# ORIGIN - DESTINATION TRAFFIC SURVEY. CASE STUDY: DATA COLLECTION FOR PITESTI – MIOVENI TRANSPORT MODEL

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**Abstract:** Both at local and regional levels it is necessary to be investigated travel behavior and intentions of the population, in order to achieve better planning and management of transport systems. To fulfill these tasks, it is essential that data be accurate. In this paper is presented the methodology for achieving the Origin - Destination survey used to identify user behavior in a transport model for the Pitesti – Mioveni area. The output of the data processing was the distribution of the transport demand in time and space and its differentiation by trip purposes and vehicle categories.

## 1. INTRODUCTION

Transport planning and land use are areas where data collection and processing are very important in making decisions. The movement itself has no intrinsic value; it only makes it possible participation in other activities. If in a particular geographic point isn't activity, then it will not generate transport application.

The spatial location and the intensity of using territories can be determined by surveys on the using of these. The movement depends on the quality of the transport system that connects spatially separated points, and the transport surveys have a major role in specification of activities location and in specification of characteristics for available modes.

The correlation between land use and transport activity leads to decision to travel or not. To identify the type and size of the transport demand are necessary the surveys for different types of trips. Each trip can be described by: place, time, transport mode, route, purpose, number of people. To estimate such a framework of trips generally is the objective of the survey methods.

To determine whether the transport system is adequate to the transport demand, are necessary performance surveys for transport system in order to assess the quality parameters, such as: journey time, variability of transport time, waiting times, number of passengers, safety. Through these surveys, the characteristics and the status of the system are measured at a certain moment.

Without being exhaustive, the following list tries to emphasize the most important goals for which it initiates an investigation of transport:

- *evaluation of existing transport conditions at a given time;*
- *establishing the causes of certain phenomena and travel behavior formalization;*
- *development of predictive models necessary to appreciate transport conditions and effects of changes in system on transport demand;*
- *determination of changes in the transport system to anticipate the effects. The surveys before and after (making changes) can be used to estimate the effects of these changes;*
- *quantification of changes in the transport system or passengers behavior, by monitoring surveys, as an extension of the concept before and after (where inquiries are made at two different times).*

## 2. ORIGIN - DESTINATION SURVEY. TECHNIQUES AND METHODS

Establishing an appropriate method to investigate Origin - Destination of traffic should be done considering the objectives of the study, type of data required, data accuracy, time and cost necessary for the investigation. The procedures by which data are collected are called *techniques* and the means to implement the procedures are called *methods* [1].

The techniques used to perform Origin - Destination surveys and the methods of implementation are summarized in Table 1.

**Table 1. Techniques and methods for Origin - Destination surveys**

| No. | Techniques | Methods |
|---|---|---|
| 1. | The vehicles monitoring after registration plate | Manual recording of license plate numbers and notation on paper |
| | | Manual recording of license plate numbers and notation on electronic support |
| | | Audio recording license plate numbers after reading by an observer situated in the survey point |
| | | Video recording of vehicles license plate numbers after passing through the survey point |
| | | Photo capture of vehicles license plate numbers after passing by survey point |
| 2. | Other techniques for vehicles tracking | Tracking vehicles that run with headlights on |
| | | Tracking vehicles that crossing the tolling areas |
| | | Video recording of vehicles |
| | | Recording of vehicles with inductive loops |
| 3. | Identification of vehicles after number plate | Obtaining contact information about the owner of the vehicle depending on the number plate and contacting him for interviewing about trip (when passed through the point survey) |
| 4. | Stopping the vehicles on the carriageway or outside for interview | Roadside interview |
| | | Receiving a survey form in the first survey post, completing it by the driver and teaching in the next survey point situated on the transport route |
| | | Receiving a flag that is displayed on the vehicle and tracking the transport route after survey points succession |
| 5. | Tracking of the vehicles by geographic coordinates of points on the transport routes | Tracking the vehicles by GPS (when are equipped with such devices on board) |
| | | Tracking the vehicles through wireless (when the driver mobile phone is provided with this system) |

Besides the method that consists in stopping vehicles and interviewing the driver about the origin and destination of trip, the route followed, the trip purpose, the type of transported goods (freight vehicles), the number of passengers in the vehicle, all other methods require tracking vehicles in several investigation points to identify the routes followed by them.

The techniques and the methods described above, excepting those carry interviewing the drivers (directly or by completing a form) record information only about the route used by vehicles.

Analyzing the techniques and the methods to achieve Origin - Destination survey presented in Table 1, in this case study was performed Origin - Destination survey method that consists in interviewing in the survey point.

The general methodology for execution a traffic investigation follows a series of logical steps, interrelated, that contribute to achieving the goal. The logic diagram of such a survey is presented in Figure 1.

