THE STUDY IMPROVEMENT OF SPATIAL ASPECTS OF PUBLIC PERSONAL TRANSPORT IN FORMER CZECHOSLOVAKIA

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SUMMARY

The bus trasportation and the railway one can be used as a indicator of spatial structure of the state territory. The timetables from years 1968 (before the federalisation of Czechoslovakia), 1981 and 1991 (before the creation of two independent republics) were analysed. The author deals with the simple registration of transport connections and the graph diagnostics of the spatial structure of inter-urban flows in the network of the 33 largest towns (22 in Czech Republic and 11 in Slovakia). The paper is the simple introduction to the next analysis.

The objective of the paper is to present - in brief - the information on the possibilities of the spatial structure research being just completing. As it is evident from my previous endeavour, I accent just the transportation spatial structure which seems to be an important geographic symptom of the social organization. I consider - in general - the transport spatial structure to be a very sensitive parameter and the application of the transport geographical tools seems to be very suitable under such circumstances. I can find identical endeavours with my colleagues.

The paper presents the first results of the investigation of transport compactness and transport spatial structure of the former Czechoslovakia for the years 1968, 1981 and 1991 while taking into consideration the public personal transport.

The former Czechoslovakia represents actually a very suitable matter to verify such arguments. Since 1969 Czechoslovakia has been a federal state which disintegrated at the end of 1992 into two independent states in a peaceful manner. And just for that reason those years preceded these events (1968, 1991) have been chosen to evaluate the spatial structures while the other monitored year (1981) has been introduced only to catch the ten-year difference in the development of the most dynamic components of the transport system (that is obviously a well developed system of long-distance bus lines with seat reservation). The settlement system seems to be mature enough from the development point of view and even a relatively high density of population, degree

of industrialization and a high mobility of population (rather commuting mobility than migration one) can be declared. On the other hand a massive presence of public personal transportation (in addition strongly endowed by the state) has certainly been a compensation for a very low degree of automobilization. For that reasons the timetable analyses of ČSD (state railways) and ČSAD (state bus transportation) is considered to be a reliable basis making possible to document - with a high degree of reliability - even a time dynamics of changes in a spontaneous spatial organization of Czechoslovakia.

Unfortunately the scope of this paper makes possible only to present a general idea on a selected methodology of transport geographical investigation whereas any deep discussions concerning the telling ability of the acquired results should be presented in some of my next papers.

I should like to stress once again that I have investigated just the public bus transportation (ČSAD) and person transportation by railway (ČSD) according to the timetables covering the above mentioned years. All the connections have been

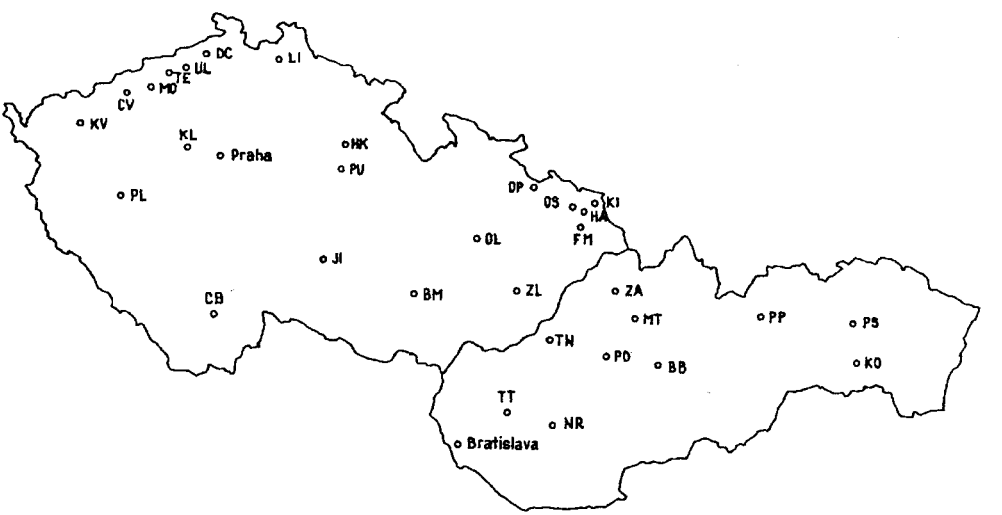

Fig. 1. The 33 largest towns of former Czechoslovakia. The following abbreviations mean in Czech Republic:
BM - Brno, OS - Ostrava, PL - Plzeň, OL - Olomouc, LI - Liberec, HK - Hradec Králové, UL - Ústí nad Labem, CB - České Budějovice, PU - Pardubice, HA - Havířov, ZL - Zlín, KL - Kladno, MO - Most, KI - Karviná, FM - Frýdek-Místek, OP - Opava, KV - Karlovy Vary, DC - Děčín, CV - Chomutov, TE - Teplice, JI - Jihlava
in Slovak Republic:
KO - Košice, NR - Nitra, PS - Prešov, BB - Banská Bystrica, ZA - Žilina, TT - Trnava, MT - Martin, TN - Trenčín, PP - Poprad, PD - Prievidza

