazards.

The physical needs for various economic activities are:

- Industry: The majority of industrial activities necessitate a significant land area, preferably flat, to facilitate smooth operation of production lines.
- Retail: Retail operations in central business districts (CBDs) typically require a smaller land area, but stability and absence of hazards are crucial. On the other hand, out-of-town shopping centers demand substantial land space for both stores and parking lots. Flat terrain is also preferred to minimize construction costs.
- Commercial: same as retail. ⁴²

ii. Land price:

As the demand for land increases, the cost of land also rises, this leads to heightened competition among businesses, who are required to offer higher prices in order to surpass their competitors. Retail activities are mentioned to generate more revenue per square meter of land compared to other land uses. Consequently, retailers can afford to pay higher rents and outcompete others for land in the central business district (CBD), also the CBD is attractive due to its easy accessibility for customers from various parts of the urban area.⁴³

In economic activities, the aim is to find the optimal location at the lowest land price.

⁴¹ Matt Burdett, 17 March 2019. Urban economic activities. consulted in 20/05/2023. Algiers. Available at: [Urban economic activities - GeographyCaseStudy.Com](https://www.geographycasestudy.com/urban-economic-activities/)

⁴² Douglas, C. (2005). Economic theories of the city. *Political Economy*, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

⁴³ Douglas, C. (2005). Economic theories of the city. *Political Economy*, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

Industries typically prefer the edge of the city where land prices are lower, road transportation links are better, and congestion is reduced. While industries historically located near, but not within, the central business district (CBD), modern industrial needs, such as ample land area and good transport links, have shifted the majority of industries to the city periphery.

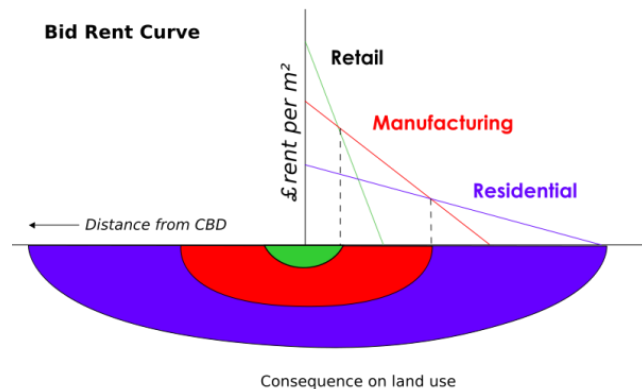


Figure 2: Bid rent curve. Source : SyntaxError55, 2008.

Retail, requiring less space, tends to prioritize CBD locations where the largest customer base is concentrated, however, with more customers owning cars, retail businesses may also take advantage of the cheaper land values on the outskirts of town.⁴⁴

Commercial activities are commonly situated where land values per square meter are relatively lower compared to retail spaces, nevertheless, if commercial enterprises generate sufficient profits, they may still choose to locate in the CBD. However, they often opt for upper floors of buildings instead of expensive ground-level spaces.⁴⁵

Interestingly, certain highly profitable commercial sectors, like finance, intentionally select the most expensive areas within the city. This decision is partly driven by prestige, as occupying the top floors of a skyscraper carries significance and is deemed valuable despite the higher rental costs.

iii. Proximity to a central business district (CBD):

Most of retail and commercial businesses prefer to be in close proximity to the central business district (CBD) due to its accessibility for customers and clients.

⁴⁴ Douglas, C. (2005). Economic theories of the city. *Political Economy*, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

⁴⁵ Douglas, C. (2005). Economic theories of the city. *Political Economy*, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>

iv. Planning:

Urban planning, led by government authorities and supported by business groups and local civil society action groups, influences economic activities through three main aspects:

- **Urban redevelopment:** Specific areas within or near the central business district (CBD) undergo government-funded redesign or reconstruction. This can involve creating pedestrian zones, reconstructing sections of the city, and establishing new public spaces. For example, after a terrorist bombing in Manchester, UK, an entire district was reconstructed, including the development of an entertainment district.
- **Expansion planning:** Obtaining permission for constructing new buildings, especially on the outskirts of cities, is a common requirement. "Greenbelt" refers to land protected from development, and requests to develop on such land can come from businesses or be initiated by authorities. The Cambridge Science Park in the UK is an example of a deliberate government initiative to attract high-tech industries.
- **General infrastructure development:** Infrastructure projects like highways, railway lines, and ports are designed to benefit industrial, commercial, and retail activities. These developments aim to enhance accessibility and connectivity, which can attract new economic ventures to the area, fostering growth and opportunities.

And also influenced by several factors, including; transportation links, competition from other businesses, proximity to the supply chain (particularly for industry), Proximity to potential employees, and the concept of cumulative causation (when one business is successful in an area, it can create the conditions for other businesses to move in and succeed too) ...etc.⁴⁶

II.10 Employment:

a) The definition of employment:

Employment (according to the International Labor Organization (ILO) definition):

A person in employment, as per the International Labor Office (ILO), is someone aged 15 or above who has worked for at least one hour and/or is absent from work due to specific

⁴⁶ Douglas, C. (2005). Economic theories of the city. *Political Economy*, n^o<(sup> 27), 82-97. <https://doi.org/10.3917/leco.027.0082>
[Urban economic activities - GeographyCaseStudy.Com](http://UrbanEconomicActivities-GeographyCaseStudy.Com)

reasons. This includes all forms of employment, whether declared or not. Those declaring their job but absent on paid leave, sickness, maternity/paternity leave, or other approved reasons of up to three months are considered employed.

Employment is an agreement between an individual and another entity that stipulates the responsibilities, payment terms and arrangement, rules of the workplace, and is recognized by the government.⁴⁷

The economist John Maynard Keynes defined employment as the utilization of labor resources in productive activities. He emphasized that employment is not solely determined by the availability of labor but also by the level of effective demand in the economy. Effective demand refers to the total spending by households, businesses, and the government on goods and services.

b) The definition of unemployment:

An unemployed person as defined by the ILO is a person aged 15 or over who simultaneously meets three conditions: being unemployed for a given week; being available to take a job within two weeks; having actively sought a job in the last four weeks or having found one starting in less than three months.⁴⁸

The active steps considered are varied: studying job advertisements, going to a trade fair, mobilizing the social network or taking advice from Pole of employment, etc.⁴⁹

Keynes viewed unemployment as a situation where there is an involuntary lack of demand for labor. In other words, it occurs when there are individuals who are willing and able to work but cannot find suitable employment opportunities. According to Keynes, unemployment arises due to deficiencies in aggregate demand, which leads to insufficient job creation by the private sector.

c) Active population (according to the International Labor Organization (ILO) definition):

⁴⁷ Accounting dictionary, URL: [What is Employment? - Definition | Meaning | Example \(myaccountingcourse.com\)](https://myaccountingcourse.com/what-is-employment/)

⁴⁸ [Definition - Unemployed person \(according to the International Labour Organization \(ILO\) definition\) | Insee](#)

⁴⁹ [Definition - Unemployed person \(according to the International Labour Organization \(ILO\) definition\) | Insee](#)

the active population includes employed and unemployed persons, both concepts defined according to the ILO definitions.⁵⁰

II.11 The planification of medium term:

1. Definition:

The Medium-term planning concerns operations that fall within these 3 administrative frameworks:

- a. **Real estate restoration:** defined in the Town Planning Code (Article L.314-4) as involving refurbishment, modernization or demolition work resulting in the transformation of the conditions of habitability of a building or a group of buildings .it is essentially architectural and does not require urban programming.
- b. **Subdivision:** according to the urban planning code (Article L.315-1) "consists of any division of a land property with a view to the establishment of buildings which has for object or which over a period of less than 10 years has had the effect of bringing to more than 2 number of lands from said property "aiming at a new construction, it is generally homogeneous in its content comprising only dwellings and covers an area of a few hectares.⁵¹
- c. **The zones of development concerted (CDZ):** defined according to the urban planning code "are zones within which a public collectively decides to intervene to carry out or have carried out the development and equipment of the land in particular those of this collectivite ... An Acquis or will acquire with a view to ceder or subsequently designed them to public or private users "The ZAC covers an area of tens or hundreds of hectares with differentiated

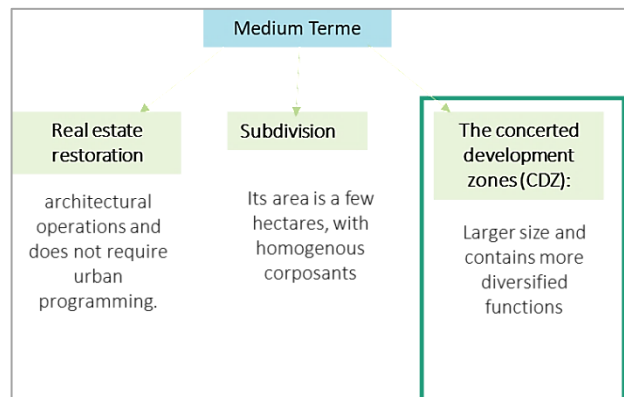


Figure 3:Medium term intervention areas Source: authors 2023.

⁵⁰ [Definition - Active population \(according to the International Labour Organization \(ILO\) definition\) | Insee](#)

⁵¹ Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :31

components (housing and collective facilities) to be put in coherence, however the ZAC relating to urban centers are more heterogonies because they are associated with housing, collective facilities and public and private service activities.

In medium-term planning, it is on a more limited scale than that of the SCOT or PLU and its realization lasts only years or more, however it is the ZACS which are the subject of urban planning and it requires a more detailed and precise programming than that of the long term.⁵²

2. Economical activities in the planification of medium term:

1. Classification of zones of development concerted following the Economic activities:

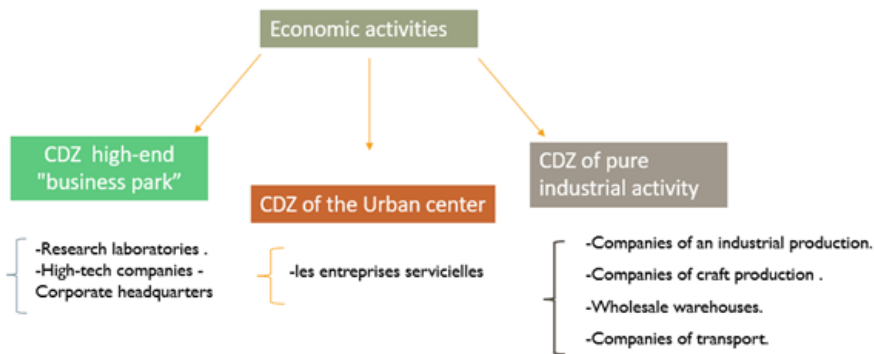
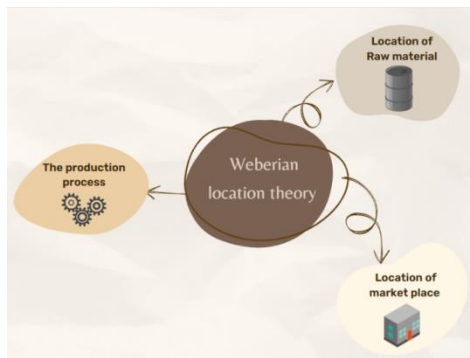


Figure 4:types of CDZ following the economic activities. Source: author

II.12 The industrial location theory:

The industrial location theory is associated with the work of Alfred Weber in the early 1900 s, in the Weberian Theory



the best location is where the firm costs are minimized, It's the location that minimizes the transport costs and its production and distribution process ,assuming other costs do not vary by location, in a

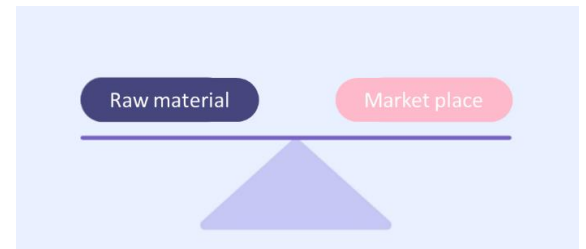


Figure 5:the industrial location theory. Source: authors 2023.

⁵² Jacques lecoreuil.2001. urban programming, necessity and challenges, methods and applications. Paris. The monitor. Page :31

more concrete image, The choice of location is one of balancing the cost of transporting the raw materials or inputs to the industrial plant or the finished product to its marketplace.⁵³ This equation becomes more complex. If a firm makes more than one product or has more than one plant that has links production process or has more than two locations from which it drives its inputs or serves more than one Marketplace, the industrial location theory offers a way to think more strategically about the location of manufacturing industry following the location of raw materials and marketplaces to lower maximum the cost of Transport, from the raw material locations to the industrial firm, and from the industrial firm to the marketplace locations. Another factor adds depends on, is the nature of the firming production process, in the process where the final product weighs a lot less than the original materials like the case in the steel manufacturing plant, or if the final product is made by assembling smaller components like the case in a car plant. At the first case the cost minimization location is nearest to the raw material location, in the second is near to the marketplace.⁵⁴

In the following figure is the case where raw materials comes from two different locations. The problem becomes choosing a location within a triangle as set out in the following figure.⁵⁵

-M1 and M2 are where the raw materials are located.
 -MK, the marketplace from the finished product.
 cost minimization point lies within the triangle.⁵⁶ This location is determined by the transport costs of moving the raw materials and the finished product taking into account that they each of the inputs and outputs have

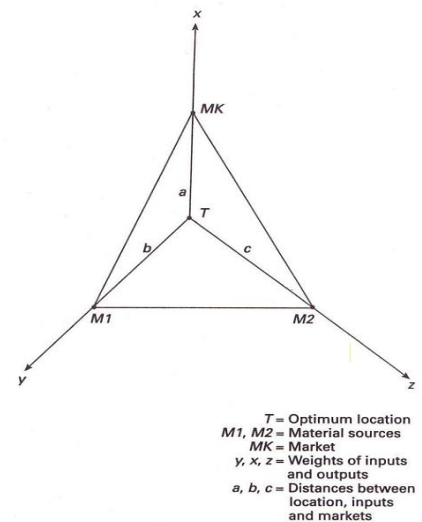


Figure 6 Weber's locational triangle. Source: Balchin et AL (2000).

⁵³ Colin Jones, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :13.
⁵⁴ Colin Jones, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :13.
⁵⁵ Colin Jones, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :14.
⁵⁶ Colin Jones, 2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :13.

different weights/sizes and freight rates.⁵⁷ In our topic the point of cost minimization is also the location of profit maximization.

This theory is founded on:

-the manufactures have full information on which to base their location decisions

The price of labor and land are assuming to be constant at all locations

Adding to the Weberian theory, the concept of Herbert Simon in the 1950s” while satisficing makes sense for firms it undermines the basis of the Weberian theory “where firms can be located because of proximity to a founders house, here it is not about the norm of maximizing profits but mainly about locations that make a satisfactory profit, in the modern economy ,the role of labor has become significant in industrial location choices ,turns about the availability and the differential price of labor at localities are now the key influences on industrial location decisions. For example, many cars for the market in the United States are now built in Mexico rather than say Detroit ⁵⁸

II.13 Examples analysis:

The following are examples of a financial packages:

“An economic forecaster is like a cross-eyed javelin thrower: He doesn’t win many accuracy contests, but he keeps the crowd’s attention.” —Anonymous

⁵⁷Colin Jones,2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :14.

