DEFINITION OF THE TRAFFIC-GEOGRAPHICAL SITUATION OF SETTLEMENTS OF SOUTHERN PART OF TRANS-DANUBIAN MEZOREGIONS

MRS. DÖBRÖNTE — R. MÉSZÁROS — B. CSATÁRI

To define the traffic-geographical situation of settlements is of basic importance because in this way we can see the possibilities and connections as well as characteristic features of these connections of the settlements and the economic and social life of the country.

A lot of authors have dealt with this problem in technical literature. A general characteristic feature of these researches is that they give a multilateral analysis in connection with the outstanding centres. It is of no doubt that this factor plays an important role in the life of the settlements. But attention must be paid to the fact that on the one hand the settlement function of the centres undergoes positive or negative changes because of the dynamic changes in the economic and social courses, so the modulating effect of these settlements on the traffic-geographical situation changes too. On the other hand every settlement has certain potential traffic-geographical capacities. These capacities must be taken into consideration when analysing the relationship between a settlement and a centre. These facts made us extend our analysis from a single-centred analysis to a many-centred one.

I. Characteristic features that can be used to define the traffic-georgaphical situation

1. *Road network*

a) The number of roads going through the given settlement which expresses the directions of the connection as well as the possibilities in connection with the network of roads in the country.

b) The quality of the roads which distribute the possibilities according to the real capacities of the roads given by the connections.

c) The number of bus routes which express the transport claims of the population in a given settlement (on condition that the number of bus routes is in proportion to the present claims of transport).

d) The period of time during which the place to where the population travels can be reached which restricts the possibilities given by the number and quality of the connections to the actual travels.

2. *Railway network*

The same factors were taken into consideration as in the case of the road network.

The ratio of the modulating effect within the transport-geographical situation in the case of settlements of a central role.

It is very important to measure the attractiveness of cities and city-like settlement to define the traffic-geographical situation. It is a well-known fact that there is a strong connection between the settlement network and the transport network. The hierarchy of the settlement defines the main tendencies, the number and quality of the arterial system of roads, and it is very important in the sphere of transport-attractiveness of the settlements. It is obvious that in the development of the traffic-geographical situation of certain settlements the role of cities, city-like settlements and centres of lower grade, big villages which have certain places in the hierarchy of the settlements play an important role. They have attractiveness in connection with the economic and social life. The effectiveness of this attractiveness is defined by the quality and size of their role. The distribution of the settlements which are on the same level in the hierarchy is not equal because of the areal differences of cultural, social and economic life. Their areal density is in connection with the above-mentioned factors. According to this certain settlements which have not too much of a central role or which have no central role at all can belong to more than one centre of attractiveness at the same time. This situation has an effect on their traffic-geographical situation and these basic effects must be taken into consideration throughout the research.

II. The method of defining the traffic-geographical situation of settlements

The actual definition of the traffic-geographical situation was carried our by automatic classification. The above-enumerated factors after certain modifications can be regarded as vector components, so a vector can be applied to each settlement. Then a disjunct heap of these vectors was created in an *"n"* dimension space by a computer. This disjunct heap classified the settlements into types in connection with the traffic-geographical situation and it gives a concrete indicator number too with maximum concentration (this concrete indicator number means the length of the vector applied to the central point of the disjunct heaps). So the traffic-geographical situation of the settlements can be expressed.

The main aspects in processing the most important characteristics which were used to denote the traffic-geographical situation:

1. The number and quality of the road connections if they were in close connection with one another, were not separated.

2. The same principle was followed in the case of the railway too, so the connections of the railway network, i.e. the number and quality of them were taken together.

3. During the research the unification of the index numbers of railway and road transport is an important problem.

A general principle in rayon research is that the railway transport is an element that belongs to subordinate, mezo- and macro-centres while road transport carries out connections among micro-regions. In the case of passenger transport the railways can carry out connections among micro-centres too. Since in this study the passenger transport is take to be one of the basic transport factors the taxonomical distribution of the region does not differentiate between the two branches of transport. This is supported by the fact that bus transport and railway passenger transport are not in practical correlational connection. This independence of the factors proves that the elements in transport exist beside one another.

In our opinion the number and quality of the connections is only a potential possibility for the settlements so the differentiation between these two branches with regard to these factors is not needed. But the number of train-routes which similarly to the number of bus-routes expresses the transport capacities having greater transport capacities as well as the similar qualitative function of the bus and train in passenger transport can be used only with weighting.

The weighting factor can be defined by the heaped curves given by the frequency of the number of train or bus routes according to the settlements Fig.(1.)

