PLANNING THE 15 MIN CITY-THE CASE OF CHANIA (1125)

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Abstract. According to C40 Cities Climate Leadership Group & C40 Knowledge hub, adopting a 15-minute city strategy means striving for an urban model that allows everyone, in every neighborhood, to meet most of their daily needs within a short walk or bike ride of their home.

The current paper will examine the possibilities of a typical Greek city, Chania, to be developed as a 15minute city. The city is chosen as it combines dense development in its historic center, and sprawled development in its borders, so these contradictions are decisive for its sustainable mobility development. Its inhabitants and visitors mostly use cars for their daily needs fact that is caused by the lack of pedestrians and cyclist networks and the fragmental way public uses and areas have been diachronically developed in the city. Research will examine the positions of public uses and areas, their connections with mobility networks and it will evaluate their accessibility. Finally, it will propose strategies for the adjustment of the city in the principles of the 15-minute city.

Keywords: 15-minute city, post pandemic cities, Chania, urban planning.

1. Introduction

During the 1960's decade Jane Jacobs in her work, argued that the creation of living cities directly depends on the proximity of their inhabitants (Jacobs, 1961). Through the next decades, urban theorists highlighted the consequences of capitalism in alleviating social and economic inequalities in the urban space (Lefebre, 2007) but also the need to shift the view of the city from the global to the local (Massey, 2005). Additionally, new technologies became new key parameters for the development of urban space, as their applications became basic elements for modern cities function.

Today, the new conditions shaped during the COVID19 pandemic, have led to the mitigation of social inequalities, and to the increase of unemployment on a global level. In this context, it is important to develop safer, more resilient, sustainable, and inclusive cities (Pozoukidou & Chatziyiannaki, 2021). The restrictions that emerged during the COVID19 pandemic made proximity a necessary feature, for urban space's function. According to data presented in the Moreno, Allam, Chabaud, Gall, and Pratlong

publication, during the period of the pandemic, cities developed different interventions. Many cities expanded their pedestrian and cyclists' networks while in other cities the role of public spaces was emphasized with the design and planning of new mostly small-scale parks and public squares. In some cases, cities proceeded to the development of small-scale and local service shops and the utilization of their external spaces, small-scale housing for the homeless and in some cases in the development of floating hospitals for the coverage of the extended healthcare needs (Moreno, et al., 2021).

2. The 15-minute city model

These new conditions that arised from the COVID19 pandemic, set the base for a dialogue for new cities forms which will provide the solutions for the emerging needs of modern societies. What was obvious was the need to redesign urban neighborhoods, cities basic urban cells in a way that will make them accessible by sustainable mobility means of transportation and ensure a mix of urban functions. These urban cells-neighborhoods can form cities in which in 15 minutes their inhabitants can approach the functions for the coverage of their needs without the need of their car. The 15-minute city is an urban planning concept in which most daily necessities and services, such as work, shopping, education, healthcare, and leisure can be easily reached by a 15-minute walk or bike ride from any point in the city (Weng, et al., 2019). This approach aims to reduce car dependency, promote healthy and sustainable living, and improve wellbeing and quality of life for city dwellers (Khavarian-Garmsir, et al., 2023). It creates a 'human-scale' city composed of vibrant, people-friendly, 'complete' neighborhoods, connected by quality public transport, and cycling infrastructure for the longer trips that residents want or need to make.

The concept of the 15-minute city assumes that the quality of life of city dwellers depends on the time they spend commuting by vehicle. Its originator Carlos Moreno argued that the more time a city dweller spends commuting to the various activities of his daily life by car, the lower the level of his quality of life (Moreno, 2021). The proposal of the 15-minute city development was strongly supported by the mayor of Paris, Anne Haldago (Fig.1), as the main axis of her election campaign (Willser, 2020) .