evaluated only in the set of 33 largest towns in Czechoslovakia (to the date of Census in 1991) while 22 towns is in Czech Republic and 11 in Slovak Republic. The population of these 33 towns represented roughly 1/3 of the whole population (exactly 30.8 % while 33.8 % in Czech Republic and 25.0 % in Slovak Republic - in more detail 35.6 % in Bohemia and 31.0 % in Moravia and Silesia). An eventual extension of the town number run on the technical possibilities of processing, moreover the comparable representativeness of this set for individual regions of the former Federation would be affected (the set of towns is presented in the form of a list and cartographically in Fig. 1). No the lines but the actual number of real connections (transport possibilities) has been subject to analysis under the condition that 2 towns at least have been connected from the specified set of the towns. The express trains have been differentiated from the ordinary passenger trains in the railway transportation and the connections with seat-reservation from the other connections in the bus transportation (the connections with a seat reservation are applied usually on long distance lines). In accordance with the premises of accepted transport geographical analyses the stress was laid on the analysis of the nearest neighbour but the primary data allow to analyse even some other relationships than only an immediate neighbourhood (i.e. when connecting the towns A, B and C, the pairs AB and BC have been registered for the task of type "immediate neighbourhood" but also the pair AC for the tasks of a different character).

The very principle of the study is considered to be the recording of connections. Let us call the specific situation arising due to a combination of individual conditions to be detected "the task". The example of such task definition can be as follows: bus transportation, connections with seat reservation, Saturday, year 1981, only immediate neighbourhood. Thanks to C. Grasland from the Equipe P.A.R.I.S. (Paris, France) the basic matrix has been set up from my primary data while this matrix represents mutual relationships of all 33 towns where every relation involves all registered connections applicable for any of the next defined tasks. To transfer a separate task to a graphic form the Grasland's program PASCART is applied. The analysis proper has been divided into two sequential stages:

1) registration, summarizing and cartographic visualization of transport connections for a particular task in a graph approach,

2) analysis of spatial transportation main features in a particular task.

The first stage seems to be quite understandable from the previous text. The second stage, however, requires a detail explanation.

When assuming that the transport geographical analyses are considered to be sensitive tools to understand a spatial structure of a territory, then such a sensitivity should be utilized as much as possible. I believe that the detail manifestation of the structure is best to be characterized in the state where the maximum possible number

of partial structural components should become evident. In other words, I shall gradually investigate the graph spatial structure corresponding to a particular task, i.e. starting from the state where the edge with the highest numerical value is present (the value is given by a number of connections in the given pair of towns - as a sum in both direction) up to the registration of all edges existing (with non-zero value) in the graph for the selected task. At the same time, however, I shall continuously register - for every consequential step - just the number of all non-trivial connective subgraphs. The maximum number of these subgraphs during the whole procedure within the given tasks conveys me that just in the given step the particular inner structure of the transportation system is that which is the most favourable for a detail structurization. After all, one usually starts from the only edge (the number of non-trivial connective subgraphs is thus equal to one) and the procedure is - as a rule - terminated again at the only one non-trivial connective graph which, for the nonce, represents all the transport connections registered in the particular task. There is no doubt that no the only maximum can be achieved during the whole procedure while proceeding regressively according to the values assigned to separate edges, but a presence of a higher number of maxima - during the identical procedure - can easy be expressed graphically (here, if necessary, through different type of lines). Apart from this it is quite evident that the bus transport tends "to copy" the separate agglomerates of towns

