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MODELLING OF VILNIUS PUBLIC TRANSPORT ROUTE NETWORK

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Abstract. The territory of the town is divided into areas: residential, industrial and recreational. Such division of the town into areas make inhabitants increasingly dependent on the transport system.
In Lithuania and in other European countries the public transport is recognised as priority transport. In the towns of Lithuania, differently from other places, attention paid to it is insufficient, and the network of routes is being changed in a chaotic and unreasonable way.
Modelling of Vilnius public transport was carried out with the help of VISUM software. The aim of modelling is to guarantee higher quality of living of inhabitants by modelling a public transport route network in Vilnius. A three-level public transport network was formed: main, service and feeder routes, which facilitated rational provision of Vilnius inhabitants with the public transport services.

Keywords: transport system, modelling, public transport, calibration of the model.

1. Introduction

The application of information technologies preconditions the optimisation of performance of transport systems: improvement of the performance quality, safety and efficiency of the overall system, increase in capacity, reduction of the trip duration without high financial investment into construction of the new technical infrastructure. Simulation of the transport system allows analysis of different phenomena related to the traffic organisation without applying expensive practical experiments. Local, national and the EU transport policy organisations before taking decisions need information on costly long-term investment into the infrastructure. Future transport demand is changing with every scenario and model, and the rest factors demanded by such changes could be assessed with certain reliability.

Vilnius was chosen for production of a public transport model within the transport system deliberately. First of all, it is one of those few cities that are served by three modes of the public transport: buses, trolley-buses and mini-buses; second, it is the only city that has undergone comprehensive public transport researches during the last five years.

At present the public transport network of Vilnius is on the average being changed by 20 % of all municipality routes per year. Routes of private passenger transport are even less reliable due to the fact that besides changes in their routes, changes in the size of fleet and in the number of the employed drivers are frequent.

To rationalize the public transport system of Vilnius in a planned way, it is necessary to create its model by establishing hierarchy of routes of different public transport modes in order to reduce their overlapping, which would result in elimination of internal competition and reduction of expenses of public transport services.

The aim of this paper is to guarantee improved quality of life of inhabitants by modelling the network of public transport routes in Vilnius.

2. Foreign experience in the public transport modelling

In 1994, Fernandez et al. proposed development of the integrated trip system with combined modes of trips at three levels: integrated trip modes, points of change and choice of route [1, 2]. At present, the proposed modes are used almost in all the models being used (Scenes, Litres-2, Expedite, Logit, Lohse, Kirchhoff, etc.). *Scenes* model is designed for passenger and goods transport and originated form *Streams* model. *Vaclav – Via* model is designed only for passenger transport [3]. *Expedite* model covers economic development and is less focused on the major goal of the public transport modelling, i.e. on the inhabitant demand for the public transport. Denmark uses the OTM (Orestad traffic model) structure that consists of RP (revealed preference) tasks and SP (stated preference) tasks. RP data were obtained from inhabitant surveys on their trip routes, while in gathering SP data the possibility of choice of inhabitants in choosing a transport mode or the data of Danish trip review were taken into account to a wider extent [4]. *Litres-2* modelling system is designed not only for transport planners but also for operators. This model includes a specialised calculation of service according to demand for the public transport, i.e. by segregating peripheral zones, as zones of lower demand, and also segregating rush and night time. *Logit* model is designed for assessment of demand for the services of special transport taking account of such parameters as time, trip duration and frequency [5, 6].

Today, a number of software packages used for the modelling of the public transport has been created in the world. Some of them are the following: VISION, EMME/2, TRIPS, TRAMOD, TRANSPORT, TRANSYT usually used in European countries and America, and GETRAM and ASCII usually used in Asia. These programmes operate in DOS and Windows. The programmes VISION ir EMME/2 are most popular in the world. For modelling they use classical 4-step transport modelling verified by the experience of many countries. This type of modelling consists of four steps: trip generation, distribution and modal distribution and arrangement of routes [7, 8].