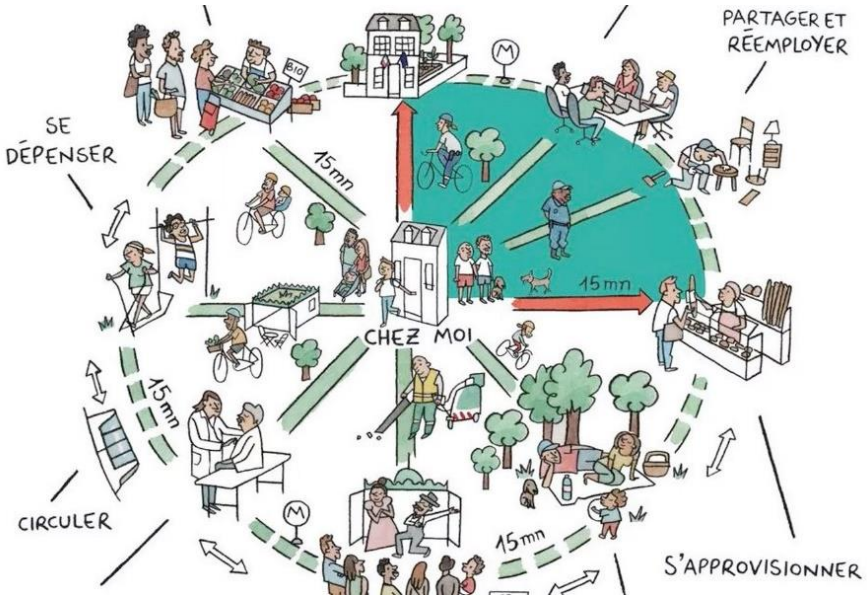

Figure 1. Anne Hidalgo's vision of a 15-Minute City according to her campaign Paris
Source: Paris en commun, Micael.

According to Andres Duany and Robert Steuteville, the 15-minute city is structured into three levels based on distances, and subsequently the times required for its inhabitants to travel these distances (Duany & Steuteville, 2021):

- The first level is the areas that can be reached on foot in 5 minutes and have a radius of 400 meters (1/4 mile). Local scale uses, neighborhood level and corresponding public spaces are developed in these areas. A key parameter is the development of many different types of residential buildings so that the area can be inhabited by all social and income strata. It is estimated that based on optimal density, this area can house 2,600 people.
- The second level is the areas that can be reached on foot in 15 minutes and have a radius of 1200 meters (3/4 mile).
- In these areas, commercial and educational uses of a larger scale and scope are developed. Green spaces and other public spaces of a larger scale are developed, while a basic condition for the development of this area is the development of public transport hubs which are the starting points or destinations of the pedestrian and bicycle networks. At this level the estimated population capacity amounts to 23,000 people.

- The third level is the areas that are covered in 15 minutes by bike and have a radius of 4,500 meters (3 miles)

In these areas, supra-local scale activities are developed (hospitals, city parks, etc.) and high-capacity networks are developed. At this level the served population is estimated at 350,000 inhabitants.

The above framework demonstrates the flexibility of the 15-minute city model as it can maintain its essential properties at all scales of urban space.

The short distances and short access times achieved with the 15-minute urban areas contribute to saving time in the daily life of the residents, (Liu, 2019) , reducing the use of the vehicle, therefore fuel consumption and pollutant emissions, in saving money and in the use of the space that until now was used for the vehicle in areas as pedestrian paths or green spaces.

The experience of the COVID19 pandemic led to the recognition of an additional key parameter that contributed to the continuous function of the city during the period of restrictive measures, the parameter of new technologies (Moreno, et al., 2021). The capabilities provided by smart solutions during the pandemic, convinced advocates the role of smart city technologies to supplement other principles (Allam, et al., 2022). Smart technologies, as big data and the internet of things, contribute to citizens and planners in planning and decision-making processes, and enable residents to use resources more efficiently. According to the above the main parameters that shape the 15-minute city are density, proximity, diversity, and the development of new technologies (Moreno, et al., 2021).

2.1. Density in the 15-minute city model.

Density is a key parameter for urban development. Salingaros states that the optimal density is that which ensures sufficient public space for the inhabitants of an area and creates the conditions so that they can be served in their daily life without the use of the vehicle (Salingaros, 2006).

