

# **Evolution of the parking system characteristics for the commercial vehicles in the centre of Thessaloniki**

**S. Kakarakis, P. Brozos, A. Strouboulis, S. Basbas & E. Bouhouras**

*Aristotle University of Thessaloniki, Faculty of Rural and Surveying Engineering, Dept. of Transportation and Hydraulic Engineering, Greece*

## **Abstract**

The urban road freight transport requires specific and significant infrastructure in order to carry and distribute goods to the final destinations, such as dedicated parking places along the road network, designed by the local policy makers in such way to service as many as possible receivers. However, in most cases, the urban centers struggle to provide the minimum required parking places needed, since the number of vehicles using the road network over exceed the number of the available parking places. In this framework, drivers of the passenger vehicles often use the dedicated to the commercial vehicles parking places thus creating major problems to drivers of commercial vehicles concerning their loading/ unloading procedures. The present paper, presents the difference between the actual and the expected usage of the dedicated to commercial vehicles parking places. Furthermore, the paper investigates the issue of knowledge of the locations of these dedicated parking places to be used by the drivers of the commercial vehicles. This investigation is based on a questionnaire addressed to the drivers of commercial vehicles. The questionnaire based survey performed during the period September – December 2014. The results obtained can be useful for planners in order to better understand the interaction between the land use system and the transport system.

*Keywords: urban road freight transport, parking, goods distribution.*

## **1. Introduction**

It is known that the urban road freight sector requires specific infrastructure in order to perform at an acceptable level. This infrastructure concerns among others, both private and public parking places dedicated to serve the needs of retail shops (and not only).

The parking places dedicated to be used only by commercial vehicles provide the necessary space in order to distribute goods to the final receivers. It must be noticed that at this point the location of the parking places is decided taking into account the overall optimization of the demand – supply system (i.e. maximum usage of the available parking places taken into account). However these parking places deprive valuable space from the passenger vehicles since their length is longer than the parking places for the passenger vehicles. Moreover their length varies based on the maximum length of the commercial vehicles that are expected to use them.

In any case, the number and the location of these parking places not only determine the level of performance of the urban freight transport (hereafter mentioned as **UFT**) but also evolve through time and space. This is due to the fact that the land use system, especially the land use system concerning the retail sector, evolve through time and space. Urban centers usually include in their area the historical center and also the commercial market of the city (e.g. retail shops, malls, cafes, restaurants, hotels).

As the cities develop, new needs are generated by the citizens who actually define the demand for goods and as a result new commercial centers are established. Furthermore, these new commercial centers in order to have proper services require new infrastructure for the commercial vehicles, which as mentioned above include special parking places.

Therefore, the systematic study of the needs for these special parking places and if possible, their presentation through thematic (Geographical Information Systems – **GIS**) maps, would be helpful for the authorities, for the drives of commercial vehicles and also for the rest of the users of the road network.

This paper, presents the systematic study of the special parking places for commercial vehicles located in the city center of the city of Thessaloniki. The study is based on field surveys performed in the framework of the research activities of the Department of Transportation and Hydraulic Engineering of the School of Rural and Surveying Engineering of the Aristotle University of Thessaloniki (the most recent data concern 2013 and the results are presented using maps). The results presented refer to year 2013 and a comparison is made with the results obtained during previous years (specifically since 2008).

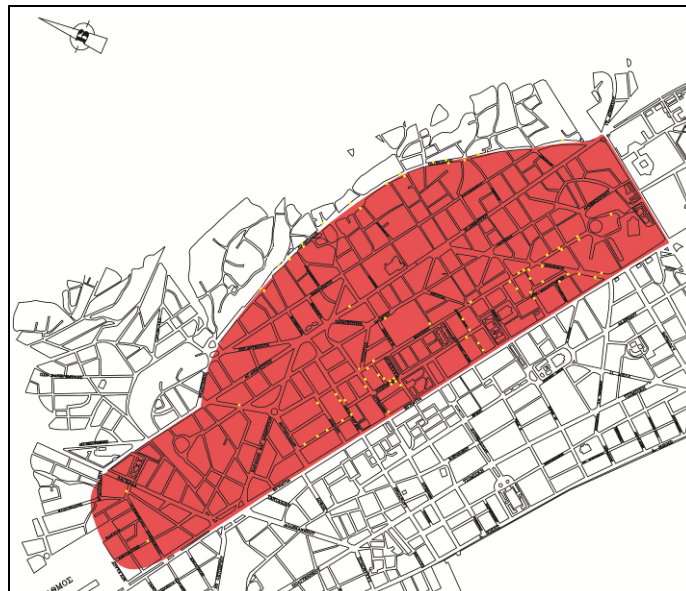
## 2. Methodology

The first attempt for identifying and recording the under study parking places in the area of the center of Thessaloniki was performed in 2008 as mentioned above. In this area, the majority of commercial activities (retail shops, small and medium shopping centers) and many organizations which provide services to the citizens are located (Basbas S. & Bouhouras E., 2012).

