

Towards Sustainable Urban Transport in small seaside cities with tourist interest: The case study of Nafpaktos city.

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Abstract

Nafpaktos is located in the southeastern part of Nafpaktia geographical unit. This seaside town constitutes a dynamically developing tourist destination. Rapid urbanization and the existing transportation network are the main causes for degraded environment, poor service level, congestion and other factors that affect the quality of the citizens' life. Adding to these, tourist regions like Nafpaktos, have to cope with abrupt seasonal changes in transportation demand, which result to congested streets, due to the overall car-centric culture. This paper aims to suggest policy interventions that can guide the development of urban transportation in a sustainable manner. In this context, major outputs from this research consist of new public transport routes, rearrangements and modifications to the existing street network, promotion of actions to increase cycling and actions to increase the area of green open spaces. The main purpose of this study is to maintain the city's cultural identity along with its conversion to a smart city, in mobility terms. After analyzing the greater area of Nafpaktos and simulating the marked changes, the expected outcomes contain the reduction of car use (up to 20-25%), the increase of annual passenger numbers in public transport and the raise of the proportion of green spaces per inhabitant exceeding 9m² (minimum standard by the World Health Organization – WHO).

Keywords: Accessibility, Green spaces, Mobility, Small-sized and seaside cities, Smart City, Sustainability assessment, Sustainable urban and transportation development.

1. Introduction

It is a fact that transportation is an essential part of urban design and a functional element of livable cities. "Transportation plays a key role in the global economy and in the challenges and opportunities associated with

sustainable development. Sustainable transportation can be defined as: The use of renewable resources, minimizes consumption of non-renewable resources, reuses and recycles its components, reduce carbon emissions on all transport modes and minimizes the use of land and the production of noise" [1]. There are plenty beneficial forms of sustainable-green transportation that are able to support and furthermore enhance walkable urbanism. Sustainable transportation modes make our lives easier, reduce congestion, reduce our dependence on cars and oil, are safer and less costly, help climate change mitigation, and make life more efficient. Alongside, when dealing with small seaside cities with tourism interest, additional factors enter into the equation of sustainable transportation. The impact of growing travel is especially felt in tourist regions that have to cope with seasonal changes in transportation demand and road congestion because of private car use. This paper assesses Nafpaktos's transportation problems and furthermore gives an overview of the sustainable transportation strategies, focusing on international case studies that have applied sustainable transportation systems on their urban environment and afterwards enrolling them according to this city's needs and capability. Moreover, in this paper there is an effort to simulate the outcome of new urban transportation goals in order to promote a sustainable urban mobility plan for this seaside city. Following that, it offers recommendations for cities similar to Nafpaktos, to make their transportation systems more sustainable, efficient, and safe.

1.1 Research Problem

Vehicles often dominate cities and city roads. They make neighborhoods less green, less safe and less enjoyable for residents who have to navigate noise, air pollution, and the risks of walking and bicycling on busy city streets. Decisions around street design and layout are made without the valuable input from youth, leaving an important voice out of the creation and growth of cities. "Unfortunately, city managers in developing countries are

following the same car-oriented transport development patterns made by many cities in developed countries in the past. Ironically, many cities in developed countries are now trying to recover from a car-dominated development era by halting the building of more infrastructures for private vehicles and re-allocating road space for public transport and non-motorized transport.” (Beim M., Haag M., 2010). According to the above, cities with tourism interest are more vulnerable to problems caused by the use of a car. In this context, this paper aims to answer how sustainable transportation can be enrolled in a small seaside city with tourist interest and what actions should be taken under consideration towards that goal.

1.2 Research Objectives

In this paper guidelines are developed towards a sustainable transportation development, specifically in the city of Nafpaktos. The final plan is an outcome of the following objectives:

- Making smart transportation by improving the urban transportation.
- Designing urban regeneration, adding to the city’s framework pedestrian paths, green ways and public green parks.
- Use smart alternative ways of transportation to achieve sustainability of the built environment.
- Promote the modernization of public transportation.
- Make transportation options such as walking, biking, and transit safer and more convenient, and neighborhoods more livable, walkable, and connected.

