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– A Research Method for Exploring the Spatial Structure in Hungary –

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Relation Analysis in Rural Space – A Research Method for Exploring the Spatial Structure in Hungary –

by
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1 Introduction

This paper is introducing a method for analysing the differences and dynamics of the social utilisation of space. The essence of this method lies in the registration of changes in the spatial structure of settlements through analysing the spatial shifts of settlements within settlement network hierarchy with the identification of coherent spatial units. The analysis of spatial relations, i.e. microregional planning is a very useful method as it helps in mapping the interrelationship of settlements, and their major linking points, as well as in identifying their positions in the settlement hierarchy and – through the analysis of the directions of gravitational force – may localise their gravitational zones as well. Hereinafter, this method will be named as spatial relationship analysis. The startup phase for the workout of this method was funded by the Hungarian Scientific Research Fund's Programme titled 'The Integration Ability of Rural Spaces in Hungary's Socio-economic Process' (registration no. T 7236).

2 Spatial relation analysis – a method for verifying changing shift directions and for micro-space research

The links and relations of rural spaces to urban and other central settlements are the major shaping forces of the actual settlement structure. Until the 1990s the administrative system of Hungary was favouring for a hierarchical system of inter-settlement relations and state initiated spatial formations such as school districts, cooperative centres, panel doctor service centre, and other centralised functions had large impacts and in many cases had determining force on the spatial shift orientations of local population.

The socio-economic transformation of Hungary terminated the earlier rigidity and forced nature of inter-settlement relations. The passing of Local Government Act put an end to joint municipalities and the new independent local governments were managing local public affairs only, the earlier strict centralised system of school districts and health services has been dissolved. The emerging new foreign-owned companies, with their opening new subsidiary branches settling down in West-Transdanubia have changed commuter directions. The opening of new shops by private entrepreneurs generated quick changes in retail trade in small and big settlements and the emergence of various never before seen private services enhanced the local business supply of villages. The emergence of the new forms of commerce and services was such a new phenomenon in villages that they generated new trajectories not only on local but on inter-settlement level as well. The directions of recreational relations have also changed and the international relations of

rural areas were gaining new force in the 1990s. As the functional content of spaces be rural or urban will be formulated by the activity of their population these new social shift directions have had great impacts on shaping the politically and economically transforming spatial structure of Hungary.

The researches to be presented below were aimed at clarifying which residential shifts and spatial trajectories can serve as a model for the representation of changing inter-settlement relations in the 1990s and what changes they have induced in microregions. These investigations launched in the midst of 'the ecstasy of freedom' of the socio-economic transformation of Hungary when local governance rights were granted to settlements and the growing number of personal cars increased residential mobility. The rapidly changing patterns of consumption have redirected the destinations of residential shifts as this was the dawn of the rise of consumer society in Hungary. The widening assortment of goods and the growing supply increased the number of rural retail trade shops as well. The start-up of new enterprises introduced such new services that had been completely non-existent so far or were hardly accessible on the market (new forms of catering, rural tourism and beauty services).

By the analysis of spatial relations we can find out what impacts the growing demands and supply, the emergence of new consumer trends, the increasing mobility and the opening up of borders did have on inter-settlement relations.

The 1990s were the years of the introduction of the new institutional system of microregional associations which will be discussed in details in the next chapter. The institutional system of microregions has been formed by the development of inter-settlement relations. The transitional period can be characterised by changing directions of residential shifts, thus this method is suitable for marking the borders of microregions (a systematic group of collaborating villages) and for identifying the directions of their relations and the microregion's nodal settlements. By the application of this method we can also identify the geographical space where the density of connections is high and where the directions of inter-settlement relations are targeted inside this space. On the basis of this model the borders of a microregion can clearly be marked. The microregional researches described below started simultaneously with the organisation of the institutional system of microregions to reveal the integrating factors of settlements.

This method falls under the category of applied geographical studies as it is investigating functional spatial structure focusing on the factors of spatiality *(Berényi,* 1972*)*.

Similar researches have been reported both in Hungarian and international literature. The so-called 'geography of time' having been investigated for the first time by Hagerstrand and his research team at the Swedish Lund University during the 1960s and 70s put residential shifts into the context of time (*Hagerstrand,* 1969). By his opinion the changes of social space with restructuring their geo-

graphical space will get into a new context. The geography of space takes every shift arising from social existence into consideration and tracks them down to the level of households.

In Lund School of Geography Öberg investigates residential shifts targeted at the dentist in the southern part of Sweden. Then he analyses primary and secondary nodes within his model *(Öberg,* 1976*)*. Also in Lund School Lenntorp analyses the relationship of man and his activity location by the method of the geography of time. He studied the mobility of housewives by the division of their daily shifts into time slices and pointed out that the patterns of their daily shifts significantly differs from those of old-age pensioners or active wage earner males *(Lenntorp* 1976*)*.

Both the shifting of a social group towards another one or the use of any services by family members within one household shows a different pattern. These patterns as a whole are demonstrating the complexity of spatial structure and may also represent what impacts may changes in social structure have on the whole system of spatial structure (*Nemes-Nagy,* 1998). I agree with Berényi's opinion saying that the major features of settlement environment development are based on the special characteristics of local society and on internal social stratification. Essential social functions, such as work, housing, provision services, training and transport are motivated by interpersonal relations such as family, friends, relatives and other communities (*Berényi,* 1983).

Mészáros analyses the spatiality of settlements by investigating the spatial trajectories of the Southern Great Plain in centre-periphery context, or in our case city-village relationship (Szeged and its environment). He focuses on the interrelationship of relatives, on the major trends of shopping and on the usual spatial directions of commuting. The results of these researches have proved that except for the changed destinations of commuting no significant changes may be observed in the microregion. 'There are almost no differences at all between the formation of the spatial structure of the past and present...' Major changes have rather occurred to the space filling intensity of population which is several times higher in the present spatial structure than before' (*Mészáros,* 1994, 104). However researchers on the spatial structure of some West Transdanubian microregions having been carried out almost simultaneously with the researches of Southern Great Plain are showing more definite signs of spatial restructuring (*Szörényiné Kukorelli,* 1994). Csatári also studied the spatial relations of settlements by analysing the spatial trajectories between small towns and their urban peripheries (*Csatári,* 1988).

Thomson's and Mitchell's hypothesis stating that rural spaces are dynamic parts of urban areas have been verified by the research of residential shift directions. The two researchers studied the spatial relationships of some rural areas of Canada by the analysis of residential shifts in three categories of local society: out-migrants, immigrants and the natives. The analysis pointed out that the research method can

successfully prove that the different active social groups of rural spaces were capable for radically changing their living environment and even for changing the whole spatial structure of the settlement (*Thomson–Mitchell,* 1998).

In the 1990s I was analysing the spatial relation system of several rural microregions to prove my hypothesis that spatial relations respond very quickly to the changing functions of rural settlements by restructuring the microregion's density nodes resulting from the emergence of new microregional centres and from the greater freedom of spatial relations. The method – or as I have named – the spatial relationship analysis method investigates spatial shifts or in other term spatial trajectories. A spatial trajectory is nothing else than a shift within one settlement or between settlements for the completion of an action. Our investigation is targeted at the analysis of residential spatial trajectories i.e. shifts for the satisfaction of residential demands.

Through spatial trajectory analysis we can draw the map of residential spatial shifts, inter-settlement relations, we may see whether there is a deficit or a surplus in the performance of local functions, we can define the microregion's closure value, the gravitational force of external and internal centres, the degree of cohesion between a settlement and its environment and the centralisation value of settlements. Some spatial trajectories are starting and ending at the same settlement. They are called as 'internal spatial trajectories' or 'reflexive spatial trajectories'. Another group of trajectories are targeted outside a settlement at another settlement within our research sample area. They are called as 'intraregional spatial trajectories'. Some other trajectories are targeted outside of the research sample area, so they are called as 'outbound spatial trajectories'. Those trajectories departing from a settlement excluded from the microregion and ending at a settlement within our research sample area are called as 'inbound spatial trajectories'. The 'individual' or 'settlement closure' value is calculated as the ratio of internal and outbound trajectories.1 The 'microregional closure' value is calculated as the sum of internal trajectories plus intraregional spatial trajectories divided by the number of outbound spatial trajectories. A low value represents the microregion's openness with the absence of functions.

The gravitational force of centres from outside of the research sample on settlements or on the whole microregion can be measured and calculated in an exact way. The value of gravitational force exerted on a given settlement is calculated by the division of all city bound (central settlement) spatial trajectories by all the outbound spatial trajectories. This is called as the city's gravitational value.

Gerle investigated the driving forces and dynamics of settlement networks but he concentrated on the economic relations of settlements and approached the problem through the directions of transportation and telecommunication. He calls

[1] Total outbound trajectories = reflexive + inside + outbound trajectories.

the spatial unit's preservation capability of outbound and inbound flows within its boundaries as 'cohesion' (*Gerle,* 1974, 159). He calls the shifting of one element of economic functions (e.g. a person or a quantitative unit of a material) as an 'act.' Then he defines the formula of spatial cohesion as follows:

$$\text{cohesion of a spatial unit} = \frac{\text{quantity of inside acts}}{\text{quantity of inside + inbound + outbound acts}}$$

The centralisation value of spatial units is calculated by the following formula:

$$\text{centralisation value} = \frac{\text{number of acts between the settlement and microregion}}{\text{number of outbound acts from spatial unit + number of inbound acts into spatial unit}}$$

I have customised Gerle's formulas for spatial relationship analysis method purposes as follows:

$$\text{cohesion value of settlement} = \frac{\text{internal spatial trajectories}}{\text{inside + outbound + inbound spatial trajectories}}$$

$$\text{cohesion value of microregion} = \frac{\text{internal spatial trajectories}}{\text{reflexive + inside + outbound + inbound spatial trajectories}}$$

The local (settlement) level cohesion value shows to what extent local population can satisfy their demand locally. Few internal spatial trajectories generate low cohesion value, i.e. the absence of local facilities forces local residents for satisfying their (shopping, schooling) demands in other settlements. These places have high number of outbound spatial trajectories with low number of inbound spatial trajectories in the majority of cases. High cohesion value implies the local residents' ability and willingness of using local facilities which generates a low number of inside and outbound spatial trajectories.

A settlement's centralisation value is a qualitative indicator of the performance of central functions. In our spatial relationship analysis model centralisation value is calculated by the following formula:

High centralisation value implies high number of visitors from neighbour villages, i.e. the village is functioning as a centre for its close environment. While spatial cohesion value is a useful indicator, the use of spatial centralisation value in case of microregions has no meaningful sense.

A cross-analysis of centralisation (C) and cohesion (K) values will result in four variants:

	C	*K*
Class 1	high	High
Class 2	high	Low
Class 3	low	High
Class 4	low	Low

Settlements of Class 1 have high centralisation and cohesion values, indicating that due to their functional surplus they can function as centres both for their neighbours and themselves. Settlements of Class 2 are not satisfied with their functions as the majority of their spatial trajectories are targeted at other settlements but they are frequently visited by neighbour settlements, i.e. they are functioning as centres for their neighbourhood but their local residents do not regard them as a centre. Settlements of Class 3 with high cohesion but low centralisation value are performing functions for their local residents only but not for other villages of the microregion. Settlements of Class 4 are functioning as centres neither for their neighbours nor for themselves. Their residents are using different functions in other villages. Their number of internal and inbound spatial trajectories is low, as they are suffering from functional deficit.