3. Calibration of Vilnius Public Transport Model

The network of Vilnius public transport was built up on the data of 2002 as that year saw the last comprehensive researches. Building up the PT network the data was taken from the VIDAS database, created while drafting the special plan for Vilnius transport infrastructure (tram) development. According to the data available on this database, Vilnius urban and suburban zones served by the PT were divided into 230 transport districts. A 676.9 km long PT network of Vilnius with 506 groups of stops and about 700 additional points necessary for a more precise picturing of the route network was built up. The public transport scheme and routes of buses, trolleybuses and mini-buses of the base year were introduced. O-D (original-destination) matrix was used for the public transport modelling. This matrix of trips was concluded after survey of 8895 passengers at 307 stops of Vilnius public transport. The obtained results were compared with the real values, thus they mostly reflect the real distribution of trips of Vilnius population among different transport districts at the morning rush hours.

The morning rush hour, when the passenger flows are maximum, were chosen for the modelling. Periodical overcrowding is characteristic of the public transport and it is heaviest in the morning and afternoon rush hours, and at that time the key problems of the public transport are revealed [9, 10, 11]. Thus, the need for the PT during the rush hours is most relevant and was chosen as the time interval of modelling.

Modelling with the help of the software package VISUM, the following main rule was observed: the lower the Integrated Choice Index (IPD) of the travel being chosen the greater the number of trips is chosen. IPD is characterised as a combination of the time indicators defined by the user when choosing the travel among transport districts which may be the following: distance to a stop, time spent in a vehicle, the number of transfers, etc. This index in VISUM software package is taken into account during modelling when the choice of different links is compared.

Matching models of the public transport system analysis and analytical structure of the public transport, the coefficients of the Integrated Choice Index are chosen. In every country these coefficients that reflect the criteria under which passengers assess their trip by the public transport, the mode of transport they choose and the routes of their trips are different. Calibrating and modelling the public transport scheme of Vilnius, the most reliable data are the data of the survey of inhabitants carried out in Vilnius in 2001–2002 that reveal the choice of the way of travel and the choice of the route, under which IPD relevance for modelling of Vilnius public transport was found. With the help of VISUM software package modelling could be carried out in the following three ways:

1. Modelling based on the public transport system (*TSys based*) where differentiation of trips is being carried out taking account of even the fact whether the public transport is available on the line in question. Among the lines on which the public transport routes are available the shortest way is looked for.
2. Modelling based on the system of the public transport routes and headways (*Headway based*). This modelling procedure demands initial data on the routes of the public transport, trip duration between stops and headways on the routes. Duration of each separate route of the trip is not taken into account, and the time loss for transfers is equal to a half of the headway.
3. Modelling based on the public transport system with the time-table (*Timetable based*), where account is taken of specific time of arrival, departure, also intermediate time of every vehicle. Passenger flows are directed not to one best road but to different roads, taking account of IPD.

When modelling with regard to every road under IPD meanings, the percentage of passengers who will choose this road (P_i^a) of the total demand for trips, i, on a chosen time interval, a, is calculated. Employment of every link U_i^a is calculated in accordance with the trip distribution function from IPD_i^a .

$$U_i^a = f\left(IPD_i^a\right), \tag{1}$$

$$P_i^a = \frac{U_i^a}{\sum_{j=1}^{n} U_j^a}, \tag{2}$$

where n is a total number of links.

Older VISUM versions used only Kirchhoff distribution law, which is described as follows:

$$U_i^a = IPD_i^{a\ -\beta}, \tag{3}$$

$$P_i^a = \frac{IPD_i^{a\ -\beta}}{\sum_j IPD_j^{a\ -\beta}}. \tag{4}$$

Coefficient β is introduced to define the IPD sensitivity. In this distribution law, IPD sensitivity is very low.

