

## Improving Mobility in Tirana Starting From Parking Management

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**ABSTRACT:** *The significant increase in car ownership and suburban sprawl last decades has overloaded the road network in Tirana, making it insufficient and problematic. Increasing the capacity of the roads and intersections has been the sole objective of the Municipality of the Capital of Albania. However, providing supply to meet demand is no longer appropriate. Managing the existing sources could be environmentally sensible, society fair, and economically sound solution. Therefore, the need for a detailed and comprehensive transport policy, to encourage sustainable transport, is essential for Tirana. One of the most crucial transportation management strategies that can be regarded to achieve more sustainable transportation system is parking management. The objective of this research was to study the nature and level of the parking problem. Moreover, the impact of parking management regulations recently enforced by Tirana Municipality is evaluated. In order to accomplish this, a license plate survey for the selected pilot study area was performed. In addition, a questionnaire with sample size of 120 drivers was conducted. Next, two parking management strategies, parking pricing and parking duration limitation were decided for the pilot study area and the impact was estimated. The results of the analysis showed that on-street parking demand could be decreased due to parking pricing, forcing some drivers not using their vehicles. In addition, parking duration limitation strategy is estimated to force some other drivers to shift to off-street parking. The impact of both strategies applied at the same time showed a reduction of approximately 38% of on-street demand.*

**Keywords:** *license plate survey, parking management, parking pricing, sustainable transportation*

### I. INTRODUCTION

The rapid growth of the transportation sector during the last decade in Albania has created many problems particularly in Tirana. The main problems, associated with increasing urban traffic and congestion are; low mobility, air pollution, energy consumption, economic efficiency, and loss of urban 'living space' (European Commission, 2004). The reaction to the pressure created by additional traffic demand has often been to increase the level of supply, in other words provide additional road space. This traditional approach of providing supply to meet demand is no longer always appropriate. Brundtland Commission [2] defines sustainable transportation as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It is affordable, operates fairly and efficiently, offers a choice of transport mode, supports a competitive economy, limits waste emissions, uses renewable resources, and promotes equity within and between successive generations.

Parking management is one of the crucial transport management strategies and initiatives. Parking is an essential component of the transportation system. Parking problems can be often defined either in terms of supply (too few spaces are available, somebody must build more) or in terms of management (available facilities are used inefficiently and should be better managed). The later, management solutions tend to be better than the former, expanding supply, because they support more sustainable transportation (Litman, 2006). Current parking planning practices tend to favor generous parking supply and minimal parking prices, which have unintended and undesirable consequences: they increase development costs, reduce housing affordability, cause dispersed land use patterns (commonly called sprawl), and increase automobile travel which exacerbates various problems including traffic congestion, roadway costs, crashes and pollution emissions (Shoup, 1999; Litman, 2006). Parking management refers to policies and programs that result in more efficient use of parking resources. Parking management can significantly reduce the number of parking spaces required in a particular situation, providing a variety of economic, social and environmental benefits.

### 1.1 Research's goals

The major goal of this research is to investigate the existing parking problem in Tirana and evaluate the estimated impact on the new parking regulations. To reach this goal this research focused on the objectives listed below:

- To study the nature and level of the parking problem in Tirana through site observations,
- To understand the attitude of the drivers toward parking management strategies, and
- To recommend and evaluate parking strategies for the pilot study area in particular.

## II. LITERATURE REVIEW

### 2.1 Parking Management

Parking facilities are an essential component of the transport system, because every vehicle requires a space for parking at its destination. An adequate, comfortable, easy to find, free, near to the destination, and cheap parking has been the most fundamental requirements of drivers for years. Nevertheless, providing a space for every vehicle in any time not only burdens a financial cost on governments but also imposes an environmental problem on the whole population (European Commission, 2004).

As it is shown in Fig. 1 the parking generation supply is a crucial component of the automobile dependency cycle. The need for parking supply is increased by automobile oriented land use planning. As a result of this parking supply generation, formation of dispersed development patterns is inevitable. The loop in Figure 1 encourages vehicle usage, decreases alternative modes and creates urban sprawl. One of the most efficient elements that could help to break this cycle is parking management.

Parking Management includes a variety of strategies that encourage more efficient use of existing parking facilities, improve the quality of service provided to parking facility users and improve parking facility design (Litman, 2006). On the other hand, Parking Management can help address a wide range of transportation problems and help achieve a variety of transportation, land use development, economic, and environmental objectives. More accurate and flexible parking requirements mean that parking standards reflect the parking demand and costs at a particular location, taking into account geographic, demographic, economic, and management factors.