Applying this method requires a questionnaire survey as the data of spatial relations and connection points are not available from statistical reports. The questionnaire should reveal as many aspects of location shifts as possible therefore the methods of its preparation, filling in and processing are the key factors of the success of our research. In several microregional researches I have used a settlement-level questionnaire and in case of one microregion (Rábcatorok) a residential (personal) questionnaire survey was conducted as a control. Its results have proved there were no significant differences between the data of residential questionnaire and of the carefully compiled settlement level questionnaire regarding the outcome of spatial relationship analysis. Settlement level questionnaires (i.e. one questionnaire per settlement) provided detailed information on a settlement's life. The mayor's office at the starting phase provided primary information on administrative or so-called official case clearance spatial trajectories but further information on the orientation of different functions and services were provided by different persons who were the most competent in the matters in question.

Our investigation of spatial relations covered the following spatial trajectories:

- the spatial trajectories of administration
- the spatial trajectories of shopping
- the spatial trajectories of services ranging from financial to residential services
- the spatial relations of nursery, primary and secondary education

– the spatial trajectories of health services
– the spatial trajectories of cultural and recreational activities
– the spatial trajectories of family and friendship relations
– the spatial trajectories of inbound and outbound commuting
– the spatial trajectories of psychological and mental maps visiting the nearest city/centre
– the spatial trajectories of crossborder relations

Except for administrative spatial relations residential spatial trajectories are arranged into primary, secondary and tertiary groups. Primary spatial trajectories are representing the settlement primarily visited for the completion of an activity. If the visit ends with no success for the fulfilment of a request or targeted at the enhancement of (e.g. commercial) assortment further settlements will be visited who will be the destinations of secondary or tertiary spatial trajectories.

And now, following the presentation of the general method of spatial relationship analysis I am going to present some of the researches I have made by the application of this model principally in rural microregions between 1994 and 2003.

2.1 The spatial relationship analysis of Répcesík microregion

This microregion of 32 settlements situated at the south-western part of Győr-Sopron County and at the northern part of Vas County has a peculiar spatial structure. Although the microregion is not integrated into one physical geographical unit it will henceforth be referred to as Répcesík. Although the microregion does not meet the criteria of underdevelopment it has some signs referring to it. One is that the microregion is situated a long way off from urban centres. At the time of our investigation Csepreg was not a city yet, therefore the whole microregion was left without any urban settlements. And even the area's economic relation system was dissolving in the socio-economic transition period of the early 1990s, the new relations were just in their early formation period, thus the whole area may be labelled as a 'fragile microregion'. Its economy did not bear the marks of renewal and has a rural economic character (Csapó 1994). It has no real powerful centres and the absence of a border crossing station raises difficulties in making advantages from the area's border zone situation. The microregion's average population number per settlement index is 570, only Bük and Csepreg have more than 3000 residents but more than 15 settlements have less than 500 residents. The large number of small villages implies an inadequate level of basic provision (*Csapó* 1992). The microregion's rural character makes its spatial relationship analysis a very interesting object of research.

2.1.1 The structure of spatial relations in the microregion'

Our spatial relation analysis was investigating what directions are this peripheral microregion's relations are targeted, does the area have any sub-centres and if it has what gravitational force do they on other settlements, what kind of new spatial relations have been generated by the microregion's border zone situation and how the area is split into two by the state border?

The survey – as it has been mentioned – has been carried out on the basis of information provided by settlement level questionnaires and has analysed the maximum number of possible spatial trajectories – 2,685 in our case – starting from 32 settlements. The analysis comprises administrative, authority, commercial, service, education, recreation, commuting related and crossborder spatial trajectories and with the exception of administrative spatial trajectories it covers not only primary but also secondary and tertiary spatial trajectories.

Administrative and official case transaction spatial trajectories can clearly be identified, their orientations are not unexpected, county borders are real separators, because in case of Győr-Sopron County Sopron, in case of Vas County Sárvár and Kőszeg are the collector cities of spatial trajectories. Iván, Horvátzsidány and Lövő seem to be functioning as the microregion's administrative centres.

By analysing the microregion's commercial and service spatial trajectories we can trace the directions of residential informal spatial trajectories of popular shopping and servicing centres or the directions of habitual shopping paths. Primary, secondary and tertiary commercial spatial trajectories reveal the microregion's preferred commercial centres. The analysis of commercial spatial trajectories revealed that Sopron was the destination of one-fifth of commercial spatial trajectories. The second in the row is Csepreg today a city with 17% of spatial trajectories, and the third is Szombathely with only a bit less value behind Csepreg. Szombathely is the destination of secondary spatial trajectories and it is followed by Sopron. 41% of all the tertiary commercial spatial trajectories are targeted at Szombathely, the second is Sopron with 14% and the third is Csepreg with 10% of spatial trajectories.

So far educational relations have been regulated by law but after the termination of the school district system the major directions of educational spatial trajectories have not changed significantly. Nursery and primary school related spatial trajectories are still bearing the marks of the earlier school district system. The school districts of Iván, Horvátzsidány and Fertőszentmiklós are the largest in size. The spatial relations of secondary schools of going beyond the territory of our research sample. The largest proportion of secondary school spatial trajectories has been collected by Sopron with 32% of the total. Szombathely is the second with 16% and they are followed by Csepreg and Kőszeg.

A separate chapter will be devised for the presentation of recreational spatial relations. One of their major research aspects is associated with the visitor destina-

tions of various cultural programmes (theatre, cinema, sports and other cultural events) which highlights the role of microregional centres. The other research aspect of leisure time oriented activities is the gravitational zone and relationship of resort villages with their environment. In this case the directions of their spatial relations are just reverse of the previous one, showing outside from cities towards the villages of the microregion. The number of intraregional spatial trajectories is low indicating the passivity of civil society. Leisure time oriented spatial trajectories are practically targeted towards cities beyond the microregion. One half of them are linked to Sopron, the other half to Szombathely. Other recreational activities such as visiting holiday homes, lands and week-end cottages are targeted at villages. 83% of these visits are originated from the greater area of the microregion and not from the dominant two cities. Some recreational spatial trajectories are originating from Switzerland, Germany and Austria.

Commuter spatial trajectories are representing the daily travel links between centres and the villages of microregion. Although the links are showing the strongest interdependence but the interrelation between the two connected settlements is the most fragile and vague at the same time. At the time of our investigation the network of commuting spatial trajectories was in a rather dispersed state. For example Sopron was a commuting destination for 20 villages offering 800 jobs for their residents. The second highest number of spatial trajectories was targeted at Sopron. Within Répcesík microregion Csepreg, Bük, Lövő and Sopronhorpács were the major destinations of commuting.

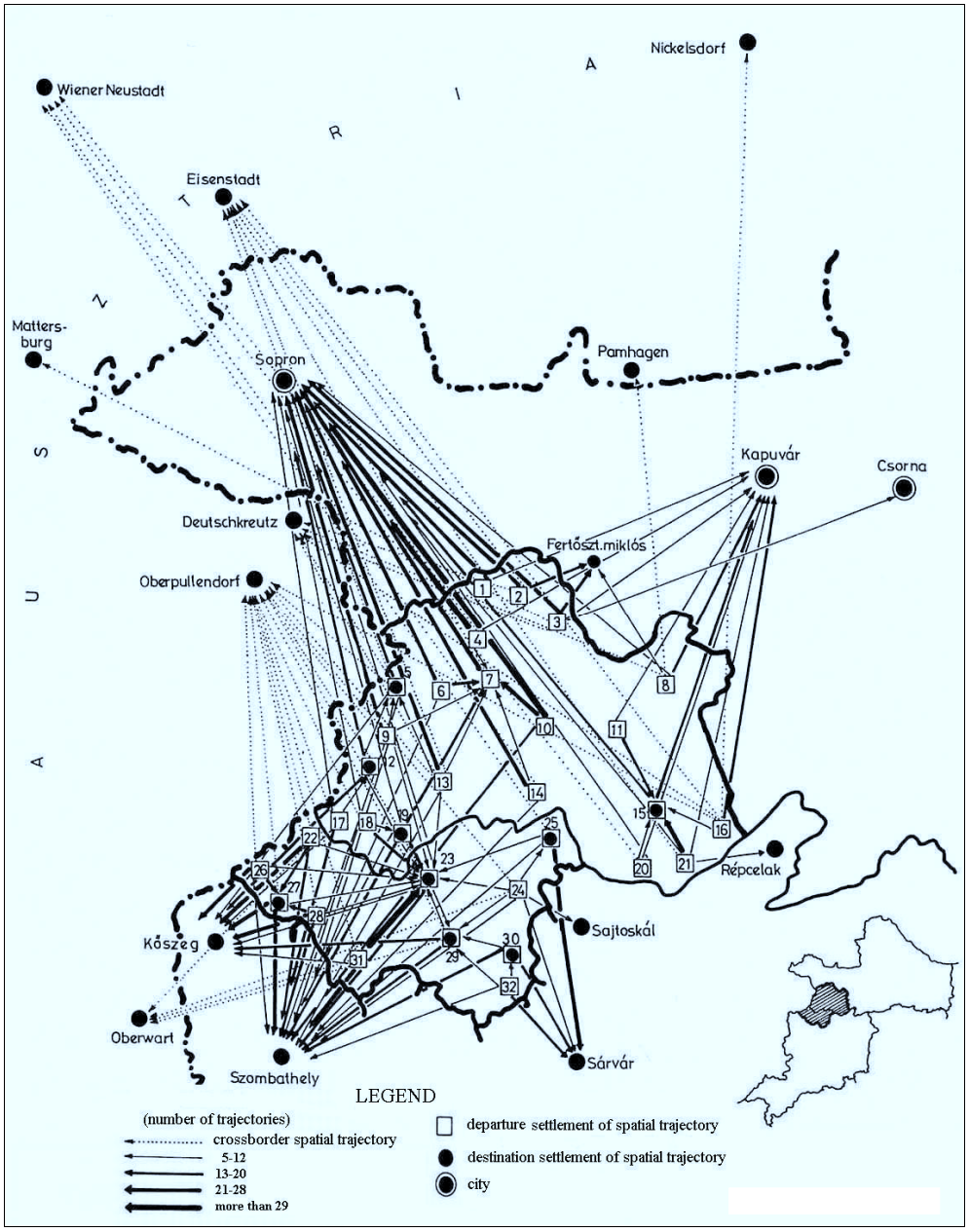
The microregion's border zone situation and the increased appreciation of this geographical situation after the collapse of the 'iron curtain' require the analysis of crossborder spatial trajectories exceeding the intraregional ones. 5% of the microregion's spatial trajectories are crossing the state border, 80% of them are targeted at the villages of Burgenland. This proves that the microregion's has the strongest cooperation relations with the villages of Burgenland. 21% of Burgenland related connections are targeted at Oberpullendorf. *Figure 1* is illustrating the breakdown of inter-settlement spatial trajectories.

2.1.2 Summary of spatial trajectory analysis

The results of spatial trajectory analysis are highlighting the absence of cities in the microregion. Répcesík microregion has no cities and this is also true for its border zones. Therefore, the spatial trajectory analysis has found a spatial structure bound to several centres with almost an equal intensity.

Figure 1

The intensity and network of spatial relations in Répcesík



Source: Questionnaire.

The city of Sopron has the highest number of spatial relations (20%) followed by Szombathely with 19% of the total number of spatial relations These two percentages are indicating the dominance of these two cities. 9% of spatial trajectories are targeted at Kőszeg. 8% at Csepreg pointing out to the settlement's micro-central character. Of the microregion's 32 settlements 31 are rather departure points than destinations of spatial trajectories. The summary of spatial relations is shown by *Table 1*.