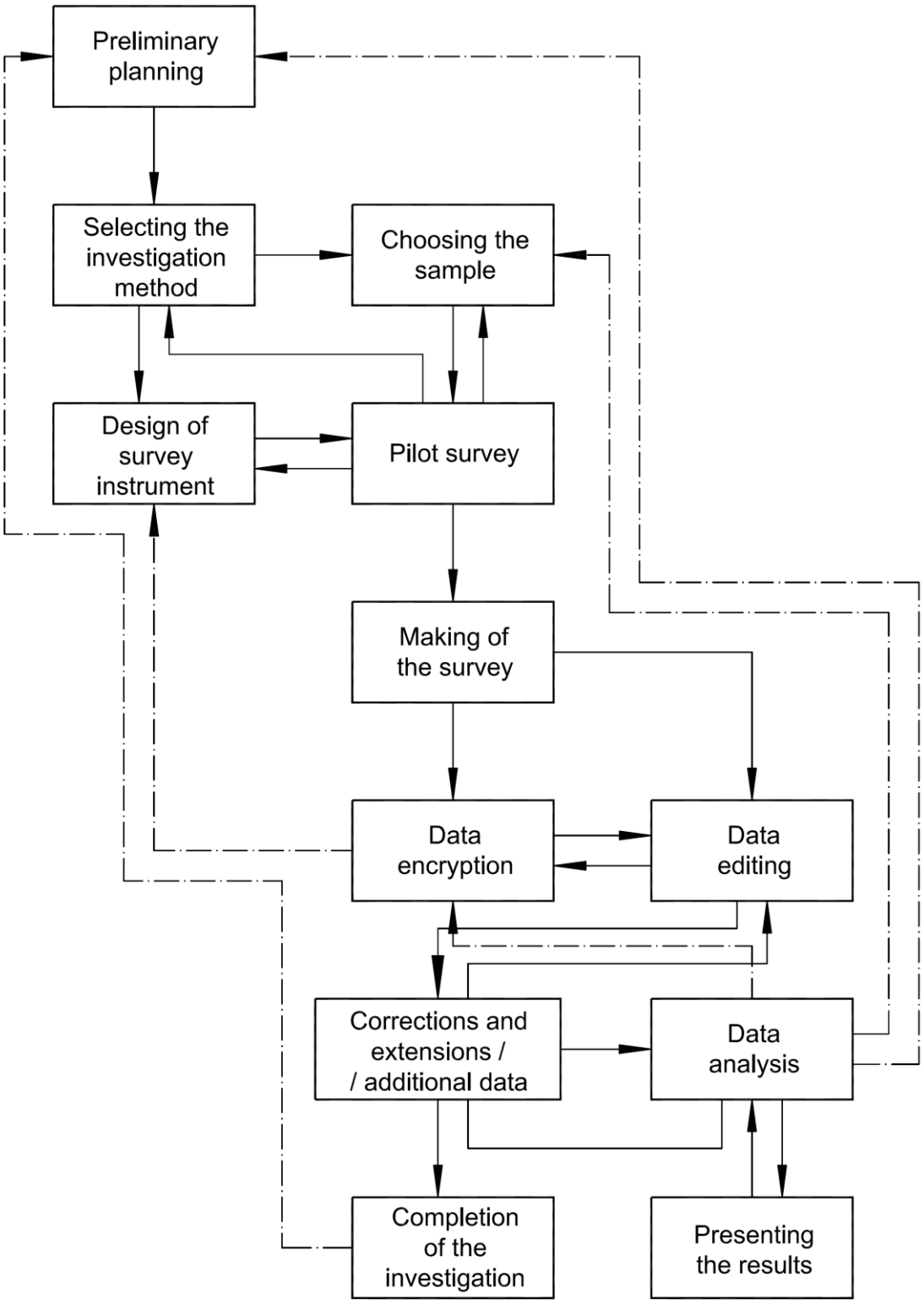



***Figure 1. The stages of the transport survey [3].***

## 3. CASE STUDY: ORIGIN - DESTINATION SURVEY FOR PITESTI – MIOVENI TRANSPORT MODEL

In this case study are presented the technique and the method used for origin-destination survey whose results were used for calibrating the transport model developed by University of Pitesti for Pitesti – Mioveni area.