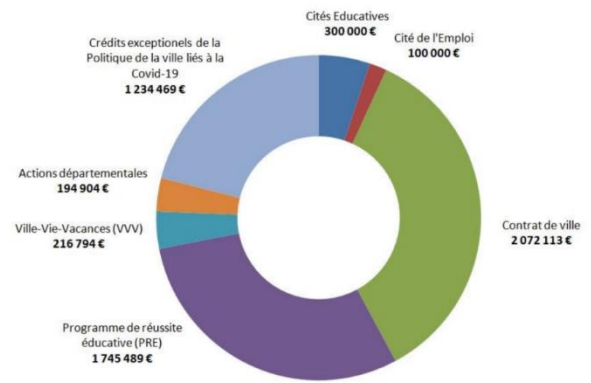
⁵⁸Colin Jones,2022, Urban economy Real estate economics and public policy, New York, Routledge. Page :14.

A. Example of Hauts de Seine département :

More than 500 initiatives benefiting the locals in the areas of education, employment, housing, social ties, and security will be funded by €5,863,769 in credits allocated in favor of the Alto-Sequanese QPV in 2020. This overall envelope consists of:

- €4,250,000 in traditional urban policy appropriations from the program operational budget (BOP) 147.
- Dedicated funds, up to €400,000, for programs including city of employment and educative city.
- A total of €1,234,469 in exceptional credits relating to the Covid-19 health issue were used in 2020.⁵⁹

Crédits de la Politique de la ville des Hauts-de-Seine en 2020



Préfecture des Hauts-de-Seine, septembre 2021.

Figure 1. City policy credits in the Hauts-de-Seine département.

Source: [Graphique 1. Crédits de la politique de la ville 2020 - Financement de la politique de la ville - 2. Politique de la ville - Politique de la Ville, Cohésion sociale - Actions de l'Etat - Les services de l'Etat dans Hauts-de-Seine](#)

B. Example of the center of the new agglomeration of Senart:

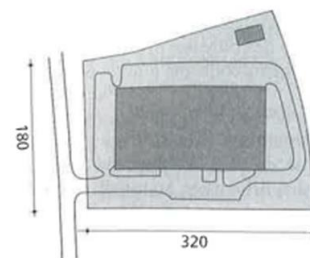
It is an international competition was launched in 1986 with urban architects on the basis of a fairly brief program of economic activities, Provide the following data. resulting in land acquisition by 120 hectares of secondary and tertiary activity the workshop laboratory Activities of the headquarters technological and research center training organization and 150,000 square meters of office and service activity field.⁶⁰

La samaritaine, East paris area, Marne-la-vallee

Type of activity: Storage and distribution.

Plot area: 62,000 m².

Ratio: 1/1.75.



⁵⁹ [Graphique 1. Crédits de la politique de la ville 2020 - Financement de la politique de la ville - 2. Politique de la ville - Politique de la Ville, Cohésion sociale - Actions de l'Etat - Les services de l'Etat dans Hauts-de-Seine](#)

⁶⁰ Jacques Lécureuil, 2001 Urban programming needs and challenges methods and applications, Paris, moniteur Group.P:111.

Company villas, grande-ile, saint Quentin-en-Yvelines.

Nature of the activity: chemicals-offices.

Plot area: 12,000 m²

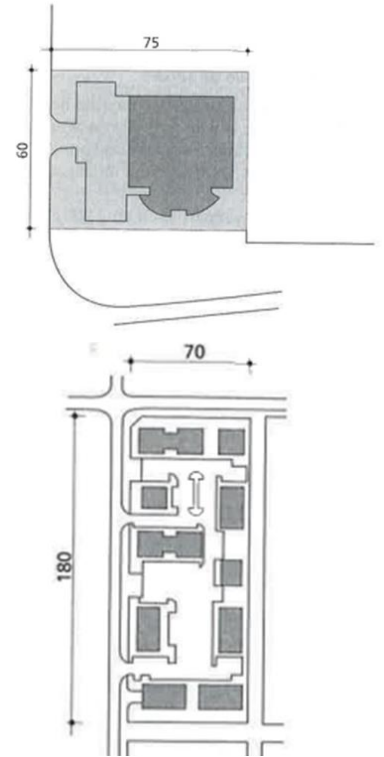
Ratio: 1/2.5

Business villas, grande-ile, Saint-Quentin-en-Yvelines

Nature of activity: 10 SME-SMI plots.

Plot area: 12,000 m²

Ratio:1/2.5.



Figures 8: Source: A.Amar, G.Chamblay, J-F.poisson, Study on activity zones, Epamarne, 1991.

II.14 The architectural project:

1) The idea of the project:

The concept of creating a new aquaculture complex arises from the need to harmoniously integrate it into an already established environment that consists primarily of industrial and agricultural activities, as well as a significant and predominantly young human population. Thus, the development of this complex takes into account these factors and is a direct outcome of their influence.

Inspired by various examples, our intervention incorporates different typological approaches for an aquaculture farm. This includes a fish farm and fish processing plant, an aquaculture learning center, an aquatic restaurant, a market for retailing cultivated fish, and functional housing.

By integrating these projects, our intervention aims to create a comprehensive and balanced aquaculture complex. The aquaculture farm provides the reproduction and grow of tilapia fish, fish processing plant ensures efficient handling of harvested tilapia, while the learning

center provides education and training of aquacultures. The restaurant and market facilitate the sale of cultivated fish, and functional housing accommodates personnel.

2) The theoretical part:

a) definition of the word aquaculture according to the F.A.O:

According to the FAO, aquaculture refers to the breeding of aquatic organisms (fish, molluscs, crustaceans, aquatic plants, etc.) according to 2 conditions:⁶¹

1. human intervention in the process of increasing production; such as regular charging, feeding, protection against predators, etc. ⁶²
2. Individual or legal ownership of the stock in breeding.⁶³

b) The purpose of aquaculture:

- increase in production and productivity through human intervention. ⁶⁴
- Satisfaction of global needs. ⁶⁵
- fill the deficit of fishing by capture. ⁶⁶
- repopulation of endangered species. ⁶⁷

c) Aquaculture systems of elevating fishes:

There are three systems depending on the density of fish in the tanks:

----->

Extensive	Semi intensive	Intensive	Super intensive
3 Fishes/m ³	10-15KG/m ³	30-50KG/m ³	100KG/m ³

Table 1: Aquaculture density systems. Source: authors 2023.

- **Extensive system:** Corresponds to a low density in a large surface area. This type of farming does not require the addition of feed, as the farmed product feeds on the

⁶¹ <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶² <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶³ <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶⁴ <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶⁵ <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶⁶ <https://www.fao.org/3/w4493f/w4493f04.htm>

⁶⁷ <https://www.fao.org/3/w4493f/w4493f04.htm>

environment in which it evolves, it requires a large surface area of water, such as ponds or lakes, for which costly artificial development is not an option. ⁶⁸

- **Semi-intensive system (medium):** corresponds to a medium density and medium production in a medium surface area, the practice defined by this framework concerns farms enriched directly by fertilization, which increases primary production and consequently secondary production, as well as the possible contribution of exogenous feed. ⁶⁹Yields in such cases are highly variable, ranging from half a tone to 30 tones/ha/year.
- **Intensive system (quantity):** corresponds to high density and high production in a small area. This is a technically advanced case. Production is technically controlled, whether in terms of physio-chemical factors, dissolved oxygen or totally oxygenated elements. It concerns species of commercial value. ⁷⁰
- **Super-intensive system (high quantity):** corresponds to very high density and very high production. Production is under technical control, whether in terms of physio-chemical factors, temperature, PH levels, dissolved oxygen, photoperiod, or totally oxygenated elements. Breeding concerns species with high commercial value, due to the heavy investment required to ensure large-scale production. Feed is generally two to three times more expensive - Energy consumption is higher (aeration), as are maintenance costs - Staff must be reliable and qualified. ⁷¹

d) Reasons for fish type selection:

⁶⁸ Meryem.M,Hidayette K.2015. Fisheries center and marine entertainment in Ain Temouchent.Master thesis in architecture.University Abou Bekr Belkaid of Tlemcen. faculty OF technology. algeria.148 pages.URL: [Centre Halieutique Et Divertissement Marin A Ain Temouchent \(theses-algerie.com\)](http://theses-algerie.com)

⁶⁹ Meryem.M,Hidayette K.2015. Fisheries center and marine entertainment in Ain Temouchent.Master thesis in architecture.University Abou Bekr Belkaid of Tlemcen. faculty OF technology. algeria.148 pages.URL: [Centre Halieutique Et Divertissement Marin A Ain Temouchent \(theses-algerie.com\)](http://theses-algerie.com)

⁷⁰ Meryem.M,Hidayette K.2015. Fisheries center and marine entertainment in Ain Temouchent.Master thesis in architecture.University Abou Bekr Belkaid of Tlemcen. faculty OF technology. algeria.148 pages.URL: [Centre Halieutique Et Divertissement Marin A Ain Temouchent \(theses-algerie.com\)](http://theses-algerie.com)

⁷¹ Meryem.M,Hidayette K.2015. Fisheries center and marine entertainment in Ain Temouchent.Master thesis in architecture.University Abou Bekr Belkaid of Tlemcen. faculty OF technology. algeria.148 pages.URL: [Centre Halieutique Et Divertissement Marin A Ain Temouchent \(theses-algerie.com\)](http://theses-algerie.com)

The Red tilapia fish is our preferred choice due to several advantageous factors. Firstly, it exhibits easy natural reproduction and a rapid succession of generations, ensuring a consistent supply. Additionally, it boasts rapid growth, allowing for efficient production. Its omnivorous diet contributes to its versatility, as it can consume various types of food. Moreover, the red tilapia fish showcases hardiness, displaying resistance to oxygen deprivation, handling, and diseases. Notably, it possesses excellent food and organoleptic quality, enhancing its appeal to consumers. Furthermore, this species demonstrates remarkable adaptability to diverse rearing conditions. Its exceptional stocking density capability enables up to 150 kg/m³ of water occupancy. Lastly, the red tilapia fish yields impressive results, ranging from 200 kg/ha/year to a remarkable 2000 T/ha/year.⁷²

e) Environmental requirements des tilapias:

The main factor is the optimal breeding temperature which varies is between 26 and 28°C.



Figure 9: Tilapia fish life stages with four phases: (i) the broodstock phase; (ii) the breeding phase; (iii) the fattening phase and (iv) the processing phase. The fish life stage and body weight depend on the phase (Source: Bhujel, 2013; SAGARPA, 2013; Snir)

f) The production chain of tilapias:

The production chain, from eggs to fillets, lasts nine months, from the spawning stage onwards.

⁷² Meryem.M,Hidayette K.2015. Fisheries center and marine entertainment in Ain Temouchent.Master thesis in architecture.University Abou Bekr Belkaid of Tlemcen. faculty OF technology. algeria.148 pages.URL: [Centre Halieutique Et Divertissement Marin A Ain Temouchent \(theses-algerie.com\)](http://theses-algerie.com)

The first stage Spawners reproduce in nursery tanks at a stocking density of four fish per m³ with a sex ratio of one male to three females, each weighing 125 g, Female tilapia produce around 1,000 eggs and incubate the embryos in their mouths for 20 to 25 days, during these days, the females stop eating, so they grow more slowly than the males, which is more costly for aquaculture, so we adapted a Dutch method which consisted of genetically modifying the sex chromosomes of male tilapia, XY, making them YY, and finally ensuring that they were all male to facilitate breeding, this Dutch method also consisted of artificial incubation in conditions similar to the natural environment of the mouth, so that after hatching we could ensure that the larvae were all male.⁷³

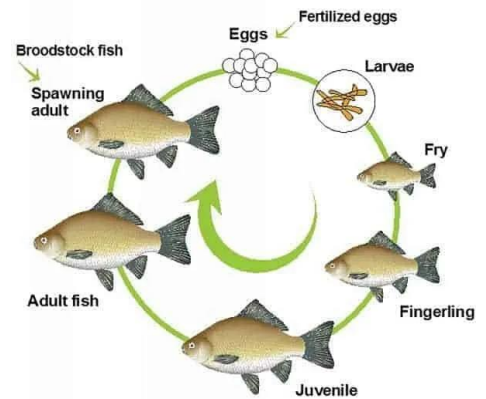


Figure 10:source: <https://theaquariumadviser.com/best-fish-and-plants-for-aquaponics-system/>

The breeding phase is when the fry receives their first food (Bhujel, 2013) during this phase the weight of the fry goes from 0,01 g to 1g, juvenile fish have a faster metabolism than adult fish, resulting in higher growth rates, at the end of the spawning phase, the fish reach a body weight of one gram (Bhujel, 2013). After the first two phases, the fries are transported to the fattening phase.⁷⁴

In the fattening phase, the fry reaches the commercial size of 350 g, reached in 5 to 6 months, depending on the aquaculture system used.⁷⁵

the processing phase, adult tilapia are transported to the processing plant, where measures are taken to maintain freshness and reduce stress, the fish undergo a heat-shock sacrifice

⁷³ P. Guzmán-Luna. and P.W. Gerbens-Leenes, and S.D. Vaca-Jiménez, 2021, The water, energy, and land footprint of tilapia aquaculture in mexico, a comparison of the footprints of fish and meat, Resources, Conservation and Recycling, Volume 165, 105224, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2020.105224>. <https://www.sciencedirect.com/science/article/pii/S0921344920305401>.

⁷⁴ P. Guzmán-Luna. and P.W. Gerbens-Leenes, and S.D. Vaca-Jiménez, 2021, The water, energy, and land footprint of tilapia aquaculture in mexico, a comparison of the footprints of fish and meat, Resources, Conservation and Recycling, Volume 165, 105224, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2020.105224>. <https://www.sciencedirect.com/science/article/pii/S0921344920305401>.

⁷⁵ P. Guzmán-Luna. and P.W. Gerbens-Leenes, and S.D. Vaca-Jiménez, 2021, The water, energy, and land footprint of tilapia aquaculture in mexico, a comparison of the footprints of fish and meat, Resources, Conservation and Recycling, Volume 165, 105224, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2020.105224>. <https://www.sciencedirect.com/science/article/pii/S0921344920305401>.

with ice-cold water to minimize meat decomposition, mechanized processes are employed, involving stunning, deglazing, washing, removal of head, fins, and intestines, filleting, and skin removal, these processes require significant amounts of water and electricity, tilapia fillet yield is relatively low at 33%, resulting in residues such as heads, internal organs, fins, and skin. These residues are unsuitable for human consumption and are utilized for fishmeal, fertilizers, animal feed, and silage production.⁷⁶

g) Production systems:

Three tilapia aquaculture production systems can be identified:

1) Rural food fish farming

Based on using ponds, very widespread in tropical zones, managed in an "extensive" way. The products of this type of fish farming are mainly intended for self-consumption, in these ponds, fish are generally reared in mixed age classes, with very heterogeneous production in terms of size and weight. Feed (or rather fertilization) is low in quantity and of low feed value (farm and household waste). The yield of this type of farm is 0.5 to 2 t/ha of tilapia per year.