The absence of centre is verified by the 35% value of microregional closure, i.e. almost two-thirds of total spatial relations are targeted beyond the microregion. This is backing up our hypothesis on the microregion's dependency and functional deficit. Csepreg is the only place bearing the marks of a central settlement with the highest microregional closure value of all the 32 settlements of our research sample.

Local closure indicator shows the rate of a settlement's spatial trajectories remaining within the boundaries of its microregion. Small and micro villages are characterised by low local and high microregional closure values because although local residents use services and facilities at other places than their own but the essential services are available in the neighbour and other surrounding settlements. This is the case in such settlements as Csér, Csáfordjánosfa and Lócs (*Annex 1*).

Settlements providing services for the locals have high cohesion values. Csapod, Egyházasfalu and Nagylózs are examples for this but their centralisation value is low, which is a sign of their closure, i.e. they are not selected as targets by the residents of neighbour settlements and they do not function as real centres. Cohesion value is extremely low in small and micro-villages which verifies the low number of functions they are able to perform. Centralisation value is an indicator of a settlement's central functions; it is the highest in Csepreg the microregion's centre. Hovátzsidány, Lövő and Iván have also high centralisation value but due to their low cohesion value they cannot function as real centres and are unable to satisfy their local demands for services. The centralisation value of the aforementioned villages with high cohesion values is low and this is not facilitating their central character. As a final conclusion we can declare that the microregion has no settlements functioning as a real centre. Csepreg, due to its extremely high centralisation value, is very near to meeting the criteria of central functions (*Table 3*).

Table 1

The summary of spatial trajectories originating from the settlements of Répcesík (%)

	Com-merce	Centre-periphe-ry	Public administ-ration	Edu-cation	Com-muting	Services	Holiday-making	Commu-ting	Foreign country	Market	Church	Holiday plot	Total
Sopron	21.26	18.25	27.43	31.79	13.92	16.67	23.85	19.15	0.00	13.51	4.35	5.56	20.18
Szombathely	24.92	14.60	10.13	15.61	8.86	6.52	15.60	10.64	0.00	5.41	4.35	0.00	15.06
Kőszeg	8.31	14.60	8.44	6.94	7.59	10.14	9.17	11.70	0.00	10.81	4.35	5.56	8.97
Csepreg	12.96	4.74	2.11	8.67	6.96	19.57	1.83	7.45	0.00	21.62	0.00	0.00	8.50
Kapuvár	9.14	7.66	3.80	2.31	0.63	2.90	5.50	1.06	0.00	13.51	0.00	0.00	5.43
Lövő	5.15	1.82	7.59	2.31	5.70	3.62	2.75	3.19	0.00	0.00	4.35	0.00	4.05
Sárvár	3.65	4.01	5.91	2.89	1.90	6.52	0.00	2.13	0.00	10.81	0.00	0.00	3.59
Iván	1.99	1.82	8.02	2.89	2.53	2.90	2.75	1.06	0.00	0.00	8.70	0.00	2.82
Fertőszent-miklós	3.16	1.82	0.84	1.73	3.80	7.97	0.92	2.13	0.00	2.70	0.00	0.00	2.56
Bük	1.99	2.55	0.84	0.00	3.80	2.90	9.17	3.19	0.00	2.70	4.35	0.00	2.36
Horvátzsidány	0.50	1.09	7.59	4.05	3.16	0.72	2.75	2.13	0.00	2.70	0.00	0.00	2.20
Sopronhorpács	0.33	1.09	4.22	1.16	5.70	0.00	8.26	6.38	0.00	2.70	0.00	0.00	2.15
Répcelak	1.50	1.09	0.84	0.00	2.53	3.62	4.59	1.06	0.00	5.41	0.00	0.00	1.59
Other	5.15	24.82	12.24	19.65	32.91	15.94	12.84	28.72	100.00	8.11	69.57	88.89	20.54
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Settlement-level questionnaire.

Table 2

Cohesion and centralisation values of the settlements in Répcesík

Settlement	Internal spatial trajectories	Intraregional spatial trajectories	Outbound spatial trajectories	Total departing	Inbound	Total	Cohesion	Centralisation
Bő	8	15	47	70	17	87	9.20	42.50
Bük	10	19	49	78	46	124	8.06	61.33
Csapod	7	2	49	58	6	64	10.94	40.00
Csáfordjánosfa	1	26	35	62	4	66	1.52	12.90
Csepreg	13	10	31	54	166	220	5.91	87.83
Csér	0	16	21	37	1	38	0.00	5.88
Ebergőc	5	7	50	62	2	64	7.81	14.29
Egyházasfalu	9	28	39	76	2	78	11.54	5.13
Gór	1	23	30	54	2	56	1.79	7.69
Gyalóka	1	33	20	54	1	55	1.82	2.86
Horvátzsidány	8	9	53	70	43	113	7.08	71.67
Iván	7	7	48	62	55	117	5.98	79.71
Kiszsidány	0	29	42	71	2	73	0.00	6.45
Lócs	0	32	38	70	1	71	0.00	3.03
Lövő	10	13	49	72	79	151	6.62	77.45
Nagylózs	8	7	49	64	3	67	11.94	16.67
Nemeskér	5	27	51	83	6	89	5.62	15.79
Ólmod	1	24	34	59	2	61	1.64	7.41
Peresznye	4	20	43	67	4	71	5.63	14.29
Pusztacsalád	0	20	40	60	4	64	0.00	16.67
Répceszemere	5	11	56	72	7	79	6.33	30.43
Répcevis	2	18	41	61	4	65	3.08	16.67
Röjtökmuzsaj	6	5	62	73	6	79	7.59	35.29
Simaság	3	15	47	65	18	83	3.61	50.00
Sopronhorpács	8	16	39	63	42	105	7.62	63.64
Sopronkövesd	8	8	56	72	5	77	10.39	23.81
Szakony	3	29	28	60	16	76	3.95	33.33
Tömörd	1	28	37	66	2	68	1.47	6.45
Und	3	30	45	78	5	83	3.61	13.16
Újkér	7	13	49	69	6	75	9.33	23.08
Völcsej	6	25	45	76	6	82	7.32	16.22
Zsira	5	17	47	69	15	84	5.95	40.54
Total	155	582	1370	2107	578	2685	27.45	

Source: Settlement-level questionnaire.

2.2 The spatial relationship analysis of the settlements of Lake Balaton

On the basis of the degree of basic provision and features of functionality the 77 settlements of our research sample area may be divided into two distinct groups: shore settlements and offshore settlements.

It should be taken into account that settlements situated at an off position from Lake Balaton resort district but having strong influence on its functional operation (e.g. Veszprém, Székesfehérvár, Kaposvár and even Szombathely, Győr and Pécs) have also a non-negligible role in the microregion's settlement system with their residents emerging as users of the area's recreational facilities. It comes from the resort district's special features that 'high season' tourists produce a much more different pattern of spatial trajectories from that that of the local residents. Recreational functions have strong impacts on the provisional and functional system of Lake Balaton's settlements but the two month summer high-season period' affects the local residents' spatial relations to a far less extent.

For the analysis of residential shifts we have selected the spatial relationship analysis method. This method is mapping the network of settlements through the system of human relationships including intraregional and interregional relations and regional compactness analysis. Thus, spatial relationship analysis reveals spatial structure through the research of residential shift trajectories.

All the settlements of Lake Balaton Resort District were involved in the research through the conduct of a questionnaire survey. The response rate of questionnaires was 50%, this was the sample of our research. The 77 responses are well representing the proportional distribution of settlements within the different counties of Lake Balaton Resort District as 52% have been returned from Veszprém County, 47% from Somogy County and 50% from Zala County. The spatial location of the responding settlements is also proportionate increasing with this the validity of sample. Only the data of eastern shore settlements are missing from the sample which explains why the indicators of the role of Székesfehérvár were low in the sample.

Settlement-level questionnaires assessed the spatial trajectories of eight different areas, such as administrative, health service, commercial, educational, services, transport and recreation. The survey conducted by the spatial relation analysis method was investigating the following questions:

- Where are the major nodes inside and outside of this settlement group for local residents?
- If there are any nodes at all what central functions do they perform for their environment?
- How are these functions cumulated and to what extent do these nodes perform multifunctional roles?

– To what extent the pattern of residential spatial trajectories is matching with the formal hierarchy of settlements i.e. what is the acceptance level of new cities for spatial trajectories?
– Our investigation involves the spatial trajectory relations of tourists as well, thus the resort district will be investigated in a wider spatial context to cover the total dimension of this space.

2.2.1 Administrative spatial trajectories

Administrative gravitation zones are very complex and very interesting phenomena, as after the collapse of the past regime's centralised system the polarisation of spatial relations increased but at the same time the directions of spatial trajectories did not change much due to the fixed location of the institutional system of medium-tier public administration. This was investigated by the inquiries on the location of district notary offices, police precinct offices, central police stations and on the location of courts, public prosecutor's offices and fire stations. We also identified the centres of these settlements. Of the total 77 settlements eight have collected a significant amount of spatial trajectories and six cities of Lake Balaton Resort District have been functioning as *administrative centres* for the settlements involved in our research namely as follows: *Tapolca, Keszthely, Siófok, Fonyód, Marcali* and *Balatonfüred*. The second largest number of administrative spatial trajectories has been collected by *Veszprém* being excluded from territory of Lake Balaton Resort District but performing significant administrative functions for the majority of settlements at Lake Balaton Resort District. 67 spatial trajectories departing from twenty settlements are targeted at *Veszprém*, the county seat among others from those belonging to the administrative gravitational zone of Balatonfüred or Balatonalmádi but their functional deficit is making them choose Veszprém as a destination city.

Badacsonytomaj is the last in the row of settlements with 20 spatial trajectories. This place is serving as a functional node for its neighbour settlements due to its fire station and police precinct office. Only very few spatial trajectories are targeted at the remaining cities of our research sample area. This is explained on the one hand by the absence of their administrative functions and by their special functions that Zalakaros and Hévíz have for example and by their yet poor local administrative functions and institutions on the other hand, as in case of Lengyeltóti from the offshore or Balatonalmádi and Balatonlelle from the shore settlements.

2.2.2 Spatial relations in health service

A wide range of spatial relations have been investigated in the area of health services. The general practitioner, paediatrician and dentist oriented spatial trajectories show a high degree of dispersal due to the diverse tasks and demands of primary health services. 83% of the general practitioner spatial trajectories are targeted outside of the 7 major district centres and additional 43 spatial trajectories are targeted at other general practitioner centres. The spatial trajectories of primary dentist services are showing a similar degree of diversity with 53 spatial trajectory destinations to other than major district centres, i.e. 73% of dentist visiting spatial trajectories are targeted at small dentist centres. The concentration of primary paediatrician services is at a higher level with 58% concentrating in seven settlements only.

We have also investigated primary, secondary and tertiary spatial trajectories targeted at the access of pharmacies, specialist doctors, hospitals and spas. This analysis informed us which settlements were functioning as primary, secondary and tertiary health centres for their neighbourhood.

The primary spatial trajectories to pharmacies are showing some correlation with the spatial structure of dentist services as 75% of spatial trajectories are targeted at other places than the microregion's seven major health centres. The network is very dispersed as a village with a pharmacy has a self-targeted relation if it is primary. Secondary directions are targeted at health centres and sub-centres such as Tapolca, Keszthely and Balatonfüred but Balatonlelle and Nagyvázsony are also serving as pharmaceutical centres for their neighbours. The number of tertiary spatial trajectories to pharmacies is lower than of the secondary ones, only the city of Veszprém has significant number of tertiary spatial relations.

