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Four stories for sustainable mobility in Greece

Bakogiannis E.^a, Kyriakidis C.^{a*}, Siti M.^a, Eleftheriou V.^a

^a National Technical University of Athens, 9 Iroon Polytechniou Zografou Campus, Athens, Greece

Abstract

Modern Greek cities experience socio-economic changes that result to their urban form and to their urban transport systems. More specifically, throughout the last five years, Greeks have been trying to find the most economic way of urban transport while, at the same time, people worldwide have been interested in making cities more sustainable and environmentally friendly. The vision of a “sustainable” and “economic” city seems to be the most important goal for policy makers, nowadays. As a result, the term “compact city”, which seems to represent this vision, is cited in a growing number of studies and policy papers concerning urban planning. However, there are researchers and urban planners who express strong doubts about that, as well as about the applicability of the model in Greek cities where urban sprawl is a common phenomenon due to the fact that housing developments are constructed in areas outside organized city plans and without permission. Thus, the question that commonly rises is if the model of “compact city” is the ideal city form that can meet the needs of locals. Even in that case, how can we manage the transport transition from a car-centric city to a sustainable and economic city?

This paper attempts to answer these questions and to provide a guide of good practices to mitigate the generated traffic and urban problems resulted by the transformation process. To achieve this objective, four medium sized Greek cities which, despite their similarities, differentiate as far as concerning urban life and their morphology have been selected as case studies. Through examining the transformation and comparing them we aim to realize the results of the implementation of a sustainable urban transport system. As these four cities have been assessed as examples with an important sustainable impact, we took the advantage of these cases and created a guide of good practices in order for anyone is interested to be informed about the process and the benefits from the implementation of sustainable urban mobility schemes.

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* Corresponding author. E-mail address: kyriakidisharry@gmail.com

1. Introduction

As part of the long search for the appropriate urban form (Barbopoulos, et al, 2005), two conflicting urban planning models have been formulated: (a) the model of the "diffused" city and (b) the model of the "compact" city. The former is based on the policy of expansion and development of uniform urban arrangements, with undefined boundaries that extend in the scope of local human activity (Aesopos, 2006), low urbanization and sociability. On the other hand, the latter adopts a design standard for the control of urban sprawl (Rodi, 2012) with compact and flexible allocation of mixed uses, which utilize as a social life center the small surface public space (Klampatsea, 2012).

The aim of both of these models is the "sustainable city". The first model aims to improve the quality of life through the interplay between the natural and urban environment and the reduction of building density (Vlastos & Milakis, 2006), while the second focuses on the restriction of urbanized land and the protection of the natural landscape on the

outskirts of cities, a better perception (in sensory, experiential and social terms) of public space (Aesopos, 2006) and the reduction of energy consumed to serve urban travel, through the implementation of sustainable mobility systems (Vlastos & Milakis, 2006). The development of more energy efficient cities, through the implementation of the "compact city" model led to the identification of this model with the "economic city". In this context, since the early 1990s, the European Union seeks to promote the model of the "compact city", through a series of policy documents and thus sustainable urban mobility comes to the fore as a means of mitigating the existing urban problems.

In the case of Greek cities, how can they with an already existing coherent structure become viable? To what extent can methods for sustainable mobility be implemented satisfactorily in the Greek territory? And how will the transition to the new reality of mobility be realized smoothly? This specific research work attempts to provide answers to these questions through the examination of four Greek cities that have implemented similar strategies.

2. Methodology

The methodological framework of this study is based on the analysis of case studies. It is a common type of research in the field of sustainable mobility (Bakogiannis, et.al., 2014), which according to Jennings (2001) is a kind of primary research since it offers new information both qualitatively and quantitatively. The cities were selected based on the following criteria: (a) the variation in their population size, (b) the variation in morphology, (c) the spatial-typological differentiation between coastal and non- coastal cities and (d) the difference in their socioeconomic sizes which characterize them.

The four cities were compared with respect to: (a) their existing state, (b) the proposed urban and transportation planning, (c) the organization of their action plan and transition plan from their existing state to the proposed one and (d) their expected outputs (cf. in Yin, 2003). In their review were instrumental the literature review and the review of other such studies.