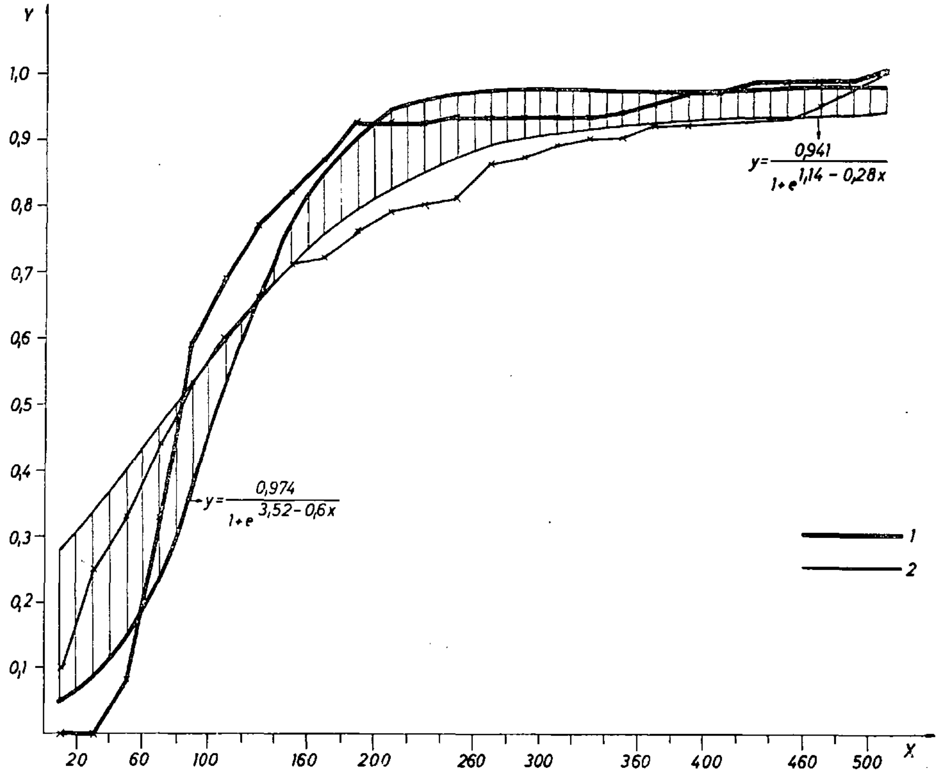

Fig. 1. The number of bus and train-routes in the mezoregion in Southern Part of Trans-danubian and the heaped frequvency values and ogives according to the routes
x = number of routes
y = relative freqvency
1 = train
2 = bus

The heaped frequency values of the number of routes can be approached sufficiently by the Pearl—Read type logistic curve.

The heaped frequency curve of the number of train routes can be denoted by the

$$y=\frac{0,974}{1+e^{3,52-0,6x}}$$

while the heaped frequency of the number of bus routes can be denoted by the

$$y=\frac{0,941}{1+e^{1,14-0,28x}}$$

logistic equation graph.

The most important characteristics:

a) The two ogives cover considerable differences. In the case of railway transport the frequency of the settlements which have 60—160 routes is extremely great while the propertion of settlement which have higher and lower numbers of routes is small. There are no considerable differences as far as the number of bus routes is concerned in the case of these settlements. It is only the proportion of the settlement which have more than 280 routes that is small, the frequency of the settlements with fewer routes is nearly the same. This is expressed by the difference between the inflection points of the two curves. (This value is $x=5.87$ in the case of the railway, in the case of buses the value is $x=4.07$.)

b) The point of intersection of the two ogives is $x=7.1$. This value is in the middle of the area marked by the graphs which means that the transport claims of the settlements are achieved.

c) The settlements which are in the area marked by the curves have close connections with the centres of attractiveness created by certain centres. In the case of the settlements which have fewer than 120 routes a week the attractive effect of the settlements which have central functions is only relative or dominant apart from certain cases while the settlings which have more than 120 routes belong to the main area of attractiveness of the centres.

d) The development of the logistic curve in our opinion proves that the qualitative function of the two branches of transport is different depending on the taxonomical level of the rayons. The road transport is first of all an element on a microregion level, so it gives only a limited possibility of creating a centre of attractiveness for the centres while with the help of the rail transport these centres can extend their centre of attractiveness, i.e. the extension of the main centre of attractiveness can be created.

e) With the development of the number of routes the relative frequency values of the settlements increase 2.15 times more quickly in the case of rail transport than in the case of the number of bus routes. Taking these facts into consideration it seems reasonable to take the weighting factor between the above-mentioned elements of road and rail transport as 2.15.

4. For the definition of the hierarchy of the settlements of a central role as well as measuring their effect of attractiveness we used the centres of attractiveness

worked out by J. Tóth. While ordering the centre settlements their central roles, functions, numbers of population as well as the quality and size of their centres of attractiveness and the population concentration according to the quality of these centres of attractiveness were taken into consideration.

We equipped some fictitious settlings with the arithmetical average of the above-mentioned data about settlements of a central role in south Trans-danubia and in relation to these data we formed nine groups of research centres:

1. Pécs
2. Kaposvár, Szekszárd
3. Mohács
4. Szigetvár
5. Bonyhád, Komló
6. Dombóvár, Tamási
7. Paks, Nagyatád
8. Simontornya, Barcs, Siklós
9. Sásd, Sellye

This was needed because of the above-mentioned fact according to which the effect of attractiveness of the centres on the settlings depends on the number of the centres as well as on their place in the hierarchy of settlements. It is very interesting that there is an extremely strong rank correlational connection between the qualitative categories, the average of the number of the population and the qualitative level ($I=0.99$).

The average values in each category of the population decrease according to the

$$y = -5556.81 + 69\,185.71 \;.\; 1/x$$

hyperbolic graph parallel with the decrease in the rank which means that the quotients of the neighbouring qualitative categories form a series convergent on zero. (This counting was done for the whole territory of Trans-danubia so as to prevent the destructive effect of smaller areas.) A point system was carried out in connection with this factor in which the maximal point value given by logical counting to the settlement which is on the highest level of the hierarchy was decreased in proportion to the appropriate values of the quotient series converging on 0. (Metion must be made of the fact that the point value which was chosen for the settling which is on the highest level of the hierarchy is subjective. But since this point value decreases according to an exactly defined proportion in connection with every settling and since the action during which the student classifies the algorhythm is not destroyed or modified by the components of the vector the magnitude of the maximum point value does not change the traffic-geographical situation of the settlement, i.e. the subjective data has no distorting effect.)

To define the level of the centre of attractiveness of the centres to which the settlements which are on the lowest level of the hierarchy belong and to define the significance and the effect of the centre of attractiveness on the traffic-geographical situation of these settlements, data gained by using the above-mentioned method were used. The period of time during which these settlements can be reached was taken into consideration.