1.3 Research Hypothesis

This paper assumes that by applying its output plan for sustainable transportation development, cities as Nafpaktos can achieve a substantial reduction of car use (up to 20-25%), an increase of annual public transport passenger numbers and a raise of the proportion of green spaces per inhabitant exceeding 9m².

1.4 Research Methodology

This paper, examines the concept of sustainable transportation from theoretical, analytical, and practical

viewpoints aiming for sustainability. Firstly, it identifies and analyzes the cities preconditions. Subsequently, it examines how international case studies and plans can fit into this specific city. Last but not least, it suggests a full plan of recommendations to develop the urban transportation system.

2. The analysis of local preconditions

Nafpaktos is a town and a former municipality in Aetolia-Acarnania, West Greece, Greece, situated on a bay on the north coast of the Gulf of Corinth, 3 km west of the mouth of the river Mornos. The town is located 9 km (6 mi) northeast of Antirrio, 18 km (11 mi) northeast of Patras, 35 km (22 mi) east of Missolonghi and 45 km (28 mi) southeast of Agrinio. The Greek National Road 48/E65

(Antirrio – Nafpaktos – Delphi – Livadeia) passes north of the town. It is the second largest town of Aetolia-Acarnania, after Agrinio. The inner city covers an area of 1,34 square kilometers and the population is about 13.415 people according to the 2011 census. Also, according to the 2014 census, there are identified approximately 3.354 private car vehicles and 1.207 motorcycles in the city.

2.1 Urban Transportation Condition in Nafpaktos

The existing urban transportation network is relatively degraded as transportation is served only through public bus. In addition, the existing bus line covers only the main streets and its frequency of service is extremely low. Inner city’s road network length reaches 32.09km and the bus line uses only 4.35km. The fact that the bus route does not cover adequate segments of the city prompts the use of private vehicles. Furthermore, in the city’s center territorial area there are 10 public parking areas. Eight of them are permanent parking spaces and two of them are seasonal spaces, that are released for function only during the summer, when the demand of parking places increases due to the needs of tourist activity. Regarding the pedestrian streets located within the urban fabric, they amount to a total length equal to 1.753m but it has to be mentioned that many of them (less than 1km) are secluded and particularly inaccessible. Additionally, within the urban fabric there is one bicycle lane and its total length stands at 2.242m. Its main disadvantage seems to be the fact that it has inadequate signage leading to lack of users’ safety. Moreover, it doesn’t cover the needs of many neighborhoods, due to the way it is designed (network distribution, design standards etc.). These are the key elements that make the bike lane mostly unusable.

2.2 Open Green Spaces in Nafpaktos

Open space is any open piece of land that is undeveloped (has no buildings or other built structures) and is accessible to the public. Those spaces can include:

- Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). Green space includes parks, community gardens, and cemeteries.
- Playgrounds
- Public plazas
- Public seating areas
- Schoolyards
- unfenced vacant lots

It is undeniable that, open green space provides recreational areas for residents and helps to enhance the aesthetics and environmental quality of neighborhoods. But within this broad range of recreational sites comes an equally broad range of environmental issues. Just as in any other land uses, the way parks are managed can have good or bad environmental impacts, from pesticide runoff, siltation from overused hiking and logging trails, and destruction of habitat. Within the framework of this study, data related to the extent of such areas were collected from

the municipality's technical department. Accordingly, the open green spaces located within the exact city limits were about 25.000m². But, after inspection, the extent of those areas, decreased to 22.505,7 m². It therefore follows that according to the existing situation, presence of green open spaces located within city limits amounts hardly 1.86%. The above translates into 1,68 m² per habitant. This is a particularly low percentage compared to international standards, which simultaneously is partially common in Greek cities.

2.3 Residents' aspect

During this research it was important to ask for the residents' aspects on the existing situation through personal interviews. Dominant themes of these interviews where the following:

- Which is your main way of moving around in the city?
- Do you prefer using car or motorcycle for your daily commute?
- Do you use public transportation? If yes how often?
- What are the reasons that make you avoid walking, cycle or use public transportation?

Additionally, data related to the demographic characteristics of respondents were collected. It has to be mentioned that respondents were chosen to be between 20-60 years old that visit city's center more than 2 times per day or work in the center. Last but not least, they were also asked to evaluate the proposed sustainable transportation plan and if that was in position to help them change their transportation patterns and mobility behavior if applied (see section 3). Firstly, as for the data collected from questions (a) to (d), the results appear in the following charts.