In the 15-minute city model, the public spaces can have multiple roles. Thus, school yards can have a more public character and function as parks to ensure their continuous use by all residents of the neighborhood (Moreno, Allam, Chabaud, Gall, & Pratlong, 2021).

An additional parameter that should be highlighted is the equality that the public spaces can promote as they are used by everyone regardless their economic and social status, but also by people with disabilities through the promoted alternative transportation networks which provide easy and quick, due to the short distances, access to the public

space (Sisson, 2020).

2.2. Proximity in the 15-minute city model

Proximity in the 15-minute neighborhoods has a spatial and temporal dimension, as the short distances ensure quick access for residents to all the city's activities. This proximity can contribute to the development of social interaction (Alexander, 2002). Neighborhood residents can easily walk or cycle through the networks of sidewalks and bike paths to any activities that interest them, thereby utilize all available spaces (Duany, et al., 2000)). Planning shifts from the prioritization of private vehicle to the pedestrian, cyclist and Means of Mass Transport utilization. (Fig 2).

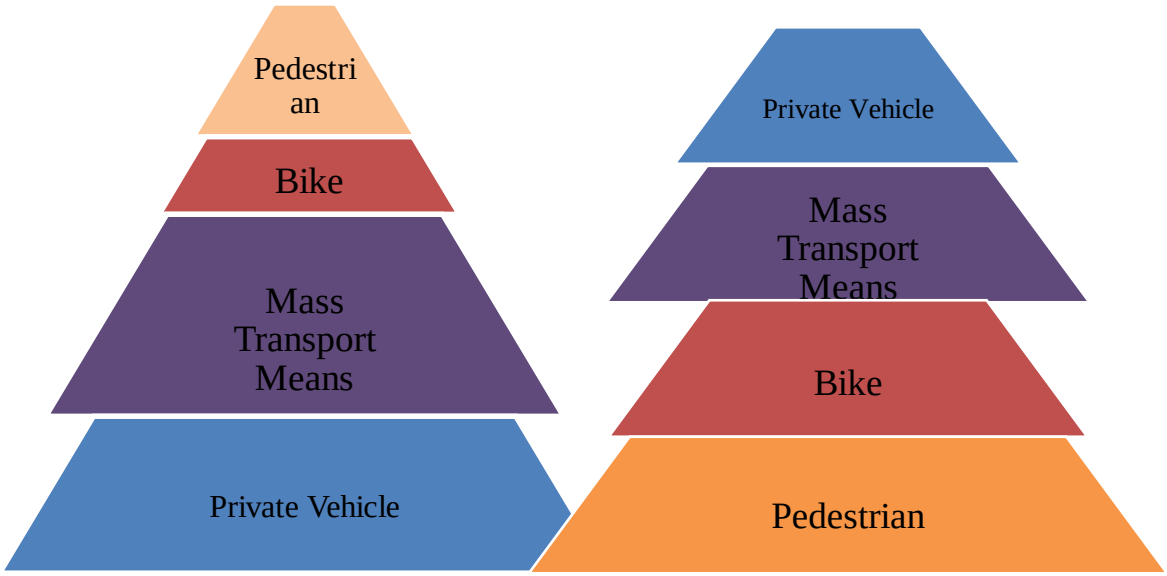

Figure 2. The old mobility planning priorities (left) and the new priorities(right) for achieving proximity in the 15-minute city

Source: Author.

2.3. Diversity in the 15-minute city model

A key feature of the 15-minute neighborhoods is the balanced development of activities with an emphasis on the human-centered neighborhood scale. As for land uses, achieving cross-functional development can be accomplished with different tools.

More specifically in suburban areas there are several concerns about the implementation of the "15- Minute City." Peripheral parts of cities have been relegated to suburban or residential status, as various studies have demonstrated (Guagliardo, 2004), and have less convenient access to services (less than 15 minutes by walking or

cycling) (Vitale Brovarone, 2022). Due to the severe zoning restrictions regarding residential uses, these locations are the most difficult to handle. A shift in the narrative that has been directing contemporary city planning worldwide is necessary to realize the aspirations of the "15-Minute City" in suburban regions as it promotes the-mix of typical uses as well as a decrease in automobile dependence, which has long been the norm in suburban areas.