III. The traffic-geographical situation of the settlements in the mezoregion

1. *Transport conditions*

It is very characteristic of the traffic-geographical situation of south Transdanubia that considerable international roads were to be found in it during the past centuries. At present this function is accomplished by one main railway line, one main road and by the Danube. These roads of course have a very important place in the home traffic, too. The capacity of the transport network in the centre depends to a great extent on the development of the international connections of the country first of all on the connections with Yugoslavia. At the same time south Transdanubia is a part of the centralised world-wide trade which is expressed by the main directions of the areal situation of the transport network.

a) Rail transport

The length of the rail network in the centre is 1126 km which is 12.8% of the network of the country. 37.4% of this is main line, but the percentage rate of the narrow-guage lines is relatively high (5.9%). The density of the rail network (9.9 km per km^2) is sufficient and it is above the average in the country (9.5 km per km^2). There are defects in the railway network besides the relative density and these defects sometimes cause considerable transport problems: there is no railway connection between Bátaszék—Mohács and Paks—Tolnamőzs and owing to the orographical conditions rail transport is "slow" in the greater part of the centre. The main axis of rail transport is the line between Budapest—Dombóvár—Gyékényes and Budapest—Dombóvár—Pécs.

b) Road transport

12.1% of the road network in the country can be found in the mezo-region (3573 km). The length of the roads in every 1000 km^2 is 30.8 km which is hardly lower than he country-wide average (31.8 km). But the qualitative distribution of the road network does not show a favourable picture. In contrast with the county-wide 6.4% only 4.9% of the road network in the centre is first class. The percentage proportion of the secondary roads is again hardly above the country-wide average (centre: 14.7%, country: 13.9%). The values gained by analysing the quality of the road surface are below the country-wide average:

	Region %	country-wide %
concrete road	2.5	2.6
asphalt, bitumen	50.3	60.2
dust-free (excluding macadam)	52.9	65.2
earth road	4.2	3.5

Owing to the orographical conditions the width of the roads is below the country-wide average, consequently the speed of transport of goods as well as of travelling is below the country-wide average.

The main axis of the road traffic is the main road no. 6 (Budapest—Szekszárd—Pécs—Barcs) but the traffic is considerable on the roads between Pécs—Bátaszék and Pécs—Siklós, too.

c) Transport of goods

Goods transport in the two branches can hardly be compared, because both branches have their own sphere of operation and function which must be taken into consideration while comparing them. Transport on the roads is first of all the means for short-distance traffic which undertakes the goods transport within the mezo-region while the connection between regions and long-distance goods transport is carried out by the railway. But it is still worth comparing the two things because in this way functional differences can be observed. The distribution of goods characteristic of south Trans-danubia and the direction of their transport are limited and can be considered as constant according to the capacities of the area and the country-wide division of labour. The transport connections are the strongest between the capital region, Budapest, but the transport connections are considerable with Balaton, too. This can be traced by the capacity factors of the railway lines and roads in the centre (which depend on the physical state and the traffic), and according to this the lines between Budapest—Dombóvár—Gyékényes and Budapest—Dombóvár—Pécs as well as the road between Budapest—Pécs—Barcs are heavily laden. A considerable part of the roads and railway lines has free capacity but the more important crossings of the roads (Pécs, Siklós, Bátaszék, Szekszárd, Paks, Kaposvár) are over-laden. But the presence of the free capacity is indicated by the fact that the weight of the goods referring to 1 km of road and railway line isbelowfact country-wide average.

	centre (tons)	country (tons)
1 km road	3 722	5 030
1 km railway	10 479	13 931

The connection between the regions and the lowland is very weak, it is represented only by the railway line and by the road to Baja which are of a bad technical level. The connection between the centre and other areas of the country is realised by transmissions and detours on the railway which means a waste of time and there ar only secondary roads to the neighbouring regions.

The quantity of the goods transported by the railway in the centre (11.8 mt) in 1973 was 9.6% of the country-wide value. The value of road transport was greater than this (13.8 mt), but its percentage proportion of the country-wide road transport is lower than that of the railway (8.4%). So the value of the goods transported on the roads was above the value of the goods transported by rail in south Trans-danubia, too. If we take the capacity of the two branches of transport as 100% then 47.1% of it belongs to the railway (country-wide value is 42.8%). But if wel take the ton-kilometres the percentage rate of the railway is higher than that of the road (81.7%).

The areal proportions of goods transport are constant in both branches of transport. The areal distribution of the goods transport and the quality of the transport-geographical situation of the settlings are in connection with each other. The areal situation of the settlements which have favourable traffic-geographical situation are along the way of the main directions of goods transport while in the areas where the traffic-geographical capacity of the settlements is not favourable goods transport is of lower volume, too (Fig. 2 and 3).

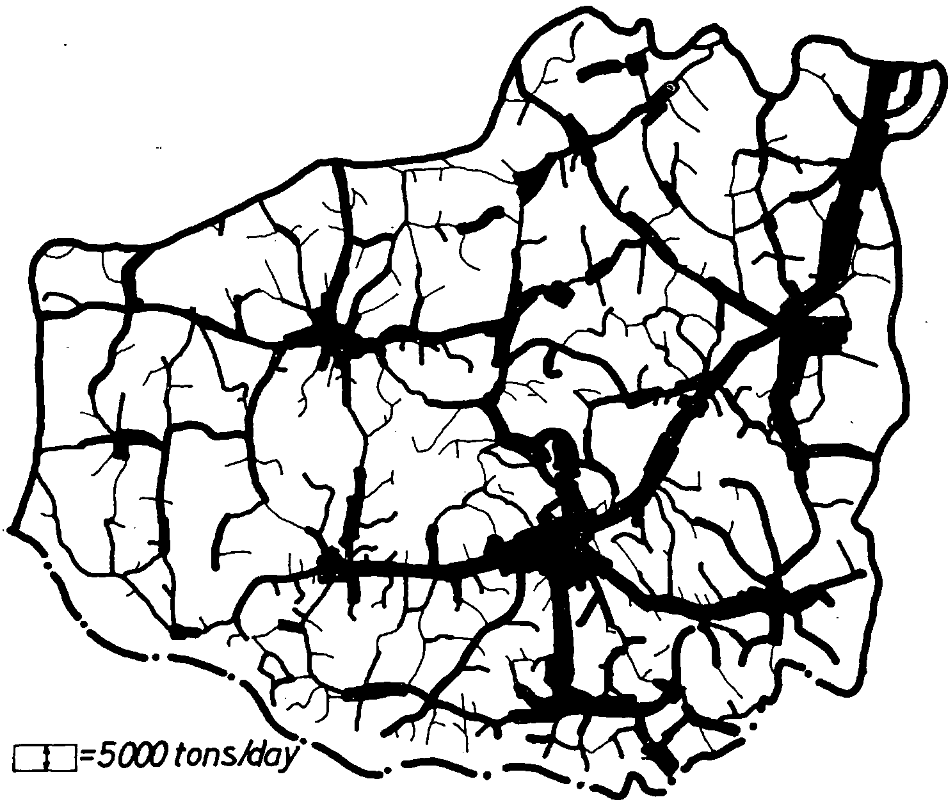

Fig. 2. The load of the roads in the south trans-danubian mezoregion (in 1970. Average daily value)

