Guidance Note N-4

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JASPERS assignment(s) code:	2023 231 RO SCF HOR
Project title:	Support on Bucharest-Ilfov SUMP Update
Subject:	Review of the SUMP tool – Bucharest-Ilfov Metropolitan Transport Model
Country(s)	**Romania**
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1. Background

1.1 JASPERS advice within the current assignment envisages a targeted support to the beneficiary to enable the enhancement of their competences in the activities related to the SUMP preparation and implementation.

1.2 The current guidance note summarizes and provides recommendations based on a feedback loop in-person peer-review of the updated transport model developed as the new tool for the SUMP mobility scenario testing. Also, this current note tries to conclude on the high level usability of the model and next steps to be taken for this tool to be properly included in the decision-making process at regional and urban level.

1.3 JASPERS acknowledges the reasonable quality of the works undertaken and the amount of information and data necessary to be compiled and processed.

2. Comments

2.1 JASPERS review of the Bucharest-Ilfov Metropolitan Transport Model (BIM-TM) was based on two main in-person meetings, that followed two main topics:

- Model development and forecast assumptions.
- Follow -up meeting, showing sense-checking, calibration and validation improvements.

2.2 During the first meeting review meeting, the consultant presented the process of model development, with a focus on the base year model assumptions. Through the network checks and model screening, it was agreed that further improvements will be considered until the follow-up meeting. Therefore, the following aspects have been tackeled and improved in the current version of the model:

- Based upon the volume/capacity ratio initial results, a revision of the link capacities for private transport was necessary and undertaken. This allows a more realistic estimation of the volume/delay function results – therefore, general link capacities were decreased in correlation to their link types, as suggested during this meeting.
- The initial version of the model assignment did not treat separately the HGV and LGV traffic volumes, therefore it was recommended that a revision should be included in that sense. So, the consultant developed 2 additional O-D matrices for the two categories of freight vehicles. In order to calculate the O-D matrices, the consultant developed an empirical set of HGV and LGV matrices for the traffic counts for the internal urban trips to which it added up the resulted matrices from the O-D surveys. This resulted into two new synthetic matrices for HGV and LGV transport system, which they were separately assigned to the network.
- Further improvements in terms of calibrating the model was considered necessary and agreed to be undertaken to ensure a more accurate simulation precision of the assignment step. Nonetheless, JASPERS recommended that any changes undertaken for the assignment calibration should be considered in the context of the full-fledged 4-stage model, without manipulation only related to the assignment process, but considering the need that the model should properly assess not only traffic, but also demand – including demand shifts.
- JASPERS noted the need of further refinement of the public transport supply model, as well as a more focused calibration on the metro system. In terms of the supply-side, it was highlighted that the model should be made ready for future refinements and detailing of operator/line performance assessment, thus both the fare system and the

public transport fleet definition were agreed to be coded into the model, and the procedure sequence changed in accordance.

- JASPERS highlighted that aside from consultants own forecasting of the demographic trends, available projections from the National Institute of Statistics should be considered as input in the process of demand forecasting for the future year scenarios.
- Further checks and realism testing were also suggested to highlight properly the level of confidence and reliability of model outputs.

2.3 Based upon considerable work before the follow-up meeting, the above-mentioned recommendation were considered and changes have been made in the model scenarios for base and reference.

2.4 In terms of the meeting the calibration criteria for the private transport, the additional calibration efforts showed slightly improved results, as follows:

Cordon	Initial results – R^2	Reported results after further calibration – R^2
Screen line 1	0.89	0.93
Screen line 2	0.81	0.88
Screen line 3	0.96	0.97
Random links except screenlines	0.96	0.95
All counted links	0.89	0.93

In terms of GEH, for all count points, 82% of the links have a GEH value below 5, while the rest have a GEH value between 5 and 10. Both R2 values and GEH results, show that the assignment model simulates in a reasonable manner the observed traffic behaviour, within the margin of statistical error.

2.5 In terms of meeting the calibration criteria for the public transport, the results shows an R2 of 0.9 for the 50 surveyed points. Furthermore, in terms of the metro passenger volumes, further efforts of calibration the assignment model, lead to an improvement of the results fitness from an R^2 of 0.7 to 0.77. It is noted that for the metro line volumes, the overall metro patronage modelled registers a difference from the observed volume of 4.3%, which can be considered acceptable. Analysing line by line, we noted that in the case of the mature lines in terms of patronage namely M1,2 and 3, the assignment model has a tendency of overestimation, while for the recent services -M4 and M5, the demand seems to be underestimated.

2.6 We note that aside from transport volumes comparison, speeds and travel time comparison have been provided for the public transport, that shows a reasonable fit between the modelled and observed values.

2.7 Throughout the follow-up meeting, the consultant presented the way JASPERS comments were incorporated in the revised model version (of which the results were highlighted in the comments above).. In addition, there was a presentation of future year scenario development and a series of live testing and running the model, with checks and model interrogation to show the model responsiveness and user readiness.

2.8 For the forecast scenarios, the Consultant reported that the demographic zone attributes have been adjusted based on a combination of NIS projections and land-use foreseen changes.