The primary spatial trajectories to specialist doctors are firm indicators of the microregion's primary nodes of health service, the cities of Tapolca, Veszprém, Siófok, Keszthely, Marcali, Balatonfüred and Fonyód collecting 74% of total primary spatial trajectories. Veszprém and Siófok have an increasing role as secondary specialist doctor centres. Keszthely is still an important specialist doctor centre on the second level of spatial trajectories but here Kaposvár is emerging with 7% of all specialist doctor oriented spatial trajectories. Only 16 settlements are selected as tertiary destinations but with a rather hectic pattern of distribution. Besides Veszprém, Siófok and Keszthely, Kaposvár has an increasing role (18.7% of tertiary spatial trajectories are targeted at Kaposvár) and Ajka is emerging as a new tertiary centre for specialist doctor services.

The pattern of the spatial trajectories to hospitals is rather similar to the ones mentioned beforehand. The cities of Tapolca, Veszprém, Siófok, Keszthely and Marcali are regarded as the microregion's hospital centres with 97% of all primary spatial trajectories are targeted at them. Secondary spatial trajectories of hospital

access are far more dispersed as Veszprém, Kaposvár and Ajka, the secondary hospital centres of our sample area are collecting 75% of spatial trajectories. It is remarkable that all these three cities are located outside of the sample area. Tertiary directions of hospital access are still targeted at these three cities, the settlements at the southern coastline are bound to Kaposvár while the settlements of the northern coast are bound to Veszprém and Ajka. Nagyatád, Budapest and Pécs are appearing in the field of hospital services as tertiary destinations.

The analysis of spatial trajectories to spas has produced very definite results. 80% of all primary, secondary and tertiary spatial trajectories are targeted at Hévíz and Zalakaros. The remaining 20% are bound to Igal in Somogy County. These spatial trajectories are departing from Igal's neighbour villages, thus the popularity and gravitational force of the settlement for its greater environment in this field is yet far from an appropriate level.

*Summarising the spatial trajectories of health services we can identify five major health centres on the territory of Lake Balaton Resort District. Of them Tapolca is the most important (as the destination for 11% of all the spatial trajectories) but Siófok and Keszthely are also collecting 6% of total spatial trajectories each. Marcali and Balatonfüred have less important functional role in health service*s. Although Balatonfüred offers outstanding health service and therapeutic services for people suffering from heart diseases but its special hospital treatment servicing the whole territory of Hungary does not significantly improve the health service palette of the neighbour settlements. It is worth mentioning that Veszprém as the second most important health centre but excluded from the resort district has quite an important role in its health service system.

2.2.3 The spatial relations of education

The analysis of the spatial trajectories of education was targeted at investigating what network of primary and secondary centres of education has been formulated and if there exist any nodes to be regarded as schooling or educational centre is it overlapping with settlements with functional surplus. This research was based on the analysis of spatial trajectories to nursery, elementary and secondary schools.

By their nature nursery school spatial trajectories are targeted at mostly neighbour settlements or those located at a short distance from departure. From the 77 settlements of our analysis 22 has no nursery schools, therefore 3–6 year old children should travel from them to other settlements. These spatial trajectories are short and targeted at neighbour settlements in the majority of cases. This is also true for cities. Tapolca is targeted by three, Keszthely by two spatial trajectories and Siófok is the destination of one spatial trajectory.

The spatial trajectories to elementary schools are showing a similar pattern, 26 settlements have no low grade classes and 33 have no upper grade classes. These

spatial trajectories are very similar to nursery spatial trajectories as mostly low grade pupils do travel to the neighbour settlements. This kind of spatial trajectory system is locked with three destinations only to places located outside of Lake Balaton Resort District. One of them is Nikla receiving pupils from Táska the neighbour village. The other is Kölcse receiving low grade elementary school pupils from Nagycsepely. Taliándörögd is the third one the destination of a spatial trajectory departing from Vigántpeterd.

The spatial trajectories of upper grade elementary school cover a larger space including the microregion's central places and cities such as Tapolca, Fonyód, Siófok and Kaposvár but for all that these spatial relations are rather dispersed due to the absence of dominant centres.

The pattern of the spatial trajectories of secondary education is rather different from the previous ones. A separate analysis has been carried out on the primary, secondary and tertiary spatial trajectories of grammar schools, special secondary schools and vocational schools. Six settlements have been proved to be *grammar school centres for the microregion*. They are *Keszthely, Tapolca, Fonyód, Siófok and Balatonfüred*. However the majority of spatial trajectories for accessing grammar schools are targeted at *Veszprém,* a city excluded from our research sample area, and even Kaposvár, another external' city, has an important share from the destinations of grammar school oriented spatial trajectories. Although Balatonalmádi has fewer spatial connections but its importance in education may be verified by being selected as destination by several settlements in the microregion and by the fact that its gravitational zone covers the whole area of Lake Balaton Resort District. Some additional spatial trajectories are targeted at Pápa (perhaps because of its Presbyterian Grammar School), Sümeg and even at Budapest and Nagykanizsa proving how huge gravitational zone special secondary classes do have.

The spatial trajectories to special secondary and vocational schools are mostly targeted at the same settlements. Of them again *Veszprém has the strongest spatial relations*. Fonyód and Balatonfüred have weaker special secondary schools and vocational school than grammar school links but *Keszthely, Tapolca* and *Siófok* (especially in case of vocational school relations) have preserved their importance. Some spatial trajectories of these two school types are targeted at Balatonboglár but the city's educational gravitation zone covers only some of its neighbour settlements.

Summarising the spatial trajectories for the access of educational institutions we can identify *five settlements – Keszthely, Tapolca, Fonyód, Siófok and Balatonfüred – with major educational functions*. Some settlements are also functioning as educational sub-centres such as Balatonalmádi, Marcali and Balatonboglár but the last two ones are important for their environment only. The two 'offshore county seats' (Veszprém and Kaposvár) are major education centres and this definition is

particularly true for Veszprém because the city has collected the majority of educational spatial trajectories, it really deserves the 'city of schools' title. Unfortunately new cities such as Balatonlelle and Lengyeltóti have been excluded from the list of educational destinations which is a clear sign of their missing educational functions.

2.2.4 The spatial trajectories of commercial relations

Analysing shopping habits we can easily detect the system of informal spatial relations, as shopping habits are very good indicators of commercial gravitational zones. The orientation of commercial spatial trajectories is completely free, as it follows residential choices and commercial offers only. Spatial relations are depending on the ever changing offers – today they can meet all kinds of demands – and on the habitual sites of shopping. Some newly opened, big shopping centres may temporarily change the route selection of daily shopping but in several cases traditions or better accessibility and last but not least high-quality goods and services are the final determinants of the spatial trajectories of shopping.

Our investigation on the directions of commercial spatial trajectories on the territory of Lake Balaton Resort District may be of a particular interest as commerce is just the very sector that – because of tourism – makes this microregion different from the commercial provision of an average Hungarian microregion. Local residents in their responses marked ten settlements with poor commercial supply. Of the two settlements – Szigliget and Paloznak – are situated on the shore of Lake Balaton the others are small, offshore settlements. In the last 10–15 years new shopping centres were opened on the shore area but their opening hours with the opening hours of several small shops are tailored to the patterns of high-season period. This raises the question to what extent commercial plants do contribute to the satisfaction of the local residents' demands. The analysis of spatial trajectory directions helps us to find a definite answer.

Our analysis of commercial spatial trajectories comprised an assessment of spatial trajectories targeted at different special shops and shopping centres including primary, secondary and tertiary spatial trajectories by asking in case when shopping ends with no success which settlement's special shop will be visited for the second and which for the third attempt? We also inquired on the most important shopping centres for the settlement and its environment.

The primary spatial trajectories of commerce are targeted at settlements of traditional good commercial provision. 83% of the total commercial spatial trajectories are targeted at ten settlements. Of them one (Veszprém) is excluded from the research sample area and one (Badacsonytomaj[2]) is not a city. For the majority of

[2] t the time of our investigation Badacsonytomaj was not a city yet.

commercial spatial trajectories Tapolca (140), Keszthely (113) and Veszprém (100) are the final destinations. The are followed by Balatonfüred, Siófok and Balatonlelle. Marcali and Balatonboglár with 30 trajectories are the third in the ranking of commercial functions. The number of trajectories is less than twenty in case of Fonyód and Badacsonytomaj. Badacsonytomaj is worth for a note as this is the only significant commercial centre that has not yet won city rank. Its neighbour settlements (Balatonrendes, Ábrahámhegy) have marked as their primary commercial centre.

The secondary spatial trajectories are more dispersed than the primary ones as only 77% of spatial trajectories are targeted at ten settlements. The commercial centres of secondary spatial trajectories are not coinciding with the primary ones. In this case Veszprém and Tapolca are standing at the first and second places. Marcali is the third in the ranking of secondary commercial centres. This is well illustrating Marcali's inferior role in commerce. Keszthely and Balatonfüred are also important centres and the next group consists of settlements as follows: Balatonboglár, Badacsonytomaj, Lengyeltóti, Zalaegerszeg, Balatonlelle, Balatonalmádi and Siófok. It is a bit surprising that only 11 spatial trajectories are targeted at Siófok but at the same time Lengyeltóti – a new city – is emerging as a new destination of shopping. Budapest is also marked as a secondary destination.

Tertiary destinations are completely different from the secondary ones as they are excluded from the microregion. These external centres are Nagykanizsa, Zalaegerszeg and Kaposvár and with the exception of Tapolca the microregion's settlements are unimportant as tertiary destinations. On tertiary level Kaposvár is the commercial centre for the southern coast of Lake Balaton. Tapolca is the tertiary centre for the microregion's north-western part while Nagykanizsa, and Zalaegerszeg are the tertiary gravity centres for the west coast settlements of Lake Balaton.

Commercial gravitational zone centres are overlapping with primary spatial trajectory nodes. 17 settlements have nominated Tapolca for their commercial centre. Veszprém and Siófok got 9 votes each, Keszthely and Balatonfüred were marked as tertiary commercial centres by 10 settlements, Balatonlelle and Marcali were marked by 5 settlements each. Practically these settlements are secondary commercial centres as well only the circle of their nominator settlements has changed. Settlements nominating Veszprém for their primary commercial centre nominated Balatonfüred or Balatonalmádi as their secondary one. A similar change may be observed for Keszthely and Tapolca, Marcali and Lengyeltóti and Balatonlelle and Siófok.

With the summary of commercial spatial trajectories the commercial nodes of the microregion's internal and external space may clearly be identified. On the basis of spatial trajectory destinations we can identify seven commercial centres. They are as follows: *Tapolca, Veszprém, Keszthely, Balatonfüred, Siófok, Balatonlelle and Marcali. Kaposvár and Nagykanizsa are secondary and tertiary com-*

mercial centres. Badacsonytomaj is also a worthy of note place from this point with significant number of spatial trajectories verifying the settlement's functional role as a microregional centre. Hévíz and Zalakaros have been excluded from the list of commercial type cities because they are performing totally different functions (spa tourism). The unimportance of Balatonföldvár, Balatonalmádi and Fonyód in the field of commerce is a bit surprising. These places have been specialised at accommodating guests for high season period only and local residents do not consider them as commercial centres.

As a general rule the microregion's settlements and the local residents' spatial trajectories are not targeted at seasonally open supermarkets, they prefer shopping in traditional, multifunctional commercial centres. This seems to verify the hypothesis that supermarkets in the coastal zone of Lake Balaton have been built rather for the provision of tourists than of the natives.

