



# The Practice of “Two-Wheelers” in Sfax City (Tunisia)

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## Abstract

In recent decades, the use of two-wheelers (motorcycles and bicycles) for travel has become an alternative to cumbersome and polluting modes, in many cities around the world and especially in developed countries. It offers several advantages. It is less polluting, less expensive and less cumbersome, especially compared to the private car. In Sfax city, and compared to other Tunisian cities, the use of two-wheelers is a specific aspect of travel. But over the past two decades, this phenomenon has continued to decline. The main objective of this article is to assess the current situation of the use of both motorized and non-motorized wheelers in the Great Sfax. It aims first of all, to show the importance of the use of this mode in this city, compared to other means of transport. It presents the trend of this mode since the 1980s. He also explains the advantages and disadvantages of this mode and the various factors explaining the decline in its use. Next, it shows its spatial distribution by movement pattern. It also determines, in a third place, the differences in practices of this mode among the Sfaxiens according to their opportunities and their strategy of displacement. Finally, we propose some alternatives to encourage the use of travel mode. Based on this research, we found that the use of two-wheelers is a Sfaxian practice of some importance in terms of mobility. Two-wheelers flows are of great importance in all road transport flows. Admittedly, this importance has been declining over the past two decades. The decline in the development of the two-wheelers can be explained by several factors. This gentle approach must be encouraged by local and national authorities, and for this reason we have presented a series of recommendations in this paper.

## Subject Areas

Human Geography, Sociology, Urban Planning

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## Keywords

Displacement, Motorcycle, Bike, Great Sfax

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## 1. Introduction

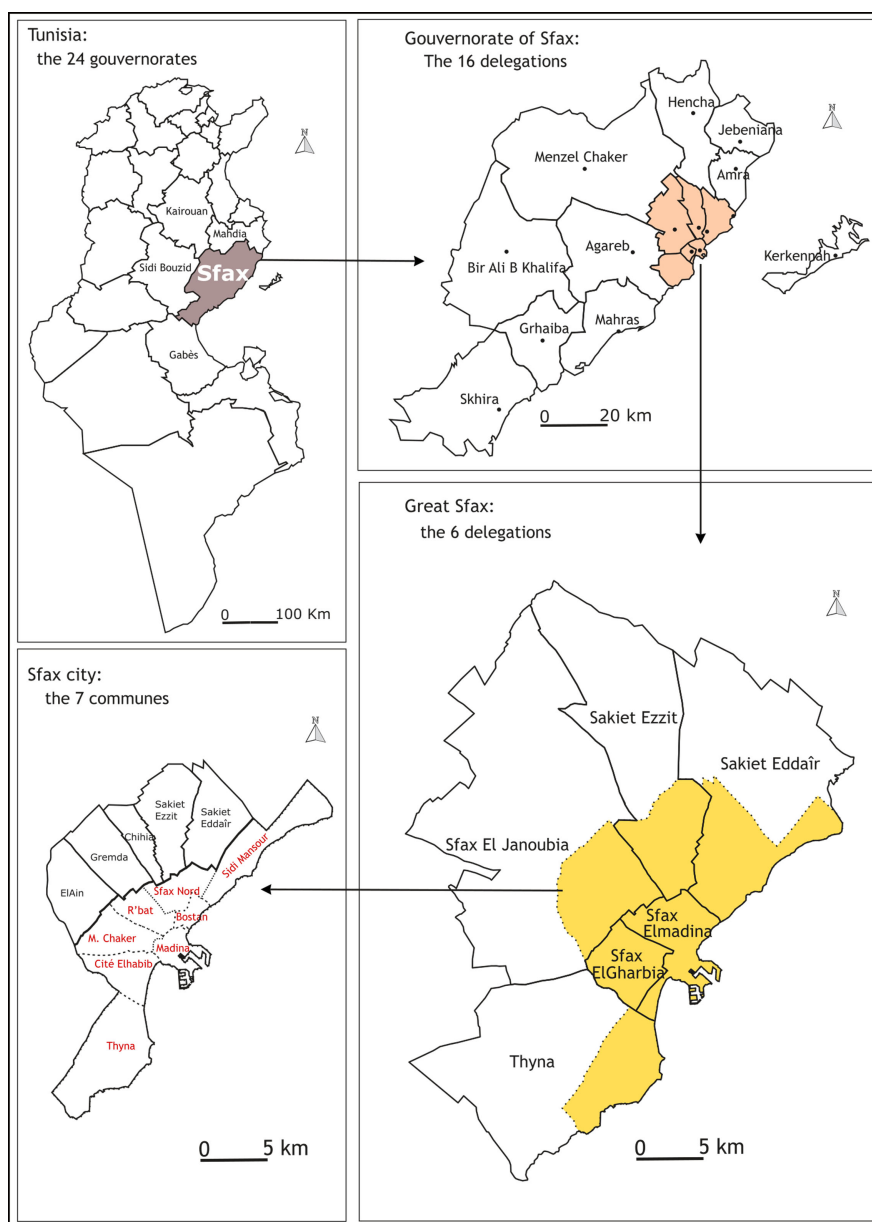
The number of two-wheelers is increasing all over the world. Users of such vehicles are relatively numerous and very diverse. Most authorities, especially in developed countries, continue to encourage it. Encouraging the use of two-wheelers has an impact on road safety. The aim is to stabilize and then reduce the number of traffic accidents. It also aims to reduce air and noise pollution. The use of this mode also allows everyone to live in good health and promotes the well-being of every one of all ages. It allows cities to be open to all, safe, resilient and sustainable.

Admittedly, in most Tunisian cities, the most used means of transport is the private car. This situation has led to congestion on the roads, especially during peak hours. The problems of urban traffic are increasing sharply, especially with the weakness of the public transit system. At Sfax, the use of two-wheelers is a specific aspect of displacement. It makes this city slightly different from other Tunisian cities.

This article aims, first and foremost, to show the importance of the use of two-wheelers in this city, compared to other means of transport and their trend of evolution since the 1980s. He mentions the advantages, disadvantages and various factors explaining the decline in the use of this means. Then and in a second place, it shows its spatial repair by reason of displacement. In a third place, it determines the differences in practices of this mode among “Sfaxians” according to their opportunities and their travel strategy. Finally, we propose some alternatives to encourage the use of travel modes.

This article aims first and foremost to show the importance of the use of two-wheelers in this city (**Figure 1**), compared to other means of transport and their trend of evolution since the 1980s. It mentions the advantages, disadvantages and various factors explaining the decline in the use of this means. Then, in a second place, he shows his spatial repair by reason of displacement. In a third place, it determines the differences of practices of this mode among the Sfaxiens according to their opportunities and their strategy of displacement. And finally, we propose some alternatives to encourage the use of travel mode.