In the USA the tools for defining uses have been enriched by promoting participatory processes at the neighborhood level (Form Based Codes Institute, 2021). In Buenos Aires, permitted uses are interconnected with building forms. Thus, at the neighborhood level, the uses promoted should be compatible with the building forms, thus giving the opportunity in residential areas to develop a variety of local uses. The Municipality has also, envisioned each neighborhood to have an administration building adjacent to educational functions to encourage city-wide decentralization and enhance neighborhood center development. In Vancouver, land use regulations changed in 2018 and made it mandatory to develop urban gardening for food production in neighborhoods. In the same vein, in New York, Lagos, Paris and London, school courtyards are used as community gardens.

Diversity of the 15-minute city is achieved through the development of many and different functions to cover all the needs of its residents (Moreno, et al., 2021). Functional self-sufficiency does not mean that the residents of the 15-minute city do not develop functional relationships with other areas of the city, as there is always a need to "use" other areas with different activities and characteristics. The base of the model is that daily essential activities are covered by walking or cycling while having the possibility to access and use other areas with other means as well.

2.4. New technologies in the 15-minute city model.

The use of new technologies is the tool to achieve density, proximity, and diversity in the 15-minute city. Smart applications supplement sustainable urban mobility (eg bike sharing), remote working, the participation of residents in planning processes and other aspects of the organization and operation of the 15-minute city. After all, recent experience has shown that the applications of digital technologies during the pandemic greatly facilitated in the cities function.

3. The case of Chania - A brief introduction

The study area of the research project is the Municipality of Chania (Fig 3) in Crete, an urban area of Southern Greece that occupies an area of 10.862 acres and has a population of approximately 90.000 inhabitants.

The city is chosen as it presents the typical characteristics of a Greek city. It has a dense coastal historic center, and it is surrounded by new areas constructed in different time periods according to social, economic, and political parameters. Its borders are constantly expanding in a sprawled way and due to the lack of construction restrictions and controlling mechanisms; it has a lot of arbitrary constructions (Dimelli, 2021). With a coastline-built area, a historic district, many random structures, and expansive new growth zones, Chania is a typical Greek metropolis.

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Figure 3. The urban area of Chania
Source: Google Earth.

Chania city expanded over the past decades based on an urban plan that was enacted in 1988. The goal of this plan was to promote recreation and tourism in the city's historic district and its coastal zones, as well as residence and other public amenities that support residence, in the "inner" zones of the city.

3.1. Density of the 15-minute neighborhoods in Chania

Over the years, Chania has seen the development of several structures. Some of them were constructed under urgent conditions, as the necessity for post-war rehabilitation and shelter for refugees. Buildings on streams, remnants of the Venetian moats, and other sites resulted from the growth of these demands mixed with the scarcity of available land and zoning limitations. A second wave of structures that take advantage of the current legal system and are developed in places as streams and coastal zones have

also emerged because of the Greek state's legalization of arbitrary constructions.

The density of the city presents many fluctuations. The existing built environment presents a median plot ratio that varies from 1,40 in the city's central zones and 0,60 in its suburbs, that are developed in the city's boundaries. During the last decades the city's population increased with fast rates, as according to the 2021 census it was estimated in 88.865 residents (Hellenic Statistical Authority, 2021), presentencing an increase as it was 84.527 according to the 2011 census (Hellenic Statistical Authority, 2011) .

This increase is reflected in new constructions that are developing in a sprawled form in the city's suburbs. The lower land prices, the lack of restrictions and the advantages of the natural environment in the city's borders act as attractors that have so far favored sprawled low-density development. On the other hand, the center of the city, where most urban activities are allocated is a less attractive area for residence for many reasons. The open and green spaces are few, the roads are congested, the conditions for cyclists and pedestrians are difficult due to the lack of the corresponding infrastructures and the land prices are high compared with the suburbs. An additional factor that does not further promote living in the central parts of the city is tourism. Many buildings are used for short term leasing as they are inscribed in platforms as Airbnb, while the intense noise, traffic and the development of recreation and other tourism activities have led to the reduction of the permanent residents in the city's central core. The high density of the city in the central areas can be a factor that will promote the development of the 15-minute city model, while on the contrary, the low-density residential areas that are developing do not have the basic characteristics to be developed according to this model's principles.

