



CETRA²⁰¹⁴

3rd International Conference on Road and Rail Infrastructure
28–30 April 2014, Split, Croatia

Road and Rail Infrastructure III

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TRANSPORT DEMAND MODELING FOR NATIONAL PARK MAVROVO

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Abstract

National parks are protected areas which are real representative of natural sources and eco systems, and require special care in part of transport demand modeling. In this paper the four steps model with features of region to get the modal values, traffic assignment and forecast for 10 years, using the powerful software PTV Vision VISUM on particular case, for the National park Mavrovo will be shown.

Keywords: National park Mavrovo, model, forecast

1 Introduction

Traffic planning, existence and connectivity of quality road network is main factor for development on each territory. In this paper, calculation of the modal values and traffic assignment is made for national park Mavrovo. Specific for regional planning is that settlements are represented as nodes.

Field data are collected for making the fourstep model in PTV VISUM software. To perceive the need of improvement and restoration of the traffic and touristic infrastructure in the park, it is made a forecast of the traffic demand for next 10 years in PTV VISUM software. At the end, it is made a comparison of the modal values for verification of the output results, and also to identify the difference between actual and forecasted condition.

2 Data collection for traffic planning in National park Mavrovo

For creating a quality planning of traffic demand, collection of reliable data is needed to obtain correct and real output.

2.1 Statistical method

For the necessities of the paper, it is made collection of data for number of citizens for each settlement, job places by activity (education, agriculture and ranching, administration, catering) and intensity of traveling to and from National Park Mavrovo.

2.2 Survey method

The survey was made of the whole region of National park Mavrovo on 06.04.2013, with purpose to collect data for job places and attendance of tourist objects. Processed data are used as input in the model.

3 Transport demand modeling

Modeling is made for actual traffic condition in National Park Mavrovo, with use of the four-step model, traffic assignment and forecast in PTV Vision VISUM software. On Figure 1 with green color is shown the traffic network for researched territory. Each link has it's own capacity and speed which correspond with the actual situation.

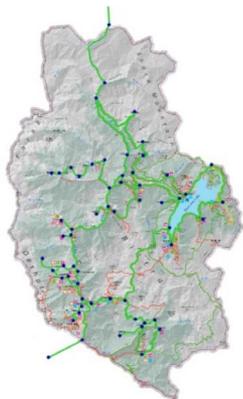


Figure 1 Graphic display of road network

3.1 Zoning

Urban zoning is a part of spatial and urban planning, and is a division of the territory covered by the plan coverage of different functional zones with different purposes. Zoning is the process of selecting areas with specific purpose and labeling (settlements, recreational areas, education, administration, tourism and catering). Zones, according of the characteristic purpose, are origin and destination of trips according the movement needs of the population. The territory of National park Mavrovo is divided on 12 traffic zones and 3 external zones, which are separated with roads, natural borders, pedestrian and bike paths.



Figure 2 Separation of the National Park Mavrovo by zones

3.2 Model choice for transport demand

Model choice depends from the input which is used. In this case, the fourstep model is selected with characteristics of generation, distribution, allocation and trip assignment. For internal calculation in the PTV VISUM software, this model uses the values of zone attributes (number of residents, job places in education, administration, tourism, catering, agriculture, and trips between and inside the zones). Figure 3 shows the selection of the fourstep model in the software.



Figure 3 Selection of four step model

4 Traffic demand for National park Mavrovo

Modal values represents trip assignment on certain streets, which actually is trip distribution on transport network. For calculation of the modal values with the fourstep model, it is necessary activation of all generations, distributions, and assignment, while the Skim matrix should be deactivated. Intensity of trips on roads is shown on Figure 4 with red color.

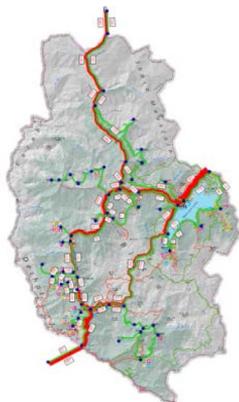


Figure 4 Traffic demand of National Park Mavrovo

5 Traffic demand forecast of NP Mavrovo

Traffic demand forecast actually is prediction of change on movement needs for certain time period. The process of forecast for next 10 years, is made with method of estimation of population increase, which linearly increases the mobility. Modal values for transport demand in the next 10 years is shown on Figure 5.



Figure 5 Transport demand forecast

6 Verification of output modal values

Verification is independent procedure which is used to confirm to what extent the model outputs match the results obtained from the field. To verify how modal values from PTV VISUM match with the real traffic flow on certain section, comparative analysis is made. According to Fund for regional and national roads, on the section Boshkov most – Debar, average by day are passing around 650 vehicles in both directions. Respectively, on this section, the software calculates that daily are passing 654 vehicles in both directions.

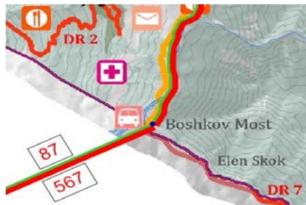


Figure 6 Modal values on the section Boshkov most

The dispersion between calculated and real value is less than 1%, which is affirmation of the hypothesis that output results are valid.

7 Comparison of current and forecasted modal values

Comparative analysis of output results is especially important to see if the forecasted values are real and match the growing movement needs in the future. Comparison is made for the current and forecasted modal values for the next 10 years, calculated in the PTV Visum, on a section of the entrance to the National Park Mavrovo road in direction of cities Kicevo and Gostivar. On Figure 7 is presented the section with current transport demand, which is 945 trips (827 for entry and 118 for exit).



Figure 7 Current modal values

On Figure 8 is shown the forecasted transport demand for the next 10 years, and it's value is 1170 trips (1025 – entry, 145 – exit).



Figure 8 Forecasted modal values

According to calculated values with the software, the forecasted values for transport demand are for 24 % greater than current.

Conclusion

Unlike analytical approaches for calculating the transport demand and forecast , PTV Vision VISUM software provides fast and accurate calculation and offers a graphical representation of the output results. Verification of current and comparison of the forecasted modal values, are part confirming the high reliability of the outcomes of PTV Vision VISUM. Calculation of current and forecasted increase of future transport demand is crucial for understanding the mobilities in National Park Mavrovo, and is the basis for taking steps in the engineering maintenance and improvement of transport infrastructure .

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