To prepare this study, we used data from the Municipality of Sfax [1] [2] [3] [4], the Ministry of Equipment and Housing [5] [6] [7] Direction of the General Directorate of Bridges and Highways GDBH (DGPC in French) [8] and the National Institute of Statistic [9]. We also developed a survey of users of two-wheelers. The survey provides statistics on the use of this mode of travel. The topics covered in the questionnaire are: mileage by type of vehicle (motorcycles, bicycles) and by type of network (main road, secondary road, paved or unpaved



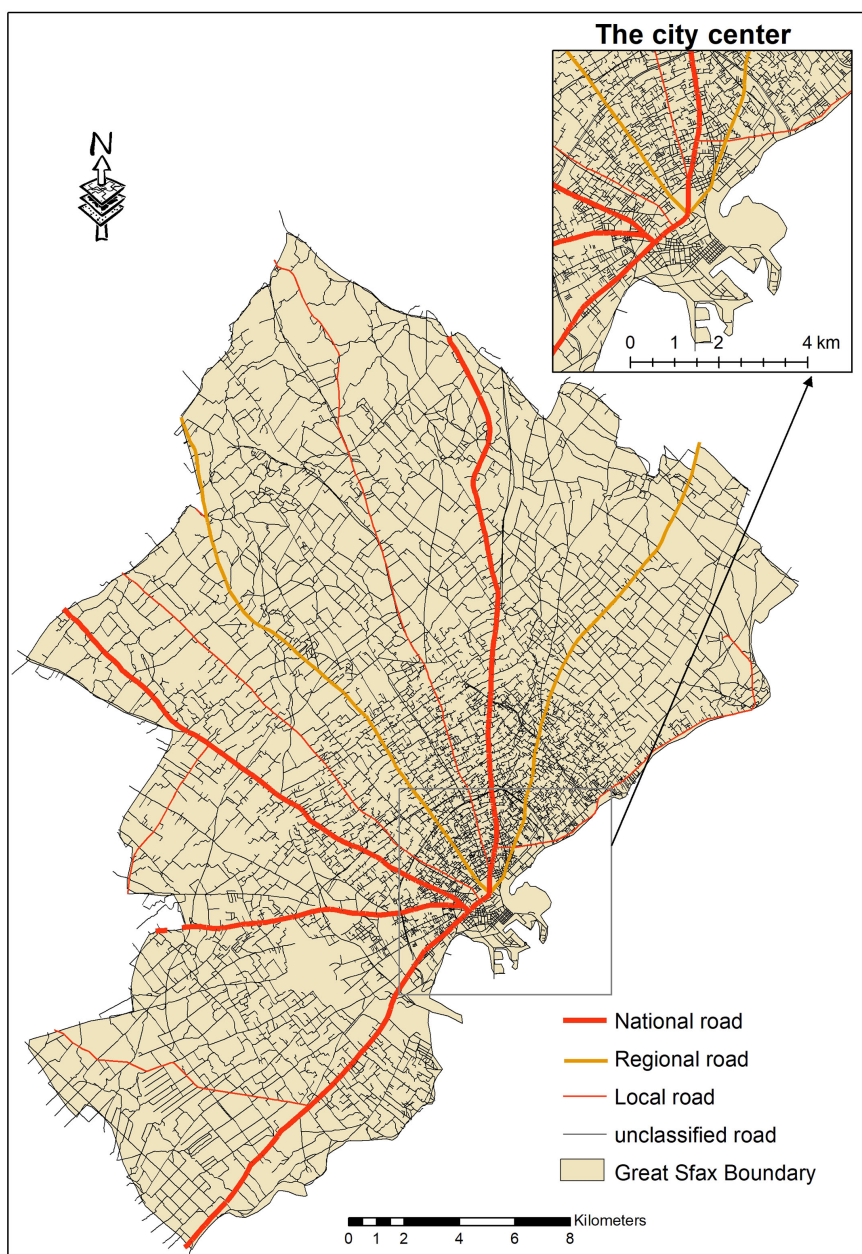
**Figure 1.** Location of study area.

road), reasons for travel, frequency and type of use, parking arrangements, equipment associated with the use of the vehicle, a characterization of commuting, the cost of using this mode and other miscellaneous data.

To elaborate the thematic maps, we integrated all the data into a database using the ArcGis software. We also used Adobe Illustrator for the layout of the maps.

## 2. Study Area and Methodology

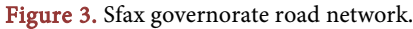
The study area (Great Sfax) is characterized by a dense and diverse road network (national, regional, local and other unclassified roads) (**Figure 2**). The density of the network is greater by comparing it with the network of the other delegations



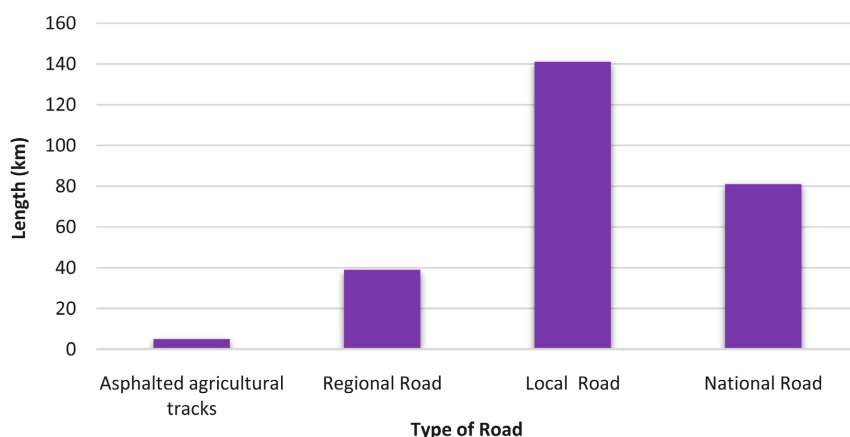
**Figure 2.** Great Sfax highway system.

of the governorate (**Figure 3**). The structure of the city of Sfax and its road network are semi-radio-concentric (**Figure 2**). All radials lead downtown. The asphalt road network of the Great Sfax is 266 km long. This value represents 21.3% of the entire network of the governorate (1249 km). The agglomeration of Sfax comprises 26% of the lengths of the national roads, 16% of the regional roads, 44.5% of the local roads and only 1.33% of the tarred agricultural roads of the governorate of Sfax (**Table 1** and **Figure 4**). It occupies almost  $\frac{1}{4}$  of the tarmac road network, spread over only almost 8% of the governorate area. Road traffic in this agglomeration is condensed, especially in comparison with other delegations (**Figure 5**). It differs according to the means of transport and according to