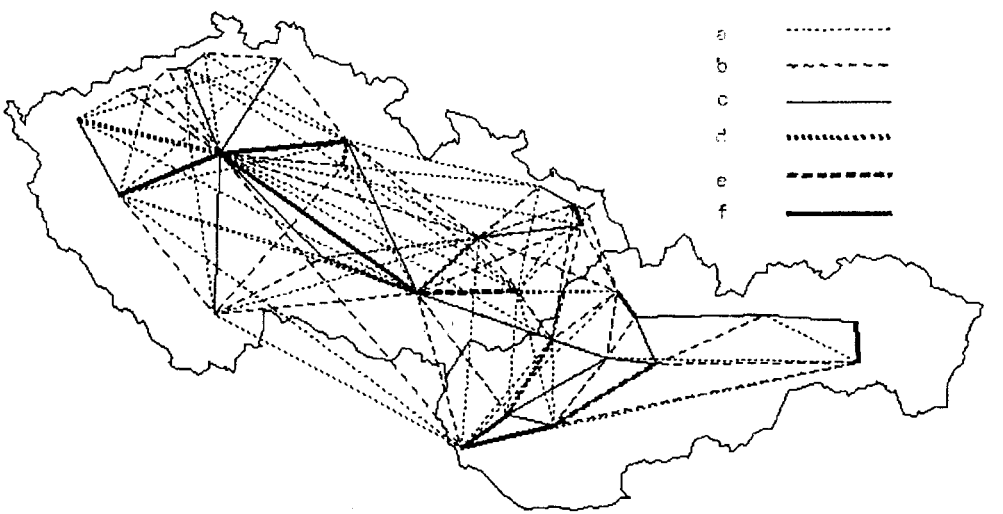

Fig. 2. Results of the first stage of the first task number of connections in both directions
a) 1 - 6
b) 7 - 20
c) 21 - 32
d) 33 - 38
e) 39 - 44
f) 45 and more

(and creates thus more frequently the structures with a higher number of subgraphs) while the railways system in Czechoslovak conditions tends to form a low number of such subgraphs and thus to generate prematuraly the only connective graph.

The second of both the stages, however, has not only the generalization meaning but even the diagnostic one, due to a high number of processed tasks (at present 38 tasks are available) namely when considering the time dynamics.

For the general information the results of two tasks are enclosed in a graphic form.

1st task;

dispositions: bus service with seat reservation, working day, 1991, immediate neighbourhood is analysed;

a) cartographic presentation of the 1st stage results (registration stage) - see Fig. 2

b) cartographic presentation of the 2nd stage results (analytic stage) - see Fig. 3

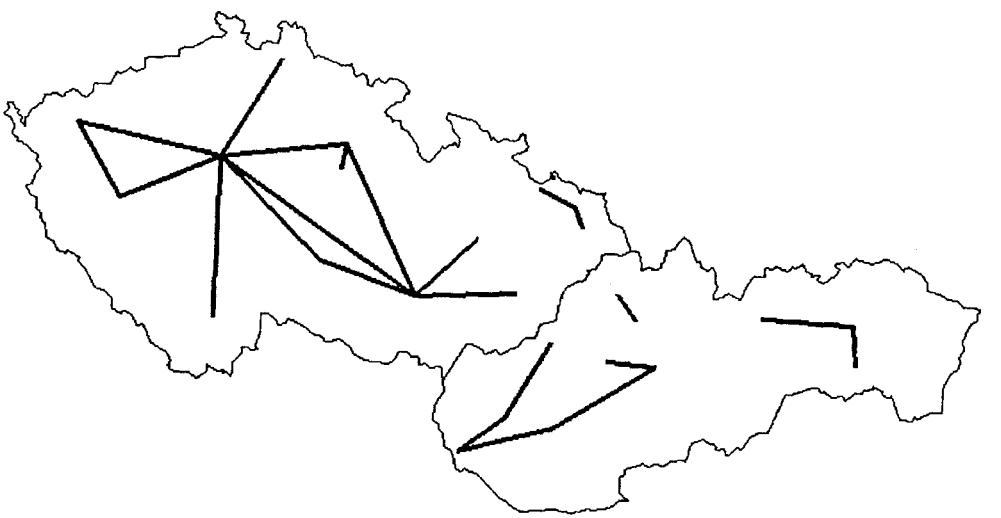

Fig. 3. Results of the second stage of the first task

Five non-trivial connective subgraphs are presented of them two in Czech Republic and three in Slovak Republic. The drawn edges in the graph represent 28 % in total of all recorded connections in the network of 33 towns.