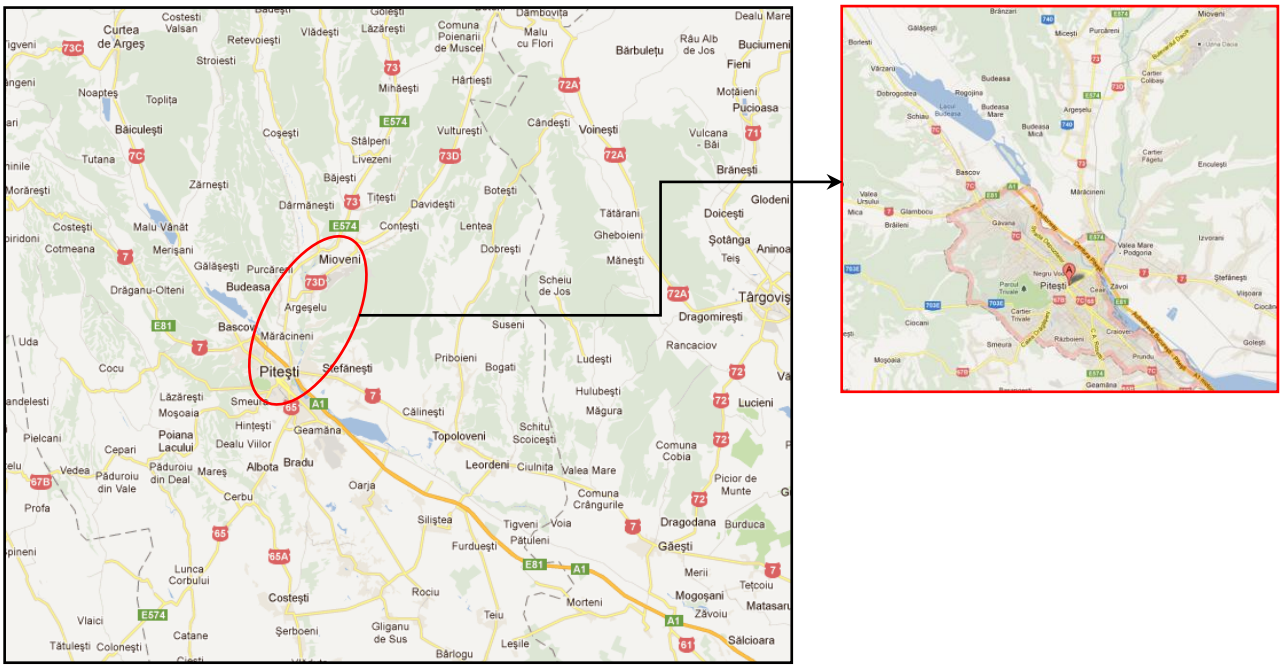



***Figure 2. Influence area of the project [2].***

The investigation technique was the interview: the vehicle was stopped on the carriageway and the method of implementation involved interviewing the driver about the current trip.

Preparations and achievement of Origin - Destination surveys require the following steps:

- *Step 1.* Locating on the map the points of investigation in the streets / roads serving the study area. Origin - Destination surveys were conducted in 6 points. In the survey points were carried out simultaneously the traffic counts. The total number of surveys points is 14 (Table 2).

**Table 2. Locations of Origin-Destination surveys and traffic counts.**

| Survey no. | Location | Traffic counts | Origin - Destination survey |
|---|---|---|---|
| 1. | Fratii Golesti Street | x | |
| 2. | Republicii Street | x | |
| *3.* | *National Road 7 in Stefanesti* | *x* | *x* |
| 4. | Negru Voda Street | x | |
| *5.* | *Dragasani Way* | *x* | *x* |
| 6. | The bypassing route | x | |
| 7. | Craiovei Way | x | |
| *8.* | *Pescarilor Street* | *x* | *x* |
| 9. | Bascovului Way | x | |
| 10. | Lanariei Street | x | |
| *11.* | *Bridge over Arges River in Pitesti* | *x* | *x* |
| 12. | Depozitelor Way | x | |
| *13.* | *National Road 73D - Bridge over Targului River in Mioveni* | *x* | *x* |
| *14.* | *National Road 73 - Bridge over Doamnei River in Mioveni* | *x* | *x* |

- *Step 2.* Checking and setting the location of surveys points with representatives of Technical and Planning Division of the Municipality of Pitesti and the Department of National Roads Pitesti (Figure 3).