The structure of goods transport is constant, too. The on- and off-loaded goods both consist mainly of mining products. This is why the proportion of the arriving and departing products is defined by the quantity of the mining products. In spite of the fact that the majority of the goods transported on the road consists of mining products (stone, gravel, earth, sand) the products of agriculture, the food industry, and light industry are very important, too.

The areal differential of the traffic-geographical situation is reflected by the qualitative and quantitative as well as the areal distribution of goods transport.

2. *Some main characteristics of the traffic-geographical situation of the settlements:*

a) Two regional centres of the area (Pécs and Kaposvár) have very favourable

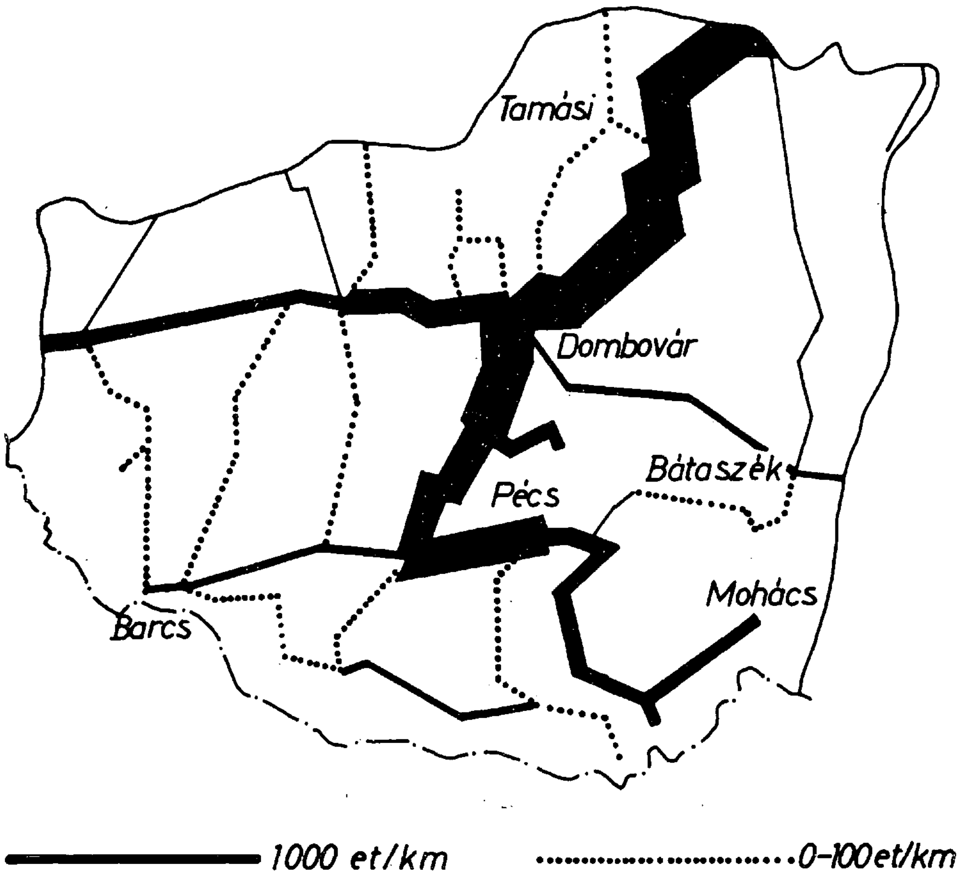

Fig. 3. Goods-transport by rail (good-tons-kilometre, 1973)

traffic-geographical situation which also indicates favourable connections between the capital and between centres of the same type in other areas. Within the centre it is the two towns that have a developing power in the traffic-geographical situation.

b) In the area of the mezo-regions there are three areas which have favourable traffic-geographical situations and which are in connection with one another:

— the bigger of these areas is the area around Pécs and in this area the proportion of the excellent traffic-geographical situation is the greatest.

— the area around Kaposvár has fewer settlements. The difference between the two areas can be explained by the fact that each town has a different regional role and the agricultural areas attached to them are different, too. But this difference can be proved by the fact that the physical geographical factors are different in each area, in this respect Kaposvár has a more favourable traffic-geographical situation. (Owing to orographical conditions Pécs is surrounded by very small villages which have unfavourable, sometimes bad traffic-geographical situations.)

— the third favourable area is around Szekszárd and Bonyhád (it has two centres) in which the centres being on different hierarchical levels have the same significance.

c) The connection among the above-mentioned three areas is one-sided because both the area around Kaposvár and the one around Szekszárd have a strong connection between the area around Pécs and there is no connection between the first two at all. The form of existence of these areas is defined by these facts, too.

d) The western part of the mezo-region has a strong connection with the area around Nagykanizsa which has favourable traffic-geographical situation, but only a few settlements are involved in this connection.

e) The settlements of outstanding central role can be characterised by the fact that they are only on the same level as the settlements around them, sometimes they are in a higher category.

f) There is a considerable amount of settlements which have a bad traffic-geographical situation. They form big areas on the southern part of the mezo-region (along the line of Nagyatád—Barcs—Sellye—Siklós) and on the northern part (along the line of Tamási—Simontornya—Paks). These areas are the most undeveloped parts of the mezo-region and in spite of the fact that there is a rail and road network in these areas the lack of an economic background destroys the traffic-geographical situation (Fig. 4.).