77

2) Small-scale fish farming OR "small market production".

Semi-intensive systems, commonly found in Asia, are replacing carp with tilapia. These systems use fry from varying genetic quality and rely on agricultural by-products like rice bran and limited animal meal as feed. The resulting fish, typically weighing 200 to 300 grams, are primarily sold

locally. Pond yields range from a few tons to 10-15 tons per hectare annually, while cage yields are a few dozen kilograms per cubic meter per year.



Figure 11 small scale fish farming. Source: [Reusing heat energy in RAS - RASTECH Magazine](#)

⁷⁶ P. Guzmán-Luna, and P.W. Gerbens-Leenes, and S.D. Vaca-Jiménez, 2021, The water, energy, and land footprint of tilapia aquaculture in Mexico, a comparison of the footprints of fish and meat, *Resources, Conservation and Recycling*, Volume 165, 105224, ISSN 0921-3449, <https://doi.org/10.1016/j.resconrec.2020.105224>. <https://www.sciencedirect.com/science/article/pii/S0921344920305401>.

⁷⁷ Jérôme L. 2009. *Aquaculture and management of aquatic resources*, Montpellier codex 5 France URL: <https://agritrop.cirad.fr/549788/1/549788.pdf>

3) Industrial tilapia aquaculture

refers to highly productive and financially demanding systems that focus on producing large-sized fish (weighing over 500 grams) primarily for urban and international markets. These systems are distinguished by the utilization of genetically superior strains and specialized feed. The majority of tilapia available in the United States, Japan, and Europe is sourced from such intensive farming methods. Intensively managed ponds can yield several tens of tones per hectare annually, while raceways, recycled systems, or cages can achieve up to 200 kilograms per cubic meter per year (Soderberg, 2006; Schmittou, 2006).



Figure 12: Industrial tilapia aquaculture. Source: <https://www.aquaportal.com/definition-1858-aquaculture.html>

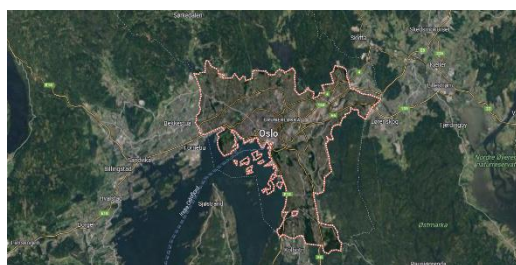
3) Examples analysis:

a) Technical sheet:

The Architect	Anders Haagaas Grinde.
Name	Land based salmon farm.
university	Oslo School of Architecture and Design.
Prices	European Architectural Medals for the Best Diploma Projects (EAM BDP) 2017.
situation	placed at the eastern end of the Harbor front in the center of Oslo, Norway.
The species elevated	Salmon.
quantity of production	6000 tons of processed product year.
Total area of the project	25 615 m ² .
State	Non-Achieved.
Volume of water	500 000 cubic meters.
Density	25 kg biomass pr cubic meter.

b) Location of the project:

The Site is occupied by the delivery function in the logistics and mail area of the Bring brand.



Site accessibility:

The site is accessible from the E18 European motorway after the roundabout below, taking the right-hand exit at the pond after the Kongshavnveien minor road.



Figure 15: Model of the project .source :FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo (aho.no).



Figure 14: Accessibility diagram. Source: Open Street map, modified by Table 2:Aquaculture density systems .Source : authors 2023.

c) The Project description:

The project investigates a new industrial typology – a complete facility for food production, connecting all the steps from breeding to processing into one single line along a visitor center, the initial question is how this line of production can inform architectural space, the biggest challenges in sea-based fish farming are coming from external factors in the sea, resulting in diseases in the livestock, stress from handling and sorting through treatments of sea lice, pollution from fish waste, and bad health among its passive population, these are the issues

that the project wants to address, the scheme is based on a passive handling system that makes the fish swim through each enclosed holding tank by itself.⁷⁸

A steel truss construction spans across the water and becomes the roof of the structure, carrying all of the technical infrastructure needed to operate the production hall along with solar panels facing south, the structure also carries footbridges, giving visual control of all parts of the facility and connecting the different parts of the production line.⁷⁹

The visitor center is an elevated path stretching through all of the different processes in the facility, it tells the story of the farmed Salmon's life cycles, from the incubation chamber to the processing line, it is not only thought of as

another attraction along the "fjord city", but also as an element of transparency, ensuring food safety, animal welfare and the education of food production, creating a new relationship to what we eat.⁸⁰

d) The Key concept:

the circular tanks are placed slightly off the center of each other, making the section of the tank walls change along the curve, creating different water flow velocities throughout the facilities and making the fish do interval training as it swims, increasing the condition factor and health of the livestock.⁸¹

e) Graphic documents:

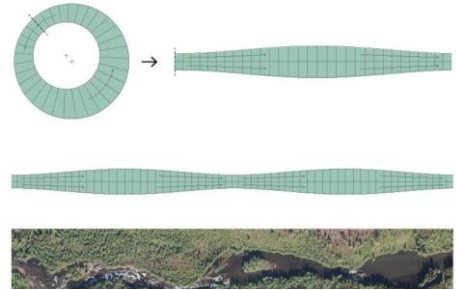


Figure 16: illustration describes the variations in the cross section of the tanks .source: [FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo \(aho.no\)](#) .

⁷⁸ [FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo \(aho.no\)](#) .

⁷⁹ [FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo \(aho.no\)](#) .

⁸⁰ [FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo \(aho.no\)](#) .

⁸¹ [WORK | Haagrin](#)

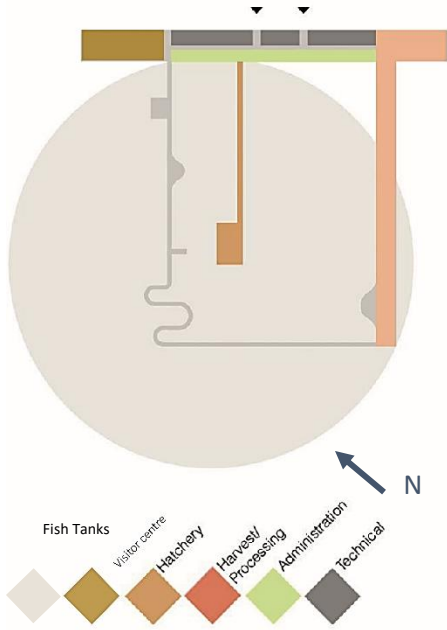


Figure 17: Project entities and main functions. Source: the architect.

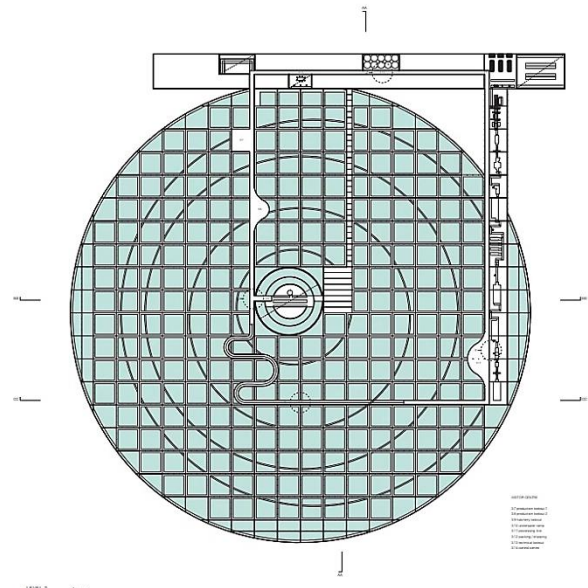


Figure 18: First floor plan. source: the Architect

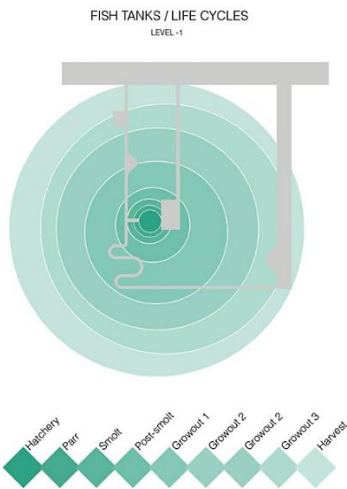


Figure 19: Each tank content. Source: [FISH - A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo \(aho.no\)](#).

The circular form gives the structure a capacity to hold enormous amount of volume, carrying 500 000 cubic meters of water. This makes it possible to manage a fish density of 25 kg biomass pr cubic meter, and still have a production capacity of 6000 tons of processed product a year. All of the tanks are organized from the center and outwards, with the tanks being larger as the fish grows, shifting tanks as it moves through different each life cycle. "

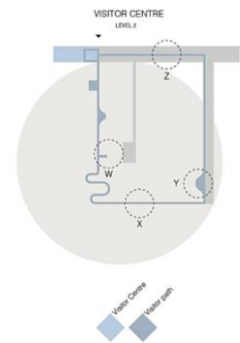


Figure 20: Visitors circulation. source: the architect.

f) Horizontal circulation:

there are two types of horizontal circulation: First of the public, the visitors, and that of the staff, which is divided into two parts: that of the fish farmers and that of the employees of the processing plant.

And the second is the visitors path takes a way around all the project

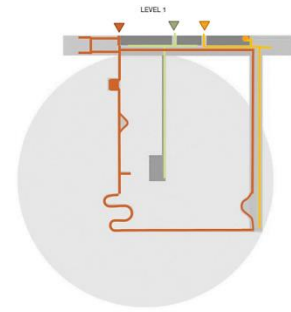


Figure 21: Ground floor horizontal circulation path.

g) Vertical circulation:

Visitor centre	Administration and technical	Harvest and processing	Hatchery
spiral shape staircase Radius=0.85 m	spiral shape staircase Radius=0.85 m	spiral shape staircase Radius=0.85 m	spiral shape Staircase ,Radius=1.1 m
located au fond behind the auditorium screen far away from the entry in a private dark space and gives sensation of privileged to the visitors who have the opportunity to take a tour around buildings and see the fish tanks	Situated next to the administration entry in a tiny hidden corner not	Situated near to the product out put area	

Table 3:table describes the vertical circulation elements and their location. Source: author.

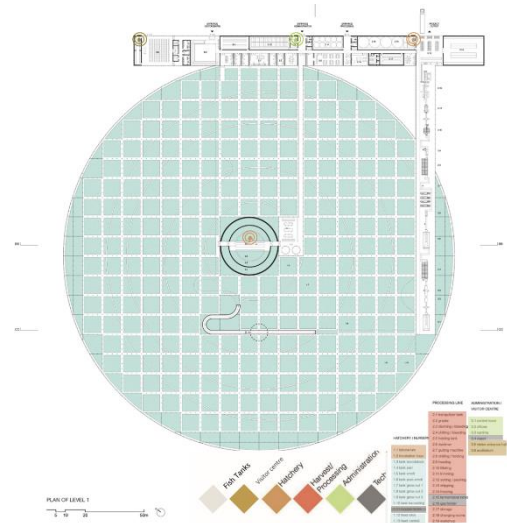


Figure 22: floor plan vertical circulation highlighted.Source : FISH – A land based salmon farm in Oslo | Arkitektur- og designhøgskolen i Oslo (aho.no) ,Modified by author.

h) Functional diagram:

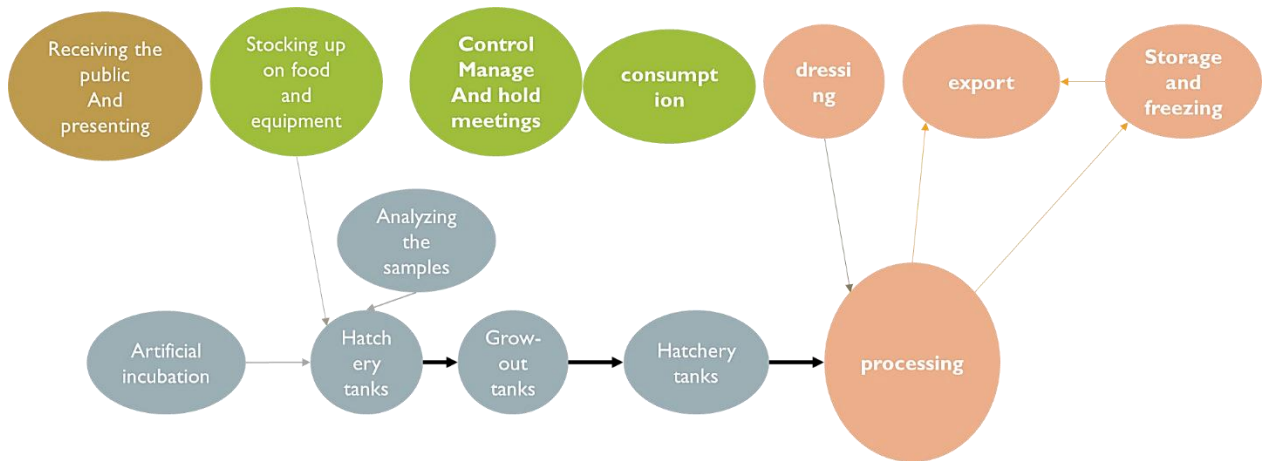


Figure 23: functional diagram. source: Author.

i) Interior views:

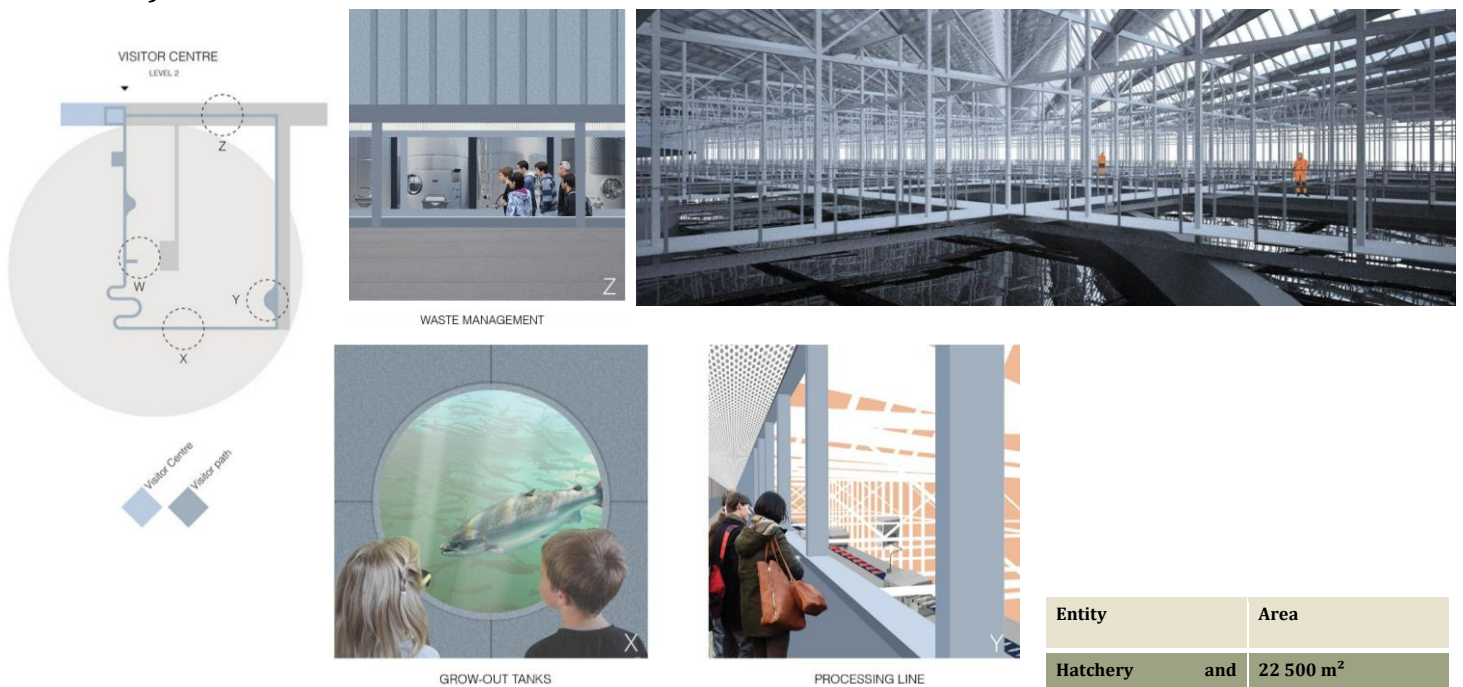


Figure 24: Interior views .Source :The architect.

j) Project areas:

For more details view in appendices.