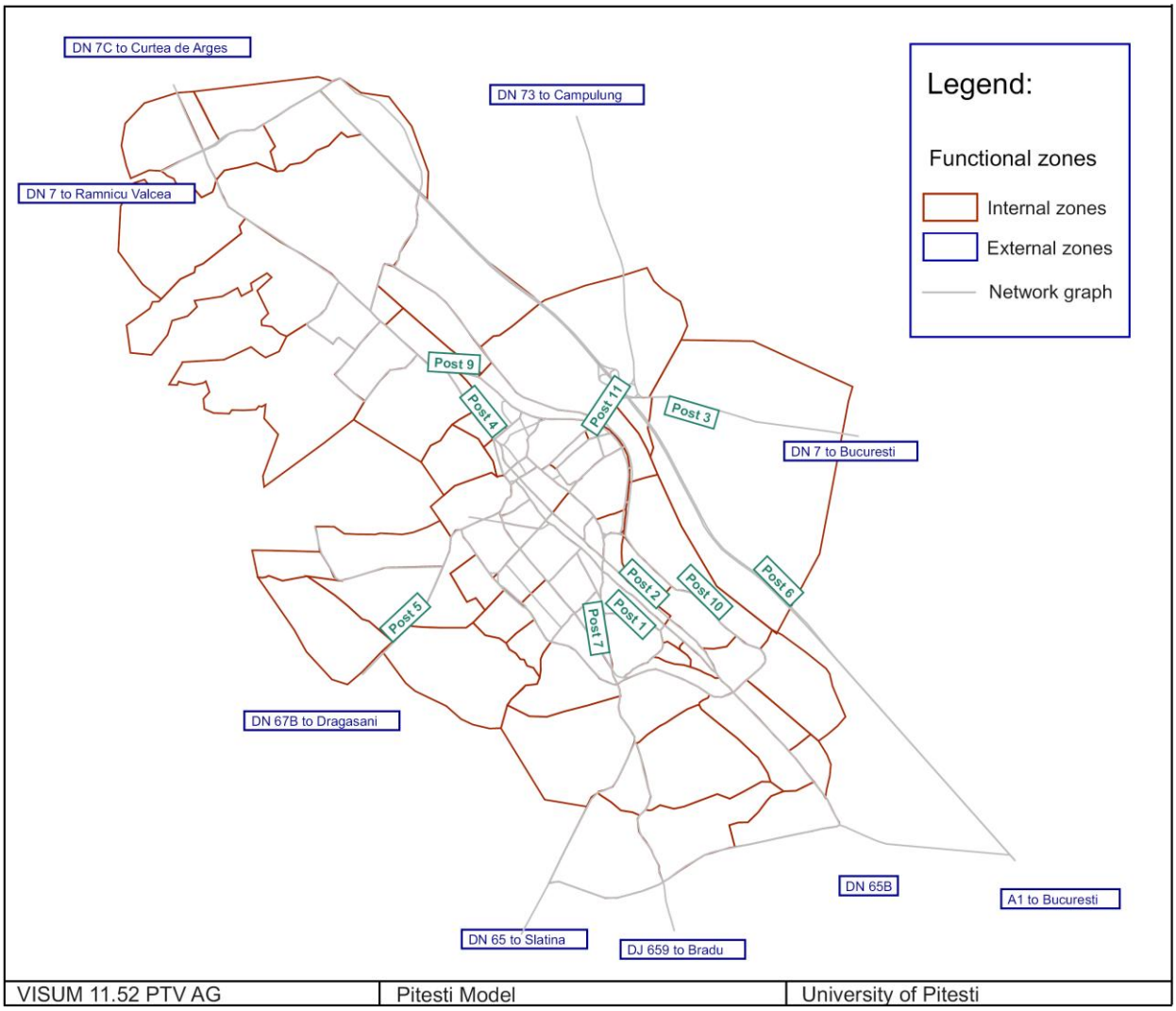



***Figure 3. Locations of surveys points.***

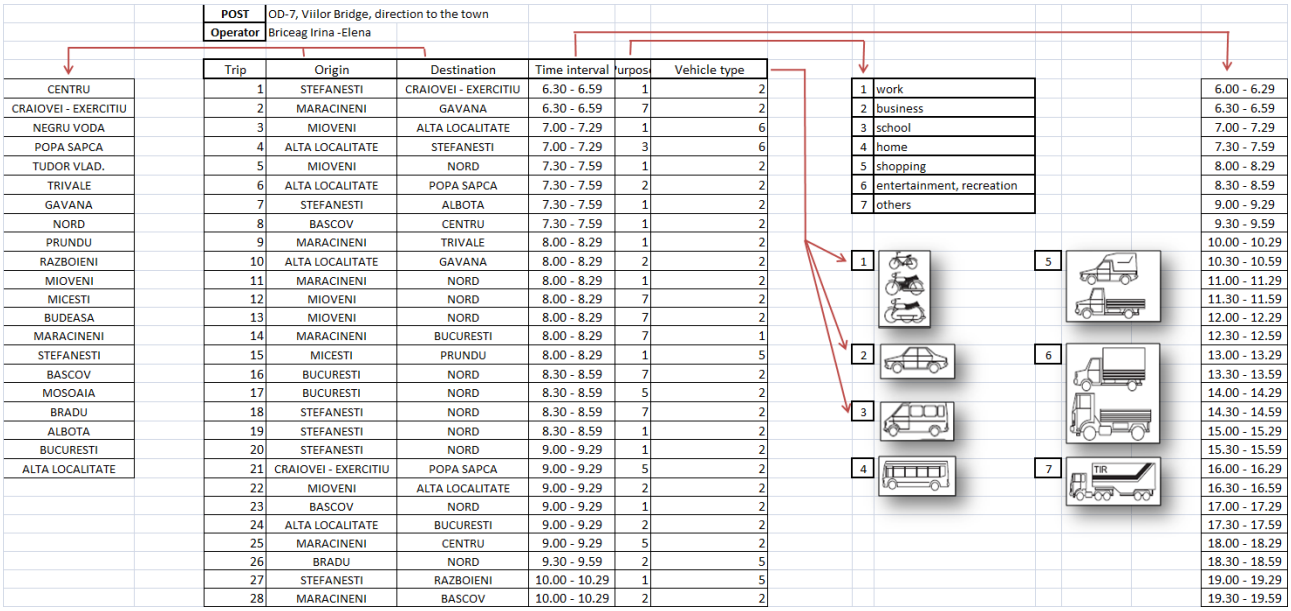
- *Step 3.* Getting approval from Regional Directorate of Roads and Bridges Bucharest (the regional administrator of the Arges County roads and bridges) and from Arges County Police Inspectorate, Road Police Service.
- *Step 4.* Training operators / investigators on the conduct of traffic counts / Origin - Destination surveys and achieving the instruction on safety.
- *Step 5.* Traffic counts and Origin - Destination survey.

Centralized data were statistically processed using specialized computer tools (Figure 4).

The study was conducted in May 2011, on working days of the week. The recordings were performed within 14 hours, between 6:30 a.m. to 8:30 p.m., for 7 categories of vehicles: *bicycle & motorcycle, car, minibus, coach, van, light and medium trucks* and *heavy trucks.* The purposes of the trips were classified into seven main groups: *work, business, school, home, shopping, entertainment* and *others*.

## 4. RESULTS AND DISCUSSIONS

The results of data processing for each of the six Origin - Destination survey points are concentrated in Figures 5, 6 and 7. The analysis of the graphic representations reveal the variations of the time distribution of traffic flows depending on the location of the transport poles, Pitesti and Mioveni.



| POST | OD-7, Viilor Bridge, direction to the town |
|---|---|
| Operator | Briceag Irina -Elena |