Summary: the density of the rail and road network in the south Trans-danubian mezo-region is favourable but in spite of this the traffic-geographical situation in the area is just around the average and it is differentiated regionally. This differentiation is not mozaic-like because there are similar and identical types of area in respect of traffic-geographical situation, too.

To choose the factors that define the traffic-geographical situation is a complicate problem. This is because of the fact that traffic-geographical situation of a certain settlement is effected by a number of different factors and on the other hand the factors of the mutual connections between the phisical, natural, social and economic conditions are very strong in the case of traffic-geograph, too.

In this present study we chose the factors which were of basic and aminent importance in the development of the traffic-geographical situation. With the help of the factors which express potential possibilities, claims and capacities, social and economic powers, the traffic-geographical situation of a certain area can be researched sufficiently and the results gained in this way are in accordance with other experiments.

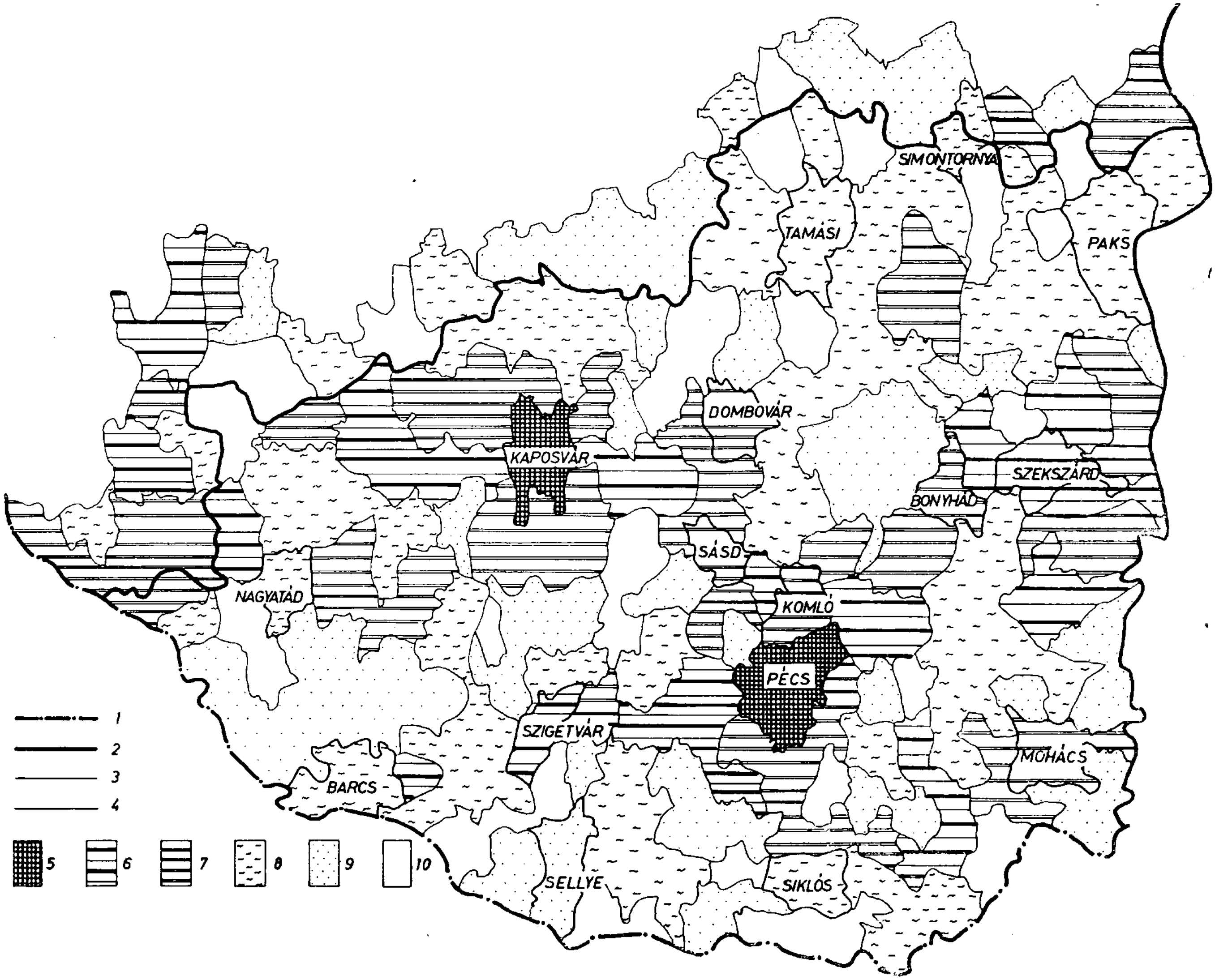

Fig. 4. Traffic-geographical situation of the settlements in the South-Transdanubian mezoregion
1 = border of the country
2 = border of the mezoregion
3 = centre
4 = type-border
5 = outstanding
6 = excellent
7 = good
8 = medium
9 = weak
10 = bad

ASSESSMENT OF THE LEVEL OF DEVELOPMENT OF THE SUBREGIONS BASED ON A FACTOR ANALYSIS MODEL PART II.

F. MÓRICZ — GY. KRAJKÓ — MRS. ABONYI

1. Economic geography deals with the laws of the areal distribution of the social forces of production. The researches can refer to the level of development of the forces of production in connection with regions of various sizes and characteristic features. These areas can be administrative units and economic regions of different level.

We chose subregions in Hungary for the analysis of the level of development in the hope of getting a real picture and real statistical data about their development. In respect of the areal distribution of the forces of labour the subregions in our country form regional production complexes. This is why the research was carried out on the level of subregions even if the data gained in this way cover certain derivations on micro-regions level.

While analysing the areas there is a need to create a complex index or complex indices which sum up and express the level of economic development of the given regional unit.

In our opinion these desired complex indices can be derived from natural indices. These natural indices can be grouped according to the main regions of the production sphere. These groups together express the development level of agriculture.

It is a very important and difficult task to choose the correct natural indices. The maximum of endeavour must be made so that there is a close relationship between the indices and the development level of agriculture.

