Evaluation of the bikeability of a Greek city: Case study "City of Volos"

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Abstract: - Driving a bike in a Greek city is not an easy case. There are no bicycle facilities available and the bicyclists and the car drivers are not used to each other. The goal of the study was the evaluation of the road infrastructure and the ability of the bicyclists to bike safely in the city of Volos. The study took place in November 2008. 100 bicyclists participated in the study and answered a questionnaire of 8 questions, which consisted of more sub questions. 38 of the participants were students in the University of Thessaly and the rest citizens of the city. The bicyclists were of different age, sex and profession, in order to have a more independent sample. The questions concerned about the road safety of the bicyclists both in bikeways and in shared roads, the road safety level on the intersections, the behaviour of the car drivers, the behaviour and the safety measures of the bicyclists, the amount of the daily bike trips and their destination. Finally, using an grading scale from 1 to 6, with 1 meaning awful and 6 excellent, in the first 5 of the 8 questions of each questionnaire, the participants tried to evaluate the concept of each question. Finally, using the summary of each questionnaire and the average of the whole sample, with a scale of 5 to 30, with 5 meaning the worst and 30 meaning the best road environment, we evaluated the bikeability of the city.

Key-Words: - Bikeability, bicycle facilities, bikeways, road safety, drivers' behaviour

1 Introduction

Bicycling is a great way to cover the daily transport needs in the urban environment. There are clear benefits from its use. The bicycle doesn't need fuel to move, decreasing the energy consumption, the air pollution and the amount of the CO2 emissions. Moreover, it needs less space for moving and parking in the city, relieving the traffic congestion problems and the necessity for new infrastructure for the motor vehicles. On the contrary, auto-dependence creates many public health problems such as lack of exercise, obesity, social isolation, mental and physical diseases and traffic dangers [1].

The land use and the road infrastructure level is not the same in every city. Moreover, there are serious differences among neighborhoods of a city. Some communities are more bikeable than others depending on specific criteria. There are many criteria that describe the term bikeability [2]. The main are [3, 4]:

- The providence of high level bicycle infrastructure.
- The condition of the pavement of the road infrastructure.
- The ease to cross the intersections.
- The behaviour of the vehicle drivers.
- The ease to ride the bike.
- The behaviour of the bicycle drivers.
- The protection devices that use the bicycle users.

The level of the bicycle use depends on many factors. The ability to have an access to a bicycle, the income, the age and the social environment play important role [5].

Bicyclists riding in areas without bike paths or lanes feel more endangered (mostly by motorists) as bicyclists with paths or lanes, and are more dissatisfied with how their community deals with them. Moreover, frequent bicyclists tend to have a strong preference for more bike lanes over more bike paths, while infrequent bicyclists display no marked preference for either [6], [7].

2 Description of the study

2.1 Description of the city road environment

Bicycling in a Greek city is not very easy because there is no proper bike infrastructure. Greek

society has not paid attention on the bicycle as a transport vehicle, but considers it more as a theme of entertainment. There is no proper driving education of the bicycle users, unless they have a driving license for motor vehicle. Moreover, drivers do not pay attention to the bicyclists' road safety.

In order to evaluate the bikeability of a typical middle scale Greek city we studied the case of the city of Volos. The main target of the study was the evaluation of the road infrastructure and the ability of the bicyclists to ride their bikes with safety in the city. Volos is a city with population of about 150,000 people. It is an industrial city with a harbor. The city is developed in two axes, one horizontal parallel to the sea and one vertical towards the mountain Pelion. It is a city with no significant slopes, which helps the bicyclists to bike with minimum human force. Moreover, the traffic congestion is basically observed in the main streets, which can easily be overpassed from the bicyclists if they choose to move across the port (Fig.1) or use local streets.

Fig. 1: Bikeway across the port

There is a limited length bicycle network in the city which doesn't attend the needs of the bicyclists, basically located in "Rigas Feraios" street, a street where have been implemented traffic calming measures (Fig.2). That is why many bicyclists use existing roads, sharing them with motor vehicles, or moving on sidewalks with pedestrians. One of the characteristics of the road network of the city is the amount of the one way streets, which help the bicyclists to organize better their trips and move and cross the intersections with higher safety level.

Fig. 2: Bikeway in "Rigas Feraios" street

2.2 Organization of the study

The study took place in November 2008. 100 bicyclists participated in the study and answered a questionnaire of 8 questions, which consisted of more sub questions. 38 of the participants were students in the University of Thessaly and the rest citizens of the city. The bicyclists were of different age, sex and profession, in order to have a more independent sample. We chose a great part of the sample being students because they are a main group of the bicycle users of the city. 60 of the participants (60%) were men and 40 women (40%). 45 of the participants (45%) were 15-25 years old, 18 (18%) 25-35 years old, 13 (13%) 35-45 years old and 24 (24%) over 45 years old. 9 of the participants were public workers (9%), 24 private workers (24%), 38 university students (38%), 9 pupils (9%), 8 households (8%) and 12 pensioners (12%).