Reducing reliance on private automobile, shifting travelers' and goods' movement to other modes and increasing transit ridership has appeared as the major objective of planners and policymakers at all levels. They have formulated some strategies some of which have been tested and have indicated good results and some others have not been applied yet due to lack of political and institutional reforms but are expected to show beneficial outcomes. The most important strategies applicable for Tirana would be:

- Shared Parking,
- Parking Pricing,
- Unbundled Parking,
- Parking Regulation,
- Parking Impact Fees,
- Combinations of the Above Strategies

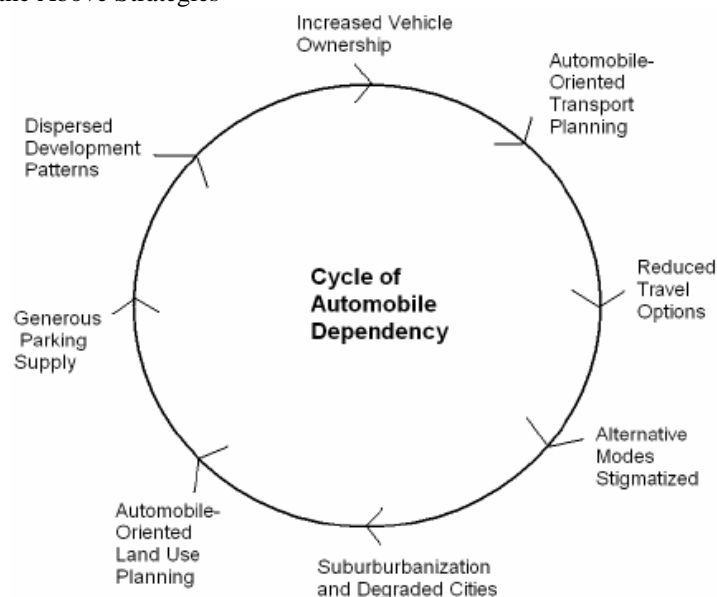


Figure 1. Vicious cycle of automobile dependency (Litman, 2006)

**2.2 Transportation In Tirana**

Tirana, the capital city of Albania, has a population of approximately 610,000 habitants (Figure 2), and this number has almost doubled last 15 years (Instat 2011). The city is highly urbanized with its average population density of 145 persons/ha. On the other hand, the number of vehicles, in particular passenger cars constantly doubled every 5 years. Passenger cars comprise approximately 77% of all vehicles on roads.

**2.3 Centralization Of Parking Management In Tirana**

The legislation on parking management and policy making has been quite dynamic in the past, hence making it problematic for traffic management of Tirana. The last decision of Tirana municipality is to create “Tirana Parking”, an on-street parking management institution. In addition, off-street parking like parking lot and underground parking, previously managed illegally by other people has started managed by Tirana Municipality in 2015. Other parking areas are planned to be constructed and managed by the municipality [6].

Current parking fees, which were set in 2003, are 0.8USD/hour. The municipality operates several parking services in some commercial street, where tickets are collected manually instead of an automatic box. In 2015, Tirana City Council approved the creation of the "Tirana Parking" Agency and specified parking fees for the four zones of Tirana as 0.15, 0.30, 0.45 and 0.80 USD/hour. In addition, according to the decision, it was decided that resident will not pay any charge at the areas where they live [6]. This new regulation will enable remote roads to be charged less.