The static indices reflecting the state of agriculture in 1972 were extended by dynamic indices. According to this the complex index expressing the development level contains the constant tendency of the past few years.

In the following we are going to deal with the indices which in our opinion denote the development level of agriculture.

2. The development level of agriculture is expressed by the indices indicating the material technical equipment. In the statistical practice these indices refer mainly to regional units and rarely to the employment within agriculture. If the analysis of the level of development is done on macro-level it is the number of the population that makes the basis. The material technical level of agriculture is indicated by the tractor equipment (which is measured by a regional unit cultivated by a tractor), power machine equipment (pulling-power is expressed in tractor units per 100 hectare unit), and the degree of mechanisation of the various agricultural operations which is denoted by the proportion of the manual work and the mechanised operation.

The development of agriculture is denoted by the grade of intensification, too. The degree of intensive stock-farming can be expressed by the proportion of irrigated area, the size of the area involved in fertilisation, the quantity of chemical fertiliser used in an areal unit, the extension of application of up-to-date weed-killers and by the areal proportion of gardens, orchards and vineyards.

The standard of agriculture in connection with arable farming can be expressed by the average crop. Mention must be made of the fact that in agricultural production the quality of the soil has an important role even today beside the material technical equipment. This value of the soil is expressed by the "golden crown value" of the soil.

These days the proportion of the arable and stock agriculture is favourable. The results of the closed cycle, industry-like pig-breeding are very good, which contributes to the development of the meat resources of the country as well as the meat production. A great development took place in cattlebreeding, too, during the past few years (for beef cattle as well as dairy cattle). To denote the standard we can make indices of the total number of livestock in connection with a given regional unit, a certain number of the population, an agricultural area, as well as the quantity of provender needed to produce one kilogram of meat, the average milk production, etc.

Indices used to denote the level of development of agriculture are as follows:

1. The percentage rate of active employment in forestry, agriculture and the management of water supplies.
2. The percentage proportion of the total arable land of the country represented by the arable land of the subregions.
3. The percentage proportion of the area covered by gardens, orchards and vineyards within the total area of land of the subregions.
4. The financial outlay on forestry, agriculture and the management of water supplies per head of the population (in forints).
5. The investment on one hectare of arable land (in Ft.).
6. The amount of the chemical fertiliser supply for one hectare (in kilograms).
7. Tractor supply on 100-hectare units.
8. The number of lorries on 100-hectare units in agriculture.
9. The percentage rate of the tractor supply in 1972 in comparison with that in 1962.
10. The percentage rate of the irrigated area with regard to the total area of the country.
11. The livestock (cattle, pigs, horses and sheep) on agricultural areas of 100 hectares on the basis of the census taken in the spring of 1973.
12. The trade of meat animals and products of animal origin with regard to the total trade.
13. The assets of the agricultural cooperatives in respect of one 100-hectare area (in Ft.).
14. The total income of a member of an agricultural cooperative (in Ft.).
15. Milk trade on one hectare of land (in liters).
16. The average crop of wheat from one hectare of land (in q).
17. The average crop of rye from one hectare of land (in q).

TABLE 1

Areal differences of the development level in the agriculture

1. indicator	1,000																
2. indicator	0,037	1,000															
3. indicator	0,384	0,153	1,000														
4. indicator	0,427	0,062	-0,002	1,000													
5. indicator	-0,226	-0,118	-0,185	0,612	1,000												
6. indicator	-0,211	-0,113	0,068	0,287	0,373	1,000											
7. indicator	-0,248	-0,479	0,211	-0,078	0,023	0,504	1,000										
8. indicator	-0,573	-0,138	0,115	0,146	0,693	0,466	0,340	1,000									
9. indicator	0,172	-0,179	-0,068	-0,386	-0,475	-0,277	-0,236	-0,520	1,000								
10. indicator	0,205	0,059	-0,421	0,300	0,183	-0,383	-0,318	-0,230	-0,041	1,000							
11. indicator	0,026	-0,319	-0,135	-0,537	-0,489	0,117	0,207	-0,487	0,656	-0.202	1,000						
12. indicator	-0,338	-0,262	-0,481	-0,396	-0,306	0,332	0,349	-0,165	0,321	-0,233	0,650	1,000					
13. indicator	—0,157	-0,255	-0,021	0,218	0,665	0,372	0,088	0,651	-0,105	0,157	-0,121	-0,073	1,000				
14. indicator	-0,287	0,037	-0,453	0,405	0,623	0,330	-0,088	0,479	-0,297	0,533	-0,288	-0,012	0,675	1,000			
15. indicator	-0,342	-0,285	-0,219	-0,453	-0,333	0,331	0,354	-0,101	0,584	-0,374	0,768	0,727	0,023	-0,024	1,000		
16. indicator	0,115	-0,002	-0,214	0,649	0,695	0,249	-0,329	0,240	-0,241	0,510	-0,293	-0,340	0,475	0,689	-0,367	1,000	
17. indicator	-0,313	0,077	-0,043	-0,404	-0,083	-0,103	-0,034	0,232	-0,282	0,063	0,000	-0,131	0,106	0,258	-0,085	-0,126	1,000

3. In the following we used the method of factor analysis to research the development level of agriculture in the subregions and on the basis of the factor model gained in this way we graded the subregions and grouped them according to the development level of agriculture.

The programme of counting was done by the computer CDC—3300 in the research department for counting and automatisation of the Hungarian Academy of Sciences.

The correlation matrix of the 17 indices in paragraph 2 can be seen in table 1. As can be seen in the table the correlation of the even numbers shows very loose connections in the case of 85% of the indices (the value of the correlation co-efficient is below 0.50), while in the case of the remaining 15% the strength of the connection is medium, the correlation co-efficient is between 0.51 and 0.79. The researched indices show a system in which there is no strong mutual dependence among the majority of the indices. This fact refers to the peculiar characteristic of agriculture that shows that the development level is denoted by a vast number of indices which are in loose connection with one another. The temporal development of the indices is partly independent, too.