New versions have three more distribution laws included that have higher IPD sensitivity. One of them is Logit distribution law in which IPD is set as the indicator e of the function:

$$U_i^a = e^{-\beta \cdot IPD_i^a}, \tag{5}$$

$$P_i^a = \frac{e^{-\beta \cdot IPD_i^a}}{\sum_j e^{-\beta \cdot IPD_j^a}}. \tag{6}$$

Another distribution law is Box-Cox. When τ = 0, then this distribution is calculated under the following formula:

$$b^{(\tau)}(x) = \begin{cases} \dfrac{x^\tau - 1}{\tau} & \text{if } \tau \neq 0, \\ \log(x) & \text{if } \tau = 0. \end{cases} \tag{7}$$

When performance is being calculated, Logit model consists of $b^{(\tau)}\left(IPD_i^a\right)$ instead of IPD_i^a , i.e. $U_i^a = e^{-\beta \cdot b^{(\tau)}\left(IPD_i^a\right)}$. P_i^a , where i number of links exists per time interval a, is calculated under the following formula:

$$P_i^a = \frac{e^{-\beta b^{(\tau)}\left(IPD_i^a\right)}}{\sum_j e^{-\beta b^{(\tau)}\left(IPD_j^a\right)}}. \tag{8}$$

It is true to say that this model connects two aforementioned models, as when τ = 0, we get the Kirchhoff distribution, and when τ = 1, then we get Logit.

And the last distribution law, in which the calculated IPD are interrelated, which in essence is different from other laws, is Lohse distribution law:

$$U_i^a = e^{-\left[\beta\left(\frac{IPD_i^a}{IPD^a} - 1\right)\right]^2}, \tag{9}$$

$$P_i^a = \frac{e^{-\left[\beta\left(\frac{IPD_i^a}{IPD^a} - 1\right)\right]^2}}{\sum_j e^{-\left[\beta\left(\frac{IPD_j^a}{IPD^a} - 1\right)\right]^2}}, \tag{10}$$

where $IPD_*^a = \min_j IPD_j^a$ is the smallest IPD option in the model, and β is the parameter that controls the IPD sensitivity.

In this case link dependences are minimally related with IPD, i.e. differences in link IPD are optimally precise. Taking this fact into account, Lohse model could be used as an alternative to Kirchhoff or Logit models but could not replace Box-Cox model.

One of the key indicators for model calibration is a general indicator of passenger transfers, which was taken from researches on the public transport passenger flows. It is a very high indicator of transfers, which under moderate and inconsistent frequency of departures on routes has a negative impact on the choosing the public transport for travelling.

The points that to the highest extent reflect the distribution of passengers within the network were selected for model calibration: the groups of stops usually used for the transfer from one PT vehicle to another and the sections of streets with the heaviest loads during the morning rush hours (Fig 1).

Calibration of Vilnius PT network was carried out after selection of three possible methods: *TSys-based*, *Headway-based* and *Timetable-based* methods. In the *Timetable-based*

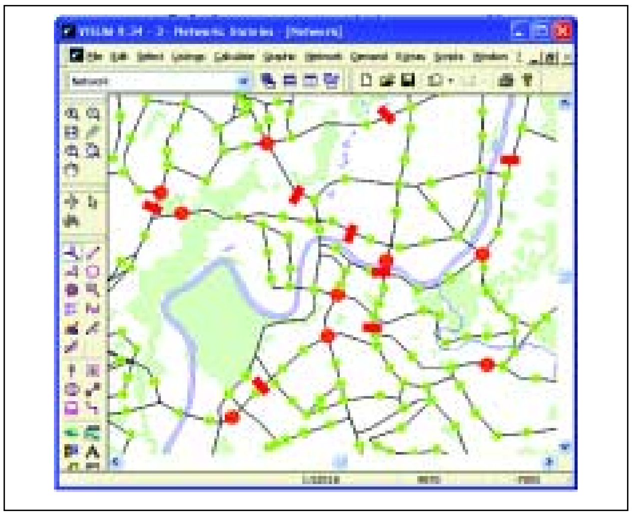

Fig 1. Chosen stops and sections, compared with data in 2002

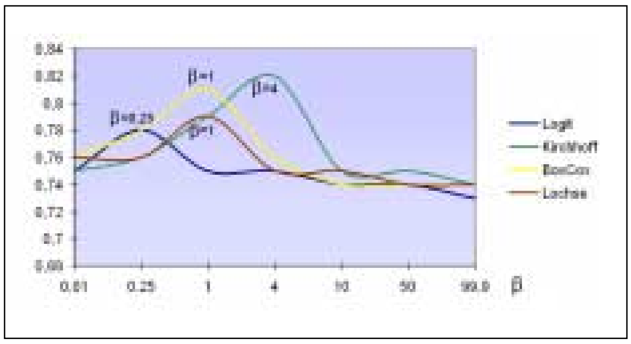

Fig 2. Schematic dependence of conformity coefficients in coefficient β variations

model the above-described distribution laws Logit, Kirchhoff, BoxCox and Lochse are inter-changed.