Entity	Area
Hatchery and nursery	22 500 m ²
Processing line	2 165 m ²
Visitor center	600m ²
Administration	350m ²
technique	477m ²
Total	25 615 m²

Table 4: Project main functions areas. Source: Author

k) Model images:

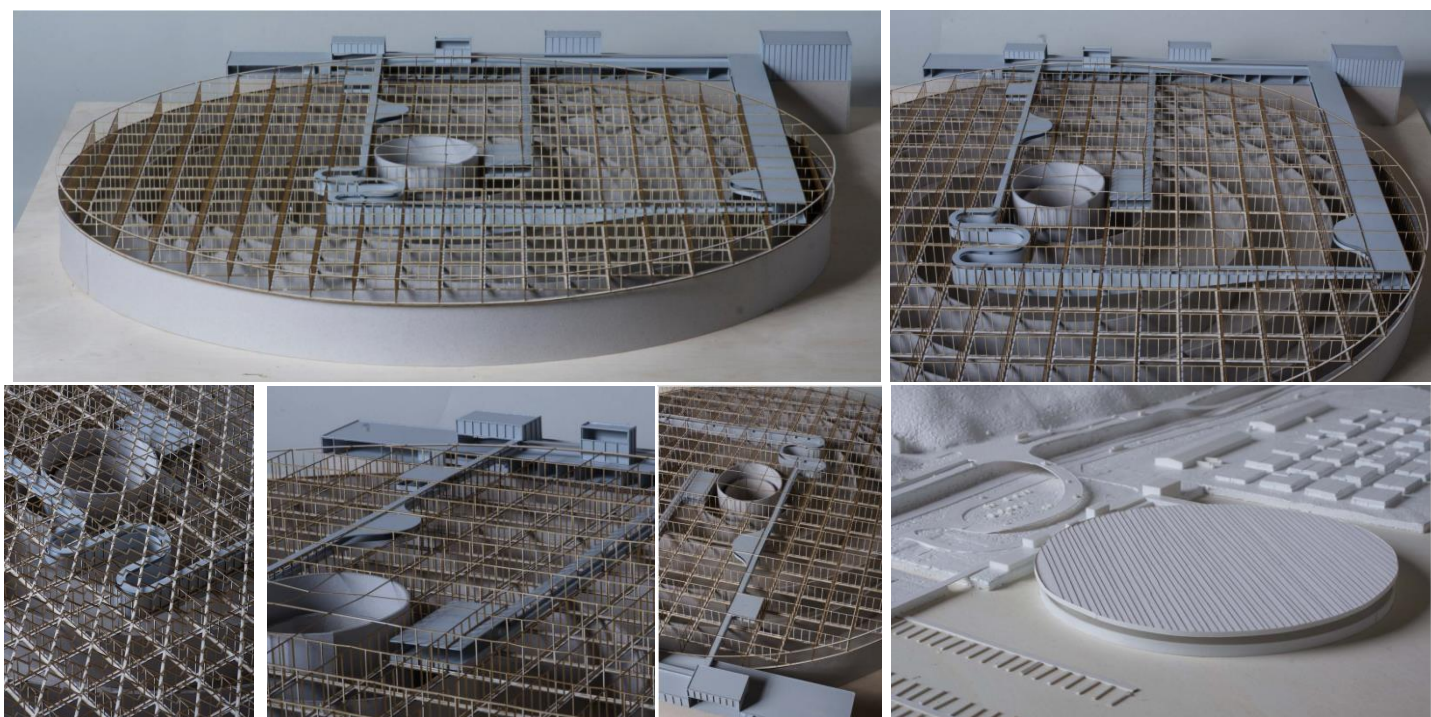


Figure 25-22: the model view source: The architect

4) The fish species chosen for reproduction in our farm:

THE NIL TILAPIA (*Oreochromis niloticus*): Tilapias belong to the Cichlidae family, which includes around a hundred species grouped into three genera: *Oreochromis*, *Sarotherodon* and *Tilapia*, the name "tilapia" means "fish" in Botswana.⁸² Tilapia are freshwater species native to Africa, adapted to all tropical regions of the globe, they were introduced to South America and South-East Asia in the 20th century to feed local populations.⁸³ Nile tilapia is the most fished species of tilapia and the second highest in the world behind carp (19.3 million tons) and ahead of salmonids



Figure 26: The leading producing countries. source: <https://www.guidedesespeces.org/fr/tilapia>

⁸² species guide for professionals. United States .1st Edition. Ethic ocean URL: <https://www.ethic-ocean.org/article-guide-des-especes-3/>

⁸³ species guide for professionals. United States .1st Edition. Ethic ocean URL: <https://www.ethic-ocean.org/article-guide-des-especes-3/>

(3.17 million tons of salmon and trout), and Indonesia and China are the leading producing countries.⁸⁴

Tilapia belongs to the Cichlidae family and comprises around a hundred species grouped into three genera: Oreochromis, Sarotherodon and Tilapia, which differ in particular in their reproductive behavior and diet. The only genus that has so far demonstrated aquaculture potential is the Oreochromis genus, three species of which are now farmed on a significant scale: Oreochromis niloticus, Oreochromis aureus, Oreochromis mossambicus and their hybrids.⁸⁵



Figure 27: Nile tilapia. source : <https://www.futura-sciences.com/planete/definitions/poisson-tilapia-18060/>

a) The characteristics of tilapia:

Nicknamed aquatic chickens, tilapia have particularly interesting biological characteristics for aquaculture:

they have a good growth rate, even on a diet containing little protein; they tolerate a wide range of environmental conditions (oxygenation,

water salinity, etc.); they reproduce easily in captivity and are not very sensitive to handling; they are highly resistant to disease and parasitic infections; and they are popular with consumers.⁸⁶

Scientific name	Vernacular name	Nature of environment	Dietary regime	Origin
Tilapia Nilotic.	Tilapia.	Fresh water.	Microphage.	Nil (Egypt).

Table 5: Technical sheet on Tilapia species. source: <https://www.ethic-ocean.org/article-guide-des-especes-3/>

b) Historical background:

Tilapia farming goes back to Ancient Egypt. The Egyptians already kept these species in ponds and basins for ornamental purposes.

The biological characteristics of tilapia make it adaptable to many environments and types of farming.

⁸⁴ species guide for professionals. United States .1st Edition. Ethic ocean URL: <https://www.ethic-ocean.org/article-guide-des-especes-3/>

⁸⁵ <https://agritrop.cirad.fr/549788/1/549788.pdf>

⁸⁶ https://horizon.documentation.ird.fr/exl-doc/pleins_textes/ed-06-08/010037151.pdf

4) The main Functional recommendations and norms for designing the aquaculture farm:

Cultural aspect:

- Provide a prayer room with ablution facilities.
- It would be highly advantageous to have the contribution of aquacultures or aquaculture architects or experts in the aquaculture trade who have mastered the breeding of the chosen area.
- Provide a small kitchen and canteen for the employees of each unit.

Spatial aspect:

- provide a room for night shift workers on the breeding farm.
- Provide direct access from outside for unloading feed silos.
- The harvesting tanks should be as close as possible to the processing plant.
- The water quality control laboratory should be centrally located in the middle of the tilapia ponds.
- The rearing area should only be accessible via buffer and sterilization areas (staffed with hand washes, foot washes and hand dryers) and a contamination control system to avoid the risk of contamination of the rearing areas.
- plan a hierarchical layout from the incubation tanks to the harvest tanks.
- plan for the silo room to be connected to the feed room.

Finally, each aquatic area has different requirements and rearing methods that need to be clearly understood when designing.

- plan the morphology of the ponds to meet the rearing requirements of the Nils tilapia species: the height of the ponds should not exceed 1.2 meters, the water temperature should be 26 to 28°, circular shapes are preferable to regular shapes because of their efficiency in circulating the water, which favors better oxygenation and reduces dead corners, where the O₂ is balanced throughout the volume of the pond, also allowing good circulation of the fish and better distribution of the food...
- plan the location of the management areas have an opposite to the breeding farm.

Chapter 3: Case of study

Part 1: Analytical approach.

A. Introduction:

This chapter represents the empirical part of our work, organized around three fundamental parts: urban analysis, urban project and the architectural design.

Our study has been centered on the city of Bou Saada, which serves as the primary location for our research. Within the realm of urban analysis, we have chosen to focus on two specific aspects. Firstly, we conducted an in-depth examination of the city, considering its natural, evolutionary, and physical structures. Secondly, we delved into an analysis of the intervention area, specifically the land situated north of the 20th August neighborhood. This analysis employed a hybrid approach encompassing typo morphological analysis and spatial syntax.

These studies, in addition to the theoretical support provided above, will then serve as a foundation for the projection of the urban planning project and the design of an architectural project, the aquaculture complex.

B. Presentation of the city of Bou-Saada:

“If heaven is in the sky, it would be above Bou-Saada, and if it were on earth, it would be in Bou-Saada.” E. Dinet

1. Geographic situation:

Known as the first oasis encountered leaving Algiers towards the south, located in the high plains in the south-west of the “Hodna”, in foot of the Ouled Nail mountains of the Saharian Atlas. Bou Saada until today is one of the 15 departments of the wilaya of M'sila, it includes 3 municipalities (Bou Saada, El Hamel and al



Figure 28: Location of the high plains in the national territory. Source :Geodumonde - Skyrock.com

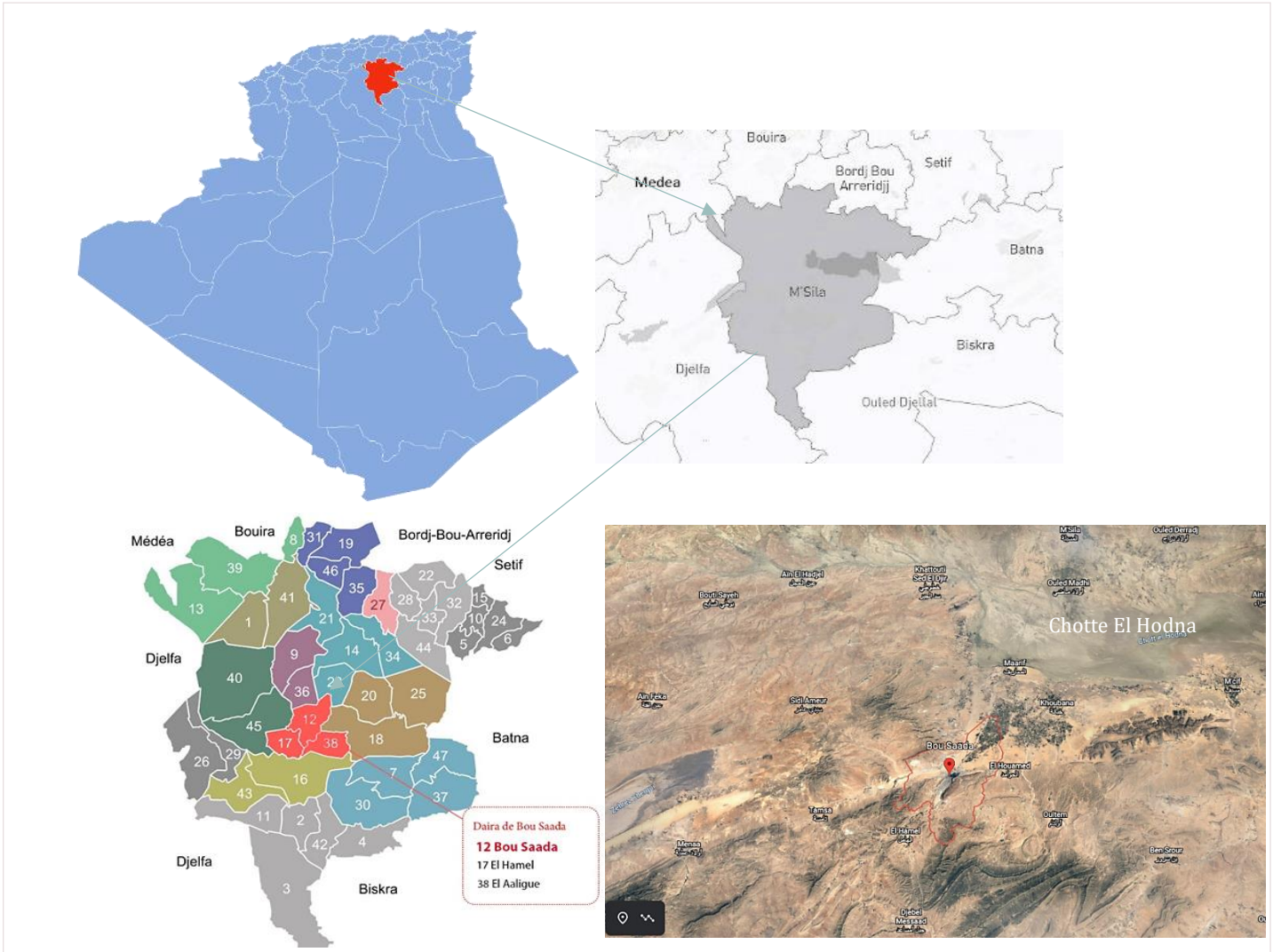


Figure 29: Situation of bousaada from the national to the local scale .source :edited by *Authors 2023*([Bou Saâda — Wikipédia \(wikipedia.org\)](https://en.wikipedia.org/wiki/Bou_Sa%C3%AAda))

Aaligue), Bou-Saada has been a Daira of the wilaya of M’sila since 1974 before it was affiliated to the wilaya of Medea from the independence until 1974.