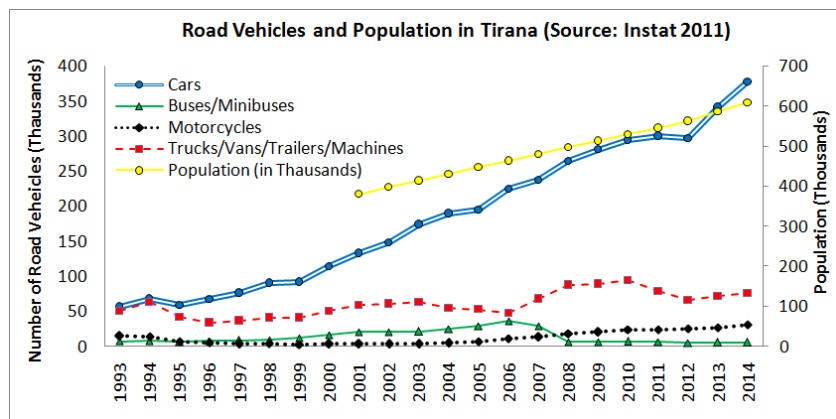


Figure 2. Road vehicles number and population fluctuation in Tirana

**III. METHODOLOGY**

**3.1 “Myslym Shyri” Pilot Study Area**

To understand better the parking situation in Tirana we chose “Myslym Shyri” area for our research. This area is one of the most problematic regions of Tirana in terms of traffic. It has mainly three different land-uses; residential, commercial, and official. As shown in the Figure 3, “Myslym Shyri” study area (about 150.000 m2) is a very busy area not only during daytime but also during evenings. It is beside blv. “Gjergj Fishta” and “21 dhjetori” intersection one of the most congested arteries of Tirana. This area is accessed by buses stopping by at main arteries and includes a large parking lot. The surveys conducted in the pilot study area were: Inventory of Parking Facilities, License Plate Survey, and Parking Problems and Violations.



Figure 3. “Myslym Shyri” parking area

3.2 Questionnaire

A questionnaire to investigate the current attitude of drivers was conducted to 120 respondents. Thirteen questions were prepared for this structured questionnaire. The form was firstly explained to the respondents and fell in at the presence of the organizer. The first part of the questionnaire provides demographic information like age, gender and education. The second part gives information about car usage and parking facilities. Economical information about the costs of car usage and parking charges are expressed in the third part of the questionnaire. The final part of the questionnaire tries to investigate the attitude of the drivers in relation to other restrictions and improvement of the transportation system such as parking charges and improvement of public transport system.

IV. ANALYSIS AND DISCUSSION

4.1 Daily Fluctuations

The total daily fluctuation of the on-street and off-street parked vehicles was calculated to be as shown in Figure 4. The survey duration for the on-street and off-street facilities was decided to be 11 hours (from 6:30 AM to 6:30 PM). The number of on-street parked vehicles reached its maximum value of 193 parked vehicles at 10:00. It should be noticed that the surveyed roads exceeded the supply of 157 spaces starting from 8 and lasting through all study time, meaning that on-street parking was saturated and some vehicles were parked illegally. On the other hand, the number of off-street (parking lot) parked vehicles was considerably below the capacity of the facilities. The fluctuation of off-street facilities reached its total maximum value of 136 parked vehicles at 12 AM, but still only one third of the total capacity.

Thirty-six percent of the total number of vehicles was parked for more than 2 hours (Figure 5). This category was also considered long parking duration. However, the percentage of parked hours for this category was about 83% of the total parked hours. This means that the higher the number of long-duration parked vehicles, the fewer is the parking space available for short-term parking duration. In other words, a small number of long-term parking durations significantly decreased the efficiency of the on-street parking facilities.

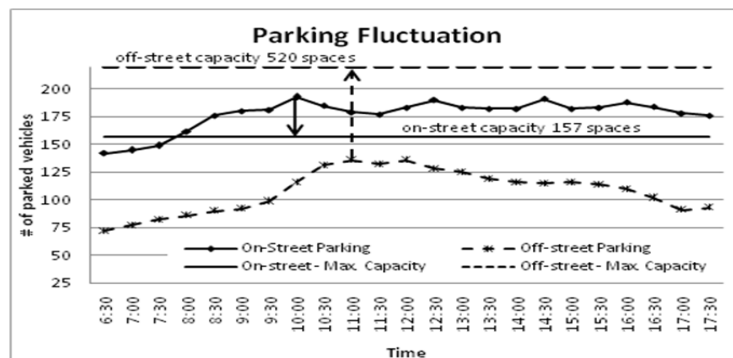


Figure 4. Total daily fluctuation of on-street and off-street parking

As a rule of thumb (Shoup 2004), the parking occupation (accumulation) of more than 90% is considered to be saturated. Hence, all the curbs in the study area were saturated, ranged from 100% to 150%. The total mean of on-street peak parking accumulation was 113%, meaning that a large number of cars were parked illegally. On the other hand, for the off-street parking facilities, the rates were far below the capacities and only one third of the total capacity was used at the peak accumulation. Hence, not the insufficiency but the inefficiency is an evident problem in this area.