In timetable-based model, in distribution laws Logit, Kirchhoff, BoxCox and Lochse coefficients β were first of all chosen those that optimally conform with passenger flow distribution. This coefficient is important for the fact that it was introduced to describe the sensitivity of the integrated choice indicator that reflects the criteria of the choice of the way and route of trip by inhabitants. Optimally chosen coefficient β of the distribution law will to the largest extent reflect passenger flows of the real public transport system of Vilnius. Comparing different coefficients β in distribution laws Logit, Kirchhoff, BoxCox and Lochse a dependence on the basic distribution of passengers found is given in Fig 2.

Taking account of the received results, comparisons between the basic public transport system of Vilnius and the obtained models of the public transport system are described, where β = 0,25 in distribution law Logit, β =1 in distribution laws BoxCox and Lochse, and β =4 in distribution law Kirchhoff.

The obtained results, i.e. the number of passengers at the stops and street sections in question, was turned into a coefficient revealing their correspondence to the basic data, which reveals the percentage of correspondence of the obtained numbers to the real passenger flow survey data (Table 1). Modelling by *TSys-based* method, the coefficient of the number of passenger transfers was very low (0.03) and, vice versa, it was high when modelling by *Timetable-based* method, while when modelling by Kirchhoff method (where β =4), the data almost completely corresponded to the basic data calculated during the real passenger flow survey.

The greatest stop group conformity coefficient (0.86) was received applying *Timetable-based* model with Logit and Lochse distribution laws. Using Headway-based model, the stop group conformity coefficient was the lowest one and equal to 0.72. In this case the coefficient of Kirchhoff distribution law is slightly lower and equal to 0.82. We may conclude that Timetable-based model with distribution law

Table 1. Coefficients of Vilnius public transport network modelling applying different methods

		Transfer conformity coefficient	Stop conformity coefficient	Section conformity coefficient	Average
Survey data of 2002		1	1	1	1
TSys-based		0.03	n/a	0.7	0.24
Headway-based		0.62	0.72	0.69	0.68
Time-table - based	Logit	0.80	0.86	0.67	0.78
	Kirchhoff	0.99	0.82	0.65	0.82
	BoxCox	0.96	0.79	0.67	0.81
	Lochse	0.85	0.86	0.67	0.79

Kirchhoff or BoxCox, where the average conformity of coefficients with the basic survey of 2002 and are equal to 0.82 and 0.81, should be used for further development of the public transport network of Vilnius.

4. Conclusion of an optimal theoretical PT service scheme

While developing urban transport systems, strategic issues are faced: what should be given priority, on which transport mode should restrictions be imposed, how to create a sustainable urban transport system [7].

According to Prof. Burinskienė and USA scientist Gakenheimer, the main reasons for the public transport decline are related to the lack of hierarchy of the public transport route network: routes of different transport modes overlap and this results in the competition among operators, which makes this system inefficient and non-prospective [12, 13]. Planning the new theoretically optimal route scheme and its services, the public transport route network was optimised under the following criteria:

1. simplification of the public transport system to make it better understandable to a passenger;
2. make the time of passengers spent for the trip minimal;
3. to use the existing vehicle fleet in a more rational way.

The proposed public transport network consists of 18 trolleybus routes (contact network base), 24 bus routes and 22 minibus routes. The number of routes in Vilnius was reduced by half and to satisfy the need of inhabitants for travelling the frequency of routes was increased.

Three-level public transport route network is being modelled:

- The main routes consist of trolleybus served routes and the main 10 bus routes. Frequency is 4–7 min.
- Service routes will consist of the routes served by buses. Frequency is 10–15 min.