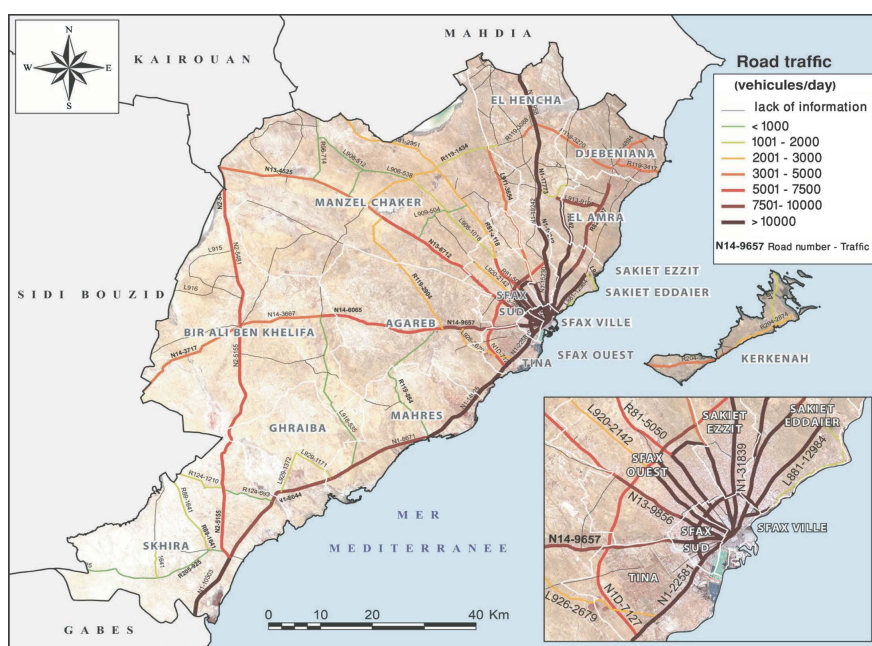




Delegation	National Roads	Regional Routes	Local Roads	Asphalted agricultural tracks	Total
Sfax Ville	4	3	14	0	21
Sfax West	13	0	3	0	16
Sakiet Ezzit	16	2	28	5	51
Sakiet Eddaïer	0	17	17	0	34
Sfax Sud	29	17	54	0	100
Tina	19	0	25	0	44
Agareb	30	28	0	20	78
Djebeniana	0	49	8	55	112
El Amra	0	15	9	52	76
El Hencha	34	18	7	65	124
Menzel Chaker	60	98	85	76	319
Ghraïba	11	0	3	26	40
Bir Ali B. Khelifa	92	0	65	77	234



**Figure 4.** Asphalt road network in Great Sfax by type in kilometers (2009). Data source: [7].



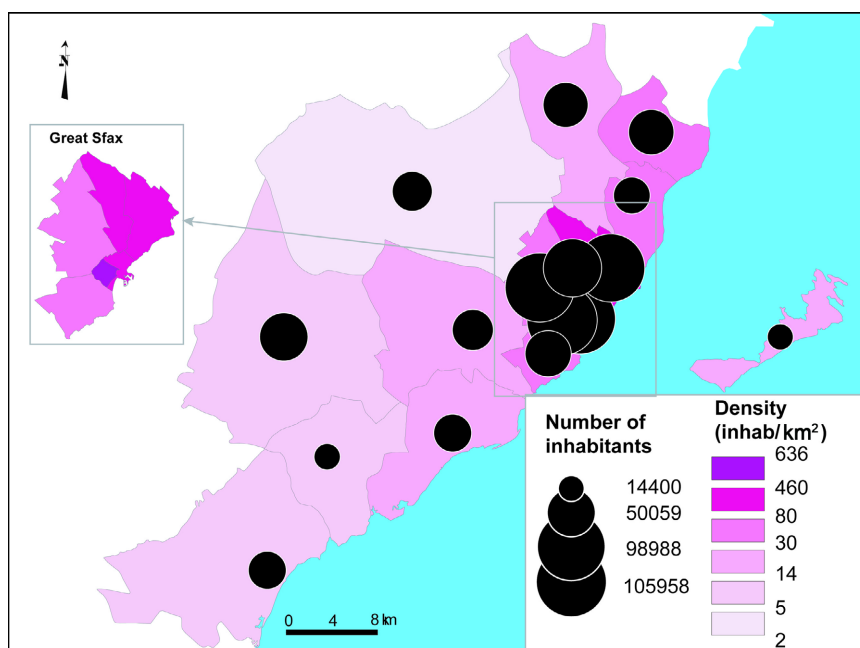
**Figure 5.** Road traffic in the Sfax Governorate in 2009. Source: [7].

the delegation or agglomeration. The largest share of the traffic of the two-wheelers of the governorate is also in the Great Sfax [10] and [11].

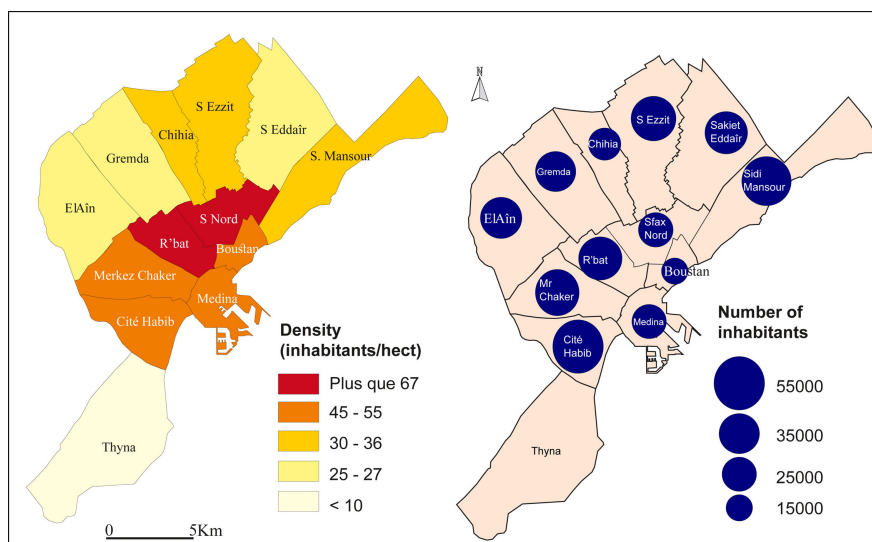
In addition to the road network and vehicle flows, Sfax is the place of concentration of a fairly large part of the inhabitants. He alone monopolizes more than 2/3 of the population of the governorate. This concentration is greater in the municipalities of this agglomeration (Figure 6 and Figure 7).

In the following paragraphs, we analyze the flows of the two-wheelers in the Great Sfax, the behaviors of the users of this means of travel, and the factors influencing this use.

In the majority of Tunisian cities, the most used means of transport is the private car. This means is the most important factor in traffic congestion, especially during peak hours. Urban traffic problems are on the rise, especially with



**Figure 6.** Population size and density in Sfax Governorate by delegation in 2014. Data source: [9].



**Figure 7.** Population size and density in the city of Sfax by municipality in 2014. Data source: [9].

the weakness of the public transport system. In Sfax, the use of two-wheelers is a specific aspect of the movements. It makes this city slightly different from other Tunisian cities.