2.3 Methodology

The questionnaire included 8 main questions. Using a grading scale from 1 to 6, where 1 means awful and 6 excellent (fig.3), in the first 5 of the 8 questions of each questionnaire, the bicyclists evaluated the concept of each question [2, 8]. We used the summary of each questionnaire and the average of the whole sample, with a scale of 5 to 30, where 5 represented the worst and 30 the best road environment. Moreover, we used the average of each question's grade, in order to have more analyzed results. Additionally, we analyzed the results by sex and by age of the bicyclists, in order to understand better their opinion.

Fig. 3: Evaluation scale

3 Results

3.1 Results of the questionnaire

In the first part of the first question, we asked the bicyclists if there was a place to bike safely on the road, sharing it with motor vehicles. 27% answered yes and 73% no, which means that there are indeed parts of the road network where the bicyclists feel safe. The main problems were a) 66% the lack of space for bicyclists to ride safely, b) 88% the poor lighting of the streets, c) 24% the amount of tracks or buses and d) 39% the fast moving vehicles. It seems that bicyclists do not find easily place to bike safely and they feel unsafe especially during the night were there is poor lighting.

In the second part of the first question, we asked the bicyclists if there was a place to bike safely on an off-road path or trail, where motor vehicles were not allowed. 88% answered yes and 12% no. This means that there are specific parts of the city like bikeways, pedestrian precincts or the area across the port where the bicyclists can bike without the avoidance of the cars and apparently they use those areas for their daily trips.

In the second question, we asked the bicyclists how the surface that they rode on was. They main problems were a) 16% the lack of proper maintenance, b) 61% the uneven surface or gaps, c) 29% the slippery surfaces when wet and d) 33% the cracked or broken pavement on the sidewalks and pedestrian precincts. It seems that the lack of maintenance of the pavement creates serious problems to the bicyclists.

In the third question, we asked the bicyclists how easy they rode through intersections. 75% answered that they did not have major problems riding through the intersections. The main problems were a) 40% the long waiting to cross the intersection, b) 64% the lack of signals for bicycles, c) 22% the low level of visibility of incoming and crossing traffic and d) 36% being unsure where or how to ride through intersection. It seems that in signalized intersections the bicyclists use the green and red light to cross the intersection safely. In the rest intersections they have to pay attention on the incoming traffic, which makes their crossing ambiguous.

In the forth question, we asked the bicyclists if the drivers behave well. 13% answered that they had a proper behaviour and 87% said no. Apparently, the drivers are not used to the sight of a bicyclist on the road. The main problems were a) 40% the fast driving of the car drivers, b) 62% the drivers passing close of the bicycles, c) 69% the drivers being inpatient and rude and d) 81% the lack of attention during the night. It seems that the lack of proper driving behaviour of the car drivers is obvious. Especially unsafe feel the bicyclists during the night.

In the fifth question, we asked the bicyclists if it was easy for them to use the bike. 75% answered yes and 25% no. The main problems were a) 16% the lack of marks, signs or road markings, b) 33% the lack of safe or secure place to leave the bicycle at the destination, c) 7% the difficulty to find a direct route, d) 95% the difficulty to take the bicycle on bus or train, e) 52% the necessity to move contra flow and f) 57% the necessity to move on sidewalks. Taking the bicycle in the bus is not allowed in the city, which hampers intermodal transport. Additionally, we see that in order two find a more direct and safe route, bicyclists force to move contra flow or on sidewalks.

In the sixth question, we asked the bicyclists what their actions to make themselves riding safer were. Of the following alternatives a) 9% wore a bicycle protective helmet, b) 40% used lights if riding at night, c) 46% rode in a straight line and d) 75% obeyed traffic signals and signs. It seems that sharing the streets with cars, forces the bicyclists to obey the law in order to be safer. Additionally, personal protective equipment is not very common.

In the seventh question, we asked the bicyclists how often they used their bicycle for their daily trips. 24% used their bike for one trip per day, 22% for two trips per day and 54% for three or more trips per day.

In the eight and last question, we asked the bicyclists what were the most common purpose of the bicycle trips. 42% answered for business, 39% for entertainment and 19% for sport.

It seems that people who decide to rid a bike use it as an equivalent transport vehicle for their daily trips and not only for sport.