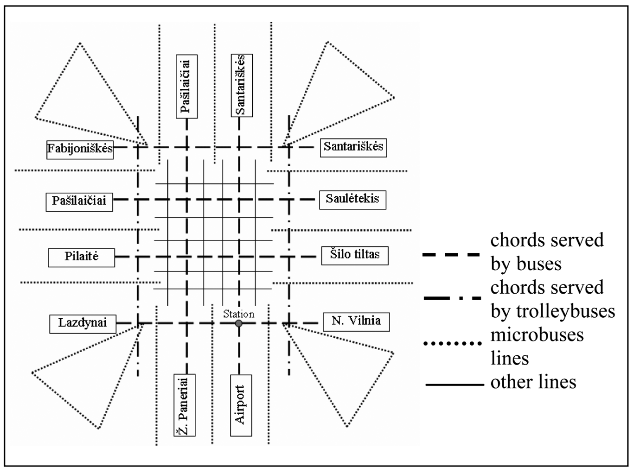

Fig 3. Service scheme of urban chords

- Feeder routes in Vilnius peripheral areas will be served by minibuses. Frequency is 15–20 min.

For services on the main routes the priority is given to the electric vehicle, a trolleybus. Their network is optimised on the existing contact network base. The main bus routes are planned to serve urban chords (Fig 3). Creating chord routes of a higher service level two goals are achieved: first, a higher level of public transport services is guaranteed in the city. When routes are situated in chords, the time of trip becomes shorter and the number of transfers becomes lower. Second, passengers use the buses in a more efficient way, as shorter trips will require lower run of a vehicle [14].

Urban chords will be served by 7 bus routes, two marginal vertical chords – Laisvės pr. and Antakalnio g. – leaving to be served by trolleybuses, which will fully satisfy the needs of inhabitants. Three main bus routes are attributed to 7 routes that service the main urban chords: Station – Airport, Lazdynai hospital – Santariškės and Žvėrynas – Old Town – Žvėrynas (circular route that services the Old Town). These routes are singled out, as they are in the areas attributed to the highest service zones and heavily visited by tourists. Outskirts of the town with low passenger flow are serviced by minibuses as the use of bigger capacity public transport vehicles is not efficient there.

Results of the modelled basic scheme and new scheme revealed that reduction in the number of routes by two times resulted only in 1.1 time (6 %) higher number of transfers during morning rush hours, i.e. from 52580 to 55586. Comparing the number of transfers per trip, in the morning rush hours the number of passengers travelling without transfer went down by 17.5 %, and the number of trips with one transfer went up by 19.4 %. Passengers would feel the changes due to a reduced number of trips with three transfers, what makes a trip by the public transport inconvenient and unattractive and then other ways of travel are chosen. Comparing the time spent for transfers after implementation of the proposed transport scheme, the time of transfers on morning rush hours would increase by 313 minutes, which would account for 3.8 % of time spent for transfers.

Taking into account changes in passengers' travel time after the route scheme of the public transport services is changed, the travel time of passengers became shorter by 61.1 %. The travel time of 36.7 % of passengers remained the same, i.e. it became shorter or longer by 5 minutes. After replacing the basic route scheme by the proposed one, the travel time became longer only for 2.2 % of passengers, which shows that the proposed routes of the public transport services are in a shorter distance between departure and destination.

5. Correction of the indicators of the theoretical scheme of services taking the run use coefficient into account

A theoretical scheme was drafted only for proposals based on the reasoning of the author, and the first step should be its quantification. The main quantity indicators when changing service route schemes is a number of carried passengers and the run use coefficient. The number of carried persons remained unchanged comparing with the basic scheme and the proposed scheme of the public transport services, thus the same travel matrix was used. Run coefficient β is an indicator of a level of vehicle use within transport process, which shows the ratio of a vehicle run with passengers l_p and the total run, which besides the run without passengers also includes idling l_t [15]:

$$\beta = \frac{\sum l_n}{\sum \left(l_p + l_t\right)}. \qquad (11)$$

Urban public transport run use coefficient in our country is 0.97–0.99 [15]. For the vehicle run to be sufficiently exploited, we assume that the run use coefficient should not be lower than 0.9. Calculation of the run coefficient of every route revealed that the run coefficient of trolleybus services satisfied the condition. The routes that fail to satisfy the condition are corrected by prolongation or direction to other links.