2. Technical sheet:

Spatial coordinates:	4°,11' long. East 35°,13' north latitude.
Altitude	Minimum altitude of 470 m, Maximum of 1,330 m, Average 560 m.
Geographical situation	Between the central highlands (Djelfa) and the Algerian tell and the Zab (Biskra)1
Micro geographical situation	Between the mountain of Kerdada and the mountain of Aazzedine.
Distances:	
-From Algiers	262,5 km by NR A1 and NR 8.
-From University Saad Dahleb Blida	267 Km.
-From its State (M'sila)	69 km.
Area	22.7 ha, excluding gardens, 71.55 ha with gardens.
Population	158 359 habitants.
Traditional economic activities:	Crafts, tourism and pastoralism (livestock farming on rangelands) and agriculture.
New economic activities:	Commerce and construction.

Table 6: Technical sheet of the city of Bou Saada. source: Author, data from Youcef Nasib and (Naceur.B date; not identified).

the Department of Bou Saada is characterized with a variety of geographical, urban and architectural landscapes.

Situated at the intersection of the two National Roads NR8 (relies between Algiers and Biskra, edified by the French colonization in 1879) and the NR 46 (goes from M'sila in North Est to Djelfa in south).

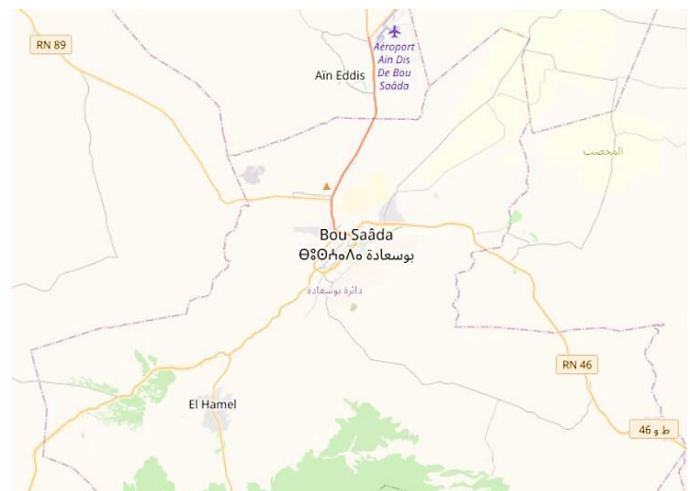


Figure 30 : Situation of Bou Saada in relation to NR8 and NR 46. source :<https://fr.wikipedia.org>

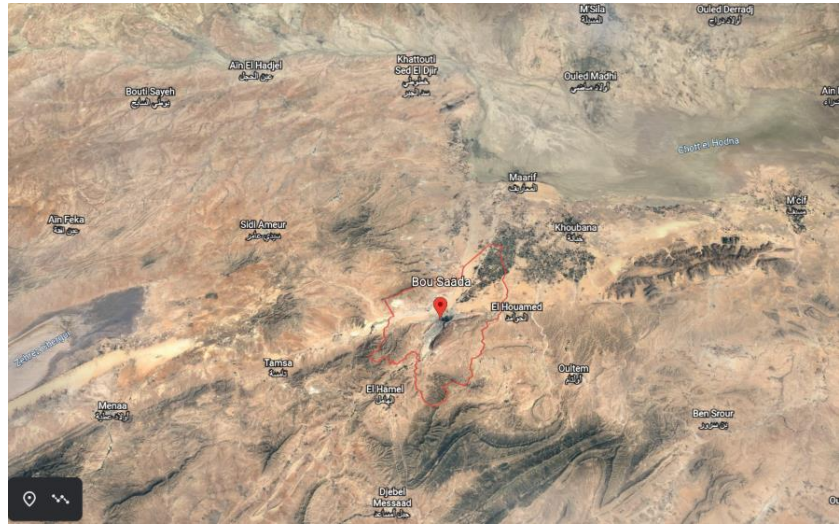


Figure 32: Visualization of residential densities (Source: Texts of the PDAU 2005) illustrated d by Authors 2023.

Figure 31/Location of Bousaada in relation to chott El Hodna .Source :google earth

3. climatology:

Bou-Saada belongs to a semi-arid zone cold and dry, between temperate and tropical climates, characterized by the drought in the hole year, countries that share the same zone with Bou Saada are: Mexican deserts, Iran and Arabian deserts.

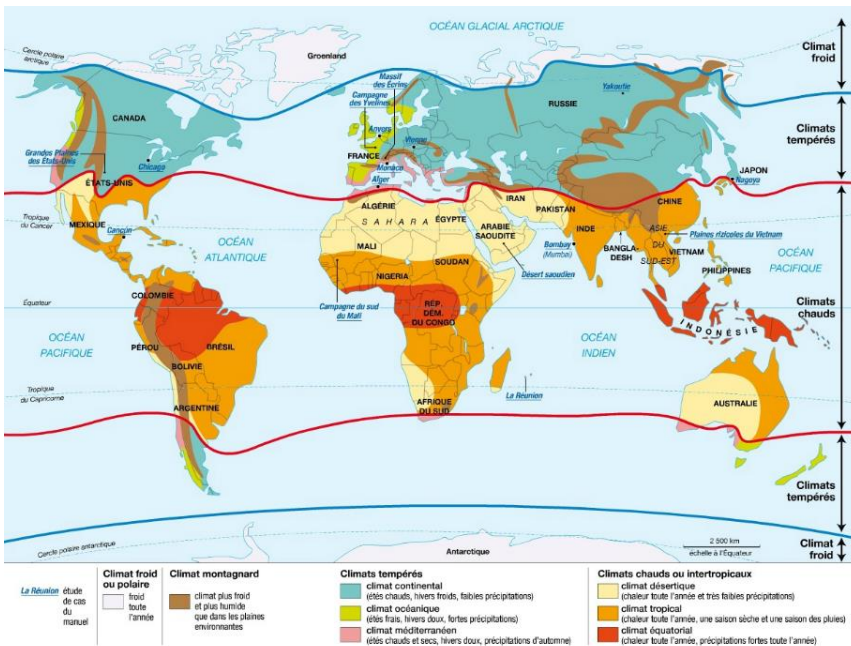


Figure 34:the main climatic zones in the earth. source: <http://histoiregeo72.canalblog.com/archives/2013/10/20/28250033.html>

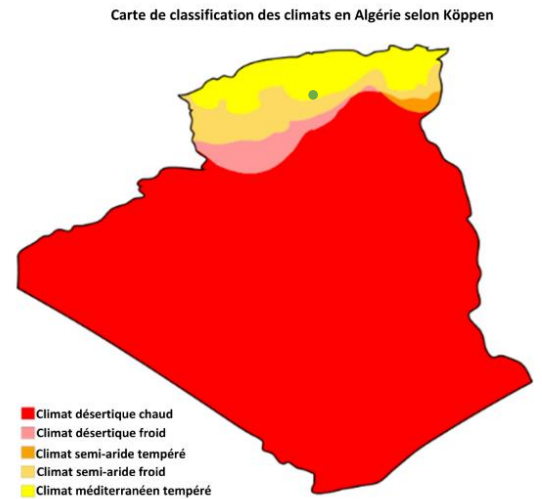


Figure 33:Map of Algeria's climates according to Köppen's classification, source | [https:// en.maps-algeria.com/](https://en.maps-algeria.com/)

in the semi-arid zones, the summers are moderately long and dry, and the winters normally bring low concentrations of rainfall. Summer temperatures usually average between 18-42° C. It normally does not go above 42° C.

The position of Bou Saada between two mountains, from its south east and north west sides,

The steppe is the dominant vegetation in this type of climate.



Figure 35:Steppe vegetation in Bou Saada. Source: Authors 2023.

4. precipitations:

During Winter, spring, and autumn rainfall is infrequent and unpredictable. The site resembles a corridor stretching from the west-northwest to the east-southeast. As a result, only rainy disturbances approaching from the west or northwest have the potential to reach it completely. Maximum 30mm in November and minimum 5 mm in July.

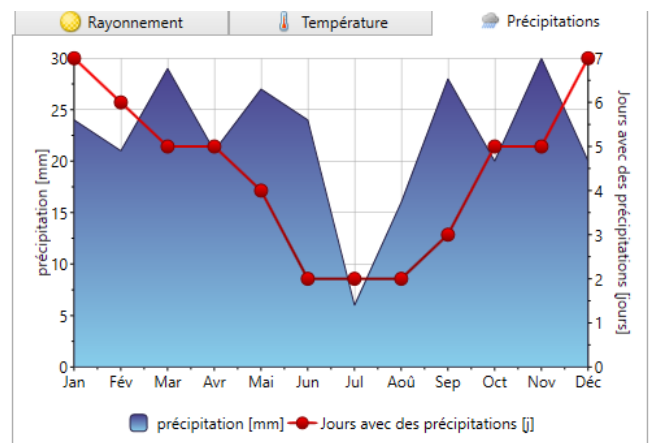


Figure 36:precipitations in Bou Saada. Source :Meteonorm 8

Region	Maximum	location
Coastline	1 800 mm	Bessombourg
<u>Talien Atlas</u>	1 600mm	Ain-El-Ksar
Hight plains	580 mm	Bou Malek
Bou-Saada	500 mm	Bou-Saada
Saharan atlas	480 mm	Reghaia
<u>Steppe</u>	345 mm	S'gag

5. Wind:

The Bou-Saada region benefits from being in the shape of an open bowl, which allows winds to flow through the inter-mountain corridors from all directions.⁸⁷ Additionally, has experienced some of the nation's fiercest winds. While the southwest offers a scorching, oppressive breeze that can blow for weeks on end with extraordinary strength in the summer,⁸⁸ Bou-Saada is exposed to cold, dry winds from the northeast in the winter. The town seems like an oven throughout the four summer months, with temperatures between 40 and 42 degrees and an average rainfall of 250 mm.

Five different types of wind can be found in Bou-Saada:

- The most dreaded sirocco, "El-Ghebli," blows in the summer, causing the plants to burn and the air to become dry.

it dries out the atmosphere and kills vegetation.

- The west wind, or "El-Gherbi," is a dry air that brings clouds but not any precipitation.

- In the winter, the "Echargui" wind from the east and northeast is arid and cold.

- The north-westerly "El-Dahraoui" blows mostly in the winter and can be rainy. It delivers cold and humidity primarily during the winter.

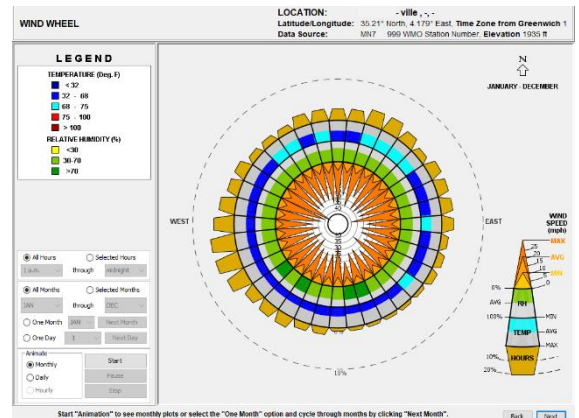


Figure 37: Wind wheel of Bou Saada. Source : Metronome 8

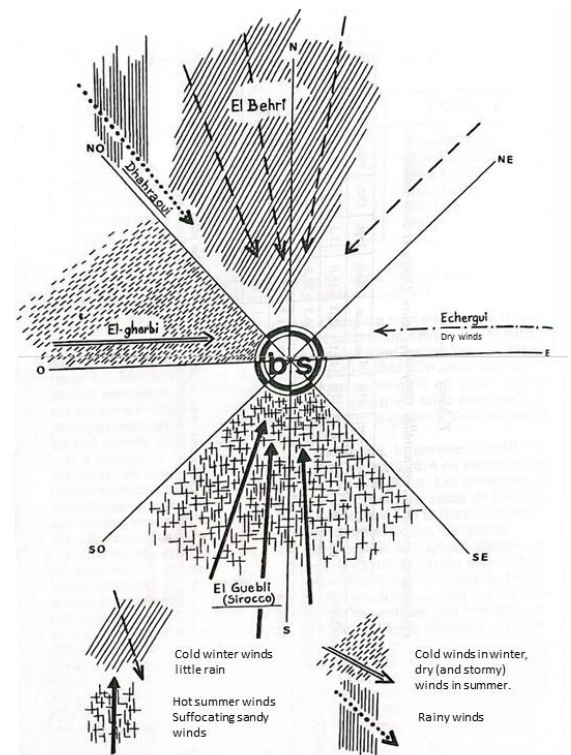


Figure 38: Wind in Bou Saada. Source: Youssef nacib,1986.

⁸⁸ Youssef Nacib, 1986, Oasis cultures: essay on the social history of the oasis of Bou-Saada. Algeria. ENAL. Page 36.

- The "El-Bahri" north-northwest wind is a sea wind that occasionally rains or is foggy.⁸⁹

6. Temperature:

The highest temperature is 30°C and the lowest rainfall is 6 mm per month in July. In January and April, the highest rainfall is over 30 mm per month.

Rainstorms can cause flooding or impressive flooding of the Oued Bou-Saada. The wadi then carries uprooted tree trunks and boulders, which are a real threat to the camps of the inhabitants who live close to the river banks.⁹⁰

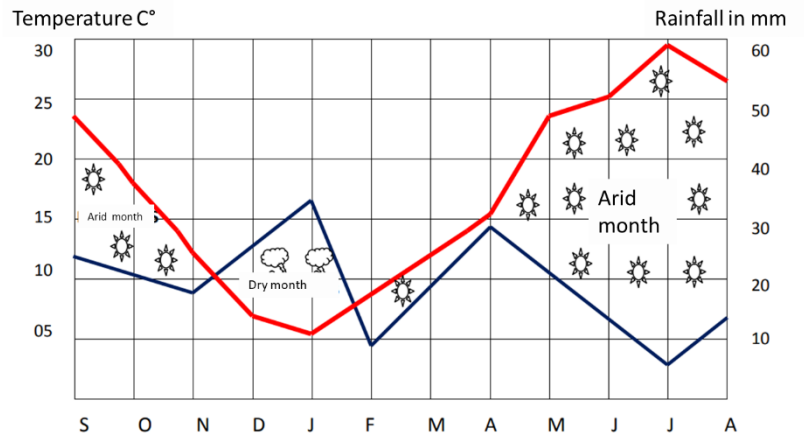


Figure 39: Shade-thermal curves of Bou-Saada. Source: Belouadah. N. Date non cite.

7. Hydrography:

There are two mains hydrographic oueds: Oued Maitar and Oued Bou Saada. These oueds play a significant role in the local water system and contribute to the overall landscape of the area.



Figure 41: The oued Maitar. Source: [a. The Maitar Oued / Download Scientific Diagram \(researchgate.net\)](#) edited by Authors 2023.



Figure 40 :View on Oued Bou Saada. Source : <https://www.visa-algerie.com/huit-bonnes-raisons-de-visiter-bou-saada/>

⁸⁹ Youssef Nacib, 1986, Oasis cultures: essay on the social history of the oasis of Bou-Saâda. Algeria. ENAL. Page 39.

⁹⁰ Youssef Nacib, 1986, Oasis cultures: essay on the social history of the oasis of Bou-Saâda. Algeria. ENAL. Page 39.