| Trip | Origin | Destination | Time interval | Purpose | Vehicle type |
|---|---|---|---|---|---|
| 1 | STEFANESTI | CRAIOVEI - EXERCITIU | 6.30 - 6.59 | 1 | 2 |
| 2 | MARACINENI | GAVANA | 6.30 - 6.59 | 7 | 2 |
| 3 | MIOVENI | ALTA LOCALITATE | 7.00 - 7.29 | 1 | 6 |
| 4 | ALTA LOCALITATE | STEFANESTI | 7.00 - 7.29 | 3 | 6 |
| 5 | MIOVENI | NORD | 7.30 - 7.59 | 1 | 2 |
| 6 | ALTA LOCALITATE | POPA SAPCA | 7.30 - 7.59 | 2 | 2 |
| 7 | STEFANESTI | ALBOTA | 7.30 - 7.59 | 1 | 2 |
| 8 | BASCOV | CENTRU | 7.30 - 7.59 | 1 | 2 |
| 9 | MARACINENI | TRIVALE | 8.00 - 8.29 | 1 | 2 |
| 10 | ALTA LOCALITATE | GAVANA | 8.00 - 8.29 | 2 | 2 |
| 11 | MARACINENI | NORD | 8.00 - 8.29 | 1 | 2 |
| 12 | MIOVENI | NORD | 8.00 - 8.29 | 7 | 2 |
| 13 | MIOVENI | NORD | 8.00 - 8.29 | 7 | 2 |
| 14 | MARACINENI | BUCURESTI | 8.00 - 8.29 | 7 | 1 |
| 15 | MICESTI | PRUNDU | 8.00 - 8.29 | 1 | 5 |
| 16 | BUCURESTI | NORD | 8.30 - 8.59 | 7 | 2 |
| 17 | BUCURESTI | NORD | 8.30 - 8.59 | 5 | 2 |
| 18 | STEFANESTI | NORD | 8.30 - 8.59 | 7 | 2 |
| 19 | STEFANESTI | NORD | 8.30 - 8.59 | 1 | 2 |
| 20 | STEFANESTI | NORD | 9.00 - 9.29 | 1 | 2 |
| 21 | CRAIOVEI - EXERCITIU | POPA SAPCA | 9.00 - 9.29 | 5 | 2 |
| 22 | MIOVENI | ALTA LOCALITATE | 9.00 - 9.29 | 2 | 2 |
| 23 | BASCOV | NORD | 9.00 - 9.29 | 1 | 2 |
| 24 | ALTA LOCALITATE | BUCURESTI | 9.00 - 9.29 | 2 | 2 |
| 25 | MARACINENI | CENTRU | 9.00 - 9.29 | 5 | 2 |
| 26 | BRADU | NORD | 9.30 - 9.59 | 2 | 5 |
| 27 | STEFANESTI | RAZBOIENI | 10.00 - 10.29 | 1 | 5 |
| 28 | MARACINENI | BASCOV | 10.00 - 10.29 | 2 | 2 |