Changes in the route resulted in 0.5 % longer time of travel, while the number of transfers went down by 4.6 %, i.e. from 55 586 to 53 045. The time spent for transfers became shorter by 7.6 %.

6. Correction of the indicators of the theoretical scheme of services taking the capacity use coefficient into account

Besides quantity indicators, the public transport is also defined by quality indicators [15]. Modelling the time spent by passengers for travel, it was tried to reduce the number of transfers from the beginning, thus the remaining key indicator is the indicator of a vehicle occupation, which could also be expressed in the capacity coefficient. Capacity coefficient γ_s, expressed by a ration of really carried passengers Q_f and passengers that could be carried by making full use of the vehicle capacity Q_n :

$$\gamma_s = \frac{Q_f}{Q_n}. \qquad (12)$$

Capacity coefficient is different not only on different routes but also in different time of the day. In Lithuanian towns, the capacity coefficient goes up from 0.15 to 0.30 and from 1.15 to 1.24 during the afternoon rush hours [15].

Vehicle occupation and capacity coefficients reflect two positions: vehicle occupation reveals the level of comfort of a passenger on a vehicle, while the capacity coefficient shows the attitude of the operator. Thus this indicator is limited on both sides. We assume the condition that capacity coefficient, taking account of the maximum number of passengers on the route, should not be lower than 0.7 for the operator to work without losses and not higher than 0.95 for passengers to have a comfortable drive.

Correcting the capacity coefficient, the same as in the case of the run coefficient, the routes of buses that mostly service visitors of the town remained unchanged. Other routes are changed by increasing the capacity coefficient, changing their frequency and even the type of vehicles. Modelling of the changed frequencies as the first access to the route scheme satisfying all conditions revealed that not all capacity coefficients satisfy the set conditions due to the influence exerted by the routes with the changed vehicle types of different technical parameters. In the second case we choose new route frequencies for the changed scenario. Modelling shows that > 85 % of all routes satisfy the set conditions. As the capacity coefficient does not go lower than 0.5, implementation of this scheme could be started and calibration of routes could be carried out when passenger flows on routes settle.

The travel time of passengers of the chosen scheme during rush hours in Vilnius went down by 27.3 % if compared to the basic scheme.

The time spent for transfers in the final scenario is 9.5 % lower than that of the basic scenario. Comparing these two scenarios, the number of transfers went down by 2288 transfers or almost by 4.4 %.

Comparison of transfer data showed that route scheme calibration on the grounds of run and capacity coefficients increased the number of direct trips and reduced the group of trips that need transfers.

7. Conclusions

1. Simulation of the public transport system allows analysis of different phenomena related to the traffic organisation without applying expensive practical experiments. Simulation is the only way to forecast the need for transport in future and the behaviour of the system participants, as well as to plan actions for the implementation of the future scenarios.

2. Calibrating and modelling the public transport scheme of Vilnius, the most reliable data are the data of the survey of inhabitants carried out in Vilnius in 2001–2002 that reveal the choice of the way of travel and the choice of the route.

3. Having analysed all coefficients obtained during modelling we conclude that Timetable-based model with distribution laws Kirchhoff ($\beta = 4$) and BoxCox ($\beta = 1$) with the average conformity of 0.82 and 0.81 is the best for further modelling of Vilnius public transport development.

4. Comparing the newly modelled scheme with the basic scheme reveals that reduction of the number of routes by half resulted in an increase in the number of transfers during the morning rush hour only by 1.2 times, i.e. by 18 %, while their length increased by 0.8 %. The travel of the public transport passengers during the morning rush hours became shorter for 61 %, while for 37 % of passengers it remained the same. Taking account of these results, it could be concluded that at present the public transport scheme is overloaded.

5. Public transport on Gedimino avenue has a positive impact on general indicators of the public transport services during rush hours. The total travel time of passengers went down by 0.2 % and the time spent for transfers – by 0.6 %. Therefore, the scheme with the routes on Gedimino avenue was chosen for further modelling.