In spite of this the factor analytical model can be applied to agriculture according to our researches. We took seven factors into consideration which refer to more than 90% of the dissipation squares. In the case of the eighth and further factors the denotation referring to the variants is below 5% and so can be interpreted as a chance effect.

The number of the factors as the total result and the dissipation squares denoted by each factor with reference to the percentage rate of the dissipation squares of the total number of factors, see table 2.

TABLE 2

The order of factors	The contribution of the factors to the dissipation squares of the variables	The dissipation square denoted by the factors in % relationship with the dissipation square of all the variables	
		Dispersion of factors	Cumulative dispersion
1.	4,974	29,3	29,3
2.	3,474	20,4	49,7
3.	2,340	13,8	63,5
4.	1,876	11,0	74,5
5.	1,128	6,6	81,1
6.	1,002	5,9	87,0
7.	0,849	5,0	92,0

While the first factor denotes 30% of the total dissipation squares further factors denote 60%. So the role of the first factor is not dominant in comparison with the other factors, i.e. the mutual dependence among the researched indices is not strong so they can be characterised by an inbalance rather than by complexity. This inbalance is not only considerable but also multilateral.

The connections between the researched, original indices and the factors are expressed by the factor-weights (see Table 3). The factors that have strong factor-

TABLE 3

indicators \ factors	K_1	K_2	K_3	K_4	K_5	K_6	K_7
1.	−0,035	*−0,666*	0,056	*−0,573*	0,228	−0,004	0,325
2.	0,119	−0,454	−0,120	0,344	−0,455	*0,575*	0,189
3.	−0,058	−0,265	*−0,757*	−0,278	0,364	0,271	0,137
4.	*0,718*	−0,204	0,070	*−0,535*	−0,223	−0,066	0,121
5.	*0,862*	0,302	0,040	−0,131	0,004	−0,004	−0,234
6.	0,230	*0,685*	−0,195	−0,415	−0,270	0,248	0,295
7.	−0,146	*0,623*	−0,435	−0,242	0,029	−0,437	0,248
8.	*0,610*	0,586	−0,412	0,169	0,116	0,067	−0,227
9.	*−0,646*	−0,055	0,466	*−0,223*	0,299	0,303	−0,271
10.	0,407	−0,330	*0,658*	0,165	0,135	−0,291	0,215
11.	*−0,748*	0,324	0,344	−0,200	0,171	0,113	0,201
12.	*−0,545*	*0,602*	0,323	−0,078	−0,353	−0,071	0,040
13.	*0,572*	0,495	0,144	−0,096	0,474	0,236	−0,072
14.	*0,711*	0,381	0,458	0,185	0,009	0,123	0,212
15.	*−0,615*	*0,646*	0,233	−0,067	0,022	0,225	0,079
16.	*0,774*	−0,021	0,420	−0,221	0,043	0,142	0,066
17.	0,037	0,183	−0,111	*0,755*	0,332	0,005	0,445

weight connections with a certain factor are illustrative especially of each researched factor, because this means that the dissipation of the given original index is denoted by this given factor.

There is a strong connection between one variable and the first factor (the value of the factor-weight is at least 0.800): This is the investment in one hectare of arable land (5). The next nine variables have medium-strength connections with the first factor (the value of the factor-weight is between 0.501 and 0.799): this is the investment on one head of the population in forestry, agriculture and the management of water supplies (4), the number of lorries for each 100 hectares of arable land in agriculture (8), the number of tractors in 1972 in percentage relationship to those in 1962 (9), livestock on every 100 hectare area of farm-land (11), the trade in meat animals and animal products in a percentage relationship with the total trade (12), the total assets of the agricultural cooperative on one hectare of arable land (13), the average income of a worker in an agricultural cooperative (per annum) (14), cow-milk trade on one hectare of farm-land (15), and the average crop of wheat from one hectare of arable land (16).

Five variables have medium-strength connections with the second factor; employment in forestry, agriculture and management of water supplies in a percentage relationship with the whole active employment (1), chemical fertiliser supply for one hectare of arable land (6), the number of tractor units on 100 hectares of arable land (7), the trade in meat animals and animal products in a percentage relationship with the total trade (12), and cow-milk trade on one hectare of farm-land (15).

Two variables have medium-strength connections with the third factor: the area of vineyard, orchard and garden in a percentage relationship with the total area of the subregions (3), the irrigated areas in a percentage relationship with the total farming area (10).

Three variables have medium-strength connections with the fourth factor: the employment in forestry, agriculture and management of water supplies in a percentage relationship with the total active employment (1), the accomplished investment on one head of the population in forestry, agriculture and management of water supplies (4), and the average crop of rye from one hectare of arable land (17).

One variable has medium-strength connection with the sixth factor: the farming area of the subregions in a percentage relationship with the total farming area of the whole country (2). There is no medium-strength or stronger connection between variables and the fifth and seventh factors.

According to the above-mentioned facts at present the development level of agriculture in the subregions is defined by the first two factors which express the intensity of the agriculture, but the factors which express the size of gardens, orchards and vineyards, the size of the irrigated areas (factor 3); the fourth factor representing forestry, agriculture and management of water supplies; the sixth factor which expresses the size of the farming-land area within the subregion all these factors are of some importance. To sum up we can say that the development level of agriculture on subregions level is defined by the following factors:

a) the intensity of the agriculture,
b) the size of the vineyards, orchards and gardens,
c) the size of the irrigated areas,
d) the role of forestry, agriculture and management of water supply,
e) the area of the arable land within the subregions.

The first of these is the most important, the significance of the other four is the same.

On the basis of the factor-analytical model we counted down the correlation co-efficients among each variable and we gained and reproduced a correlation matrix in this way. By comparing the original correlation matrix and the counted-up, reproduced correlation matrix we can see the reality of the factor-analytical model. The difference of the order of magnitude between the elements of these two matrices can be seen in table 4. As can be seen in table 4, the matched correlations of the factors are reproduced sufficiently by the analytical factors. This proves that the factor-analytical model can be used in analysing the development of agriculture.