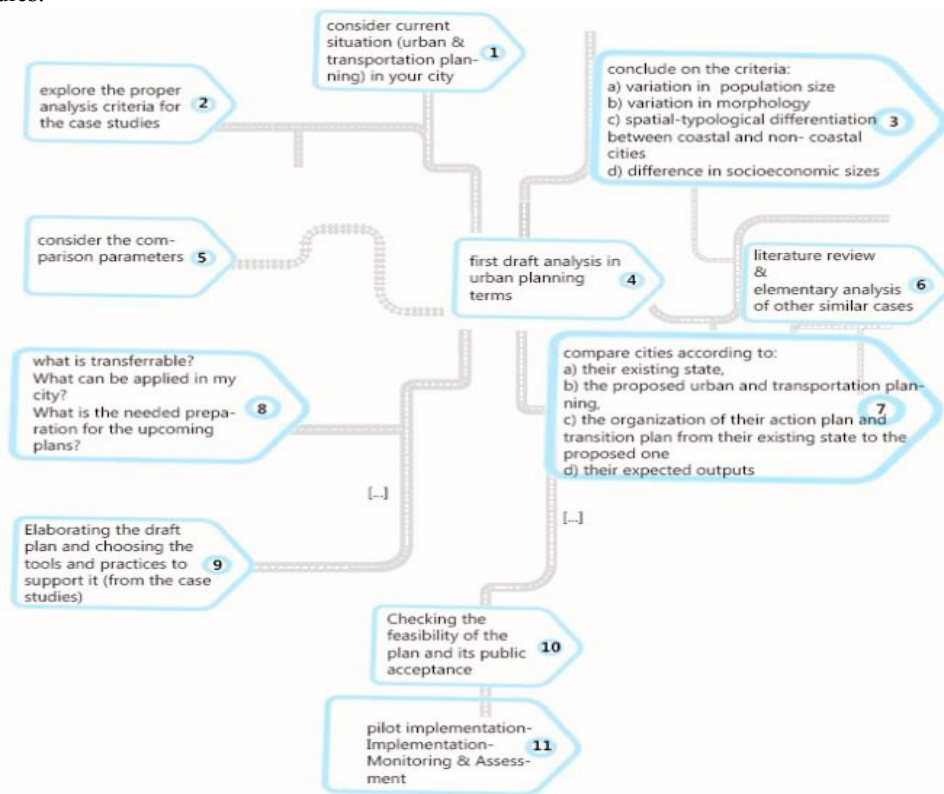


Figure1: Methodology graphic representation

The conclusions drawn contributed to the concise phrasing of the realization procedures of the implementation of

the specific projects, similarly to a catalog of effective practices.

3. Presentation of case-studies

The cities selected are Elefsina, Karditsa, Larissa and Thessaloniki (Figure 2a). Each one plays a different role on a local scale, while Thessaloniki holds a special role on a national level, due to its location and population size. Larissa acts as an important development center in Thessaly, as does Karditsa in the western part of the same region. Elefsina, despite being a regional center in Attica, due to the occasionally proposed spatial and developmental policy, plays a particular role in the function of the urban agglomeration of the Greek capital.

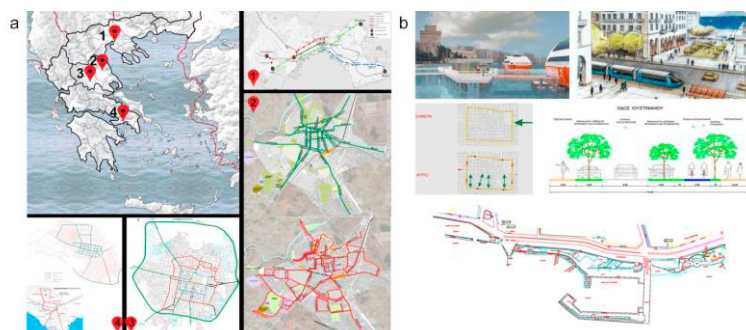


Figure 2: (a) The cities studied in this specific research and the main proposals (b) Proposal details for each city.