2.2.5 The spatial relations of financial services

In our age financial services get a high appreciation in the hierarchy of services. This is particularly true in case of a microregion where tourism has primary importance involving a higher than average financial activity performed both by local residents and tourists. Our questionnaire was inquiring on the local palette of financial services and the spatial trajectories of local residents for accessing the relevant financial institution for the services they need. In a similar way to the previous case we have assessed the directions of primary and secondary spatial trajectories for the identification of primary and secondary centres. We have completed this spatial analysis with an assessment on the directions of spatial trajectories targeted at the gravitational zone centres of residential savings and other financial services.

Of the 77 responding settlements 34 have reported on the local availability of a financial institution be it as a savings cooperative, bank branch or local post office with banking functions. Cities offer a far wider palette of financial services as they generally have three-four but in several cases (e.g. Siófok) five banks offering a wide range of financial services for local residents, for the citizens of the agglomeration settlements or for tourists.

The primary spatial trajectories for accessing banking services are targeted at four cities. They are Tapolca, Keszthely, Siófok and Balatonfüred. The lower number of primary spatial trajectories implies lower importance in banking in cities of Balatonboglár, Marcali, Fonyód and Lengyeltóti. Tapolca, Veszprém and Balatonboglár are the nodes of the secondary spatial trajectories *of banking services* and on secondary level Nagyvázsony is emerging as a new destination for its neighbourhood.

Questionnaire data are verifying the role of *Tapolca,, Keszthely, Siófok, Veszprém and Balatonfüred as the financial centres for their gravitational zone*. 60% of the total financial spatial trajectories are targeted at these cities, another 20% are targeted at minor cities with Nagyvázsony and Nagykanizsa a city located outside of the research sample area the financial centre for Zalakaros and Nagyrada. The remaining 20% are occasional, in the majority of cases reflexive or neighbourhood oriented relations.

2.2.6 The spatial relations of recreational activities

The spatial relations of cultural and sports events have spatial organisational force and at the same time they indicate local society based inter-settlement relations which are initiated in the majority of cases within these to fields (culture and sport). The analysis of spatial trajectories reveals those centres that may be considered as 'sanctuaries' of cultures and sport. For localising these places we have assessed the primary and secondary trajectories of various cultural and sports events but also conducted a survey on the location of most visited theatres, cinemas, entertainment programmes, concerts and other cultural facilities and sports events.

The primary spatial trajectories of the aforementioned events show a rather dispersed spatial pattern depending on the type of event itself. No doubt, that the spatial trajectories of theatre visits have been concentrated in the microregion's theatre centres: Kaposvár, Veszprém and Zalaegerszeg. No other settlements have been marked by the respondents as destinations. The spatial trajectories of cinema visits are more dispersed. Besides cities villages with cinema are also marked as destination. These are Sármellék, Balatonfűzfő and Révfülöp. A similar fragmentation of spatial trajectories may be recognised in the destinations of entertainment programmes. This fragmentation has been resulted from the wide palette of programmes organised by local societies, in several cases spatial trajectories are targeted at very small settlements which is clearly marking the increasing significance of local cultural events (Somogybabod, Kapolcs). Some special cultural centres are also emerging on the map such as Tihany and Balatonföldvár. The spatial trajectories of sports events – as expected – were the most dispersed which is in a strong correlation with the participation and the number of fans at local sports events. The spatial trajectories of sports events are not concentrated into cities, for example only three spatial trajectories are targeted at Tapolca and 54% of the total number of spatial trajectories is targeted at non-urban settlements. The spatial trajectories of discos and other cultural events are showing a similar pattern.

Within this dispersed network finding cultural and sports centres concentrating a significant number of spatial trajectories is a more difficult job. Although the significance of sports related spatial trajectories is weaker than of educational or

commercial ones they still may be recognised on the map of spatial relations. Of the microregion's cities Veszprém, Keszthely, Siófok and Tapolca have collected the highest number of primary spatial trajectories but Balatonfüred and Balatonboglár are also important sport and cultural centres. The ranking of sports related spatial trajectories is ending with the two 'legitimated' county seats (Kaposvár and Zalaegerszeg) situated outside of the research sample area.

The system of secondary spatial trajectories shows less density and a higher number of spatial trajectories is targeted at settlements situated at a greater distance off from their departure points such as Budapest for example.

The majority of secondary spatial trajectories are targeted at Tapolca. Veszprém has the second highest number of spatial trajectories. Siófok maintains its third position and the fourth place is shared by Keszthely with Balatonfüred. The next two cities are Kaposvár and Balatonlelle a city famous for its sports and cultural events and discos.

And finally, by summing up primary and secondary spatial trajectories we can map the microregion's recreational centres. The highest number of recreational spatial trajectories is targeted at *Veszprém, Tapolca, Keszthely and Siófok*. *Balatonfüred is a significant cultural centre* while Kaposvár and Zalaegerszeg are functioning as cultural sub-centres for the microregion.

2.2.7 The spatial relations of tourist accommodation

This chapter is dealing with another aspect of spatial relations. Here we are analysing not local residential shifts or spatial trajectories as we have done so far but rather the departure settlements of tourists accommodated in the settlements of our research sample area. We also investigated the places of permanent residence of the holiday-home or holiday landowners having properties at the settlements of Lake Balaton Resort District and having a kind of local ties. Unfortunately, we received detailed and correct responses to our questionnaire only in a few cases, especially from holiday home proprietors; therefore our presentation is based on the evaluation of trends only.

Our research evaluation has verified the famous Hungarian slogan 'Budapest is the capital of Lake Balaton'. 20% of the spatial trajectories of tourist accommodation are departing from Budapest. 42 settlements (of the total 77) are reporting having holiday home owners from Budapest and the majority of settlements accommodate tourists from Budapest. Presumably due to incomplete responses – especially from the eastern coastal areas of Lake Balaton – neighbourhood cities have less important role in tourist accommodation than expected. This is particularly true in case of Székesfehérvár with only 4% of spatial trajectories originated from here. This implies a lower ratio of spatial trajectories than Pécs and Győr have. *Looking at the spatial trajectories between some large cities and the settlements of*

our research sample area we can observe that the territory of Lake Balaton, e*specially its shore district is divided into zones by the departure cities of tourists*. Which zone is selected as a destination by which city's tourists depends principally on the zone's accessibility. The eastern coast has a majority of tourists originating from Székesfehérvár. Győr dominates nearly over the whole northern coast, principally between Balatonalmádi and Tihany and between Balatonszepezd and Gyenesdiás. The 'territory' of Pécs covers an area between Balatonmáriafürdő and Siófok, practically the full southern coast of Lake Balaton. Spatial trajectories departing from Zalaegerszeg and Szombathely are targeted principally at the area between Balatongyörök and Balatonmáriafürdő. *By all means it seems obvious that domestic holidaymakers and tourists visiting Lake Balaton are coming mostly from Budapest and Trandanubia*. Certainly the cities of Great Plain are also represented among the departure settlements of spatial trajectories but their dominance compared to that of Transdanubian cities is by far less.

Tapolca and Káli Basins, the microregion's two special zones, with Hévíz and Tapolca the two cities with spa are also worth for a note. The settlements of Tapolca but principally of Káli Basin – as it has been verified by spatial trajectory analyses – are favourite destinations for visitors from Budapest. Every settlement has spatial trajectories departing from Budapest. The same is true for the spatial relations with Germany and Austria. Here an unstoppable process seems to have started. The area has become fashionable and this also comprises the real threat of uncontrolled developments with losing the very same values that made the landscape so beautiful and valuable. Something has to be done right now so that to preserve this place's background role in tourism and to preserve it as an area for sustainable, eco and heritage tourism.

Zalakaros and Hévíz, the two spa cities, have different patterns of spatial relationship. While Hévíz is a traditional spa city, the majority and most important visitors are coming from Budapest to here. Zalakaros, a new holiday centre reveives the most visitors from Nagykanizsa. Both cities have extensive German, Austrian and Swiss relations.

In the European context the spatial trajectories of Lake Balaton *reflect Hungary's traditional international relations*. Of the 77 settlements 59 has relations with Germans who emerge either as holiday landowners or as tourists. German spatial trajectories are followed by Austrian ones. 38 settlements have Austrian spatial trajectories and relations. Beyond these two countries the relations with Switzerland and the Netherlands have significant importance. Swiss tourists are preferring exclusive places while the Dutch are visiting mostly off-shore settlements. Some visitors from Finland, Denmark, Sweden, Italy and France are also recurring to here but they are bound to one or two settlements only on a random occurrence basis.

2.2.8. The general features of spatial relations

I have presented the spatial trajectories of different activities and functions with their concentration points and nodes inside and outside of the microregion. By summarising spatial trajectories we can map spatial trajectories of residential preference. As with the exception of tourist accommodation related spatial trajectories all spatial trajectories are marking the spatial shifts of local residents our summary will exclude the results of the spatial trajectory analyses of recreation and tourist accommodation *(Table 3)*.

The structure of spatial trajectories is partially reflecting the hierarchy of settlement network, the majority of spatial trajectories is targeted at traditional cities *(Figure 2)*. The analysis clearly shows that the research sample area (Lake Balaton Resort District) has no 'capitals', there are no cities functioning as a central place for the microregion. Of the microregion's 13 cities eight are destinations of high significance but five have no importance at all. *The settlements receiving the highest number of spatial trajectories, i.e. the most heavily 'used' by local residents are as follows: Tapolca, Keszthely, Siófok, Balatonfüred, Marcali, Balatonboglár and Balatonlelle*. Beyond these cities *Badacsonytomaj* is the only village that receives a significant number of spatial trajectories. The second highest number of spatial trajectories is concentrated in *Veszprém*, therefore the city should be treated as a part of the microregion.

Hévíz, Balatonalmádi, Balatonföldvár, Zalakaros and Lengyeltóti are cities with insignificant number of spatial trajectories.

The analysis produced a surprising result: practically there are no relations between the northern and southern coasts of Lake Balaton. No spatial trajectories have been found to be targeted at any settlements of the southern coastline from the northern coast (or vice versa). The spa cities of the western coast of the lake were the only connection points between the two spatial trajectories being equally visited by the residents of both coasts.

There are three major poles in the spatial structure of the northern coast. *Tapolca* is the destination for the majority of spatial trajectories but this high position is resulting from its good geographical position in the micro-village space, from its good transport connections and from its traditional urban functions. Tapolca is practically the centre of the western part of the northern coast. Keszthely is the subcentre of the microregion, serving as the primary centre for the west-coast villages of Lake Balaton. The functions between Tapolca and Keszthely are well-divided as in some functions Keszthely is the primary destination and Tapolca is the secondary and vice versa. Keszthely is the primary destination for educational and cultural spatial trajectories.