3.2. Proximity of Chania's neighborhoods

Proximity in the 15-minute neighborhoods is an important factor, as the short distances ensure quick access with the use of sustainable mobility ways for residents to all the city's activities. Proximity promotes cyclists and pedestrians mostly for local distances, while it facilitates the role of means of Mass Transport.

In the city of Chania, according to the recent Sustainable Urban Mobility plan the basic choice of the city's residents for their journeys is the private car as the use of sustainable means of transportation (public transport, pedestrians, bicycles) is limited. It is recorded that almost 97% of the city's residents use their car of their motorcycles, while people who use bicycles or the existing network of buses is limited.

The existing mass transport means are only serving 4,7% of the residents needs for many reasons. A basic parameter is the low frequency of routes that is estimated in

approximately every 30 minutes, and the low average speed of the bus vehicles in morning peak. As for the existing pedestrians' network this is downgraded. The absence of a satisfactory Mass Transport means network leads to the high dependence of the use of motorized vehicles (Municipality of Chania, 2018)

Many sidewalks are extremely narrow, or in bad condition so it is not easy for residents and visitors to walk in the city. It is characteristic that although the minimum standard width for pavements is two meters according to the Greek legislation, the medium width is 1,7 meters. The historic center is in its most parts developed for pedestrians, but the rest "new" city is presenting difficult conditions for walking. The cyclists' network is still weak, and it does not serve central, educational, cultural and other public functions.

As for parking conditions, although a satisfactory amount of offered parking spaces is offered, however, the problem of illegal parking is still intense

The increased mobility demands during the summer season caused by tourism and the low capacity of the existing infrastructures lead to traffic congestion. Finally urban planning and mobility planning are not connected fact that leads to fragmental interventions.

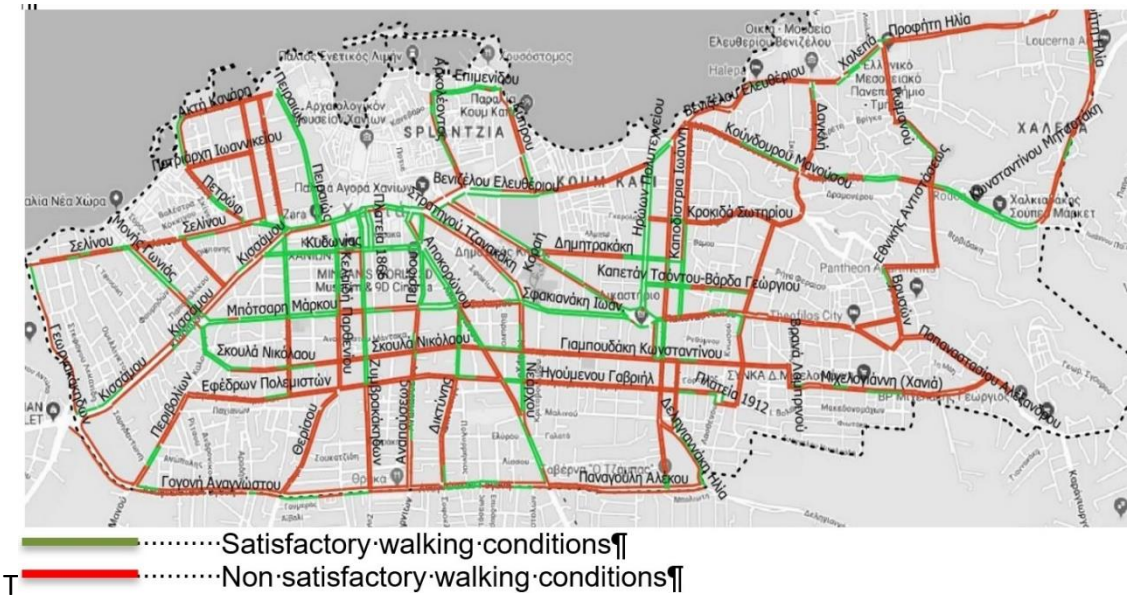

Figure 4. Pedestrian walking conditions
Source: (Municipality of Chania, 2018).