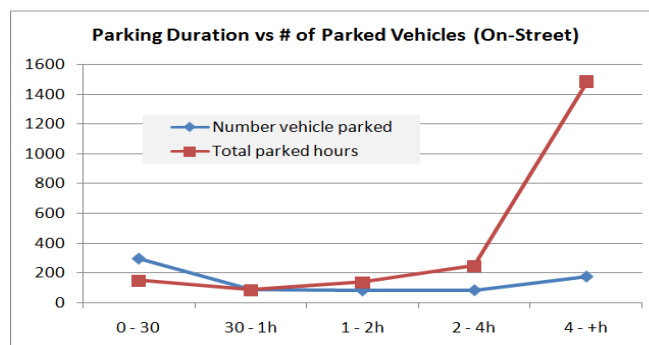


Figure 5. Impact of parking duration on efficiency

4.2 Questionnaire Results

The sample size analyzed in SPSS (version 13) was 120. Eleven results were considered outlier thus extracted from the analysis. The average age of the respondent was 32.36 and about 75% of them were males. In addition, approximately three quarters of the respondents had a university education and most of the remaining had high school diploma.

The weekly car usage frequency for the analyzed sample is shown in Figure 6a below. Those who use their cars two times or three times a week are not considered commuters. In other words, this category is not using their cars for their work trip, but mainly during the weekends or rare commuting. According to Figure 6a about 24% of the respondents were using their cars for non-commuting purposes (less than 3 days a week). On the other hand, approximately 76% of the car owners in this research are using their vehicles for their daily commuting showing a high dependency on passenger car travel.

Figure 6b shows frequency of different parking facilities during the day and night. Distinguishably drivers prefer to use on-street parking (38%) or personal garages (47%) mainly during the night since they are free of charge. The remaining ones use parking lots, which are priced. On the other hand, during the day the majority of the drivers (74%) use curbs (on-street) for parking their cars. Personal garage parking is low during the day showing that this opportunity is not offered by Employers. Parking lots still show very low frequency by drivers.

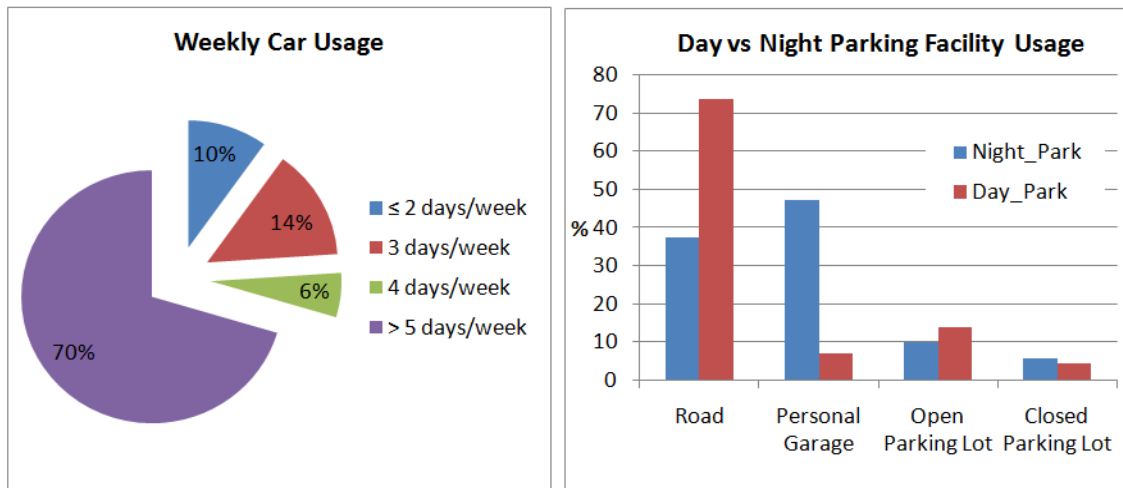


Figure 6. a) weekly car usage frequency, b) day vs night parking facility usage

The monthly expenditures on passenger car and specifically on parking are shown in Figure 7. It is clearly visible that the monthly expenditures on car usage for the selected sample is averaged between \$80 and \$160. On the other hand, approximately 95% of them are paying less than \$24 per month. In addition, income of the majority of respondents (90%) of this study is less than \$1,000. All this information makes the sample size a good representative of all car owners.