| | |
|---|---|
| 1 | work |
| 2 | business |
| 3 | school |
| 4 | home |
| 5 | shopping |
| 6 | entertainment, recreation |
| 7 | others |

| |
|---|
| CENTRU |
| CRAIOVEI - EXERCITIU |
| NEGRU VODA |
| POPA SAPCA |
| TUDOR VLAD. |
| TRIVALE |
| GAVANA |
| NORD |
| PRUNDU |
| RAZBOIENI |
| MIOVENI |
| MICESTI |
| BUDEASA |
| MARACINENI |
| STEFANESTI |
| BASCOV |
| MOSOAIA |
| BRADU |
| ALBOTA |
| BUCURESTI |
| ALTA LOCALITATE |

| |
|---|
| 6.00 - 6.29 |
| 6.30 - 6.59 |
| 7.00 - 7.29 |
| 7.30 - 7.59 |
| 8.00 - 8.29 |
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| 19.30 - 19.59 |

***Figure 4. Centralization of data recorded in Origin - Destination surveys.***

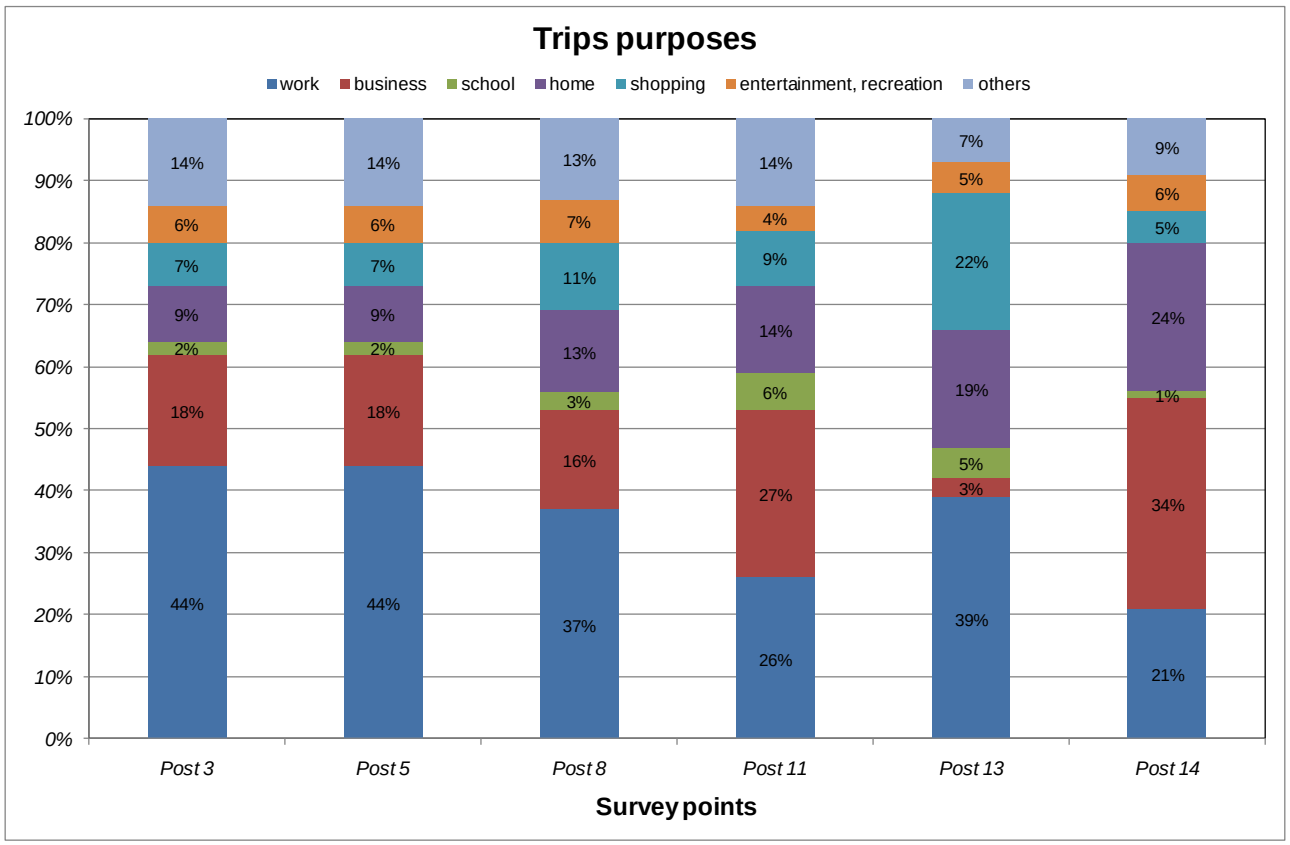


***Figure 5. Trips purposes recorded in Origin - Destination survey points.***

From Figure 5 we see that the main purposes of trips are work and business, purposes associated to displacements generated in the morning. Trips aiming to return home presents proportions comparable to those aimed shopping and other activities, indicating a chain of travel: work – home – shopping – home.