2.9 In terms of sense checking and elasticity testing, the Consultant proposed two tests:

- One test related to demand elasticity to private transport cost, in order to highlight the change in demand if private transport costs vary over time. The empirical test assumed an increase of 1.5 times of the private transport cost, which lead to an absolute decrease in mode share of the private transport of 2.23%, thus leading to an elasticity of -0.11. In terms of the cross-elasticity, the increase in car cost by 50% leads to a shift towards public transport of 2.04%, showing a cross-elasticity of 0.08. Therefore, in terms of elasticities, the model shows a variation of the demand, nonetheless this is in the lower band of literature reported values.
- One test related to demand elasticity to public transport service improvements. The proposed test consisted in including a new metro line in the supply model of the public transport system. The introduction of metro line 5 leads to an increase in an improvement of the metro service by 9.4% in terms of service vehicle-km, which in turn leads to an increase of 10.96% in the metro demand. Therefore, the elasticity of metro demand resulted from the modelled outputs is around 1.16, which is in the range of literature reported values.
- Both tests show that the demand model is performing in a realist manner when changes are introduced in the network/supply side.

2.10 On the reporting side, we noted that additional detailing should be undertaken to the modelling and manual report, as to better highlight the outcomes and to better inform further use of the model. We recommend that the calibration and validation process should be clearly presented in the modelling report, showing which set of data was used for calibration purposes and which one was used for the validation process (mentioning that those data sets should be independent). The sensitivity/elasticity testing should be reported as well, highlighting the results and comparison to the reference literature. Also, further detailing in the modelling report should be included in relation to the forecast process/activity, showing the methods and detailing result plots.

2.11 The modelling report should also include a clear description of the functionality of the model and intended use.

2.12 Model parameters like gasoline prices and car operating costs, or value of time should be checked against Romanian available guidance on unit values and the comparison should be reported, as well.

2.13 In terms of the manual of the model, there should be a series of improvements in relation to:

- The description and coding of model parameters, where specific model constants have been used, those should be referred in the manual on their meaning and their initial estimation method or source of information providing that specific numerical value. This could formalize in a summary list of key assumptions
- Additional appendices addressing:
    - Lists of matrices with description – naming, meaning, how were those calculated (for the ones calculated with miscellaneous procedures), where are they used etc
    - A brief matching and description of each modification/scheme coded
    - Explanation on the scenario management part and how is this built
    - A series of tutorial example or at a minimum a comprehensive lists with changes and types of schemes that can be tested through the model.

3. Conclusions and recommendations

3.1 As a summary, the BIM-TM is a 4-stage demand model, with a detailed supply side. In terms of the assignment, while the demand estimation model results are daily outputs. In terms of the assignment, the private transport assignment is considered for peak hour matrix results, while the public transport assignment runs the daily matrices. The model is developed as a variable model, with capabilities in assessing mode shift between private and public transport modes.

3.2 From a user perspective, the updated model has been now developed and readily available for use in a software platform which is commonly known by the consultancy market in Romania. Moreover, based upon the above mentioned, BIM-TM model is structured with VISUM Scenario Management Tool, which makes this easy to follow, review and further use in the project development phases.

3.3 BIM-TM is a strategic transport planning tool, which was developed for assessing the impacts of the mobility scenarios and action plan proposed in the SUMP. One can conclude that for the above-mentioned scope, the model is fit for purpose and provides reasonable and acceptable results at strategic level, in terms of overall demand and its trends. We strongly recommend that further use of the BIM-TM for project appraisal should be foreseen in the context of additional modelling activities for specific refinements and detailing to ensure a proper granularity of the modelled traffic flows and other relevant results, upon specificity of the project.

3.4 JASPERS notes that though the model can be considered as globally calibrated and validated for the current strategic purpose of the SUMP, there will be further need of calibration and validation, aside from the potential refinements to ensure the fitness to purpose of the model for project scheme testing at the level of pre-feasibility and feasibility study stages.

3.5 We note that at this stage of finalisation of the SUMP, the land-use model and the general guidelines for the land use planning are still undergoing the process of update. From our knowledge, this would be the second time when the SUMP is developed based on an agreed consultants' set of assumptions on land-use scenario. The basis in terms of land-use planning guidelines, existing situation of the functional urban zoning and future urban planning scenarios was the UGP from 2011, to which through several iterations of data collections, consultations with the beneficiary and processing of available information, the consultant made a set of reasonable assumptions, which was agreed and accepted by the beneficiary. Thus, being the case, we recommend that as soon as the new urban general plan will be adopted a thorough check of the transport model in terms of the input data related to spatial development of the urban/metropolitan territory – e.g. transport zoning system, the land-use scenario future proposed etc – should be undertaken. In case of considerable differences between the considered land-use forecasts of the BMI-TM and the new urban general plan, then a revision of the transport model should be considered, together with sense checking the appropriateness of the SUMP action plan at that time.

3.6 Further steps in the use of the model for project appraisal should consider the development of the institutional procedural chain – related to consolidating the organizational structure already in place to manage the transport model, through adequately sizing and provision of resources, defining and approval of process description and procedures related to model access and use, revision and introduction of the use of this tool in the formal decision making process and approval related to strategic decision at urban/metropolitan level, development of an institutional library with guidelines and practitioner notes and references for proper use of the model and its results in project generation, project initiation and appraisal. All this should be formally acknowledged at each relevant institutional level and use uniformly in the region. As we

acknowledge that these steps can be lengthy, the beneficiary should identify and define the critical path of this important stage, while considering an optimal route towards achieving this goal of digitalisation of the decision-making process in strategic transport planning. JASPERS will remain available to discussion further steps in this process in the context of project development and appraisal for EU funding.