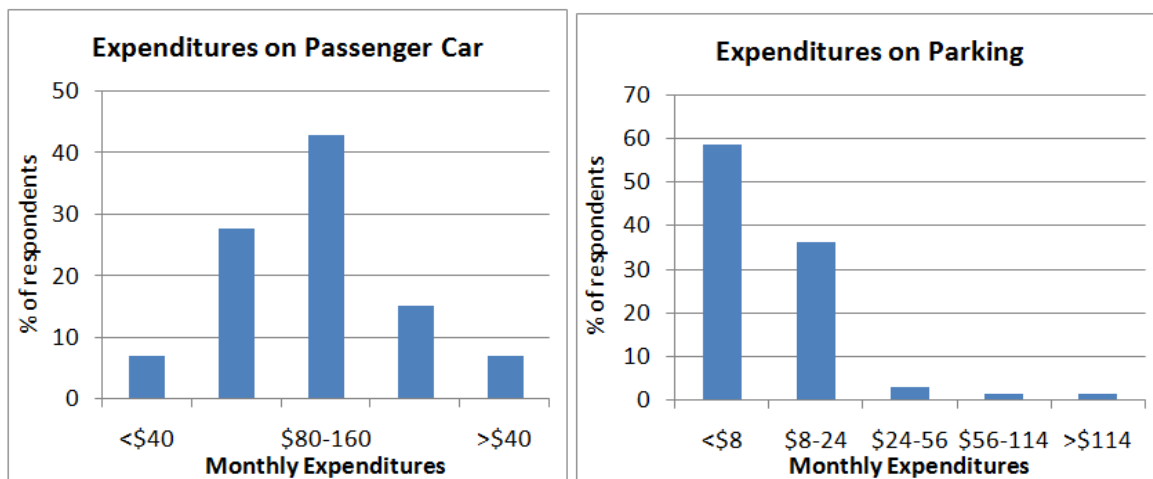


Figure 7. a) expenditure on passenger car, b) expenditure on parking

Another very beneficial data gathered from these respondents was their behavior related to different downtown congestion pricing strategies, which take into consideration the existing and improved public transport. The question was: "In order to relieve the traffic while travelling to CBD areas some congestion pricing strategies are used in some European cities. What is your car usage behavior for the existing public transport conditions if similar congestion pricing strategies were applied?" The alternatives were; giving up using their cars for any price, giving up using their cars for some amount of money, or not giving up using their cars. The same question was asked for the case when existing public transport conditions is improved.

Approximately 36% of automobile users surveyed (Table 1) were ready to quit using their cars for any price, while traveling to these highly congested areas for the existing condition of public transport. Another 11% of them would not use their cars if they were required to pay a charge up to \$1. However, 11% stated that they would not give up using their cars if existing public transportation conditions remains unchanged.

The attitudes of respondents changed considerably if public transport conditions were improved. About 14% more respondents were ready to leave using their cars for any price if public transport conditions were enhanced. It should be noted that the public transport conditions are very important in the whole transportation system of Tirana. If public transport is improved it will attract 14% more car users and thus significantly decrease the traffic congestion. This result, once more, points out the effect of public transport conditions on automobile usage.

**Table 1:** Park pricing strategy for existing and improved conditions of public transport

	Existing Condition	Improved Condition	Change
	%	%	%
I will not use the car whatever is the price	36.1	50	13.9
I will not use the car if parking price is more than \$1	47.2	26.4	-20.8
I will not use the car if parking price is more than \$2	4.2	11.1	6.9
I will not use the car if parking price is more than \$4	1.4	1.4	0
I will use the car whatever is the price	11.1	11.1	0
Total	100	100	0

#### 4.3 Observed Parking Problems

Traffic rule violations such as invasion of sidewalks by parked vehicles, usurpation of parking spaces, and illegally parked vehicles were only some of the major parking concerns detected in the study area. Double parking has been defined as another major problem which was pretty common in the main artery during the rush hours. As a consequence of this double parking behavior, the capacity of the main artery was significantly decreased and thus the traffic congestion and delays were increased.

## V. EVALUATION AND DISCUSSION

### 5.1 Development Of Parking Strategies For The Pilot Study Area

Parking strategies used in "Myslym Shyri" pilot study area were basically related to parking pricing, and parking duration restriction (limit). It is thought that these strategies are the simplest and the most easily comprehended ones by users (Litman, 2006).

- i. Parking Pricing Strategy: Percentage of drivers willing to leave using their cars when they were required to pay \$1 because of pricing strategy was estimated 11%. Thus, a fraction of drivers (11%) was anticipated to leave their cars, reducing the demand required for accommodation of the vehicles.
- ii. Parking Duration Limitation Strategy: Finding the percentage of drivers who will not use on-street parking facilities due to parking duration limitation was based on the following assumptions:
  - Prohibit on-street parking duration more than 4 hour (1). Four hour limits are generally applied to prevent commuters from using parking spaces. They will be forced to use off-street facilities,
  - Use the 85th percentile parking demand of each on-street parking (2). Thus, the majority of parkers is supported,
  - Decide the minimum of the values above.  $\text{MIN} \{1, 2\}$

Parking duration limitation in the main arteries and inside the block was decided to be 2-hour and 4-hour, respectively. The number of cars parked for the existing situation was 714 vehicles, whereas for the improved conditions this number was 541 vehicles. Hence, about 30% (211/714) reduction was estimated to be due to parking duration limitation strategy decided for the pilot study area.