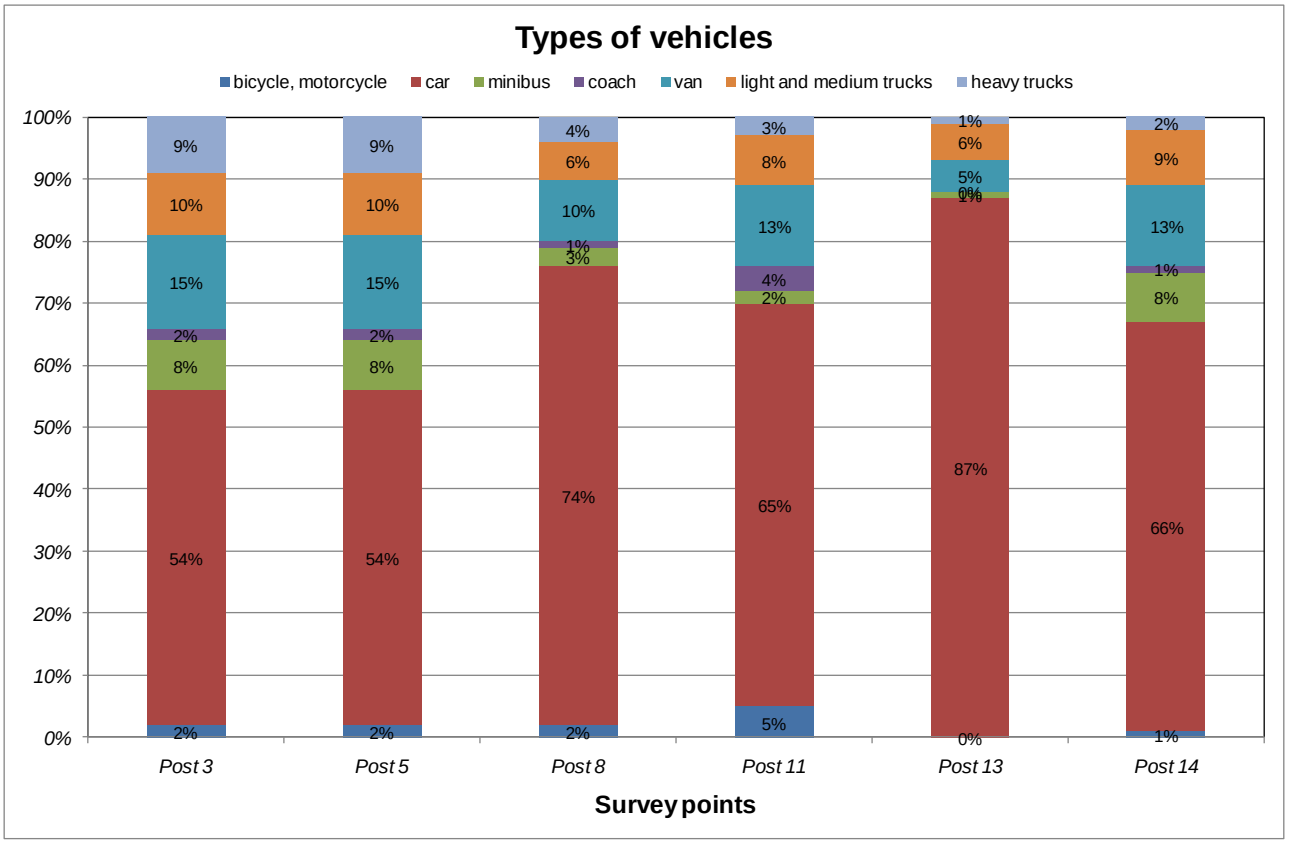


***Figure 6. Types of vehicles recorded in Origin - Destination survey points.***

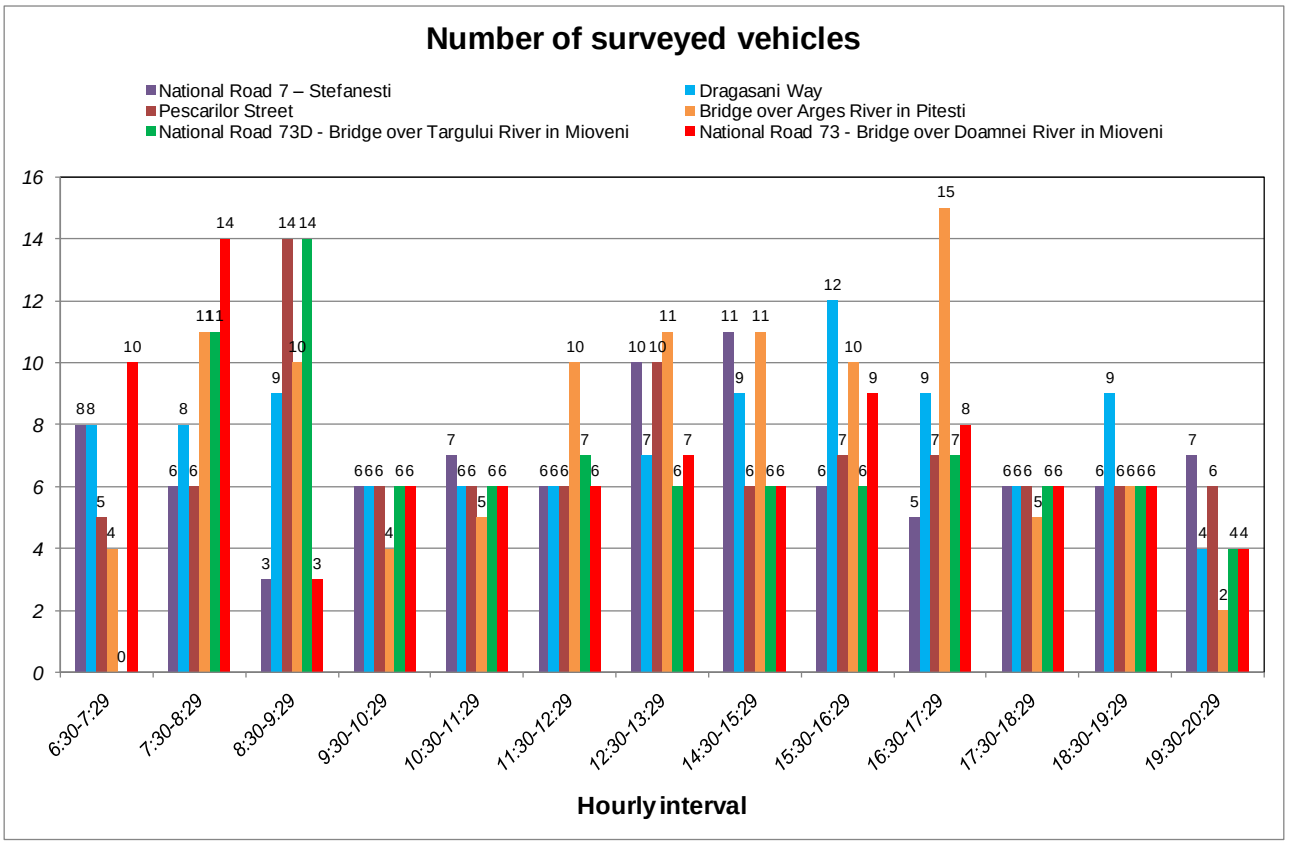


***Figure 7. Number of vehicles surveyed in Origin - Destination survey points.***

Regarding the type of vehicle with which the movement is done, in all Origin - Destination survey points, the share of car journeys is exceeding 50%, the maximum reaching 87% in post 13, located at the entrance of city Mioveni.

The number of vehicles hourly surveyed for each Origin - Destination investigation point is plotted in Figure 7. The maximum value of this indicator shows the peak traffic periods, 7:30 to 9:30 and 4:30 p.m. to 7:30 p.m. respectively.

The results obtained for the samples investigated were extrapolated to the traffic flows recorded in the counts points that worked simultaneously with the Origin - Destination investigation in the same locations.

## 5. CONCLUSIONS

In this paper the authors have presented a methodology for implementation of Origin - Destination surveys and survey results conducted to calibrate the transport model for the Pitesti – Mioveni area. The results from processing raw data are special importance both in calibration and validation of the transport model in terms of spatial distribution of trips and the purposes of the trips.

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