2nd task;

dispositions: trains, only express trains, working day, 1991, immediate neighbourhood is analysed;

a) cartographic presentation of the 1st stage results - see Fig. 4

b) cartographic presentation of the 2nd stage results - see Fig. 5

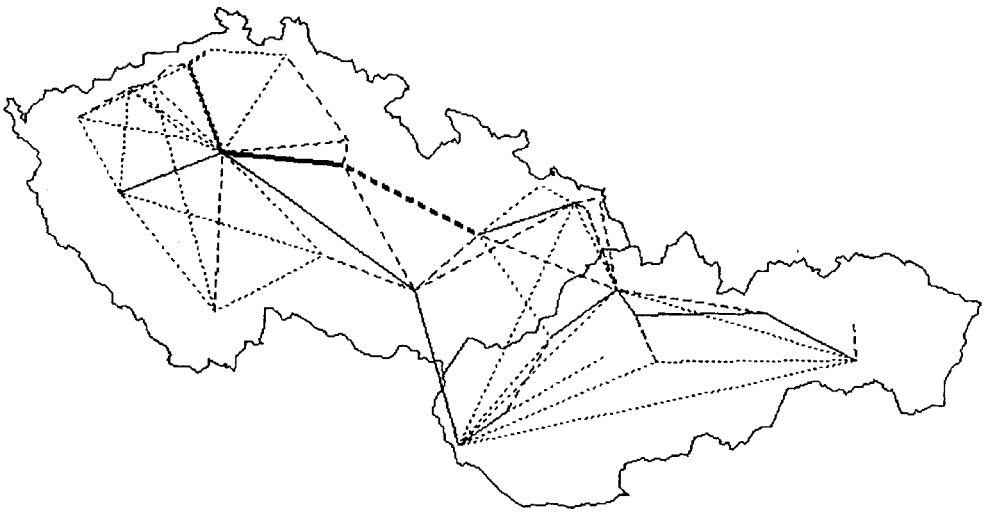

Fig. 4. Results of the first stage of the second task (see the legend in Fig. 2)

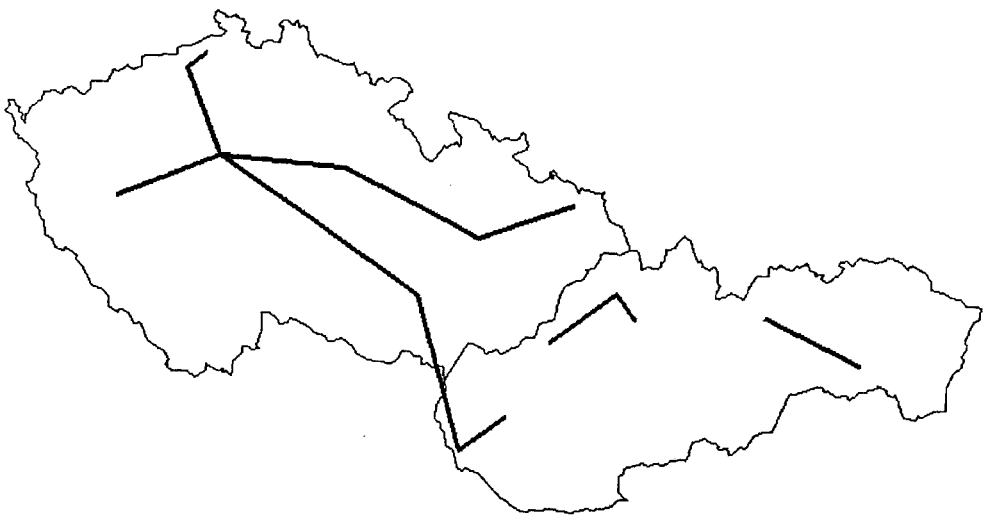

Fig. 5. Results of the second stage of the second task

In this case the state with 3 non-trivial connective subgraphs is represented. The drawn edges in the graph represent 27 % in total of all recorded connections in the network of 33 towns.

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REFERENCES:

BAILLY, A.S.,GUESNIER, B., PAELINK, J.H.R., SALLEZ, A. (1987): Comprendre et maîtriser l'espace, ou la science régionale et l'aménagement du territoire. GIP RECLUS, Montpellier, 176 pp.

CATTAN, N. (1992): La mise en réseau des grandes villes européennes. Université Paris I, Paris, 379 pp.

DUPUY, G. (1985): Systèmes, réseaux et territoires. Presses de l'Ecole Nationale des Ponts et Chaussées, Paris, 168 pp.

MERLIN, P. (1991): Géographie, économie et planification des transports. Presses Universitaires de France, Paris, 473 pp.

REITEL, B. (1987): L 'espace fonctionel routier européen: accessibilité routière entre 54 villes d'Europe occidentale. D.E.A., Strasbourg, 119 pp.

SMITH, D.M. (1975): Pattern in human geography. Penguin Book, New York, 373 pp.

VARLET, J. (1987): Géographie des relations ferroviaires en France. Université de Clermont II, Clermont-Ferrand, 219 pp.

VARLET, J. (1992): L'interconnection des réseaux de transport en Europe/Interconnection of transport networks in Europe. ITA études et documents, Vol. 24. Institut du transport aérien, Paris, 198 pp.