### 3. Results and Discussions

#### 3.1. Remarkable Weight of Cycling Trips but in Permanent Decline

Cycles and motorcycles occupy a predominant place in all trips to Sfax. Accord-

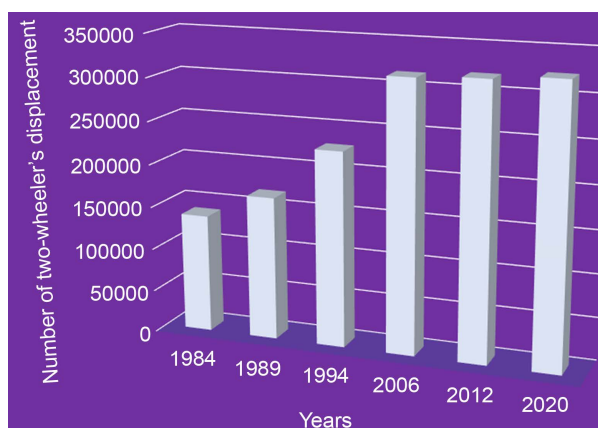
ing to the censuses of the Directorate General of Roads and Bridges, their traffic represents 8.76% of all motorized traffic in Tunisia. Their average daily journey, in the governorate of Sfax, occupies the second place after that of Medenine with 164,587, which represents 8% of all motorized daily journeys.

### 3.1.1. Significant Share of Motorcycle Travel and Its Advantages and Disadvantages

In Great Sfax, this mode represents in 2006, 32% of all motorized trips with 314,665 trips. The share of two-wheelers has declined relative to other means, although the number of trips has grown remarkably. The share of two-wheelers was 35.9% in 1984, 34.7% in 1989, 34.5% in 1994, 33% in 2001, 29% in 2012 and 27% in 2020. The number of trips increased from 138,000 in 1984 to 167,200 in 1989, to 227,700 in 1994, to 262,020 in 2001, to 314,665 in 2006 (Source: Municipality of Sfax), 318,100 in 2012 and 323,000 in 2020 (**Figure 8**).

#### 1) Advantage of using the motorcycle

According to the surveys we conducted, at the level of use, the motorcycle offers great flexibility, it allows autonomy, independence, handling and no clutter. The maximum speed of the motorcycle in urban areas is limited to 50 km/h. But it is possible to increase this maximum to about 80 km/h, or even more if the motorcycle is new, the road is straight and in the absence of constraints (congestion, traffic lights, rain, etc.). The user can make tens of kilometers in a day. Economically, the purchase cost and maintenance that are truly within everyone's reach is an essential factor that explains the easy and widespread possession of this means. It consumes less energy than other motorized means. The cost of parking is cheaper than that, that is 0.5 Tunisian Dinar for the motorcycle and 1 Dinar for the car. In terms of maintenance, for motorcycles, there are fewer parts than the car, so probably less risk of breakdown. The risk of the breakdown of the motorcycle is significant, but local labor is widespread almost everywhere in the Great Sfax, the same for the premises selling spare parts. Of course, maintenance is often insufficient because of "poverty" and neglect of maintenance by the majority of users. Maintenance is usually done individually



**Figure 8.** Evolution of cycling in great Sfax between 1984 and 2020. Data source: [1] [2] [3] [4] and [8] and personal estimate.

except in very serious cases (very serious breakdown). The most common type of failure is wheel puncture. In this context, we note that each motorcycle contains a trunk for a few mini tools or emergency dispatch. Spatially, in the urban environment, particularly in the central and pericentral area, where two-wheelers share the street with other motorized modes, the use of motorcycles helps to minimize congestion due to heavy use of the automobile. The motorcycle is a simple way often powerful and capable of supporting several people and luggage with a luggage door back. But despite this series of advantages, the use of this mode is bypassed by another series of disadvantages of the car.

## **2) Disadvantages of using the motorcycle**

Among the disadvantages of the motorcycle, we mention the difficulties of its use especially during rainy days. It becomes inconvenient because of the cold. The user must protect himself with waterproof clothing to protect himself from the rain. It also requires a band against mud to protect clothing. In addition, he must always wear a helmet. But unfortunately, the helmet is used only rarely. According to the surveys we conducted, only less than 10% of users often take their helmet and 70% refuse to wear it. However, the use of the helmet is very rare for several reasons: several users claim that they want to be “light”, without a helmet, while others want to avoid the risk of catching a cold blow after wearing the helmet, others, and especially young people, claim that taking the helmet is done out of fear “of the police” and want to be “famous” and do not have the feeling of fear. In reality, the use of the helmet remains very limited and concerns above all the movements in the central and pericentral areas where the missions of control by the police are too frequent and daily. However, in peripheral areas, the use of helmet remains very limited.

Users of two-wheelers, generally, do not follow the light signs, the indications (road signs and police signs), or the signs. The few bike paths that were established in the 1980s, were removed and even when they were existing, most “cyclists” did not always use it and preferred to travel on the road reserved for vehicles.

### **3.1.2. The Use of the Bicycle and Its Advantages**

In Sfax, the use of bicycles is an important regression phenomenon. Since the 1980s, this fact has begun to recede.

#### **1) Negligible share of cycling trips in decline**

Based on our direct observation and the few manual counts we conducted on a few cords during the morning peak hours, in the absence of fairly accurate, up-to-date and accurate statistics, we noticed that the movements of two-wheelers are dominated by those of the motorcycle and that those made by bike are very rare. They represent only a relatively small proportion, not exceeding 4% of the total movements of the two-wheelers. In recent years, the use of bicycles in Sfax has become very marginal. It is felt as an archaic and outdated transport. Unfortunately, the bicycle user is often perceived as being at the margins of society. They are carried out either on foot, by motorcycle, by car or by public transport,



but very rarely by bicycle although this mode has a series of advantages

## **2) Benefits of using the bike**

The advantages of bicycles include:

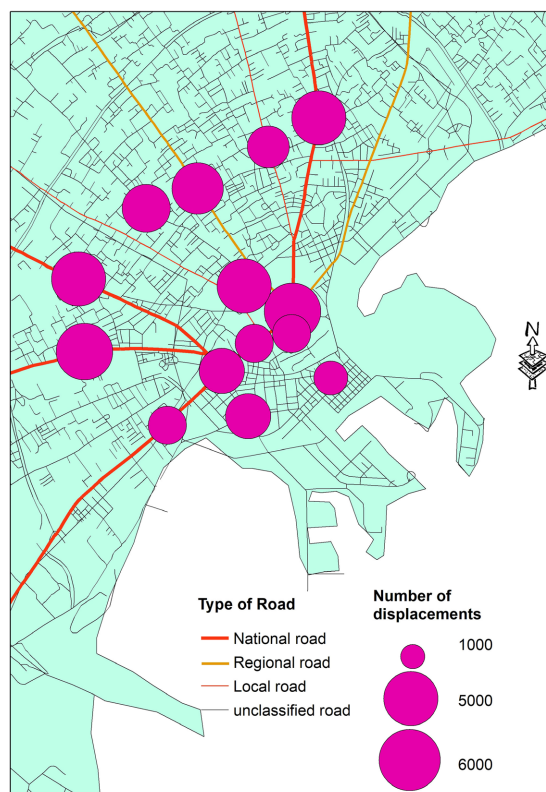
On a spatial scale, “the optimization of the public space used per person transported during travel and during parking, thus reducing road traffic congestion and the demand for parking spaces” [12]. From an economic perspective, spending is negligible. The user is not called upon to pay for fuel, insurance, traffic tax, etc. The maintenance and even the purchase of the bike are, generally, within everyone’s reach. Spare parts are neither numerous nor very expensive and the risk of failure is minimal. From an environmental point of view, cycling is the ideal way for the environment. The bicycle does not pose a problem of air pollution, land, noise or vibration. It is a very “quiet” and “environment-friendly” way. In terms of health treatment, cycling has an effect on reducing the risk of cardiovascular disease and therefore improving health. On the road, this is the least dangerous way, but it is often the “wall” of cars, buses and heavy trucks in case of accident.