3.3. Diversity in Chania's neighborhoods

In the 15-mitute city residents can find a variety of land uses that fulfil all their daily needs and urban functions close to their homes. A basic parameter for the development

of the 15-minute neighborhoods is the balanced development of activities with an emphasis on the human-centered areas. The development of urban cells that concentrate the necessary needs for neighborhoods function is an important characteristic of 15-minute cities as they it.

In Chania city where the historic dense zones, co-exists with the sprawled suburbs the achievement of mixed uses is a huge challenge. In the historic center the existing density favors the implementation of the 15-minute model as they provide greater densities, short ways, and a mix of different land uses (Birbi , et al., 2020). However, the intense tourism development has led to the relocation of activities for the area's residents due to tourism activities. So, the mono-functional development of hotels, tourism trade, restaurants and other tourism supplementary activities is a common characteristic in the historic city which is gradually facing the reduction of its permanent residents. As for the areas in the city's borders these are strongly depending on the city's central core (Fig5.) as they have not developed local- central activities.

Another characteristic feature is the development of retail "corridors" in the main rods, mostly the supra-local roads that connect the center of the city with the rest urban zones of the city. This kind of development, caused by the "freedom" that is provided by the existing land uses legislative framework allows the allocation functions as trade in the majority of the city's zones. So, although since the 1980's decade the existing plan attempted the creation of nucleus urban neighborhoods centers, still the provided freedom led to a different allocation, as the activities "preferred" to be allocated at both sides of central roads which served in a best way their function, in a city where private car is the main transport mean.

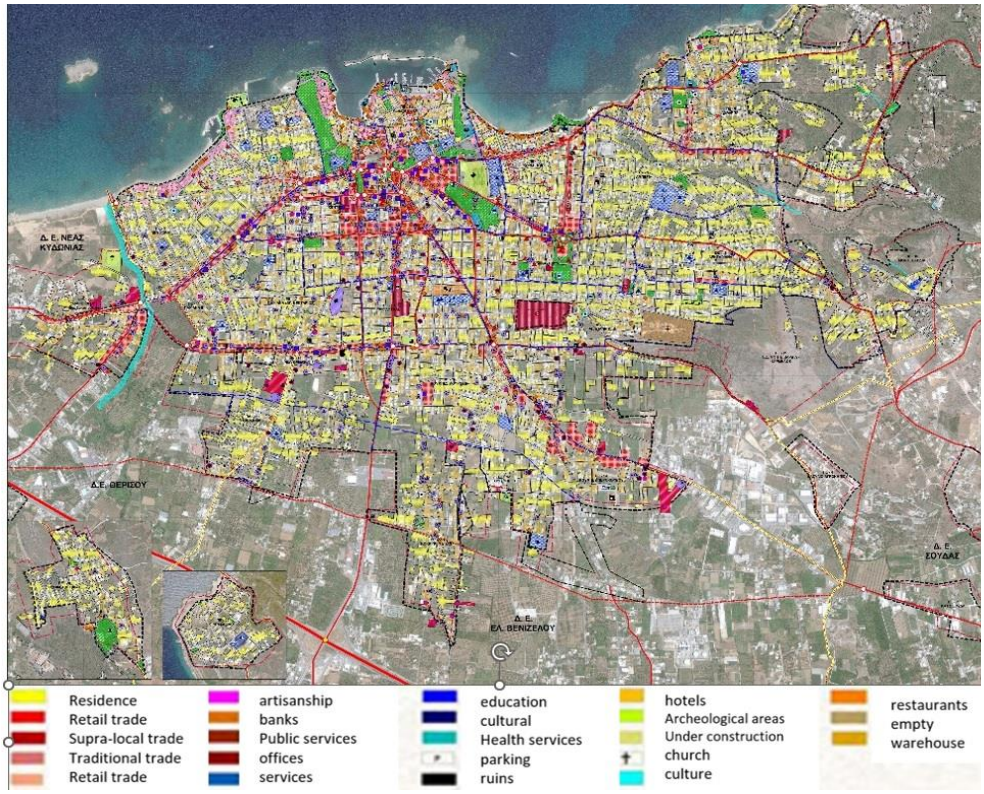

Figure 5. Land uses in Chania City
Source: (Doxiadis Associates, et al., 2017).