Source: <http://www.seleo.gr/thessalonikh/156000-tram-thalassia-sygkoinonia-kai-eniaio-komistro-stis-sygkoinonies-oi-protaseis-gia-ti-thessaloniki/#.Vvf05dJ94dU>, <http://www.newsfilter.gr/2011/06/01/to-kalokeri-tou-2012-tha-litourgeisi-i-thalassia-sigkinonia-ston-thermaiko/> and own elaboration

Morphologically, these cities show geometric characteristics relative to their urban block organization which is the result of the recent design practice on existing residential nuclei developed centuries ago in the same places. The city of Larissa is an exception, as the remnants of the city's organic growth are more prominent. This reference focuses on city centers, since in non-central residential areas of all cities there is a disparity in terms of their town planning.

The waterfront, central to the function of coastal cities, is more exploited in the case of Thessaloniki, while in Elefsina only a small part of the waterfront is in direct communication with the city on account of its secondary sector and the existence of an archaeological area.

The long-term lack of uniform urban mobility planning and urban planning resulted in the presence of mobility problems within the residential centers, especially in their city centers. The situation deteriorated in Thessaloniki in recent years due to the construction works of the "Metro" underground system of the city, while in Elefsina the transit of heavy vehicles within the city complicates its use as a residential area for the users of its urban space. In Larissa, problems are focused on traffic congestion and parking availability especially in the central areas, as the existing available parking space appears to be insufficient to meet the city's needs. The state of the city of Karditsa is relatively different as its urban restructuring has been studied for approximately a decade through the application of sustainable urban mobility methods.

Today the other three cities (Thessaloniki, Larisa and Elefsina) have also conducted similar studies which are currently at a mature stage, based on the core of Sustainable Urban Mobility Plans (SUMP), and have implemented interventions to mitigate existing problems. In the next section are summarized the main proposals through which the integrated sustainable mobility program of the cities in question is expressed.

4. Presentation of the focal points of the action plans

The development of motoring in the 20th century redefined the meaning of "boundary": From the walls, which among their other functions, surrounded the city and defined it morphologically and socially, the boundary is now entrusted with the concept of imaginary and/or real barrier in the city's daily operation. The boundaries are increasingly

common in the interior of modern cities, especially in large urban centers, which are now called to action against this situation..

The modern defensive line does not include walls, but a series of interventions reflected in SUMP and around which hinge traffic and urban planning.

Such interventions are as follows, proposed in the frame of SUMP cities studied in this work:

- **Ring Roads:** The ring road design is a method to control the motorization in city centers (Buchanan, 2015) or in other urban areas emphasizing in their local character (Alexander, et al., 1977). Common to the historical development of non-coastal cities (Buchanan, 2015) the ring road system was proposed in Larissa and Karditsa (Figure 2a and b) to, first of all, protect the city, and secondly the commercial and business center, from the local and supra-local traffic. The various ring roads were proposed to be organized as external and internal to play specific roles: the outer ring road is to manage traffic on a supra-local level, and the two internal ones are to manage urban traffic and aim at the social development of the center (Vlastos, 2012) as well as the reduction of air pollutants, which, based on surveys, are increased in city centers due to motorization and the particular urban morphology (Casellia, 2010). Egnatia and the inner ring road in Thessaloniki serve a similar function, which in addition to the large volume of supra-local traffic which is facilitated by it, there is a considerable volume of urban traffic.

In the case of Elefsina the ring roads suggested are internal (Figure 2a) and aim to protect the local centers and to manage urban traffic, discouraging residents to use their cars for short journeys within the city (Banister, 2008), as well as to facilitate supra-local traffic of heavy vehicles associated with the port. The reasons for this choice are the city's small size and the existence of both the Attica and the Athens-Corinth highways.

- **Redevelopment of road sections:** The redevelopment of road sections is associated with both the complete modification of the form and function of the road as well as its partial change. This includes, interventions such as the widening of sidewalks, installation of cycle lanes, the creation of bus lanes, transforming roads into pedestrian park roads or low traffic roads and finally, as a radical intervention, when complete removal of motor means is considered necessary the complete pedestrianization. These reconstructions, although of local significance, are important as they aim to highlight the role of the neighborhood, which is considered the city's social cell because: (a) it is characterized by the human scale, as the distances separating the people are small and (b) it is characterized by a sense of community, since the character of the neighborhood is often similar to the problems presented in it. Through redevelopment, the road is redefined as a social element and not as a conduit of motorized means of transport. A characteristic example is the case of Larissa (Figure 2b) where based on the proposals 'low traffic' residential pockets are created to enable the development of neighborhood socialization, while around them are created roads geometrically suitable to allow for the safe passage of vehicles, bicycles and pedestrians, marking the neighborhood boundaries, a common phenomenon in urban areas (Duany & Plater-Zyberk, 1993). In this way, the car movements through the neighborhood are reduced to a minimum while the open spaces in the neighborhood are consolidated, creating a grid of common areas that attract residents to walk, both to serve their needs (transportation to and from school, shopping, etc.) and their leisure. The strengthening of the neighborhood, however, can be accomplished through the implementation of ring roads, as in the case of Elefsina, where the ring roads have created, in combination with other methods, traffic cells and social activity cells.