But for their part, the users of the two non-motorized wheels do not respect the code. They do not represent problems to the value of those posed by the “motorcyclists” insofar as the share of the bike becomes more and more negligible in Sfax.

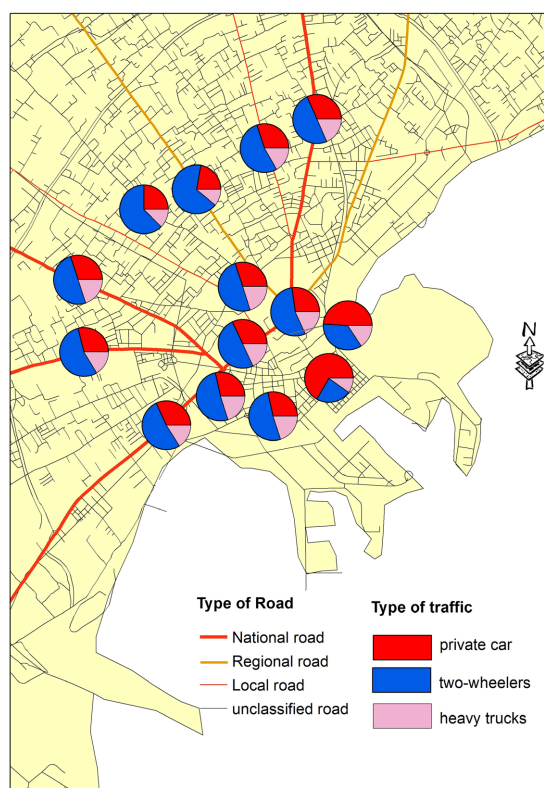
## **3.2. Unequal Spatial Distribution of Two-Wheelers Flows**

The distribution of flows is uneven between the different crowns and radials of the city of Sfax. In the center and peri-center and on the avenue of Martyrs, at the morning rush hour, the traffic of the two-wheelers represents 32% with 770 trips. In the Avenue Majida Boulila, the share of two-wheeled trips is slightly higher than that on the Avenue of Martyrs, at 34% with 1140 trips. On the “old railway” line, the share of the two-wheel movements is significant on all radials. It represents 34% of motorized travel. The radial distribution is thus 30% on the road of Mahdia and that of Tunis with 826 and 650 trips respectively, 35% on the road of Gremda with 735 trips, the road of Menzel Chaker monopolizes the most important proportion (39%) but with the lowest number (500 trips). At the level of the “ring road of 4<sup>th</sup> km”, the share of the two-wheelers becomes more important. It is estimated at 42% of all motorized trips. It is of the order of 39% on the road of Sidi Mansour with 410 trips, 55% on the road of Saltania, 47% on the road of Mahdia, 36% on the road of Tunis, 29% on the road of Taniour, 37% on the road of Gremda 36% on the road of Lafrane, 52% on the road to El Ain and 46% on the road to Menzel Chaker (**Figures 9-11**) (Source. PDRTGS, 1996).

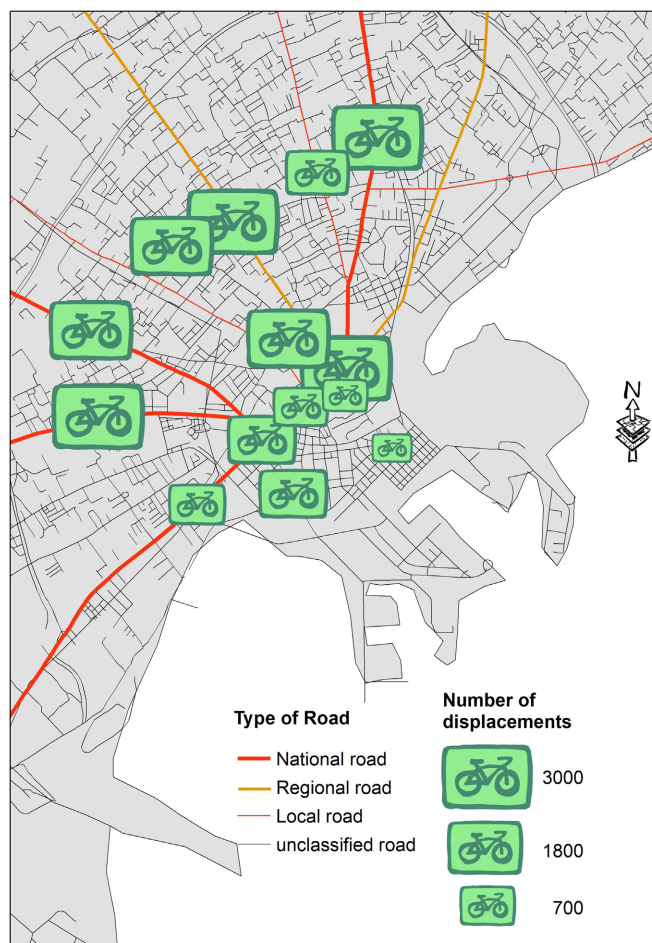
These proportions show that in the city of Sfax, the traffic of the two-wheelers is very important uniformly on almost the entire network, with however some radials with a rather high density: the roads of Gabes, of Menzel Chaker, from El Ain, from Tunis and the road to Saltania. The inhabitants of the second and third crown, that is to say those who reside beyond the “ring road of 4<sup>th</sup> km”, use the



**Figure 9.** Distribution of traffic in Sfax city center. Data source: [4].



**Figure 10.** Traffic composition in the center and pericenter of the city of Sfax by mode of transport. Data source: [4].



**Figure 11.** Two-wheelers traffic in the center and pericenter of the city of Sfax. Data source: [4].

two-wheelers as an essential means for their movement. The inhabitants on the roads of Mahdia, Saltnia, El Ain and Menzel Chaker are the most captive in terms of use of the two-wheelers (Source: Municipality of Sfax).

Since the movements of the two-wheelers are dominated by those of the motorcycle and those made by bicycle are very rare and represent only a relatively small proportion not exceeding 4% of the total movements of the two-wheelers, we present ourselves, in the following paragraphs, the factors determining motorcycle use and displacement strategies.

### 3.3. Factors Determining Motorcycle Use and Displacement Strategies

For some people, motorcycles are the primary mode of transportation; for others, it is an alternative to the car, and a way to share the vehicle with other household members [13]. For others, the motorcycle is used mainly for commercial purposes. For a minority, it is used for recreational purposes. There are several factors that affect the use of the motorcycle and travel strategies. For example, the frequency of use of the motorcycle, the distances travelled and the

travel route vary “according to different elements related to the type of use of the motorcycle, the motivations of the ‘cyclists’, the different age classes, their mobility and their needs...” [13].