The research examined the available parking places for loading/unloading of goods considering their infrastructure (length, types of vehicles that can park to load/unload goods) as well as the legislation that defines their usage. The existing legislation for the goods distribution system and especially the rules for parking in the existing parking places, is defined by the state's law 1726/8.12.2005 (FEK 1726/8.12.2005). The under study area was divided in two smaller areas (sectors), the northerner one shown in Figure 1 and the southerner one shown in Figure 2 (Basbas S. & Bouhouras E., 2012).

The northern sector was enclosed by the Egnatia Street in the south, the Olympiados Street in the north, part of Ethnikis Amynis Street in the east and Dodekanisou Street in the west.

The southern sector was enclosed by the Egnatia Street in the north, the Nikis Avenue in the south, the Aggelaki Street in the east and the Dodekanisou Street in the west. The southern sector covers the biggest part of the historical and commercial area of the center of Thessaloniki.



**Figure 1:** Northern sector of the study area



**Figure 2:** Southern sector of the study area

In the study area, 285 parking places for loading and unloading goods (76 parking places in the northern sector and 209 in the southern sector) were identified. Surveys took place in 155 parking places (145 with time restrictions and 10 with weight restrictions). In addition 79 questionnaires were filled by employers of the shops located in a buffer zone of 50 meters radius around each parking place (Basbas S. & Bouhouras E., 2012).

The analysis of the data collected from the survey of the parking places and the questionnaires led to some very worth mentioning results. The majority of the parking places (56,68%) could serve vehicles up to 7 meters length, while 21,05% of the parking places could serve vehicles with length less than 7 meters (Basbas S. & Bouhouras E., 2012). After all the length of a commercial vehicles defines its capacity to transport goods, the minimum radius necessary for turning movements, the emissions, the level of produced noise, etc. Quite often the dedicated parking places for commercial vehicles do not have the necessary capacity to serve the retail enterprises in the near area since the location of those parking places are not decided exclusively based on the needs of the retail enterprises, but also based on the characteristics of the road such as the width of the road, the width of the crosswalks, the number of junctions along the road, etc., the existence of other parking places for passenger vehicles, etc.

Another interesting result of the data analysis shows that 84% (240 parking places) were under time restrictions while 16% (45 parking places) were not. Yet, only six of the 240 parking places were located on the northern sector while the rest are located in the southern sector and this reveals that this distribution of the location of the parking places must be reconsidered by the authorities since the existing commercial land use do not support such a significant difference in the number of the parking places. The data analysis revealed that in the northern sector, parking turnover was recorded only for the 29% of the parking places, while 71% of the parking places were not used at all. According to the data analysis, 58% of the parking places were occupied by 0 to 3 vehicles during an hour, 38% of the parking places were occupied by 4 to 8 vehicles during the same period and finally 4% of the parking places were occupied by 8 to 12 vehicles. It is clear that in the southern sector of the study area, the parking places were performing in a better way than in the northern sector. However, the analysis of the data for the southern sector revealed that the parking turnover rate per hour for the parking places was less, or in the best case equal to the illegal parking turnover rate of the vehicles delivering goods next or very close to the same parking places (Basbas S. & Bouhouras E., 2012).

The second survey was performed in 2013 (S. Kakarakis, P. Brozos & A. Strouboulis, 2014). It was decided that the study should not be limited on the identification and recording of the location of the

parking places and legislation concerning the restrictions for their use, but in addition the research should also consider the decisions of the City Council regarding the enforcement of the parking places and in general the rules about the transportation and distribution of goods in the study area. In order to meet this objective, it was required by the responsible Technical Department of the Municipality of the city of Thessaloniki to provide to the researchers with the respective official decisions. As a result, in the 2013 study the data needed were included in the recent analysis (S. Kakarakis, P. Brozos & A. Strouboulis, 2014).

In the study area, 175 parking places for loading and unloading goods were identified (159 places with length restrictions and 10 places with length and time restrictions). Also 6 parking places were identified to be used by “public use” commercial vehicles. There were also identified 7 pedestrian road segments with time and weight restrictions (S. Kakarakis, P. Brozos & A. Strouboulis, 2014).

Detailed surveys were performed in 76 parking places (16 places in the western sector of Thessaloniki’s center, 41 in the central sector and 19 in the eastern sector) and 2 pedestrian road segments (S. Kakarakis, P. Brozos & A. Strouboulis, 2014) as far as their use is concerned.

In the western sector, 10 parking places were under length restrictions, 4 were under length and time restrictions and 2 were for other use. In the central sector 36 parking places were under length restrictions, 2 were under length and time restrictions and 3 were for other use. In the eastern sector all 19 places were under length restrictions (S. Kakarakis, P. Brozos & A. Strouboulis, 2014).

In total 200 questionnaires were addressed to the commercial vehicles’ drivers and 50 questionnaires were addressed to the employers of the retail enterprises located in a buffer zone of 50 meters from each parking place.