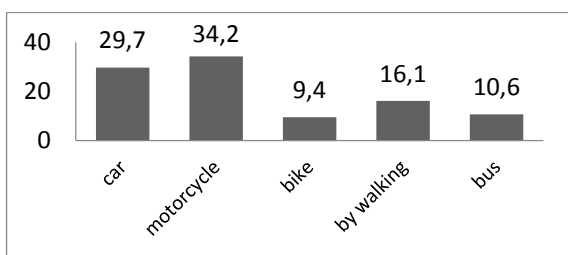


Figure 1. The main way of moving around the city as it emerged from citizens' answers.

As revealed from the above figure, it is a fact that most of the citizens prefer to use their car or motorcycles. This percentage is rather high and reaches 63.9%. Regarding the usage of public transportation (bus), it turns out that practically one out of ten citizens chooses it. The main reason that leads to bus usage according to the responses is the non-possession of a private vehicle. People using the bus mentioned that the frequency of using the bus approximates in average to 3-4 times a day. In regards to the main reasons that citizens avoid the existing public

transportation, or avoid walking or cycling, some of them are:

- Bus: Low level of service (low frequency, scattered bus station)
- Walking: lack of open spaces, unsafe crossings.
- Cycling: unsafe crossings, dangerous infrastructures.

Concerning the proposed project's evaluation and the will to change mobility behavior, the results are shown in the next section.

3. Proposed Action Plan for a Sustainable Urban Transportation Network

As is apparent from the above, in this case study, citizens are intrinsically linked to using private vehicles. A modern public transport system needs to be close to its passengers. Accessibility to tram and bus stops plays one of the most important roles in modal choice (Litman 2008). The sprawl of the city led many residents to stay far away from their daily chores. The above in combination with the low level service of public transport and also with the short-comings identified in open spaces and cycle paths, led to the promptness/ necessity of private car usage. An integrated plan is proposed in order to deal with the above and in order to design a city that will have a sustainable urban transportation network. Main axe of this plain is the integration of walking and cycling on citizens daily transport. In this context, this study proposes the following:

- Reallocation of the public parking areas and undergrounding six of them.
- Strengthening the public transportation network.
- Modification of the bicycle network in order to reach more city areas and become safer for the users.
- Design of a light-rail line that will reach city's boundaries.
- Transform untapped areas into open green spaces.
- Design of a continuous pedestrian network.
- Pedestrianization of the two coastal roads.

Following the above rationale, optimal conditions can be established in order to prevent citizens from using their cars or motorcycles. Firstly, when referring to the parking areas, the plan proposes that six of them should be underground in order to achieve areas with greater capacity. The remaining areas shall be shaped into open green spaces. Moreover, regarding the strengthening of public transportation networks refers not only to the improvement of the existing bus network distribution but also to the adding of a new light-rail line. Light – rail is an urban public transportation mode using rolling stock similar to a tramway, but operating at a higher capacity, and often on an exclusive right-of-way. The proposed rail system will cover the main roads of the city and will also serve the two coastal roads that will be converted into

pedestrian routes. Tracks are highly visible, and in some cases significant effort are expended to keep traffic away through the use of special signaling, level crossings with gate arms, or even a complete separation with non-level crossings. This line shall have a total length equal to 4.3km. Furthermore the sidewalk network will be increased by 5.2km. Also more than 3.422,5m² come to be added to the existing open green spaces. Those areas are designed to be dispersed and proportionately distributed inside the city. Also more than 2.221m will be added to the pedestrian network.

3.1 Residents' reaction to proposed plan

As already mentioned in subsection 2.3 residents were also questioned about what is their reaction to the newly proposed plan. According to the collected answers, most of them (72%) were truly interested in this new plan, 26% were wistful and 12% were negative. The residents that appeared to be negative explain that their main concern is not relevant to the specificities of the plan itself, but are related to the implementation of the project from the local authorities. Except from the above, the presence of residents that now are using either their cars or their motorcycles, admit that with this proposed plan they will rethink the using of their private vehicles. Characteristically, from the citizens mostly using their private vehicles (63.9%), 52,7% of them were positive to this new plan.

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