3.4. New technologies in Chania.

The Municipality of Chania during the last decade emphasizes its digital transformation and interaction with citizens, while creating an attractive environment for businesses, visitors, and operators. To make this transition the most appropriate, a Smart City Action Plan and a Strategic Marketing Plan for City Identification are developed. In the framework of the Act the role of. visitors, businesses, and operators is crucial for adapting data to the characteristics of the Municipality (Smart Cities-Greece Cyprus Interreg Project, 2023).

Until now the city has developed smart applications in the sectors of environmental protection, mobility, healthcare education, governance, and cyber security.

More specifically, Chania have developed smart applications in the following sectors:

- Geographic Information System for waste management using sensors in the fleet of garbage trucks of the Municipality.
- Integrated management platform of Beneficial Social Structures and Provision of Electronic Services.
- Integrated platform for the management of kindergartens.

- Smart Medical data collection and transmission devices
- Intelligent early fire detection system
- Environmental data Stations
- Energy consumption monitoring in municipal buildings
- Integrated Intelligent traffic light system
- Intelligent parking management system.
- Municipal Digital Training Center – Digital Academy
- Platform for consultation and participatory planning
- Cybersecurity Actions

In 2023, the city of Chania, received awards for its innovative smart development among other Greek cities.

The COVID19 period was a challenge for the city's residents that had the chance to use many of the above applications and integrate them in their lives. Still today, the main weaknesses are the degree that these applications are used by all ages and educational level citizens as still many of the city's residents are not familiar with many of public smart applications or even ignore their existence. Additionally, another problem that needs to be considered by the authorities is the lack of coordination of these applications under a strategic framework. So, although many smart applications are functioning , they are developed in a fragmental way fact that reduces their effectiveness.

4. Conclusions

The current paper is a part of a research that will proceed to further investigation with indicators that will specify the possibilities of the 15-mute city development in the city of Chania. Until today the macro-analysis of the examined city presents some interesting conclusions about the urban characteristics of the area in an urban context as the four main parameters that shape the 15-minute city, density, proximity, diversity, and the development of new technologies present a lot of weaknesses.

Density is a basic factor for the 15-minute city model as it promotes the required short distances for pedestrians and cyclists. In Greek cities, the lack of plans, the availability of land for sprawled constructions are key factors that create low density residential urban zones in the urban boundaries. As a typical Greek city, the city of Chania, presents a variety of densities. In its central historic core, a dense center is developed while in more distant urban zones, the densities are reducing, fact that intensifies the use of private vehicles.

Proximity is a parameter that further promotes the sustainable mobility means. In the

examined city the existence of cyclists, pedestrians and means of mass transport networks is limited in the central zones of the city, where it also presents weakness in its infrastructures. So, except from the attractive for tourists' pedestrians' networks in the historic center, in the rest urban zones the conditions for walking and cycling are not satisfactory. It is important for the authorities to promote strategies and infrastructures for sustainable mobility that will be based on modal split and combine all the sustainable mobility means and then proceed to the development of networks in a local level which will make Chania's neighborhoods friendly for walking and cycling.

Diversity of land uses is a characteristic phenomenon mostly in the city's central areas and in linear zones, following main roads. The historic central zone concentrates the majority of supralocal and tourism functions. On the contrary on the distant from the center zones, the mono-functional development of residence is the common way of uses development.

Finally, the integration of smart technologies is an important factor for the organization and operation of the 15-minute city model. In the city of Chania, smart applications are developed in many urban activities as mobility, governance, education etc. Still, they can be organized in a better way so that they can supplement each other and produce a more effective smart city system.

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