It is worth noting that all studied cities utilized the policy of redevelopment in order to highlight the outdoor urban city areas and promote cycling and public transport.

- **Parking Policy:** The parking policy implementation aims to the regeneration of urban areas by improving their aesthetic and socio-economic characteristics and limiting the access of private vehicles in them. It often provides the link between urban planning and land use policy and traffic planning (Marsden, 2006). In the case-studies, the parking policy focused on increasing the parking cost in central key points and simultaneously reducing the number of parking spaces. A relatively independent policy was proposed in Thessaloniki, based on a mixture of similar policies in Denmark, Sweden and Spain. Instead, in Larissa the policy was associated with the policy of redevelopment, which the local authorities have supported in the past decades.
- **Improving and promoting Public Transport (PT):** The policy to promote public transport and the improvement of services is common in many urban areas, but mainly so in metropolitan centers (Studies,

OECD Green Growth, 2014). Indeed, it was found that in all the cities studied, except for Elefsina, the promotion of public transport has been the focal point of SUMP proposals. It is striking that in the case of Thessaloniki (Figure 2a and b) the proposal included the establishment of two other types of transport (metro and water bus) in order to significantly improve services to citizens and therefore motivate them to use public transport. Proposals such as the single and intelligent fare system, which will soon be implemented in Thessaloniki, have proven particularly satisfactory abroad (see in Blythe, 2004) and it is believed that they can be successfully applied in Greek cities as well.

The implementation of such a system is expected to have a positive effect for the managing authorities, since a series of data will be available for further research and the improvement of city transport, as advocated in the study of Uniman, et.al. (2010).

- **Promoting cycling:** Walking and cycling are considered economic and high quality transportation methods (Vlastos, 2012), and their promotion is one of the main strategies for the reorganization of cities in a more sustainable manner. Depending on the social characteristics of each case different strategies should be applied (Wundsch, et.al., 2015) to promote cycling.

In the studied cities a decision was made in favor of the design and development of bicycle lanes or a bicycle lane network, wherever it is not allowed by the geometrical characteristics of the streets. In cities like Larissa, where there has already been constructed a network of cycle lanes, its expansion in both the urban and the suburban areas was decided, thus creating a network connecting neighboring sites. This action, in the cases of Thessaloniki and Karditsa, is combined with the installation of public bicycle stations.

These measures can work cooperatively for the reorganization of the case study cities to create the 'sustainable city' model. For this reason, it is considered that the above guidelines can be used as a useful practice guide for the formation of a combined traffic and urban planning strategy. The aforementioned cases are expected to see the outcomes of their planning efforts in a number of fields, allowing the shift in various indicators. Thessaloniki and Larissa have implemented a standard Sustainable Urban Mobility Plan (SUMP), following EU directives, while Karditsa and Elefsina have explored and built solutions based on particular case-specific sustainable mobility research combining urban and transportation planning. The proposals for all cities are expected to deliver outcomes in alleviating traffic congestion, implementing traffic calming techniques for neighborhood enhancement and traffic safety, promoting walking and cycling as a crucial element in daily commuting patterns, enhance public transportation and parking situation, integrate smart services and schemes to manage transportation issues as well as engage their citizens in their ultimate goal regarding the change in modal share in favor of walking- cycling- public transport. The following table (table 1) concentrates the key fields of urban mobility (qualitative assessment) that the suggested plans will or have already been affected. All cities present short to long term implementations for walking and cycling enhancement as well as include plans to reduce traffic congestion and upgrade their neighborhood centers.