Table 3

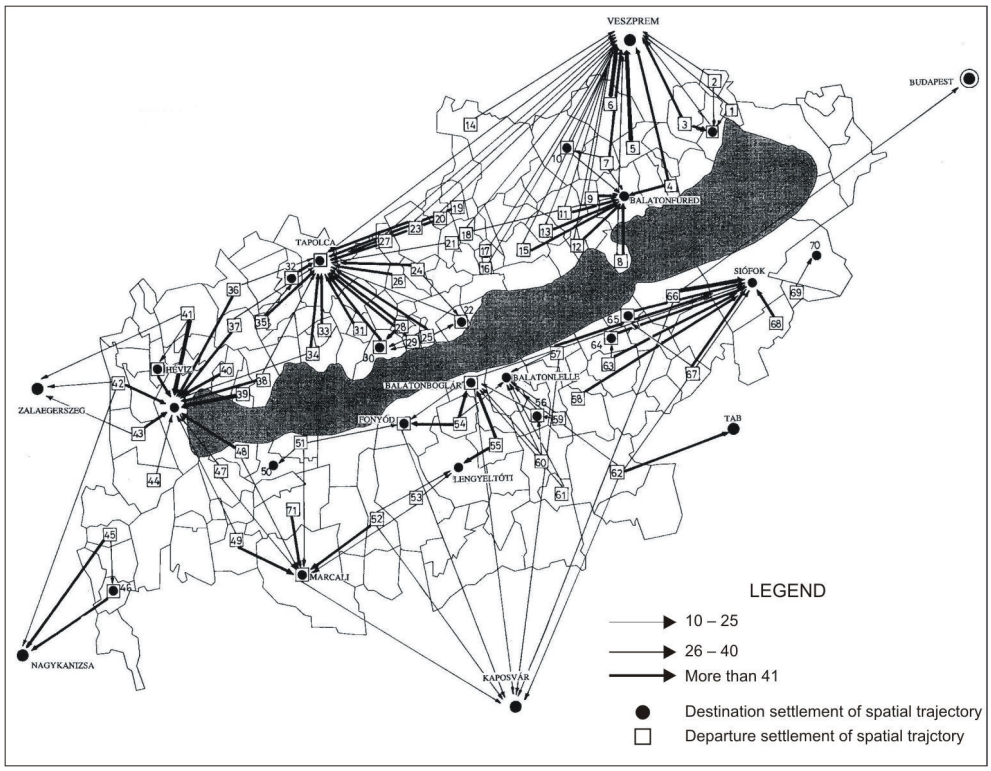
Orientation of spatial trajectories departing from the settlements of Lake Balaton Resort District (%)

	Commercial	Health service	Transport	Educational	Recreational	Public admin-istrational	Services	Total
Tapolca	17.06	11.30	12.22	8.69	9.38	15.82	16.24	13.69
Veszprém	13.69	9.83	11.78	10.46	13.49	14.73	7.22	12.34
Keszthely	12.36	6.39	9.72	8.84	9.21	12.75	11.08	10.46
Siófok	5.90	6.63	6.63	5.01	9.05	10.33	8.76	7.22
Balatonfüred	8.22	3.69	6.48	4.42	6.25	5.27	6.70	6.32
Marcali	5.27	4.79	2,95	3.09	2.96	7.69	3.09	4.50
Kaposvár	2.39	3.32	6.63	4.71	4.77	0.66	1.29	3.58
Balatonboglár	3.79	1.97	3.24	2.80	4.44	1.76	5.15	3.40
Fonyód	1.40	1.97	2.80	6.92	0.99	7.91	2.06	3.11
Balatonlelle	5.41	0.98	3.98	0.29	3.95	1.10	0.77	2.99
Zalaegerszeg	2.04	1.60	3.09	2.36	4.11	0.44	0.26	2.19
Hévíz	0.91	7.86	2.06	1.03	2.14	0.22	0.26	2.31
Nagykanizsa	3.30	1.47	1.62	1.62	1.48	1.76	1.80	2.11
Budapest	0.77	0.61	1.18	0.15	1.48	0.00	0.00	0.70
Other settlements	17.49	37.59	25.63	26.07	26.32	19.56	64.95	26.27
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Settlement-level questionnaire.

Figure 2

The breakdown and intensity of spatial trajectories at Lake Balaton



Source: Settlement level questionnaire.

Veszprém is the centre for the eastern half of the northern coast. Some villages on the northern coast such as Nemesvámos, Nagyvázsony and Tagyon and even some larger settlements as Balatonalmádi, Balatonfűzfő consider it as their primary centre. *Veszprém is also the destination of the primary spatial trajectories of the north-eastern coast functioning for them as a primary centre*. *Balatonfüred is the secondary centre only of the north-eastern coast of Lake Balaton*. This shadowed position is explained by the functional sufficit of Veszprém but the poor accessibility of the settlements of Balatonfüred microregion is another contribution to this handicapped situation. Balatonalmádi, the smallest and youngest city of the northern coast of Lake Balaton also falls into the gravitational zone of Veszprém and the two other cities' (Veszprém and Balatonalmádi) with their traditional and stronger functions are sucking off even the spatial trajectories of settlements situated in the close environment of Balatonalmádi.

The settlement structure at the southern shore has some similarities with that of the northern coast: it has also multiple poles but has more urban settlements and cities are forming a special agglomeration system along the coastline. The majority of these cities are new and this is also true for off-shore cities, therefore their functional system is yet incomplete. The majority of spatial trajectories departing from the settlements of the southern coast are targeted at Siófok. Marcali is the other central settlement of the southern coast. The cities of the southern shore zone such as Balatonboglár, Balatonlelle and Fonyód receive an equal share of spatial trajectories. Lengyeltóti, the newest city, has no spatial organisational functions, and the same is true for Zalakaros being the destination of health service related visits only.

– The role of 'legitimated' county seats and of Nagykanizsa in spatial organisation:

The different spatial relations of Veszprém, Kaposvár and Zalaegerszeg, the three county seats, can easily be mapped on the basis of spatial trajectory analysis. By applying this method we have calculated the gravity value of settlements located outside the microregion, i.e. we have divided the number of spatial trajectories targeted at a city with the total number of spatial trajectories *(Annex 2)*. The results show that Veszprém has a far greater gravitational force on some settlements than Kaposvár or even Zalaegerszeg on their neighbourhood. While Veszprém is targeted by primary spatial trajectories the other two county seats are targeted by secondary or tertiary spatial trajectories only. The spatial trajectories of theatres are the only exceptions from this rule. While the gravity value of Veszprém is exceeding the value of 50% in several cases which may be illustrated by the examples of Nagyvázsony, Nemesvámos, Veszprémfajsz and Hidegkút, in case of Kaposvár 20% is the highest gravity value. This value is corresponding with the gravity value of small towns such as Marcali or Balatonboglár. Zalaegerszeg has even lower gravity value.

– Lake Balaton Resort District in the context of Hungarian and European space

The analysis of the local residents' spatial trajectories has shown that local population through their everyday lifestyle and through the performance of shopping, cultural, service, educational and administrative functions is not directly connected with the other settlements and big cities of Transdanubia. This microregion, in this respect, has similar features with any other microregions of Hungary. However during high tourist season period these settlements are widely opening their gates to the Hungarian and European space, in domestic relations to Budapest and the other cities of Transdanubia (Győr, Pécs, Székesfehérvár and Szombathely), and they are welcoming European tourists principally from Germany and Austria.

2.2.9 Spatial structure in the reflection of spatial trajectory analysis

Spatial trajectory analysis is suitable for finding an answer to such questions as for example does a settlement perform central functions for its closer environment or how much gravitational force has a city for a settlement or how much closure is represented in its relationship system within the microregion of our research. To provide a reply for all these questions we have calculated the values of cohesion, individual closure, microregional closure and urban gravity.

We have calculated each value for all the settlements involved into our research *(Annex 3)*. The values of individual closure and the values of cohesion are definite indicators of settlements standing on the lower levels of hierarchy as those with low closure and cohesion values can perform their basic functions neither for themselves nor for their environment. In very extreme cases both values may be zero. We have found ten settlements with zero values. These settlements have no reflexive spatial trajectories, all services are available elsewhere only and they are neither marked as destinations from any other settlements, therefore they have been left without inbound relations. Among these settlements we can find a coastal one (Örvényes) but the majority of this group consists of off-coastal micro-settlements. They are listed in the table under the column heading of 'Settlements with significant functional shortages'.

The second group consists of settlements with low cohesion but high closure value. These settlements are able for servicing their own demands, i.e. they have a high number of reflexive spatial trajectories but their low cohesion level is indicating a low number of inbound relations, which means that the importance of these settlements for their environment is low. These settlements are listed in the table under the column heading of 'Satisfied settlements'.

The third group consists of settlements with low individual closure and high cohesion value. They categorize themselves as a settlement having too few functions but a high number of spatial trajectories are targeted at them and their functional excess enables them for providing services for the neighbour settlements. Henceforth we categorise them as 'unsatisfied' settlements.

The fourth group consists of central settlements with high individual closure and high cohesion values. These settlements are performing central functions both for themselves and their environment. Due to their high cohesion value they are functioning as multifunctional centres for their neighbour settlements.

Beyond the aforementioned disjunctive categories spatial trajectory analysis is a suitable instrument for creating an additional category indicating the openness of settlements towards areas beyond the microregion. This category consists of settlements with spatial trajectories targeted beyond their microregion, thus having strong ties with areas falling outside their microregion. Only peripheral or very open settlements have low values of microregional closure as their relationship

system is the most oriented towards external territories. In our case some settlements (Balatonfűzfő, Balatonalmádi, Nagyvázsony, Nemesvámos etc.) have several spatial trajectories targeted at Veszprém as it is shown by their urban gravity values. For this reason the settlements of the northern coast have low microregional closure value in the majority of cases. Henceforth they will be referred to as 'open settlements for external territories'. This latter fact explains why Veszprém is treated as a part of the microregion.

The categorisation of the settlements of our research sample by the categories set forth above is presented by *Table 4*.

2.3 The analysis of the spatial relations of Szigetköz

This investigation is special in the sense that in 1993 right before the political transformation a spatial relation analysis had already been prepared for the territory of Szigetköz and this is repeated now after a ten year's period. We can compare the results of the two analyses and can see how residential spatial trajectories have changed during the past ten years of transition, what were the determining factors of changes if there have been any, which spatial trajectories have changed for the most part and what were the reasons of these changes? Both researches are associated with the preparation of the development concept of Szigetköz and their results are available in the Library of West-Hungarian Research Institute (Szigetköz társadalmi... 1993; Szigetköz területfejlesztési... 2003).

Unfortunately the processing of questionnaires for three settlements of the research sample area has failed and this raises the problem as if the missing settlements should be treated as outsiders but Dunasziget, Dunaremete and Ásványráró are inseparable from the landscape unit of Szigetköz. Any inbound flows into these three settlements will be regarded as intraregional even if the exclusion of these settlements from the research sample will produce no outbound spatial trajectories distorting the research sample in this way.

The investigation was carried out by the means of settlement-level questionnaires. This method was differing from the ones previously applied that during the collection of educational and commuting data the number of travellers was counted for the weighing of spatial trajectories. The following analysis is comparing the data of our research having carried out in year 2003 with those of the previous research having carried out ten years before.