8. Seismicity:

According to the Algerian seismic regulations issued by the R.P.A. The national territory is divided into five (05) zones of increasing seismicity, as follows:

- Zone 0: negligible seismicity.
- Zone 1: low seismicity.
- Zone 2.a: moderate seismicity.
- Zone 2.b: medium seismicity.
- Zone 3: high seismicity.

The Bou Saada region is characterized by low seismicity. It is classified in zone (1), according to Algeria's parasismic recommendations (1999).

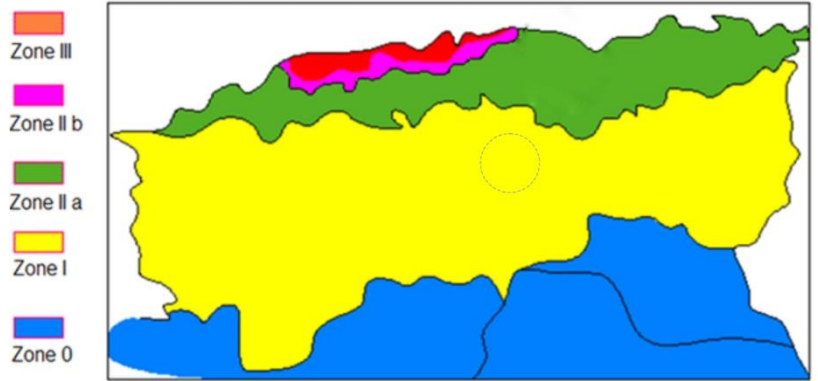


Figure 42: National seismic zoning map-RPA99, Bousaada highlighted .Source: https://www.researchgate.net/figure/Figure-NI01-Carte-zonage-sismique-du-territoire-national-RPA99_fig1_334544683 [accessed 28 Jun, 2023]. Edited by e Authors 2023.

9. The physical environment (relief):

Large flat plains and moderate hills may be seen in the Bou Saada communal area's relief. The altitudes range from 470m (the lowest) to 1330m (the highest).

The mountains represent 11.57% of the total area of the city of Bou Saada, 2952 ha, mainly the mountains represented in figure 40:⁹¹

⁹¹Lahrech, A. university of Djelfa Ziane Achour. Department of science, earth and universe. the restoration of old districts and its impact on the living conditions. Master thesis. Page 25.

it is surrounded by the Kerdada mountain to the east (750 to 900 meters), and the Azzeddine mountain to its west, and the El Maaleg mountain to its south.

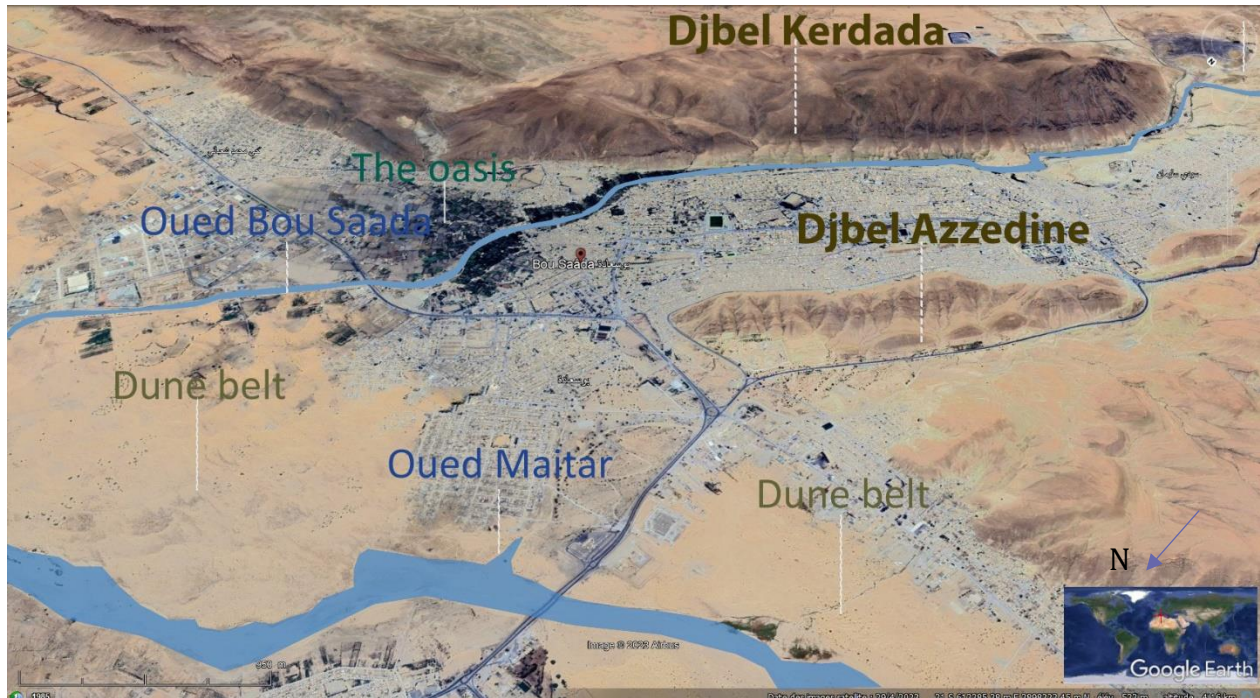


Figure 43: Natural features in Bou Saada. Source: google earth edited by Authors 2023..

C. Site analysis:

1. Situation and accessibility:

The site of our project is a dune belt land located on the north-west side of Bou Saada old ksar, 2.3km distance. It is limited by:

- Oued Maitar to the North and West.
- NR 8 to the West.
- 20 August village to the South.
- Farmlands and Oued Bou Saada to the East.

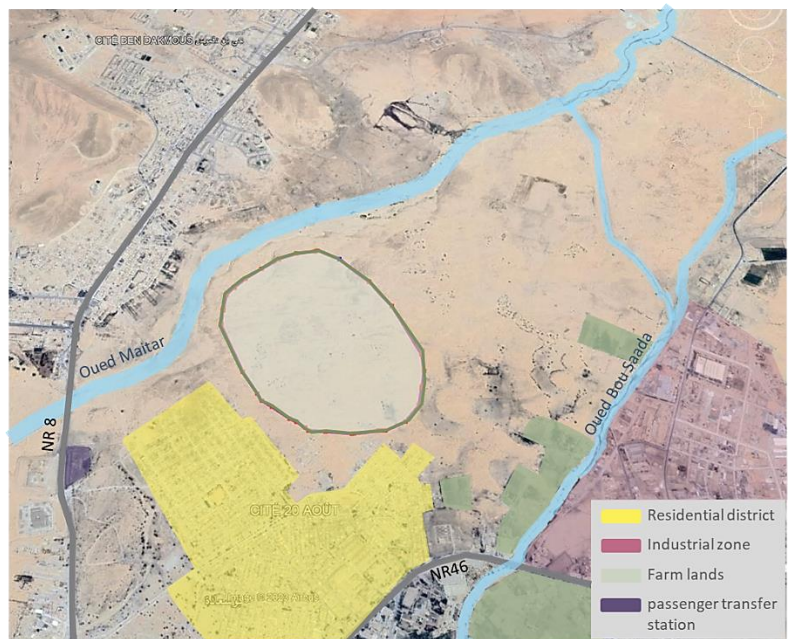


Figure 44: Site bouderies. Source : Authors 2023.

our site is easily accessible via the National Road n° 8 on the west side, and by secondary roads shown in figure 45 the national road n°46 and from the city 20 August.

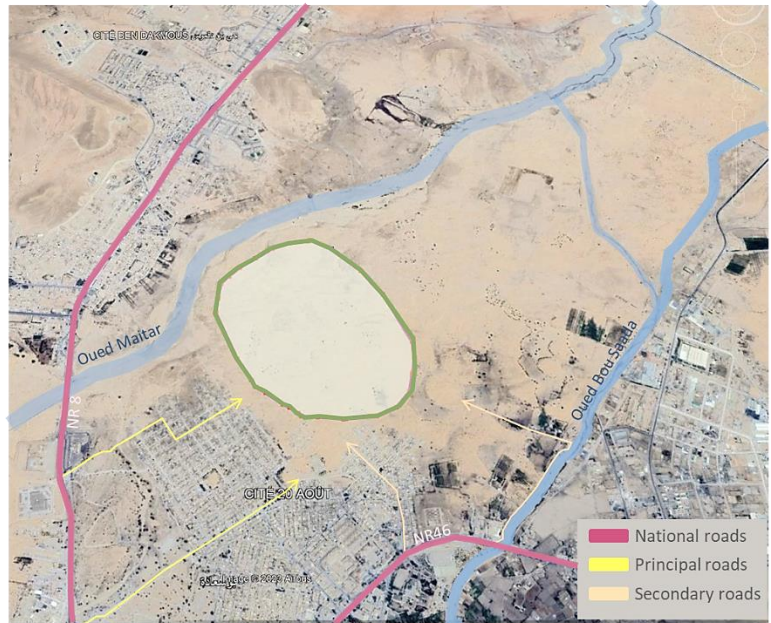


Figure 45:Accessibility paths to the plot. Source: Authors 2023.

2. The immediate environment:



Figure 49: View on the plot from National Road n°8. Source: Authors 2023.



Figure 49:View on the plot from Oued Maitar. Source: Authors 2023.

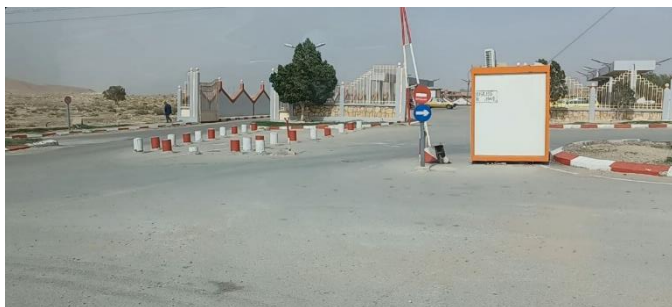


Figure 49:The passenger transfer station; Source: Authors 2023.



Figure 49:view on the plot from 20 August district. Source : Authors 2023.



Figure 51: View on the plot from National Road n°8. Source : Authors 2023.



Figure 52: View on the plot from National Road n°8. Source: Authors 2023.



Figure 50: View on the plot from National Road n°8. Source: Authors 2023.

3. Site morphology and topography:

the shape of the land: an irregular shape.

surface area: 93 Ha.

Topography: uneven terrain with a maximum slope of 36.3% and a minimum slope of 3.1%.⁹²

minimum height: 535 meters.

maximum height: 545 Meters.

The equidistant contour lines are 2 meters.

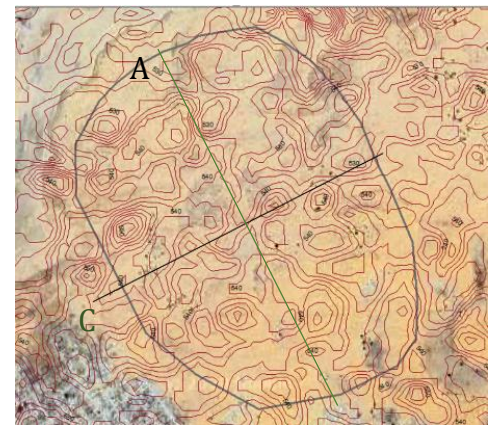


Figure 53: topographic contours. Source: Extracted from DEM Authors 2023.

⁹² [Google Earth](#)

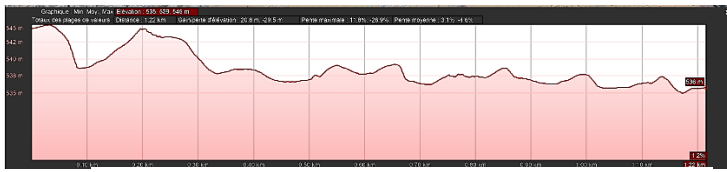


Figure 54: Topographic section A. Source: Google earth.

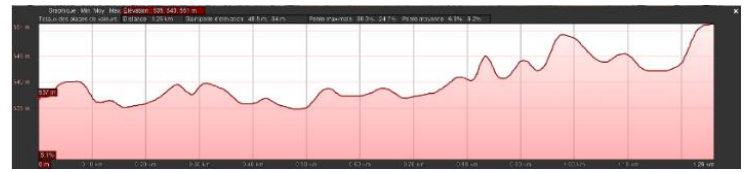


Figure 55: Topographic section C. Source: Google earth.

4. motivation for choice of site:

our choice of study site is justified by:

- its proximity to the main economic and industrial activity concentration zone.
- its proximity to national roads 8 and 46, making it easily accessible.
- a large unexplored open area.
- the variety of the landscape: panoramic views of the two Oueds Maitar and Bou Saada, and external views of the main access to the town of Bou Saada.

Part 2: The conceptual Approach.

A. The urban scale project:

Our project will be based on two main parts: the first is the development of a new city in Bou Saada, based on the principles of sustainability, and the second part of our study will be the design of urban project that pacifies the employment at the same time.

1. Number of inhabitants in the district:

Number of houses = 124 individual habitation and 9 buildings of collective housing and 21 semi collective housings.

1 house = 6 inhabitants.

Number of dwellings = 400 habitations.

2. The proposed facilities in the fragment of the city are:

A-Within the town:

Commercial centre, Primary school, Health centre, parking and Gardens.

B- On the outskirts of town:

Sport complex, packings, High school and technical college - polyclinics - OMS hall-specialised sports hall-Swimming pool 25m-cinema (500) seats -hotel 15 beds -specialized shops - post office hotel R2 -phone centre - APC headquarters-Mass organisation -party-court -civil

protection- branches Management-Infrastructures - management office-cementers-Mosque-abattoirs-halls-storage areas.

The amount of employment planed:

Facilities	Induced jobs
High school and technical college	150
polyclinics	101
OMS hall	13
specialised sports hall	06
Swimming pool 25m	10
cinema (500) seats	10
hotel 15 beds	30
Specialized shops	175
S.N.N.G. A	100
post office hotel R2	25
phone centre	10
APC headquarters	100
Mass organisation	05
Party	53
section court	10
civil protection	35
Branches Management-Infrastructures - management office	53
abattoirs-halls-storage areas.	250
Mosque	02
Cementers	02
Total	1140 employment

Table 7: Amount of jobs for urban amenities (neighbourhood unit type 35 000 habitants) Source : Amenities grid CNERU.

3. The population structure based on economic activity:

The active population includes all individuals capable of working, typically between the ages of 15 and 65. It encompasses those who are employed or engaged in income-generating

activities. By analysing these factors, we can better understand the dynamics of the population and tailor our development plans to meet their needs.

The table n° 8, presents the estimation of the active population in the city of Bou Saada, which stands at 92,538 individuals. In relation to the

total population of the municipality, this results in an activity rate of 60.32%. The employed population accounts for 55,140 individuals, reflecting an employment rate of 68.79% among the active population in the municipality. This data indicates an unemployment rate of 31.21%, equivalent to 26,198 individuals within the active population. The high unemployment rate in the municipality of Bou Saada is attributed to worker layoffs and a decline in job creation.

Table 8: The composition of the working and non-working population Source: PDAU of Bou Saada 2020.