Table 1. Policies & Actions outcomes according to planning

| An example of a column heading | short term | medium term | long term |
|-------------------------------------------------------------|------------------------------------------------------|-------------|-----------|
| | ①: Elefsina, ②: Karditsa, ③: Larissa, ④:Thessaloniki | | |
| overall mobility parameters | | | |
| modal shift change (car usage & ownership) | | ①② | ②③④ |
| improvements for walking & cycling (changes in modal split) | | ①② | ①②③④ |
| traffic flow & congestion traffic safety | | | |
| car use restriction | ①③ | ①②③④ | ①③④ |
| traffic calming neighborhood enhancement | ①②③ | ②③④ | ①③④ |
| traffic management | ④ | ③④ | ③④ |
| awareness raising & TS education | ④ | | |
| surveillance & monitoring | | ④ | ③④ |
| walking & cycling | | | |
| pedestrian accessibility | ③ | ③④ | ③④ |
| pedestrian infrastructure | ②③ | | ③④ |
| cyclists' accessibility | | ③ | ③④ |
| cycling infrastructure | ②③ | | ③④ |

| An example of a column heading | short term | medium term | long term |
|---------------------------------------------------|------------|-------------|-----------|
| public transport | | | |
| PT accessibility | ① ② ③ ④ | ② ③ ④ | ② ③ ④ |
| intermodality | | ③ ④ | ② ④ |
| systems & services | | | ③ ④ |
| parking | | | |
| enhancement on-street | ① ② | ① ② ③ ④ | ③ ④ |
| enhancement off-street | ② | ① ③ ④ | ③ ④ |
| systems & services | | ④ | ③ ④ |
| smart mobility technology assisted applications | | | |
| ridesharing schemes (bike sharing, car sharing) | ① ② | | ② ③ ④ |
| smart vehicles & e-bikes | | | ④ |
| smart services, systems & apps | | ③ ④ | ③ ④ |
| citizen participation | | | |
| information & awareness raising | ① ③ | ④ | ④ |
| engagement in decision making | ③ ④ | ③ ④ | ③ ④ |

Source: own elaboration (Processing elements from Litman (2011&2012), Burggraf (2013) and Marsden (2005))

5. Involving the people

The interventions provided by SUMP requires the approval of the public, without which, it would be relatively difficult or even impossible to implement, due to the multi-factorial nature of the design and different interests between different groups (Booth and Richardson, 2001). The consultation process, which acts within the European Commission framework for the past decade, so that the results will be satisfactory (Gil, et al., 2011) for all the parties involved (Arnstain, 1969), is not sufficient and often there are other tools which are exploited to inform the public and raise their awareness for the various actions. Something similar took place in the cities examined, with Thessaloniki being the one to present, perhaps, the most comprehensive plan of action to raise public awareness, a fact associated with its larger size and the metropolitan features it presents. In more detail, the basic methodology tools can be summarized in the following points:

- Informational Events and Mobility Forums:** Seminar type meetings where citizens are invited to learn about a project and express their approval or disapproval are a usual practice in urban planning. Workshops, and forums are the most common forms of such events, while in much rarer cases more interactive activities are realized, as in the case of Oatlands in Scotland, where field-trips were organized in order to inform the public and raise awareness on the design process of the project (Kyriakidis, 2012). To raise public awareness and create information networks throughout the local community both forums and informative events were organized addressed to all citizens interested in the matter. The most important event was held in the city of Karditsa where the first National Conference was organized on this subject in cooperation with Central Union of Municipalities and Communities of Greece (known as KEDKE) and Local Union of Communities and Municipalities (known as TEDK), in 2004 (Bakogiannis, et al, 2015). Through such actions in Karditsa and Larissa, citizens were informed on sustainable mobility, effective practices applied in other countries and the benefits of the bicycle and pedestrian accessibility in daily commute. The forums held in Thessaloniki were more targeted. As in previous cases in Switzerland and Germany, where they were applied (Gil, et al., 2011), in the case of Thessaloniki they were well received. In fact, local authorities, although had planned to organize five such events they hosted an additional one, where the single fare strategy was presented. However, in the case of the forums, topics are more focused on the proposed arrangements for the specific city rather than wider issues.
- Advertising and publicity:** Advertising is a method of mass communication to disseminate information (Demetriadis & Tzortzaki, 2010) which in this case coincides with the proposed action to promote sustainable mobility. The boundary between advertising and publicity is very thin and lies in the payment factor. Thus, the publication of articles in the press or on various websites without payment is not considered an advertising method but publicity, nevertheless its results are also quite significant in informing the public. However, normal advertising methods such as television and promotion through printed material are also methods

which may be used, as was proposed in the case of Thessaloniki.