The microregion became famous at the change of political system as this is the site of the worldwide famous political Gabčikovo–Nagymaros Dam conflict. Unfortunately neither of its political nor environmental conflicts has been resolved so far which makes the implementation of the area's long-term development concept rather unpredictable and requires the rethinking and changing of regional and rural

Table 4

Types of settlement categories resulting from spatial trajectory analysis

Settlements with significant functional shortages	Settlements with functional shortages	'Satisfied' settlements	'Unsatisfied' settlements with functional excess	Central settlements	Open settlements for external territories
Balatonrendes	Ábrahámhegy	Látrány	Balatonszárszó	Balatonboglár	Balatonalmádi
Hegyesd	Balatonberény	Litér	Balatonszemes	Fonyód	Balatonfűzfő
Hidegkút	Balatoncsicsó	Nemesgulács	Balatonszentgyörgy	Hévíz	Hidegkút
Lesencefalu	Balatongyörök	Szigliget	Buzsák	Keszthely	Litér
Örvényes	Balatonhenye	Tihany	Gyenesdiás	Marcali	Nagyrada
Siójut	Balatonszőlős		Monostorapáti	Siófok	Nagyvázsony
Szentkirályszabadja	Bálványos		Nagyvázsony	Tapolca	Nemesvámos
Szőlősgyörök	Balatonmáriafürdő		Nemesvámos		Szentkirályszabadja
Tagyon	Dörgicse		Pécsely		Tótvázsony
Veszprémfajsz	Hegymagas		Révfülöp		Veszprémfajsz
	Kéthely		Sármellék		Zalakaros
	Kapolcs		Tótvázsony		
	Karád		Zalakaros		
	Mindszentkálla		Badacsonytomaj		
	Lesencetomaj		Balatonalmádi		
	Nagycsepely		Balatonföldvár		
	Nagyrada		Balatonfűzfő		
	Ordacsehi				
	Paloznak				
	Rezi				
	Salföld				
	Ságvár				

Table 4 continued

Settlements with significant functional shortages	Settlements with functional shortages	'Satisfied' settlements	'Unsatisfied' settlements with functional excess	Central settlements	Open settlements for external territories
	Somogybabod				
	Somogysámson				
	Somogytur				
	Szentantalfa				
	Szentbékálla				
	Szentgyörgyvár				
	Szólád				
	Táska				
	Vállus				
	Várvölgy				
	Vászoly				
	Vigántpeterd				
	Vonyarcvashegy				
	Visz				
	Zamárdi				
	Zalavár				

Source: Own calculation on the basis of settlement level questionnaires.

development programmes. I would like to mention just one thing of this bundle, namely the issue of national parks emerging from time to time on debates then disappearing again without making any progress. Although the microregion regularly faces environmental crises but so far no signs of socio-economic backwardness or lagging have occurred here. The rate of population growth is exceeding the county's average and it was only stagnating when the county's population showed a decreasing trend (between 1941–1949 and 1980–1990). Today the total population of the microregion's 27 settlements is 38 thousand with an average settlement size of 1400 inhabitants/village. Only three settlements have less than 500 inhabitants. From this settlement structure we can conclude that this type of spatial relationship structure is differing from that of Répcesík, a peripheral and small village based settlement network.

2.3.1 Administrative and official spatial relations

Of the settlements involved into our research fifteen provides administrative services for the locals only as no entry of administrative service oriented spatial trajectories have been detected into any of these settlements from outside. Settlements providing administrative services are as follows: Nagybajcs, Kisbabot, Vének, Abda, Máriakálnok, Vámosszabadi, Győrladamér, Dunaszentpál, Levél, Darnózseli, Rajka, Mecsér, Bezenye, Kunsziget and Győrújfalu.

There are nine settlements providing administrative services not only for the locals but for outsiders as well. They are Hédervár, Püski, Kimle, Győrzámoly, Hegyeshalom, Dunaszeg, Kisbajcs, Halászi and Dunakiliti. Six of them are notarial district centres. Some other administrative functions are concentrated in Halászi, Kimle and Hegyeshalom. Hegyeshalom and Kimle are building society centres while Halászi is a district police centre. 50% of non-primary administrative spatial trajectories are collected by two cities: Győr and Mosonmagyaróvár.

When comparing the results of the 2003 research with those collected ten years before one can see that small local governments are performing multiple tasks themselves. Spatial trajectories are more dispersed and the settlements of Dunaszeg, Győrzámoly and Kimle have greater significance for their neighbourhood while Győr and Mosonmagyaróvár are collecting 65% of spatial trajectories than they did ten years before. The majority of court, labour and police station oriented spatial trajectories are unanimously attached to these two cities but the mayor's offices of villages are also administering a growing number of official cases. Official case clearances have been more restricted to the territory of microregion.

2.3.2 Commercial spatial relations

Residential commercial spatial relations are determined by demand-supply relationship. The intensity of their usage depends on the supply of commercial units and on local residents' income and mobility level.

We have analysed the spatial trajectories to different shops. As shopping situation may imply alternative choices we have investigated primary, secondary and tertiary spatial trajectories, seeking for the place where the local residents' first (primary) unsatisfied shopping demands are going to be satisfied next. We wanted to see if the second attempt of shopping is ending with no success which settlement will be the third to be visited (tertiary spatial trajectory) for shopping purposes.

The directions of commercial spatial trajectories – just as we have expected – proved to be rather dispersed. Primary spatial trajectories remain at local level which indicates a good commercial supply in settlements as food and essential goods are purchased in local shops. But even in this case the majority of spatial trajectories are targeted at Mosonmagyaróvár (37%) and Győr (30%). The settlements in the agglomeration zone of Győr are purchasing their daily food stock in Győr and this is also true in case of Halászi, a settlement near Mosonmagyaróvár whose commercial spatial trajectory is closely attached to Mosonmagyaróvár.

The orientations of secondary spatial trajectories are showing a greater dominance of cities. They are bound to the two cities in 90% but the share of Győr is 60%. We are unable to provide a reliable analysis on tertiary spatial trajectories as the relevant questionnaire items were not replied in the majority of cases and the low number of input data would produce false results.

When comparing the present results with the old ones we can see that shopping is made locally or at the neighbour cities, the microregion has no commercial subcentres. Perhaps Hegyeshalom is worth mentioning due to the high number of commercial spatial trajectories ending here but this is explained by its border city functions involving a high number of commercial and catering establishments. Trading activities have been concentrated principally in cities during the last ten years. While ten years ago the proximity of Austria was a major factor in the purchase of car, home electricity and manufactured goods, its importance has diminished by now and a less number of spatial trajectories are targeted beyond the border. The fact that the present shopping spatial trajectories do not go beyond Győr and Mosonmagyaróvár is explained by the growth of the two cities' commercial supply, by the changing of shopping habits and by the opening of new big shopping centres.

2.3.3 The spatial relations of services

While the spatial trajectories of retail trade habits were assessed for the network of special shops our investigation on the spatial trajectories of services was limited to some special services only. Our analysis covered the spatial trajectories attached to financial services (various banking services), and car related services such as the accessibility of petrol and car service stations.

These services are principally attached to urban settlements but some sub-centres are also emerging in the palette, such as Hédervár and Halászi. Hédervár may thank the majority of its incoming spatial trajectories to its petrol station. This place offers the nearest petrol filling services for six settlements.

Halászi is a financial sub-centre due to its savings cooperative. The importance of financial services is great in the settlement's everyday life. The secondary spatial trajectories of the settlements of the inner part of Szigetköz (Darnózseli, Hédervár, Lipót, Püski and Kisbodak) are also targeted at here.

The directions to the nearest and most frequently visited car service stations are showing an unexpected trend. The emergence and diffusion of western, high brand cars would raise an expectation that spatial trajectories are targeted at the service stations of various car brands but this hypothesis has not been proved in practice. The number of reflexive local spatial trajectories is very high meaning that several settlements have their own small but good car repair stations servicing local car owners at a satisfactory level. The visits to car brand service stations still have a random character.

All service related spatial trajectories are distributed between Mosonmagyaróvár and Győr at a share of 20% each. The two sub-centres' percentage value is 6% each. Of the remaining spatial trajectories the rate of reflexive (local) spatial trajectories is rather high due to the local level extension of financial services. This was unusual ten years before.

2.3.4 The breakdown of educational spatial trajectories

Educational spatial trajectories may be regarded as one of the most intensive relations as every settlement has secondary school students who are builders and carriers of educational connections. Although visiting schools is typical for a certain age group only, schools with their gravitational zones may influence a microregion's spatial relation system and vice versa as general relations as whole may also influence the directions of educational spatial trajectories.

The microregion's two cities have an important role in the spatial relations of both nursery and primary education. 50% of nursery and primary school spatial trajectories are targeted at Győr, while the remaining settlements are district school

centres. They are Kisbajcs, Dunakiliti, Hédervár and Püski. These schools were already functioning as district centres ten years before.

The spatial trajectories of secondary education have greater significance than that of the primary ones. We have carried out a detailed analysis on the spatial trajectories of grammar schools, special schools and vocational schools. Of the settlements of our research sample area 143 spatial trajectories are targeted ten at settlements including the closest two cities to the microregion (Győr and Mosonmagyaróvár). The most popular secondary school centre is Győr, offering the widest choice of secondary schools. Mosonmagyaróvár is the next after Győr in popularity bur Sopron a city situated a bit further off with Pápa, a traditional city of schools are also important secondary school spatial trajectory destinations.

The number of secondary school related spatial trajectories targeted at external territories from inside the microregion is three only. Along with Sopron and Pápa, Vép is the third external target of outbound spatial trajectories. Ten years ago a significant ratio of secondary special school oriented spatial trajectories were targeted at Csorna but today none of them at all. Some years ago the kindergarten nurse training school in Csorna had lots of students from all over the county but today the excess in the number of graduating students with the decreasing number of children and the closure of schools made the students think over their job selection policy.

Today 1,147 students are commuting to secondary schools along 88 spatial trajectories. Győr is the destination for 55% of spatial trajectories but weighting this ratio with headcount data the result will jump up to 62%. In case of Mosonmagyaróvár these values are amounting up to 39% and 37%. The remaining one per cent of weighted headcounts is shared among the cities of Sopron, Pápa and Vép in Vas County.

2.3.5 The special features of recreational spatial trajectories

Recreational spatial trajectories are strongly correlating with educational spatial trajectories because cultural and sport events investigated within the framework of recreational spatial relations are primarily visited by the young generation including secondary school students.

The research was investigating three questions: first, which settlements of the microregion are selected by local residents as recreational centres. Secondly, whether the cities in the proximity of region are exercising their cultural functions or not and thirdly, which other cities do have gravitational force on the settlements of Szigetköz?

The primary destination of theatre performance visits is – not surprisingly – Győr having a theatre and theatre company. This city is the destination for the majority of primary and secondary spatial trajectories (71%, 60%). Mosonmagyaróvár

has far less and rather casual significance from this point. While some decades ago every settlements even the smallest ones had local cinemas with local visitors, now the location of cinemas is concentrated in cities only. Győr collects 67% of the primary and 100% of the secondary spatial trajectories of cinema goers. Multiplex seems to be the winner of this process.

The spatial trajectories of other forms of entertainment and sports events are rather dispersed all over the microregion but the majority of spatial trajectories are targeted again at Győr (71% and 50%). In major settlements these spatial trajectories are self-targeted (reflexive).

Music related entertainments and discos have rather dispersed spatial trajectories but Dunaszeg has a strong pull of gravity on the settlements of Szigetköz microregion. Dunakiliti and Lipót are collecting a far less number of spatial trajectories. The microregion's leisure time centres are providing various recreational facilities for the locals as well and this explains the emergence of Dunasziget and Lipót as additional destinations of leisure time activities. With rebuilding the local thermal spa into an aquapark Lipót has further increased its importance for the microregion.

To sum it up, the microregion's leisure time oriented spatial trajectories are apparently concentrating in two cities (Győr and Mosonmagyaróvár) but local leisure time centres and tourist spots are also attracting a significant number of spatial trajectories.

2.3.6 The spatial trajectories of second-home functions

The exploration of spatial trajectories related to second-home visits, i.e. the spatial relation analysis of recreational zones is another field in our investigation of recreational spatial trajectories. Unfortunately Dunasziget and Ásványráró have been excluded from the research which may a bit falsify the figures of final research results as both settlements have significant number of vacation plots and second homes. However we have data on the number of second-homes and on the permanent residence of second home owners, thus we can calculate an average by the dividing the number of spatial trajectories by the number of second-home owners.

During the past ten years the microregion's role in tourism has significantly increased with an increasing number of tourists, tourist facilities and accommodation capacities. With the increasing role of tourism the importance of second-home functions has also grown. Between 1994 and 2001 the number of annual visitor nights has doubled (from 10,521 to 21,519)[3].