TABLE 4

Order of magnitude of the derivation	Distribution in % of all the matcaed correlation
0,010	22,1
0,011—0,050	66,1
0,051—0,100	11,8
0,101	0,0

Then we defined the value of the first three factors in each subregion and on the basis of this we made a list of the subregions according to their development level. The factor values K_1, K_2 and K_3 mean three orders which were united with the help of a weighed, mathematical average. (According to the part proportion K_1 was weighted 29.3, K_2 20.4, and K_3 13.8.) The results are summed up in Table 5.

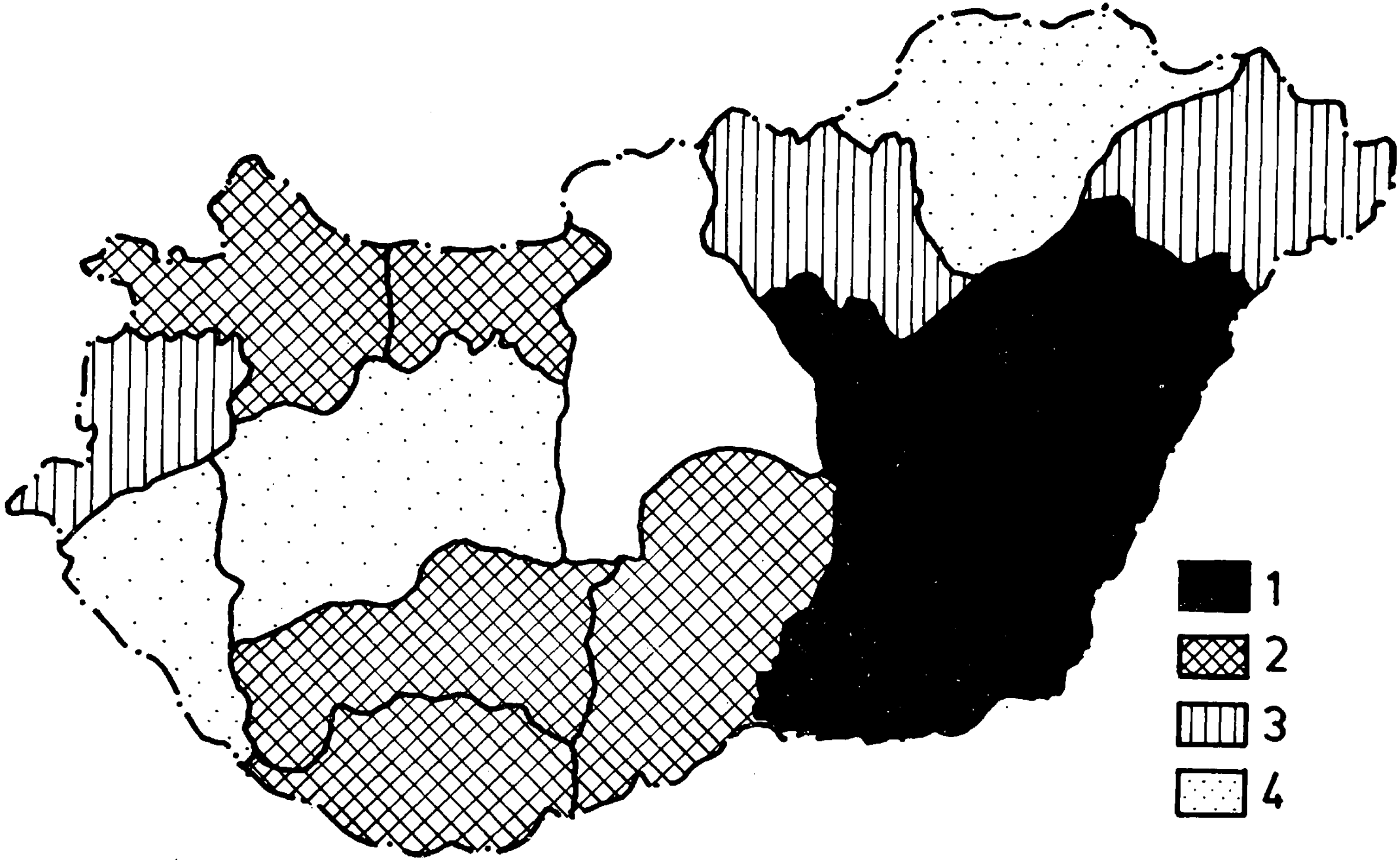

Fig. 1. The territorial differences of development of agricultural
1 = highly developed
2 = developed
3 = medium developed
4 = under-developed

TABLE 5

Subregion	The value of K_1	The value of K_2	The value of K_3	The order of agricultural development level
Csongrád	0,112	0,096	0,576	3
area between Danube-Tisza	−0,262	0,276	0,237	5
Békés	0,024	0,235	0,565	4
Szolnok	0,876	−0,109	0,521	2
Hajdú	0,330	0,079	0,402	1
Szabolcs	−0,837	0,343	−0,037	11
Borsod	−0,297	−0,139	−1,013	15
Nógrád	1,583	−0,740	−0,654	10
Győr	0,045	−0,097	0,138	9
Szombathely	−0,846	0,300	0,208	12
Zala	−2,876	0,931	−0,528	13
Komárom	2,111	−1,115	−0,051	7
Baranya	0,143	−0,043	0,054	6
Tolna	0,265	−0,118	−0,049	8
Veszprém	−0,370	0,101	−0,370	14

On the basis of this we grouped the subregions according to their development level. By creating four grades we came to the following result:

Hajdú Szolnok Csongrád Békés	highly developed
the area between Danube and Tisza Baranya Komárom Tolna Győr	developed
Nógrád Szabolcs Szombathely	medium developed
Zala Veszprém Borsod	under-developed

4. Mention must be made of the fact that the criterion combinations created by the factor analysis can refer only to concrete research units and periods of time. So the researched criteria cannot be generalised theoretically into sufficient factors. In spite of this we think that the factors which express the development of agriculture in the subregions as well as the order of development of the subregions made by the factor-analytical model agree to a great extent expert opinion.