3.2 Results of the grading of the questions

The bicyclists had to grade each question in order to evaluate the bikeability of the city (tables 1 & 2). In the first question, the bicyclists graded the providence of road types where they rode safely with 3.83. Both men and women had the same opinion, respectively 3.82 and 3.85. According to their age, bicyclists 15-25 years old graded with 3.78, 25-35 years old with 3.22, 35-45 with 4.31 and over 45 with 4.13.

In the second question, the bicyclists graded the pavements' maintenance with 3.27. Men were more positive grading with 3.43 than women grading with 3.03. According to their age, bicyclists 15-25 years

old graded with 3.67, 25-35 years old with 3.22, 35-45 with 2.38 and over 45 with 3.04.

In the third question, the bicyclists graded the ease of crossing the intersections with 3.89. Both men and women had about the same opinion, respectively 3.95 and 3.80. According to their age, bicyclists 15-25 years old graded with 3.73, 25-35 years old with 3.67, 35-45 with 4.15 and over 45 with 4.21.

In the forth question, the bicyclists graded the drivers' behaviour with 3.14. Men were more positive grading with 3.25 than women with 2.98. According to their age, bicyclists 15-25 years old graded with 3.18, 25-35 years old with 3.72, 35-45 with 3.31 and over 45 with 3.29.

In the fifth question, the bicyclists graded the ease of riding their bike with 4.00. Women were more positive grading with 4.23 than men grading with 3.85. According to their age, bicyclists 15-25 years old graded with 3.80, 25-35 years old with 3.72, 35-45 with 4.77 and over 45 with 4.17.

The total grade, as a summary of the 5 questions was 18.13. This means that the bikeability of the city is good but with some problems. Men are more positive, grading the bikability with 18.30, but the women were more skeptistic grading with 17.88. The difference was not important but men were more confident on them selves and more used to the traffic. More positive were bicyclists 35-45 years old, grading with 18.92 and more skeptistic the ones of 25-35 years old, grading with 16.56. This means that younger bicyclists are not very satisfied with the bikeability level of the city and locate some problems that hamper them to bike easy. Older drivers are more used to traffic or do not have the proper education to judge properly.

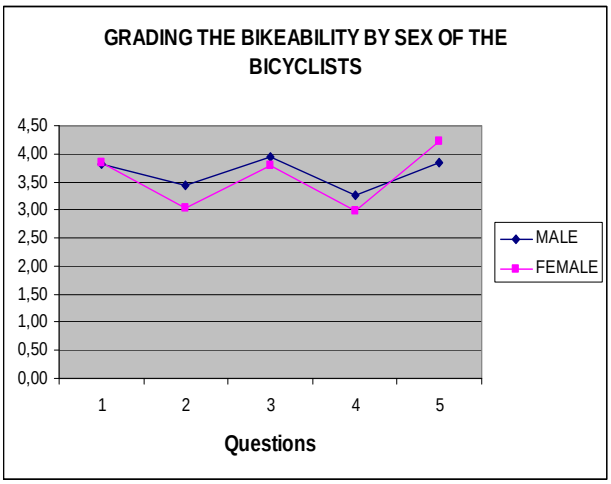

Table 1: Grading the bikeability of the city by sex of the bicyclists

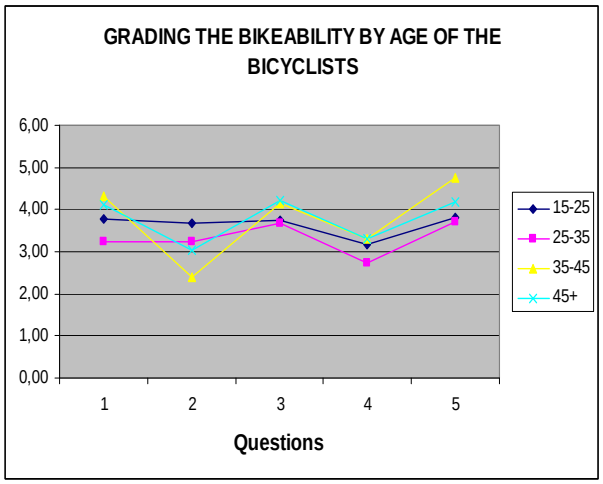

Table 2: Grading the bikeability of the city by age of the bicyclists

4 Conclusion

Riding a bike is not an easy case, especially in a Greek city. There are many problems but the situation can be improved. Basically, it seems to be necessary the deployment of a functional bicycle network. Moreover, the education of the bicyclists, even the acquisition of a bicycle driving license could be useful in order to improve their road safety.

Bicycling and walking are the solution to the problem of traffic jam. Cities that reinforce their use become more sustainable, accessible and economically competitive.

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