- iii. Demand Reduction: The decided strategies in the pilot study area were parking pricing and parking duration limitation. The reduction due to parking pricing strategy was estimated to be 11%. In addition, a 30% reduction of the on-street parking demand was calculated to be due to decided parking duration limitations. Hence, the reduced demand as a result of applied parking pricing and parking duration limitation strategies was calculated by Equation 1 as:

$$D_R = N_T * (1 - S_1) * (1 - S_2)$$

$$D_R = 193 * (1 - 0.11) * (1 - 0.30) \quad (1)$$

$$D_R = 120 \text{ vehicles}$$

Where:

- $D_R$ : Demand reduction due to applied strategies, vehs  
 $N_T$ : Peak hourly parking demand, vehs  
 $S_1$ : Fraction reduction due to the parking pricing strategy  
 $S_2$ : Fraction reduction due to the parking duration limitation strategy

### 5.2 Demand-Supply Comparison

We were able to accommodate all legally and illegally parked vehicles and excessive spaces are used for handicapped people (24%) or loading/unloading purposes, when parking pricing and parking duration limitation strategies were applied. On the other hand, the maximum accumulation at the parking lot including accommodation of all on-street cars parking longer than restricted time is estimated to be 67% of the capacity of the parking lot.

### 5.3 Environmental Benefits

Approximately 11% of parked vehicles were considered not to be used for trips to the study area. The lesser the number of vehicles used, the lesser the fuel consumption will be. The lesser the fuel consumption is, the lesser the environment will be polluted. Furthermore, when the parking spaces are reduced those spaces can be changed to sidewalks or to green spaces. Thus, the surrounding environment becomes more friendly and relaxing for the people. Last but not least, as the number of vehicles in the traffic is reduced the number of congested roads is decreased. Less congested roads mean less travel times and thus a better public transport service.

### 5.4 Social Benefits

Social benefits are very important in the medium and long run. The reduction of parking spaces and thus the number of used personal vehicles will lead to more compacted areas with different land use. A more relaxing and safer environment for children and elderly people is also very common in these applications. The walking and biking mode is very much encouraged in these well-mixed areas. People find more time to socialize with each other, when the number of green spaces is created for their relaxation.

### 5.5 Financial Benefits

Financial benefits are very important for the operation and maintenance of the facilities. The financial benefits can be used to improve the services and modernize the system. The financial benefits are also used to widen the parking management application area. Furthermore, indirect financial benefits come from the reduction of vehicles usage in the traffic. If the car usage is reduced fuel consumption is reduced, too. As a result the household expenditures will decrease, thus increasing the economy of the country.

The hourly parking charges for 2-hour and 4-hour were decided to be \$1 and \$0.5, respectively. Notice that, on-street facilities with 4-hour parking duration limitations were found in less congested streets. Thus, a lower parking charge for 4-hour parking duration limitation was decided to encourage drivers to use less congested streets. The total 11-hour earnings were approximately computed to be \$1,150. The yearly income is estimated to be USD295.360. This amount is estimated to cover all management costs and for modernization of the system.

## VI. CONCLUSIONS AND RECOMMENDATIONS

- There is a misbalance in terms of turnover between on-street and off-street facilities; the former oversaturated, the later very low frequented.
- A small number of long-term parking durations significantly decreased the efficiency of the on-street parking facilities. Obviously, if the long-term parkers could be mobbed to off-street parking lots, the turnover for the on-street parking would have been increased significantly.
- Improving the efficiency of on-street facilities rather than increasing the number of off-street facilities (by building new garages and parking lots) is a more effective and cheap solution.
- On-street parking demand reduction due to applied parking pricing and parking duration limitation strategies was calculated to be 38%.
- 76% of the car owners uses their cars for daily commuting.
- The monthly expenditures on car usage for the selected sample is estimated to be \$80-160. In addition, approximately 95% of drivers are paying less than \$24 per month on parking.

- Improving the public transportation system is estimated to attract at least 14% more drivers.
- More research is needed to test the hypothesis that most parkers would rather switch to transit than spill over on to non-priced parking spaces.
- More research is needed on how reorganization of parking management affects business sales and the local economy.

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