### 3.3.1. Reasons for Use of the Motorcycle

The use of motorcycles for commercial purposes, of which commuting is fairly dominant, is the most important. The use of motorcycles for studies, whether for high school students on the different roads, or for students especially on the El-Matar and Soukra roads (Soukra ElMatar university campus) is the second most important. However, its use for leisure purposes is of lesser importance. “Utilitarian use often occurs over fixed distances that are sometimes quite long (city-wide) and destinations are often determined (in time and space)” [13]. For example, for some users the daily journey consists of moving, in the morning, from Merkez Chaker (place of residence) to the Poudriere (her place of work), and doing the opposite in the evening. “Utilitarian users try to optimize the time and their movements, which are often made during peak hours (morning, noon and evening) or at fairly fixed schedules during the day” [13].

The use of two-wheelers to settle cases is also of great importance. Indeed, the city center and suburban destination is very dominant. The city center is the market place for various products. It is the place of concentration of shops (souks, supermarkets, etc.), socio-community equipment (for example those of health; hospitals, clinics, etc.) and authorities (regional directorates, corporate headquarters, etc.). Recreational use differs in several ways from utilitarian use, but even within this use, differences can be observed. These differences are most noticeable in terms of distance travelled and season to season. In fact, the use of motorcycles for recreational purposes is more important during the summer, as the distances of journeys become longer. In summer, the beach is the privileged place of leisure. We note the dominance of the destinations Sfax-Echaffar (20 km) and Sfax-Sidi Mansour (beach, municipal theatre, El Khalij garden, etc.); some representing a minority go further to Chabba for example (60 km). But for leisure activities, there are some young people who move in a more or less dangerous way. Thus, very dangerous practices are practiced on the streets and on the sidewalks sometimes at hours of high frequency (of vehicles and pedestrians). “Recreational use can be characterized by longer distances and more flexible destinations” [13]. This use is most often summer and remains very limited because “the region of Sfax is characterized by an unfavorable natural environment. It is a polluted industrial city without recreational facilities” [14]. For recreational use, time does not appear to be a significant constraint and travel can occur throughout the day rather than concentrated during peak hours. Moreover, weather conditions influence the benefits of recreational use rather than utilitarian use [13]. The winter marked, most often, by the bad weather causes a decrease in the use of the motorcycle compared to the summer and spring. Indeed, some people who do not want to use the motorcycle during the winter sell it or leave it aside until the good weather returns. The majority of

those who sell their motorcycles usually buy another one during the spring or summer.

### **3.3.2. Reasons for Using the Motorcycle**

Sfaxien culture and traditions are essential factors in explaining the practice of motorcycles and the types of journeys. The region of Sfax is known by the strong cycling habit, the fact of using the motorcycle is “normal” act for the majority of Sfaxiens. But unfortunately cycling begins to become like an index of poverty or eccentricity. The use of the motorcycle is a “door-to-door” means of transport without a required schedule. Its use offers independence and freedom. Motorcycles use little space and allow people to travel around and avoid traffic congestion [13]. However, the consumption of energy (gasoline) is much less than that of the automobile so the price of the motorcycle and that of maintenance is less expensive than that of the car.

### **3.3.3. Transport Supply and Opportunities**

People’s displacement strategies are influenced by different elements. The supply of transportation from both the point of view of car ownership and access to public transport can influence the frequency of use and the distances travelled by motorcycle. Not all residents have the same opportunities for mobility. Some motorcycle users own or share a car with other family members. So, some people use this means more intensively than others and adopt very different travel strategies. For example, it is certain that those who have a motorcycle and do not have a car use it for utility purposes and will tend to travel longer distances [13]. Some activities offer opportunities to use the motorcycle similar to those offered by the car. Indeed, when shopping, for example, it is easy and usual for the majority of users to carry a large quantity of goods (on the handlebars, between the legs and back on the luggage rack) on motorcycles. The individual can carry his purchases twice. The motorcycle sometimes acts as the car or taxi.

### **3.3.4. Place of Residence**

The place of residence may influence the use of the motorcycle [13]. For example, those who live in the apartments find problems sheltering their motorcycles. Those who think that the motorcycle procession and a necessity prefer not to live in apartments. But some people sell their motorcycles because they rent an apartment from a building and cannot find a place to park their motorcycle, especially at night. Some people who live in an apartment and want to own a motorcycle decide to change their place of residence to buy a motorcycle. Generally, the majority of middle-class people prefer to live outside the city center, on the one hand, because renting a house is relatively expensive in the central areas and on the other hand, they find the solution in the motorcycling procession. We observed the importance of motorcycle flows on the radials that run along the densest and most popular areas (Northern sector; road of Tunis, road of Mahdia, and the pericentral crown which are characterized by dense habitat of type Rbat). Other users come from far (out of the Great Sfax) for work. They live in



more remote areas such as Agareb, Esghar, Ain Torkia, Sidi Saleh...

### 3.3.5. Lack of Public Transit Service

The Sfaxien road network is characterized by the dominance of radio concentric radials that converge in the city center with a lack of ring roads. It is also characterized by narrow streets and lack of maintenance. The bus network, the only public transport network, managed by the Sfax Regional Transport Company (Société Régionale de Transport de Sfax: SORETRAS) since its creation in the years 1963, is almost modelled on the road network with a weakness in the share of circular and tangent lines. It has followed a major evolution during the last forty years, but remains far from adequately covering the needs of displacement of the entire population of Great Sfax.

The spatial distribution of bus stations is a good indicator of the quality of public transport service. Indeed, the coverage of the urban space by bus stations quite close at the vertical and horizontal level, with a fairly high frequency of bus passage, ensures good accessibility. On the other hand, the further away the stations are from each other, the lower the frequency of bus traffic and the lower the level of accessibility. The distribution of bus stations is far from covering populated areas with the same degrees. At the radial scale, the stations are closer together in the first two crowns. Beyond the “ring road of 4<sup>th</sup> km”, the stations become more and more distant up to a very high level of distance which sometimes exceeds 1000 meters between two successive stations. If we look at the spatial distribution of the population (**Figure 6** and **Figure 7**), it appears to be inversely related to the distance from the city center, which is logical. Indeed, the further away we are from the city center, the lower the population density becomes. Conversely, the closer we get to the city center, the higher the density becomes, but with exceptions, especially at the level of the hyper center, where the density is low compared to the other sectors of the first and second crowns. At the radial scale, the distribution of the stations shows a large aspect of imbalance, revealing a malfunction of the public transport system. The stations are very far apart from each other, especially by moving away from the city center. What aggravates the situation is that the connections at this level are very insufficient, the number of circular lines being very small. Generally, the bus stations are further apart from each other by moving away from the city center. In the first two crowns, the average distance between the two successive stations varies between 250 and 350 meters. In the third ring, stations move away from each other with an average interval of 500 to 600 meters. Beyond this crown and especially outside the communal area, the average distance between bus stations becomes even greater and sometimes exceeds 1000 meters. This trend of remoteness from stations is more important at the ring road level. Indeed, because of the radio concentric pattern in “glove fingers”, the distance between two nearby stations, away from the city center, becomes more important [11]. As a result, residents are forced to use other means of transport and modes of travel such as private cars, motorcycles, bicycles and walking.