Total population	Active population	Number of activities %	Population	Occupancy rate %	Unemployed population	Unemployment rate %	Loading rate
158 359	92 538	60.32	55 140	68.79	26198	31.21	6.08

4. Distribution of the employed population by economic sector:

The distribution of the employed population across different economic sectors provides insights into the labour force's orientations and the specificities of various activities. This distribution determines the concentration of the workforce within specific sectors, as follows:

- ✓ Primary sector: agriculture.
- ✓ Secondary sector: industries, construction, and public works.
- ✓ Tertiary sector: commerce, administration, and public services.

Analysing the distribution of the employed population by sector allows us to understand the composition of the workforce and the economic landscape of the region. It helps guide strategic planning and resource allocation to promote balanced economic development and ensure the sustainability of different sectors.

Branch of activity	Population employed	%
Agriculture	5917	9.62%

Industry	3352	4.59%
Construction and engineering	10122	19.79%
Services	35749	66%
Total	55140	100%

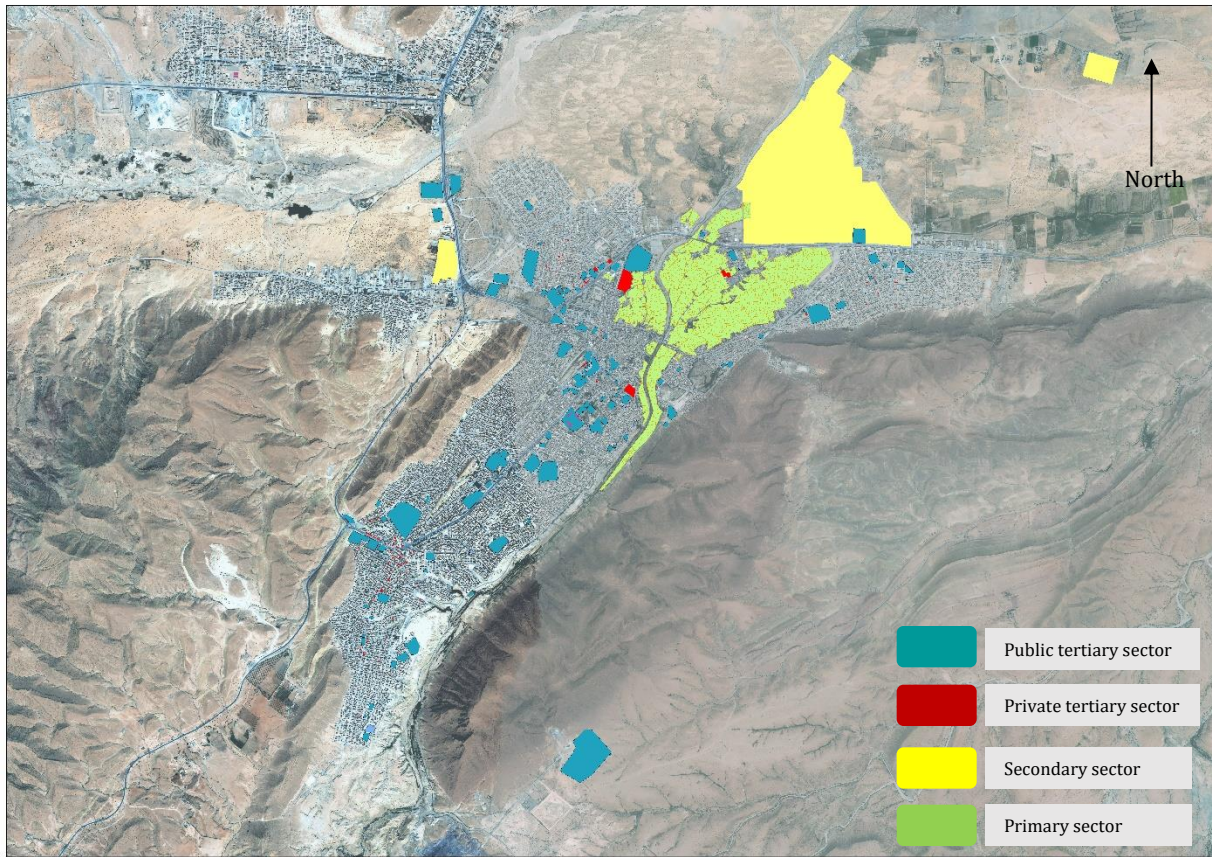
Table 9: Distribution of the population occupied by BAE in the commune of Bou Saada. Source: PDAU OF Bou Saada.

According to Table No. 9, it can be observed that the majority of the employed individuals work in the administration sector, which represents 66% of the total workforce. The construction sector follows in second place with a share of 19.79%. Agriculture comes next with 9.62%.

Furthermore, there is a noticeable weakness in industrial activities, accounting for only 4.59% of the employed population. This can be attributed to the lack of factories and the release of workers from their positions, leading to a decline in the industrial sector.

By analyzing this data, we can gain insights into the distribution of labor across different sectors and identify areas for potential growth and development.

Figure 56: Implantation of main urban activities in the city of Bou Saada. Source: Based on OSM and PDAU and google maps data, authors 2023.



The above figure n 56 represents the distribution of the urban activities we notice that the agriculture is concentrated in the north Est of the city mostly in the oasis and the long of Oued Bou Saada also the secondary sector activities are mainly implanted in the north Est region of Bou Saada on the main national road n 46 above the Oasis

5. Establishing the road system:

Taking into account the slope of the land and the contour lines, we drew up a proposal for a road system based on the surficial hydraulic system.



Figure 57: The sketch of the Urban plan. Source Authors 2023.

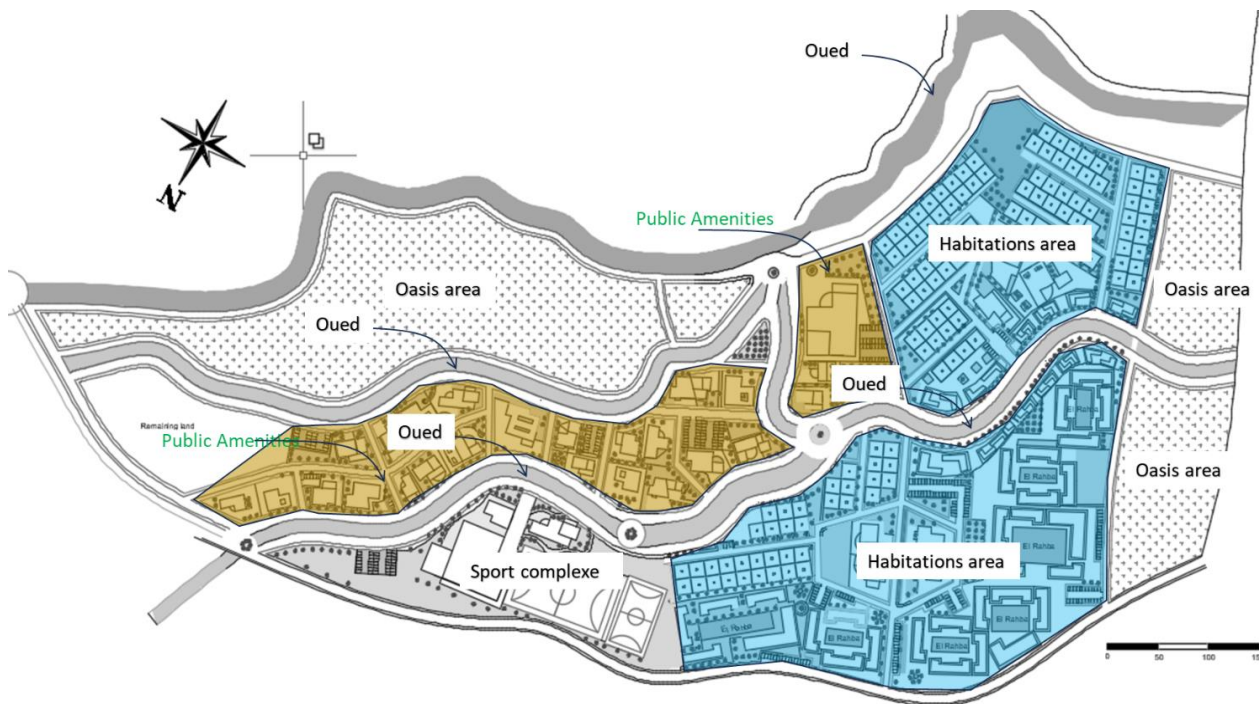


Figure 58: The main fonctions distribution. Source : Authors 2023.

6. The main functions distribution:

7. The master plan:

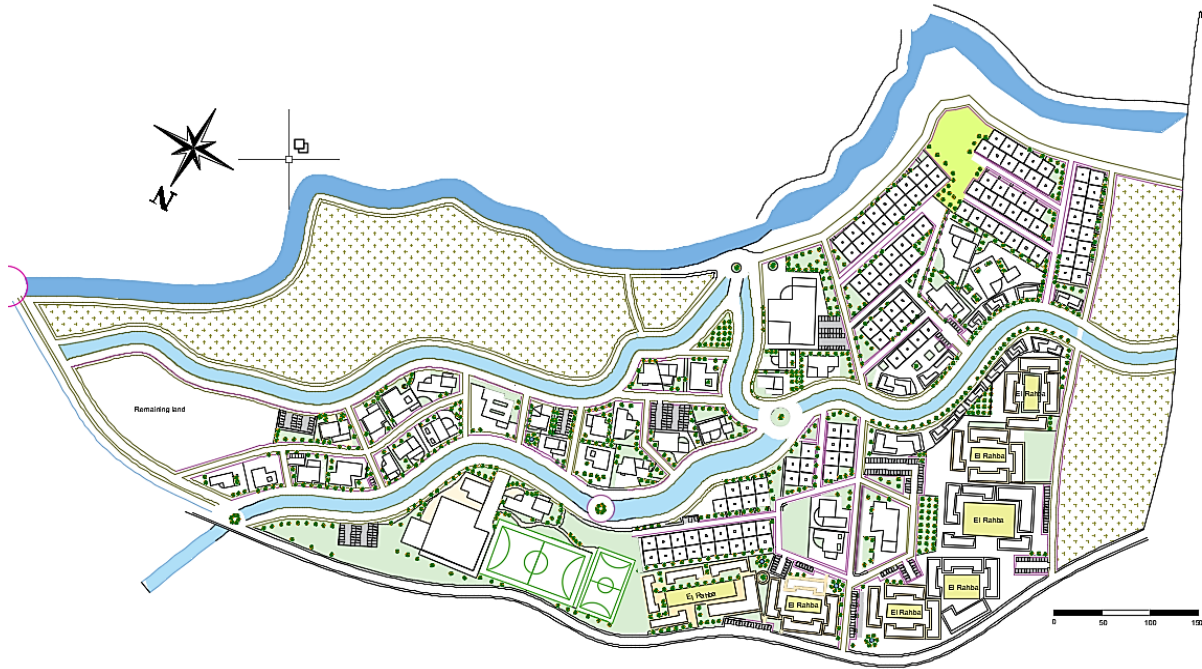


Figure 59: The master plan of the new extension. Source: Authors 2023.

1. Project layout principles:

Our plan for the new urban extension is based on the principles of sustainable urban development, which sum up the foundations on which our vision is based:

1) Social diversity

Challenges:

The new urban extension we are proposing resonates in a city that is constantly expanding, a place that aspires to welcome and energies diverse communities with distinct characteristics. Affluent and modest families, families with children, the elderly and young people with different aspirations and lifestyles... This diversity calls for an innovative vision capable of transforming both the neighborhood and the buildings.



Figure 60: Social diversity. Source: Freepik.com.

Applied approach:

Although the concept of social diversity is ambiguous and its application can vary from one city to another, or even from one neighborhood to another, in our case study we propose to implement it by proposing high-quality, diverse housing. This approach will undoubtedly have a direct influence on the social

composition of this extension. In this way, we are offering a variety of types of housing, whether individual, semi-collective or collective, thereby encouraging a multitude of choices and making it possible to accommodate diverse social groups.

2) Functional diversity

Challenges:

The challenges of functional diversity lie in the presence of a variety of functions within a given area: services, commercial activities, facilities, public green spaces and leisure activities, as well as housing. This diversity promotes the human and convivial dimension, stimulates local employment and improves the quality of daily life.

Applied approach:

In our new urban extension, we aim to make different functions coexist, offering a dynamic and balanced environment. This reduces travel, strengthens the community and encourages social interaction, as maintaining a varied offer of urban services and activities in our new extension will certainly improve the quality of life. In addition, functional diversity stimulates local employment, supports the economy and enhances sustainability. Our aim is to create an attractive environment that meets the needs of residents, focusing on their well-being and quality of life.

3) Partnership

The Challenges:



Figure 61: Functional diversity .Source :ResearchGate.com

Any sustainable urban project requires a wide range of skills that the project owner does not always have. This is where the partners come in, contributing their expertise and references. They offer support and advice and are involved in the project, contributing to debates to confirm choices, sharing objectives, providing financial backing for studies and projects, and supporting implementation.

Applied approach: By calling on project developers and interested partners to move into this new extension and invest in it from the outset of the regeneration project, the constraints and expectations of all the players involved can be effectively taken into account.

- To carry out the project, it is essential to bring together partners from the outset who will check the relevance of the choices made and propose solutions, thus facilitating coherent and operational implementation. These partners will be maintained throughout the process and coordinated within a joint working group.
- The partners include the authorities, which have an in-depth knowledge of the regulations and will play a key role in implementing the new neighbourhood unit.
- The participation of residents in our new extension is essential. They must be involved in all consultation meetings, so that their voices are heard and their needs are taken into account in the decision-making process.
- Financial backers and investors in economic and industrial activities can benefit from land within the extension or be allocated premises dedicated to trade. In return, they provide assistance and participate in the implementation of the planned program.

4) The landscape

The Challenges:



Figure 62: Partnership between the local authorities and the study members. Source: Authors 2023.

The landscape offers an overall vision that reflects the history of the area, its geography, its culture, its inhabitants, its evolution, etc. Each landscape is unique



Figure 63: Bou Saada landscape. Source: Adobestock.com

and its consideration guides choices throughout the process. Each landscape is unique, and taking it into account guides choices throughout the process. It anchors the project and plays an essential role in the quality of the living environment, as do the heritage features. Together, they contribute to the creation of a harmonious and enriching environment.

Applied approach:

- Moving away from the purely aesthetic dimension of the landscape by designing attractive community spaces that create added value for the new extension (attraction spaces, traditional event spaces, El Rahba, outdoor facilities, etc.).

- Aiming at the natural and artificial landscape in a global way and not in isolation, this participates in the integration of the new extension between, the mountains (Djebel kerdada and Djebel Azzedine in the south) and the oasis in the south-east and the sand dunes in the north-east, also a continuity of artificial landscape of the existing city of Bou Saada.

- The landscape is perfectly integrated into our new town, so the inside of our buildings (old and new) is closely linked to the outside, i.e. inside, the houses, the facilities and the road system extend outwards, allowing you to contemplate the outside landscape and the extraordinary views it offers, from the 20 August district to the south and the Ben Dakmous district to the north and north-east, while respecting the privacy of everyone.