- **Electronic Information:** With the advent of the internet, communication acquires a distinctive character thus amending in part the process. Unlike other conventional media, the possibilities of communication via the Internet are ample. The user not only has the ability to be informed but can also express his opinion publicly, be informed of other users' comments and views and often be the one to contribute to the development of the proposed actions content (Lampropoulos, 2008).

The interaction, however, with the public is even more intense through social media because they provide flexibility as to the target audience to which they are addressed to, with little or no cost and great impact to the public and especially the younger age groups, a fact that makes them a necessary part of an information campaign (Demetriades & Tzortzaki, 2010).

In the case of Thessaloniki the use of such tools was employed. A special group was created in the Facebook site entitled "Sustainable Mobility in Thessaloniki" (numbering 388 members) and is engaged in the promotion of proposals concerning the city of Thessaloniki and sustainable mobility in general.

Events organized by NGO's and other local agencies, such as bicycle rides and cycling guided tours also add to the above efforts. Through such actions, citizens become familiar with the bicycle and the development of additional social networks is achieved. Such actions are organized (especially during the summer months) in all case study cities. A noteworthy example of that was the initiative taken by the Secondary Department of Education in Elefsina to participate in the events and promote the use of the bicycle as an educational tool (Anon., 2012).

The process of informing citizens and raising public awareness, however, usually requires considerable time. In conjunction with operational reasons, the implementation of proposed interventions is usually organized in stages. Therefore, in the case-studies which were examined the projects are planned to be implemented in phases. At first, as shown by the examination of these cases, the aim is to restructure the urban transport system, which in many cases requires considerable time because of the several parameters included. The redevelopment and the limitation of mobility of the motorized means of transport in the central areas is usually applied in the early stages, as in the case of Larissa and Karditsa. However, in some cases, like that of Elefsina, due to the ownership status and a range of administrative issues, the redevelopment is applied in the second stage. The next steps relate to the creation of bus lanes and the implementation of new public transport methods, such as the BRT and the tramway in Thessaloniki. The creation of cycling lanes and the promotion of the bicycle in general, finally, depending on the applied policy, was in some cases implemented in the early stages and in some others much later on in the process.

6. Conclusions

The coordinated urban and traffic planning of the cases studied allows for three main conclusions to be drawn:

- It is confirmed that the traffic planning ought to be combined with urban planning. Indeed, the parking policy implementation is on the borderline between land use policy and traffic planning (Marsden, 2006) Additionally, policies such as the promotion of cycling and public transport are difficult to implement if no urban redevelopment projects are realized, which fall within the jurisdiction of urban planning and urban design.
- The implementation of sustainable urban mobility methods does not focus on removing the motorization from commercial and / or historic centers of the city in order to increase traffic congestion in other areas. The objective is the development of both central and local areas so as to become communication nodes and areas of high social activity. At the same time, the plans must respect the nature of the neighborhood as the core of development and building block of a city. All of the above aim to improve the quality of life of the citizens.
- The acceptance of the proposed interventions is the result of the correct information of the public and its involvement in the design process. The utilization of a series of marketing methods aims to develop an appropriate plan which will inform citizens and raise their awareness regarding sustainable urban mobility options. This action is particularly important and it is believed it should be combined with participatory planning processes.

These issues are utilized by the studied SUMP in order to successfully implement sustainable mobility methods. The case of Karditsa which has made a long-term effort to implement such proposals confirms the above. The number of bicycle users has increased, the number of cars in the city center has significantly dropped, while the character of the city has already changed.

Having taken all of the above into consideration, it can be concluded that the combined traffic and urban planning can have multiple benefits in aesthetic, functionality, social and economic terms. It is believed that the application of such methodologies in other urban centers will have similar benefits, making the above guidelines, a complete and comprehensive guide of effective practices for similar interventions.

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