The analysis of the data collected from the survey of the parking places and the questionnaires led to interesting results. The majority of the loading/unloading activity (97, 6%) was performed illegally as a result of the occupied parking places by private cars of which 53% was performed in the central sector (S. Kakarakis, P. Brozos & A. Strouboulis, 2014).

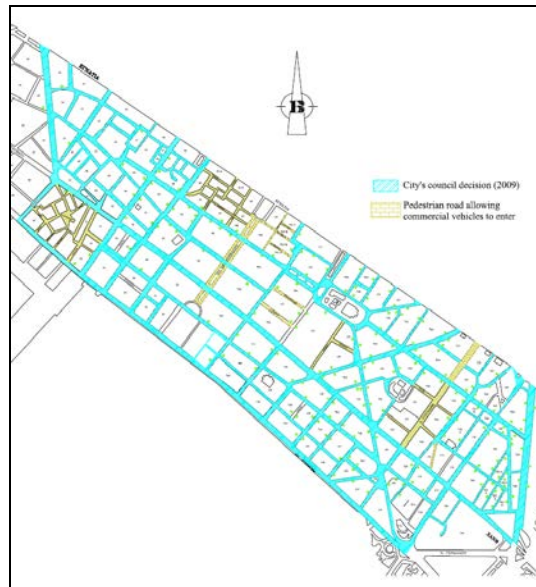
Another interesting result is that 75% of the commercial vehicles spent over 4 minutes during loading/unloading goods and 34 % of the commercial vehicles spent over 8 minutes. Also the analysis of the data revealed that 70% of the loading/unloading activity was performed before 12.30am. Finally, 70% of the drivers suggested that there was the need to create new parking places more customized to their needs (S. Kakarakis, P. Brozos & A. Strouboulis, 2014).

The comparison of the collected data through the above mentioned research activities between the years 2008 – 2013 revealed that in the current situation in total 40 parking places were suspended while 43 new places were established. The total number of parking places dedicated to commercial vehicles is increased by 3 parking places (in the area of interest). The locations of the suspended parking places as well as the locations of the new ones are presented in Figure 3.

As mentioned above, the recent (2013) study took into consideration the decision of the City Council of Thessaloniki as far as loading/ unloading activities are concerned in the under examination central area. The information included in these decisions were used by the research team in order to produce thematic maps presenting the road network associated to the regulations in force. Such a map is presented in Figure 4.



**Figure 3.** Locations of the suspended and newly established parking areas in 2013 compared to 2008 (S. Kakarakis, P. Brozos & A. Strouboulis, 2014)



**Figure 4.** Road networking allowing the distribution of goods according to city's council decision in 2009 (S. Kakarakis, P. Brozos & A. Strouboulis, 2014)

### 3. Comparative analysis between 2008 and 2013

The comparison between the infrastructure concerning dedicated parking places to commercial vehicles in order to perform loading/ unloading activities in the framework of the goods distribution system in the area of the Thessaloniki in years 2008 and 2013, reveals that significant changes have been performed. However, these changes are not mentioned by the most recent decision of the City's Council. Furthermore, these changes confirm that the city logistics sector, is as expected a dynamic phenomenon, evolving through space and time, and thus all stakeholders (including the Municipal Authorities) should constantly monitoring it and evaluating it in order to take most productive measures.

The Municipality of Thessaloniki has developed an online Geographical Information System (**GIS**) available to all users, providing important and useful information (Thessaloniki Municipality Geoportal, 2014). However, this GIS tool does not currently have the ability to present the parking places dedicated to the commercial vehicles, as well as the parking places for all the vehicles. Since

many, if not most of, policies and measures aiming at the optimization of the city logistics sector rely to the usage of telematics applications, it is of highly importance for the decision makers to be aware of the infrastructure used by the commercial vehicles in terms of their location and also in which level are used by the drivers of commercial vehicles. For this to happen, the information collected could be incorporated to the city's GIS online tool aiming not only to inform the users, but also in order to be used in any effort to optimize the city logistics sector.

Based on this approach and data as those presented in the paper, the Municipal Authorities, could design a specialized tool which could inform the drivers of the commercial vehicles for the usage of the parking places dedicated for loading/ unloading activities in real time based on special devices - sensors installed at these parking places. These devices could record data about the dimensions of the parking vehicle and transmitting them through Wi-Fi networks to a management center in order the GIS tool to be updated. Also, in case any vehicle park at these places without permission (passenger vehicle, bus, motorcycle, and bicycle) the sensors could inform the police in real time for the violation. These systems were mainly developed and tested for passenger vehicles in urban areas and along rural roadways (EasyWay, 2012) not only in Europe (France - Paris, Italy, Germany) but also in the United States of America (New York and San Francisco cities – Streetblog NYC).

Finally it must be noted that the cost of such a system can be justified if someone considers the problems identified in the existing situation in terms of lost productivity for the stakeholders of the city logistics sector. In any case, the first step for the authorities concerns the collection and analysis of relevant road network data on a constant basis in order to better support their decisions for the Urban Freight Transport.

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