- Integrating the buildings that make up our new town into the existing or future landscape, from its insertion into the topography that characterises the site and the context in which the town is located to its contemplation (integrating into the topography of the land, reorganising itself (urban composition) again in line with the sustainability approach, its external appearance rooted in the local context).

- There will also be planting of local species and quality urban furniture (fencing, benches, materials, etc.).

5) Mobility:

The Challenges:

Introducing different mobility tools in the district and beyond will improve quality of life by reducing toxic emissions and energy consumption. This helps to limit car dependency, which has been a key factor influencing habits and development, generating pollution and congestion. By diversifying modes of transport, the project becomes more sustainable and long-lasting, promoting a healthier and more efficient environment in the long term.

Applied approach:

- Because of the importance and strategic position of our project, we want to focus on mobility to ensure good connectivity of our new neighbourhood unit with existing entities in the town of Bou Saada. It is therefore necessary to review the public transport routes by promoting multimodality and intramodality.

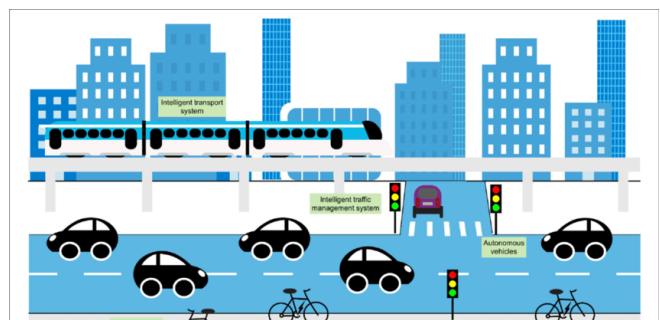


Figure 64: The future extension mobility illustration. Source: ResearchGate.com.

- Our aim is to improve the means of travel available, correct the dysfunctions observed and propose credible alternatives, such as alignments and grouped outdoor car parks. In order to create a calmer, healthier indoor environment, we plan to minimize car traffic within the neighbourhood, favouring outdoor and grouped car parks.

- The development of public spaces and soft paths encourages walking and gives pedestrians and all those who frequent the housing and its surroundings a sense of security. These spaces offer opportunities to relax and meet people, and enhance the conviviality of the community.

6) Participation

Challenges:

In sustainable housing projects, the involvement of current and future residents is essential. Their contribution helps to understand lifestyles, problems and assets, and to identify specific needs. Participation encourages ownership of the project, integrates future residents, generates a positive dynamic and facilitates the pooling of investments.

Applied approach:

-Involving users (through regular meetings, consultation workshops, etc.) right from the start of the planning process is essential. All the necessary information, including non-negotiable elements, must be communicated.

-Involving local residents requires adequate preparation and organisation. These discussions must provide an opportunity to step back and build a collective project. Sharing a common level of information is an essential first step. Those responsible for regeneration must be involved from the outset in order to discuss with residents, ensure the coherence of the new extension project and check its financial feasibility by involving residents, the administration, financial backers, associations and specialists.

-Being well informed about the needs of local residents and involving them throughout the process helps current residents to reclaim the new extension and creates a special attachment between future residents and their urban space.

7) Real estate

The challenges:

the land or building on which the project is developed plays a decisive role in its sustainability. Land management requires anticipation through planned regeneration of the development, judicious selection of development sites and the implementation of appropriate tools, partnerships and approaches. By controlling these aspects, the project can guarantee its sustainability and encourage responsible use of resources.

Applied approach:

firstly, by managing space and land efficiently throughout the new urban proposal, optimizing the use of available space, promoting compact buildings and minimising the amount of land required to preserve agricultural and natural areas.

We also aim to preserve natural areas, green zones and ecological corridors by integrating them into the new town.

by following an integrated urban planning approach to effectively manage our space by considering population density, housing needs, infrastructure, economic zones, green spaces, etc. This will optimize the use of land by avoiding inconsistencies and wastage, and guarantee the balanced use of space.

8) Density

The Challenges:

Exploiting empty spaces and reusing vacant buildings are key strategies for developing more compact urban forms that save land and energy. Making efficient use of the empty spaces between existing buildings and renovating vacant buildings optimises the use of resources and reduces urban sprawl. This helps to create sustainable urban environments, preserving land and reducing energy consumption.

The old ksar, the benchmark for Bou Saada town centre, is characterised by its compactness, density, mix of uses and, above all, its pedestrian scale.

Applied approach:

- Implementing more compact urban forms that consume less land and energy is a key approach to promoting sustainable housing. These urban forms include features such as densification, functional mix and proximity to services, shops and green spaces.

- Urban compactness reduces urban sprawl by concentrating activities in smaller areas. This reduces the consumption of agricultural and natural land, thereby preserving the natural environment and biodiversity. In addition, a compact city encourages more efficient use of infrastructure and public services, reducing the costs and environmental impacts associated with their deployment.

- In addition, compact urban forms are often associated with energy savings. Proximity to buildings, public transport and amenities reduces travel distances, encouraging the use of sustainable modes of transport such as walking, cycling and public transport. This in turn reduces greenhouse gas emissions and travel-related energy consumption.

- Planning and designing a compact, energy-efficient city requires an integrated approach, involving collaboration between planners, architects, engineers and local communities. Tools such as intelligent zoning, the design of pedestrian and cyclist-friendly streets, and the integration of sustainable technologies into buildings all help to create efficient and liveable urban environments.

- In short, implementing more compact urban forms that consume less land and energy is a key strategy for promoting sustainable housing. This helps to conserve natural resources, reduce greenhouse gas emissions and improve the efficiency of infrastructure and travel.

9) Architecture

The Challenges: The aim of architecture is twofold: to meet the current needs of occupants in terms of space, uses, functions, health, energy and quality of life, while integrating harmoniously into the wider neighbourhood or town. In this way, architecture helps to create functional spaces that are adapted to users' needs, while promoting coherent integration into the existing urban fabric. In other words, the marriage between the functional and the aesthetic.

Applied approach:

The design of the housing and amenities in the new extension must adapt to meet new expectations, as family structures and lifestyles are constantly evolving (flexible, expandable...).

- All proposed solutions will be innovative and contemporary, seamlessly integrating into the local context of Bou Saada.



Figure 65: Bousaada city facades and city density. source :Google .

- To materialize functional diversity in our city, a specific architecture is envisioned—one that adapts to the context, culture, and local traditions of Bou Saada, ensuring quality and a sense of conviviality for the residents of the new city and its users.

10) Energy

The Challenges:

Minimizing and reducing energy consumption as much as possible requires informed choices to be made in planning, building layout and construction or renovation techniques. The use of local and renewable resources promotes a new sustainable economy. It should be stressed that energy consumption depends mainly on the architecture itself, even before the materials and equipment used.

Applied approach:

Raising awareness among residents about the importance of changing habits and behaviours is crucial in our endeavour to effectively reduce energy consumption. By emphasizing the significance of individual actions, we can collectively make a decisive step towards a more sustainable future

Solar panels are planned to be installed on rooftops to harness the abundant sunshine in the region and generate clean energy. Not only will this help in producing sustainable energy, but it will also provide shade over the terraces. The inclusion of solar panels will contribute to a greener and more environmentally friendly neighbourhood. Additionally, by utilizing solar energy, the houses in the area can potentially reduce their reliance on traditional cooling systems during the hot summer period. This initiative aims to enhance energy efficiency, promote sustainability, and create a comfortable living environment for the residents.



11) Biodiversity:

The Challenges:

The life and development of plant and animal species concerns all areas and all scales of a project, from the plot to the city and beyond. The aim is to create favourable environments and to reconnect disrupted circulation areas.

Application:

In our project, we plan to reinforce the existing natural frameworks, which are ecological spaces of great importance both for the city and for the wider area.

- We are seeking to preserve, reorganise and encourage the initiatives of residents who wish to create gardens or areas for traditional events (El Rahba) at the foot of the buildings where they live.

- The integration of watercourses and wadis into regional biodiversity and ecosystems acts as an ecological corridor, facilitating the dispersal of seeds and encouraging plants to colonise new areas.

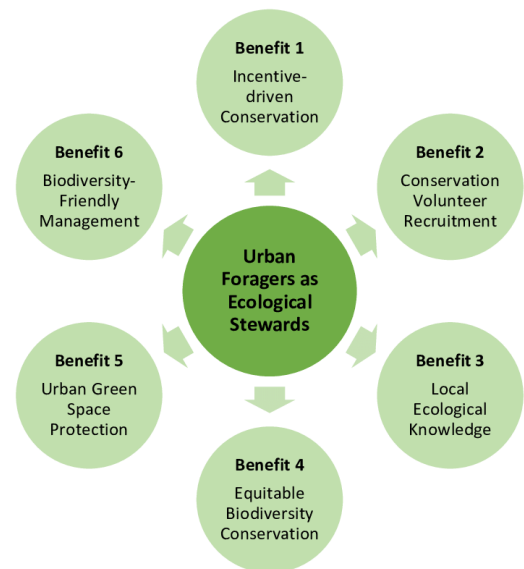


Figure 66: Biodiversity in urban extension benefits
 .Source Google .

- These actions towards the plant element will help to protect and preserve even animal species.
- In order to protect and develop biodiversity, local residents need to relearn and reappropriate these good habits and common sense, through awareness-raising campaigns organised by local authorities, environmental associations and others.

12) Waterways

The Challenges:

Understanding the moisture-rich zones is necessary to optimise the use and treatment of water, which is a priceless resource.

Application:

Given that water may result in inundations and detonations, we have confirmed on-site and even with knowledgeable services that the area where the new extension is located has not been exposed to this type of natural disaster. As a result, we do not currently plan any special modifications to be protected from this risk.



Figure 67: Water way of Bousaada .Source :Vitamedz.com .

An environmentally friendly and cost-effective management of surface water is

anticipated in our project. This will be accomplished through the construction of new (planted) wetlands, the construction of mini-basins for retention in each public green space, the design of redans (small retaining peaks), the requirement for rainwater collection (5 m³ cisterns), and drainage. This will result in fewer pipes and less water used for sanitizing.

Materials that permit rainwater infiltration must be used in mineralized areas (surfaces impermeable).

13) Materials

The Challenges:

Materials can be assessed according to a number of criteria, including their integration into the built and natural landscape, their visual and aesthetic appearance, their impact on health, their pollution and emission levels, their energy footprint, their recyclability, their ability to age or develop a patina over time, and their maintenance requirements.



Figure 68: Stone material. Source: Google.

Application:

- In our approach, we favour the use of local materials that reflect the surrounding built landscape, such as The Toub, stone and sand. We also seek to limit as far as possible the use of materials that are unsustainable and harmful to health and the environment.

- In addition, we Favors the use of compatible, ecological and sustainable materials, in order to integrate the new town harmoniously into its surrounding context. By choosing materials that respect the principles of sustainability and eco-responsibility, we are helping to preserve the environment and create a healthy and pleasant living environment.

By using local, sustainable materials, we are also supporting the local economy and promoting the use of locally available resources. This approach strengthens links with the community and promotes sustainable economic development in the region.

14) Comfort and health

Challenges:

The comfort and health of residents must be taken into account in sustainable urban development. This makes it possible to promote a healthy lifestyle in cities, taking into account air quality, noise, light, privacy, building materials and safety.

Application:

- To guarantee air quality and indoor comfort by making sure the buildings that make up this new city project have appropriate thermal and acoustic insulation, as well as good ventilation and aeration:

1 - Heat and cold insulation.

2- Overheating-prevention tools, such as solar covers, evergreen trees, etc.

3. Controlled airtightness should be provided for buildings.

The choices made in terms of architecture are crucial since the design of buildings must help maximize natural lighting penetration in order to reduce energy consumption on the one hand and increase comfort inside on the other.



Figure 69: The urban extension comfort .Source :Google.

A very good relationship between the outside and inside of the homes, with a pleasing exterior design and an interior that provides unobstructed views of the outside, adds a healthy dose of natural lighting and shade, and ensures an enjoyable way of life that undoubtedly contributes to the well-being of the resident and user.

The architectural organization of the neighbourhood and the promotion of single-family houses significantly decrease neighbourhood annoyance.

All internal transportation is for foot travel, entirely eradicating the pollution brought on by mechanical cars.

15) Waste:

Challenges:

-Waste management on site can be improved by adopting optimized practices. It is also crucial to take care of waste management afterwards, which can be complex and costly for the local authority in terms of setting up collection and sorting systems.

-Solutions are available to reduce the volume of waste upstream, such as composting, selective sorting and the reuse of materials, thereby contributing to more sustainable waste management.

Application:



Figure 70:Wastes treatment. source: Google .

In the context of the urban extension project, we are planning to integrate dedicated waste sorting facilities. Individual and collective composters, as well as selective waste bins with appropriate storage, will be implemented. We are also considering the establishment of centralized collection points and the installation of vermiculture composting systems for households without gardens. Active involvement of residents is crucial to ensure effective waste management. Awareness-raising companies, supported by local authorities and associations, will play a key role in promoting greater consciousness and encouraging community participation in waste management. Together, we aim to create a sustainable environment where waste sorting becomes a common and responsible practice.

1. Realistic views of the urban extension:



Figure 71: Realistic views on the urban extension. Source: authors 2023.

General conclusion.

Through our meticulous study, we have uncovered the hidden treasures of Bou Saada. Its vibrant socio-cultural society and iconic architecture continue to captivate and inspire those who immerse themselves in its enchanting embrace. Whether meandering through its labyrinthine streets or basking in the lively squares, exploring ancestral homes or marvelling at historic monuments, Bou Saada reveals its timeless allure, beckoning us to embrace the essence of this extraordinary land.

Our research endeavours have entailed a harmonious blend of theoretical frameworks and analytical approaches, enabling us to cultivate a profound understanding of our research subject and grasp the intricacies of the urban environment with astute discernment. These synergistic methodologies have been pivotal in fostering a comprehensive and nuanced analysis of our topic, thus laying a solid groundwork for our conclusions and offering insightful recommendations.

Within Bou Saada's architectural tapestry, the urban economy assumes a pivotal role, shaping the very identity of its built landscape. The economic aspirations of the local populace and the resulting tapestry of commercial activities intricately weave themselves into the architectural fabric, leaving an indelible mark on the region's distinctive features. The architecture of Bou Saada, with its intricate design and thoughtful layout, stands as a testament to the community's economic and social needs, catering to specific activities such as trade, craftsmanship, and agriculture.

Moreover, the city itself holds a paramount position within the economic fabric, emerging as a bustling crossroads where economic resources are meticulously managed, and commercial ventures are orchestrated under the careful guidance of urban planners. It is within this carefully regulated framework that the urban landscape takes shape, forging pathways to prosperity and delineating the myriad commercial opportunities that await its denizens.

As the urban tapestry of Bou Saada continues to evolve, it is through our diligent research and holistic understanding that we can contribute to its sustainable development. By embracing the interplay between the urban economy and architectural identity, we can envision a future where Bou Saada thrives as a harmonious fusion of economic vitality and cultural legacy, exemplifying the immense potential that lies within the heart of this extraordinary city.

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