### 3.3.6. Location of Economic Activities and Socio-Economic Facilities

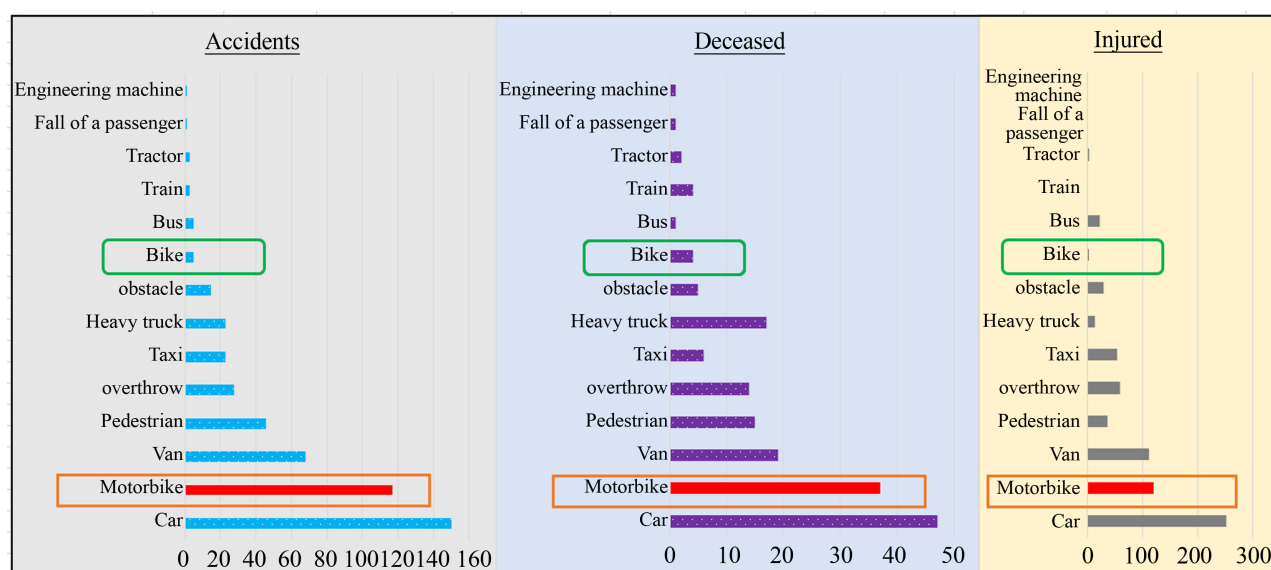
The location of economic activities is a major factor explaining the importance of motorcycle flows. Indeed, the radials and ring roads leading to the industrial areas of Poudriere I and Poudriere II are known by very important flows of motorcycles especially, in urban areas, as we announced earlier, the use of motorcycles is advantageous to move quickly from one point to another, especially in conditions where public transit lines are virtually absent, since the user is obliged to take a bus line with a high waiting time (during peak hours) [13]. The radials that are characterized by the existence of secondary educational institutions (high schools) and universities (such as the roads of ElMatar, Soukra and Sidi Manour) are characterized by a significant share of bicycle traffic.

### 3.3.7. Theft of the Motorcycle

The theft of the motorcycle is one of the major factors that contributed to the decline in the use of this mode in front of automobiles. Despite the many complementary measures that can help reduce this phenomenon, such as the use of anti-theft devices (various fastening techniques), this phenomenon remains very serious and worrisome and flight operations are growing. Thus, we have noticed the decline in the use of the motorcycle, but the decline in the use of the bicycle is the most important.

### 3.3.8. Contribution of Two-Wheelers to Road Accidents

The share of traffic on two-wheelers is significant in relation to all road traffic in the governorate. As a result, a fairly large proportion of accidents are related to this mode. In 2020, in the governorate of Sfax, two-wheelers contribute with 25% of all accidents (122 accidents), with 23.7% of the injured (41 injured) and 17.7% of the dead (120 dead). Motorcycles account for the largest share of all accidents, injuries and fatalities involving two-wheelers (Figure 12). National,



**Figure 12.** Distribution of road accidents, injuries and deaths by cause in Sfax Governorate by type in 2020. Source: [15].

regional and local authorities must act against this phenomenon in order to reduce the risks associated with this means of transport [15].

### **3.4. Typology and Behaviors of Motorcycle Users**

#### **3.4.1. Typology of Users**

It is very difficult to create a typology of motorcycle use. The interest here lies in the complexity of the movements made by users, which often take the form of loops. A complex loop is defined as a chain of movements and not a round trip from one place to another with a single activity (Nathalie Noel, 2003). The destinations are, for the most part, simple and see themselves as journeys to and from work. On the other hand, complex loops are mainly related to leisure travel, shopping and administrative matters. According to Nathalie Noel (2003), complex motorcycle loops reflect the importance of this mode in travel strategies.

#### **3.4.2. User Behaviors**

According to the “motorcycle surveys” and our direct daily observations, we have noticed that most motorcycle users do not comply with the rules of the road either out of ignorance (they do not have a driving license) or out of negligence, but in reality, the motorcycle and even the bicycle are considered in the same way as other types of vehicles. They often do not respect the pedestrian. They do not stop at the red lights and even if they stop, it is just for a few moments by “fear of fall or accident” and to wait for the opportunity to infiltrate the crossroads. They even travel on sidewalks and often at high speeds. We find them everywhere: On the right, on the left, in the center of the road, on the sidewalk, between the vehicles, in all directions and even in the prohibited and counter-directions. The result, is a great risk therefore great attention and precautions must always be present. The non-aspect of the highway code is a habit and for some users especially the young it becomes a way to assert itself. Most users make dozens of violations every day. However, their perception of vulnerability most often puts them at risk [15].

### **3.5. Proposals to Encourage the Use of Two-Wheelers**

Taking into consideration the advantages of using two-wheelers, we propose to the local authorities to encourage the use of this soft mode and especially that of bicycle. This can be achieved by adopting a policy to encourage the use of two-wheelers; by adopting new laws that encourage the use of two-wheelers and minimize the use of private car, for example, by taxing the use of cars by paying to enter the city and by imposing heavy rates on car parks in the center of city. We are also proposing to invest in two-wheelers and to ensure road safety for all users. There is a need for a series of changes in the structure of roads (for example, bike lanes). It is proposed to follow a stringent protection policy and ways to mitigate non-compliance with laws. Speed bumpers must also be provided to force users to reduce speed. We propose, for example, limited areas of 30 km/h

in the center and pericenter, where the largest share of traffic flows and road accidents are concentrated. Action must be taken to encourage cycles and motorcycles in order to minimize the use of private cars, so that pollution becomes less severe.