6. While modelling in three steps – theoretical schemes, corrected schemes on the grounds of the run coefficient and corrected schemes on the grounds of capacity coefficient – every step made improvements on the passenger service indicators. If compared with the basic scheme, the total time of travel went down by 27.3 %, the time spent for transfers became 9.5 % shorter, and the number of transfers went down by almost 4.4 %. Therefore I propose this three-step modelling method to be applied when modelling public transport schemes of other towns.

References

1. Lo, H. K.; Yip, C. W.; Wan, Q. K. Modelling competitive multimodal transit services: a nested logit approach. *Transportation Research Part C*, 2004, Vol 12C, p. 251–272.
2. Wardman, M. Public transport values of time. *Transport Policy*, 2004, Vol 11, p. 363–377.

3. Jong, G.; Gunn, H.; Ben-Akiva, M. A meta-model for passenger and freight transport in Europe. *Transport Policy,* 2004, Vol 11, p. 329–344.
4. Jovicic G.; Hansen, Ch. O. A passenger travel demand model for Copenhagen. *Transportation Research Part A,* 2003*,* Vol 37, p. 333–349.
5. Horn, M. E. T. Multi-modal and demand-responsive passenger transport systems: a modelling framework with embedded control systems. *Transportation Research Part A,* 2002*,* Vol 36, p. 167–188.
6. Horn, M. E. T. Procedures for planning multi-leg journeys with fixed-route and demand-responsive passenger transport services. *Transportation Research Part C*, 2004, Vol 12C, p. 33–55.
7. Burinskienė, M. Sustainable urban development. Vilnius: Technika, 2000. 251 p. (in Lithuanian).
8. Trujillo, L.; Quinet, E.; Estache, A. Dealing with demand forecasting games in transport privatization. *Transport Policy*, 2002, Vol 9, p. 324–334.
9. Stopher, P. R. Reducing Road Congestion: a Reality Check. *Transport Policy*, 2004, Vol 11, p. 117–131.
10. Baldwin Hess D. et al. Waiting for the Bus. *Public transportation*, 2004, Vol 7, p. 137–148.
11. Hensher, D. A.; Stanley, J. Performance-based quality contracts in bus service provision. *Transportation Research Part A,* 2003*,* Vol 37, p. 519–538.
12. Baublys, A. et al. Transport: Technology, Economy, Environment, Health. Vilnius: Technika, 2003. 875 p. (in Lithuanian).
13. Gakenheimer, R. Urban mobility in the developing world. *Transportation Research Part A,* 1999*,* Vol 33, p. 671–689.
14. VIPS/3 User's manual. VIPS AB, Gothenburg, 2000. 499 p.
15. Jurkauskas, A. Public transport. Kaunas: Technologija, 2004. 247 p. (in Lithuanian).

VILNIAUS MIESTO VIEŠOJO TRANSPORTO MARŠRUTINIO TINKLO MODELIAVIMAS

R. Ušpalytė-Vitkūnienė

Santrauka

Miesto teritorija skirstoma į skirtingos paskirties rajonus: gyvenamuosius, pramoninius ir rekreacinius. Toks miesto susiskaidymas į rajonus daro gyventojus vis labiau priklausomus nuo transporto sistemos. Lietuvoje ir Europos valstybėse prioritetiniu pripažintas viešasis transportas Lietuvos miestuose, kitaip nei kitur, nesulaukia reikiamo dėmesio, o maršrutinis tinklas šiuo metu keičiamas chaotiškai ir nepagrįstai. Vilniaus miesto viešojo transporto modeliavimas buvo atliktas naudojant VISUM programinę įrangą. Modeliavimo tikslas – užtikrinti geresnę miesto gyventojų gyvenimo kokybę modeliuojant viešojo transporto maršrutų tinklą Vilniaus mieste. Suformuotas trijų lygių viešojo transporto maršrutų tinklas – pagrindinių, aptarnavimo ir pagalbinių maršrutų – leido minimaliomis sąnaudomis užtikrinti racionalų Vilniaus miesto gyventojų aptarnavimą viešuoju transportu.

Reikšminiai žodžiai: transporto sistema, modeliavimas, viešasis transportas, modelio kalibravimas.

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