The use of two-wheelers can also be encouraged by the creation of a bicycle or/and motorcycle system. This type of project can be created by local authorities (municipalities, governorates, etc.) or by private investors [11] [16]. A system of bicycles in self-service (VLS) or bicycle sharing, that we propose to introduce in Sfax, puts at the disposal of the public bicycles, free or not. "Such a mobility service makes it possible to make proximity trips mainly in urban areas. Most self-service bike devices allow you to pick up a bike at one station and drop it off at another" [12]. This system existed in several countries and cities of the world as in France, Austria, Portugal, Germany, Belgium, Denmark, Brazil, Canada, USA, China, ... "This system, which also exists in the capital Tunis, is still limited. It is called 'Doora'. Doora is the first self-service bike rental system in Tunis available, from 2018, thanks to several stakeholders and operated by the start-up of the same name. Result of a partnership between the Business France Structure, the company Smoove, the French Development Agency, the Manufacturer Eurocycles, the Lake Promotion Society of Tunis, the authorities and the local civil society, this project is launched by its sponsor Adel Beznine in 2017. In 2018, the network has between 20 and 25 stations, a fleet of 250 bicycles and a total of 400 bollards serving the Berges du Lac 1 and 2 neighborhoods in Tunis" [12].

Other bicycle services in France include Paris, Lyon, Marseille, and Lille. The Marseille self-service bike rental system (**Figure 13** and **Photo 1**), has been available "since October 12, 2007. Set up by the urban community Marseille Provence Metropole, it is managed by the industrial group JCDecaux. The system has a fleet of approximately 1000 bicycles at 130 stations" [12].

We also quote V'Lille (**Photo 2**), "the system of bicycles in self-service the metropolis of Lille, inaugurated on September 16, 2011. As of January 1, 2020, it has 2200 bicycles spread over 223 stations, making it one of the flagship elements of the bicycle system of the Lille metropolis, which has about 1000 km<sup>2</sup> of bike paths and lanes. V'Lille is managed by EFFIA, a subsidiary of Keolis, as part of Ilévia's public service delegation" [12].



**Photo 1.** Bicycle station in Marseille (France). Source: [17].



Photo 2. Bicycle station in Lile (France). Source: [19].

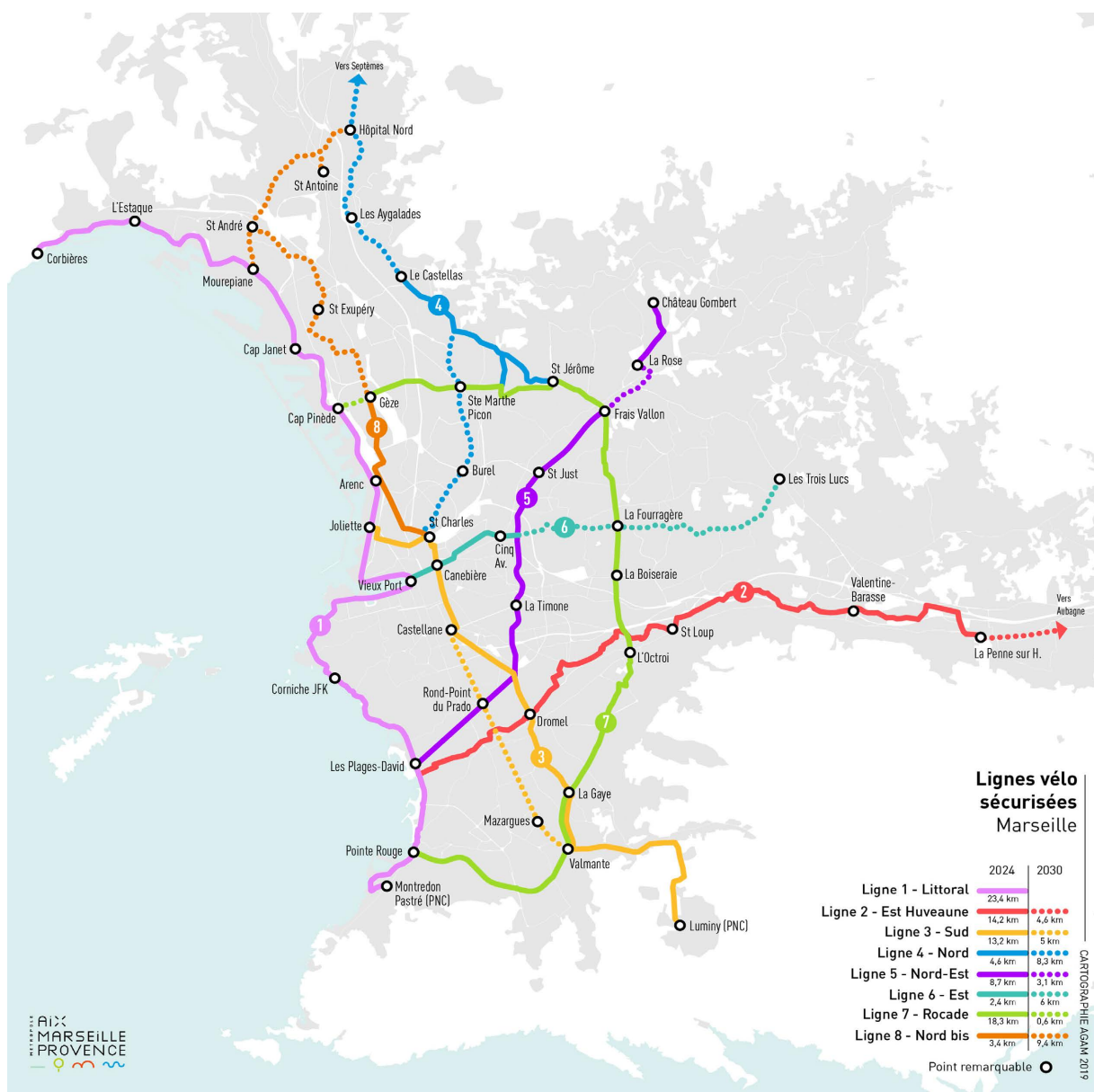


Figure 13. The bicycle network in Marseille. Current state and future projection. Source: [18].



It is obvious that this cannot be done without the contribution of all city dwellers, all users, all national, regional and local authorities, all agencies and public authorities in order to make the city of Sfax more secure.

#### 4. Conclusion

Based on this contribution, we find that the use of two-wheelers is a Sfaxien practice of some importance in terms of mobility. The two-wheelers flow accounts for a fairly large proportion of all road transport flows. But this importance is declining especially over the last two decades. The decline in the development of the two-wheelers, and particularly of the bicycle, as a “smooth” transport, is due to a series of factors. The most important traffic of the two-wheelers is carried out in the center and pericenter city of Sfax, place of concentration of the great part of the jobs, the activities and the socio-economic services. On the other hand, in the delegations, outside the Great Sfax, its use is limited. The flows of two-wheelers are therefore limited. Unfortunately, two-wheelers contribute to a large proportion of the number of accidents, injuries and fatalities for several reasons. Among these reasons, we note above all, the non-compliance with the highway code. In addition, the use of two-wheelers has a series of advantages from where it should be developed. In this sense, we have proposed a series of recommendations, to disseminate it more and more, and to encourage the Sfaxien inhabitants to use it.

#### Conflicts of Interest

The author declares no conflicts of interest.

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