[3] Data are provided by Hungarian Central Statistical Office TSTAR database

Of the spatial trajectory categories we have investigated so far the location of the permanent residence of second-home owners shows the largest diversity which correlates with the microregion's increasing role in tourism. Holiday home owners visit this microregion from various cities, such as Mór, Veszprém and Pécs. Of the settlements of our research sample area Máriakálnok, Vámosszabadi, Lipót and Vének has the largest number of vacation plots. As regards the spatial distribution of the permanent location of second-home owners, 38% live in Mosonmagyaróvár, 37% in Győr, 23% in Austria and the remaining 2% in various parts of Hungary including Pécs, Veszprém and Budapest. The second-home owners living in Mosonmagyaróvár as permanent residence mentioned six places as their holiday home or plot destinations marking in this way the city's recreational zone. These places are Máriakálnok, Lipót, Levél, Feketeerdő, Dunakiliti and Darnózseli. The holiday-home owners of Győr have weekend homes at twelve settlements of Szigetköz. Besides Lower-Szigetköz the places of inner-Szigetköz are also popular holiday destinations and Máriakálnok, a settlement in Upper-Szigetköz, is also visited by second-home owners from Győr. Nine settlements have second-home owners from Austria.

2.3.7 The spatial trajectories of commuters

During the past fifteen years the spatial trajectories of commuting have significantly changed reflecting changes in the structure of economy, in the corporate system of domestic economic organisations and as a result of the inflow of foreign direct investments. By now Győr-Moson-Sopron County's economy has recovered from crisis, new important and less important employment centres have been formed and the spatial trajectories of commuting have been stabilised.

We have mapped the relationships of spatial trajectories on the basis of the databases of local governments as mayors provided us information not only on the number of commuters but also estimations on the number of outward and inward daily commuters. The spatial trajectories of both inward and outward commuters show a rather dispersed pattern.

The spatial trajectories of inward commuters

Inward commuters are defined as a group of people migrating to a settlement for employment purposes. Besides the microregion's settlement there are eight additional ones plus Austria from where employees commute daily into the settlements of our microregion. A simple network of spatial trajectories clearly represents the microregion's employment centres: settlements receiving employees from multiple settlements. Their headcount data are also informative. Dunakiliti is

the largest centre of inward commuters receiving nearly six hundred commuters daily. The second group of the largest commuter centres consists of Kunsziget, Hegyeshalom and Győrladamér receiving 300, 260 and 200 daily commuters. Győrzámoly, Máriakálnok and Rajka also have significant labour gravitational forces receiving 100–150 daily inward commuters. Abda, Dunaszeg and Kimle are the third group of commuter centres receiving 40–60 daily commuters. 13 additional settlements receive 8–30 commuters daily but they cannot be regarded as inward commuter centres because their number of daily outward commuters. Feketeerdő and Kisbodak are not receiving daily commuters at all.

The number of spatial trajectories i.e. the paths of inward commuting starting from another settlement is 81. These spatial trajectories are followed by 2,180 people every day. The spatial relations of inward commuting are clear indicators of the economic stability of Szigetköz. Of the microregion's 27 settlements 11 are functioning as employment centres, thus the microregion has managed to set up its own economic relationship system working independently from the economy of the nearby cities.

The spatial trajectories of outward commuters

Outward commuters are defined as a group of people leaving their home settlement (residence) on a daily basis for employment purposes and migrating into another settlement either inside or outside the microregion of our research. Of the settlements of our research sample area 21 are visited for employment purposes. Four commuter destinations – Mosonszentmiklós, Jánossomorja, Mosonszolnok and Budapest – are located outside the microregion. Eight Austrian settlements are also visited for employment purposes. We counted all the commuter traffic to Győr and Mosonmagyaróvár as intraregional. These two cities are functioning as real employment centres for the microregion. 5,000 people commute daily to Győr and 2,500 to Mosonmagyaróvár. Austria is the third in the row of the commuter receivers from Szigetköz now employing 800 daily commuters. Jánossomorja receives 108 employees from Levél and Mecsér. From the microregion's settlements several spatial trajectories are targeted at Győrladamér and Rajka. The number of daily commuters visiting these places is 62 and 40. The remaining settlements have minor role only in the employment of the residents of Szigetköz; even Kunsziget, employing 300 people, receives only 40 employees from the villages of Szigetköz.

The number of spatial trajectories i.e. the number of outward commuter paths connecting one settlement with another is 76. These 76 spatial trajectories are followed by 9,086 daily commuters. This is 120 heads per spatial trajectory.

While the research carried out ten years ago assigned a greater role to cities in employment not in absolute but relative sense, today villages have an increasing role in employment and this increased the number of spatial trajectories as well. Ten years ago only five villages had 142 outward commuters to Austria but today 815 daily commuters from nine villages are employed on the other side of the state border. While ten years ago besides cities Rajka, Hegyeshalom, Halászi and Hédervár were functioning as employment centres, today Dunakiliti, Győrladamér and Kunsziget have developed into economic and industrial microcentres. Of the settlements excluded from the territory of Szigetköz microregion Mosonszolnok and Jánossomorja have major role in the employment of Szigetköz people.

2.3.8 The microregion's crossborder relations

Szigetköz is located in the border zone, thus it is not surprising that the intensity of its crossborder relations is higher than any of other areas in Hungary or Győr-Moson-Sopron County. The proximity of the Austrian and Slovakian state borders was encouraging us in assessing the spatial relations established with both countries. The majority of crossborder spatial relations is targeted at Burgenland and Csallóköz but the selection of destinations in the two countries' microregions has rather an occasional character, the geographical location of the target points of spatial trajectories is rather dispersed, thus no settlements can be selected as a node. The majority of responses to our questionnaire marked Csallóköz or Burgenland as a target of their trips instead of pointing at a single settlement. The spatial trajectories between Vienna and Szigetköz are principally used by second-home owners.

2.3.9 Summary of spatial relations

The two cities' importance is fundamental for their microregion. Győr has the majority of spatial relations (32%) being followed by Mosonmagyaróvár with 25% of spatial relations. These two figures are illustrating the two cities' dominance within their microregion. Hegyeshalom, Dunaszeg and Dunakiliti are sharing 2% of the total number of spatial relations each. This means that more than 40 spatial trajectories are targeted at each settlement. Hédervár, Halászi, Püski, Nagybajcs, Kisbajcs, Kunsziget and Kimle has 20–35 spatial trajectories. All the other settlements involved into our research have collected less than 30 but at least ten including reflexive (local) spatial trajectories *(Table 5)*.

As in all settlements involved into our research the number of outbound spatial trajectories is exceeding the number of inbound ones Szigetköz has no settlements with spatial organisational functions except the two cities.

Table 5

Orientation of spatial trajectories originating from Szigetköz settlements (%)

	Commer-cial	Administ-rative	Service	Recre-ational	Inter-settlement	Educa-tional	Agri-cultural	Inward commu-ters	Outward commu-ters	Holiday home owners	Total
Győr	38.80	29.63	19.48	36.21	29.45	52.45	26.73	17.28	25.00	30.77	32.29
Mosonmagyaróvár	33.20	24.79	20.35	16.09	23.97	33.57	24.75	13.58	19.74	15.38	25.33
Hegyeshalom	2.28	4.56	2.60	2.87	0.68	0.00	1.98	3.70	1.32	2.56	2.52
Dunaszeg	1.66	2.28	1.30	5.17	4.79	0.00	4.95	3.70	0.00	0.00	2.36
Dunakiliti	0.21	2.85	3.46	4.60	1.37	2.80	0.99	0.00	9.21	2.56	2.30
Hédervár	0.00	3.13	5.63	0.57	1.37	2.10	0.99	2.47	2.63	0.00	1.92
Halászi	0.83	1.71	6.49	1.72	2.74	0.00	0.00	2.47	1.32	0.00	1.92
Püski	1.45	1.71	3.90	1.15	1.37	2.10	0.99	2.47	2.63	0.00	1.86
Nagybajcs	1.45	1.42	3.03	2.87	2.05	0.00	2.97	2.47	0.00	0.00	1.75
Kisbajcs	0.62	3.99	0.43	0.57	2.05	4.20	1.98	1.23	1.32	0.00	1.75
Kunsziget	1.87	1.71	1.73	2.87	2.74	0.00	1.98	0.00	1.32	0.00	1.70
Kimle	0.62	3.42	2.60	3.45	0.68	0.00	0.99	0.00	1.32	0.00	1.64
Győrzámoly	0.41	2.28	3.03	1.15	1.37	0.70	0.00	0.00	0.00	0.00	1.21
Abda	1.45	1.14	3.46	0.57	0.00	0.00	0.99	1.23	0.00	0.00	1.21
Bezenye	0.41	1.14	2.16	2.30	1.37	0.00	1.98	3.70	0.00	0.00	1.21
Darnózseli	1.45	1.14	1.30	0.00	1.37	0.00	1.98	2.47	1.32	0.00	1.15
Levél	1.66	0.28	2.16	1.72	0.68	0.00	0.99	2.47	0.00	0.00	1.15
Rajka	0.41	0.57	3.03	0.57	1.37	0.00	1.98	3.70	2.63	0.00	1.15
Austria	0.21	0.00	0.00	0.00	0.68	0.00	0.99	1.23	10.53	23.08	1.15
Mecsér	1.04	1.71	1.73	0.57	1.37	0.00	0.99	0.00	0.00	0.00	1.04
Máriakálnok	1.04	1.71	1.73	0.57	0.68	0.00	0.00	1.23	1.32	0.00	1.04
Lipót	0.41	0.00	0.87	4.02	1.37	0.00	1.98	2.47	0.00	0.00	0.93

Table 5 continued

	Commer-cial	Administ-rative	Service	Recre-ational	Inter-settlement	Educa-tional	Agri-cultural	Inward commu-ters	Outward commu-ters	Holiday home owners	Total
Slovakia	2.90	0.00	0.00	0.57	1.37	0.00	0.00	0.00	0.00	0.00	0.93
Dunaszentpál	0.62	1.71	0.87	0.57	0.68	0.00	0.99	2.47	0.00	0.00	0.88
Ásványráró	0.62	1.14	1.30	0.00	0.68	0.00	1.98	2.47	1.32	0.00	0.88
Győrladamér	0.21	1.14	1.30	1.15	0.68	0.00	0.00	1.23	3.95	0.00	0.82
Győrújfalu	0.62	0.85	1.30	1.15	1.37	0.00	0.99	1.23	0.00	0.00	0.82
Egyéb	3.53	3.99	4.76	6.90	11.64	2.10	14.85	24.69	13.16	25.64	7.07
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Settlement-level questionnaire.

Spatial relation analysis is a good method for investigating such issues as spatial closure, the dependence on centres outside the microregion. In the context of this spatial formation the analysis of spatial relations is a very good method for the localisation of gravitational zones as the settlement level 'gravity of Győr' or 'gravity of Mosonmagyaróvár' values are good indicators for identifying which settlement groups belong to the gravitational zone of Győr or Mosonmagyaróvár on the basis of a multiple variable residential relationship system. In cases when the 'gravity of Győr' value is higher than the 'gravity of Mosonmagyaróvár' value the relevant settlements are belonging to the gravitational zone of Győr. In cases when they are smaller they do belong to the gravitational zone of Mosonmagyaróvár. of the 26 settlements involved in our research 22 may definitely categorised into one of the two cities' gravitational zones. The number of settlements falling into the gravitational zone of Győr is 11 and of Mosonmagyaróvár is also 11. The settlements of Győr agglomeration such as Abda, Dunaszeg, Győrújfalu, Darnózseli, Hédervár and Mecsér have 60% or more gravity values. The gravitational force of Győr and Mosonmagyaróvár for Hédervár are balanced with a value of 40% each. This clearly marks the gravitational zone border of the two cities and verifies the applicability of this method. Dunakiliti and Hegyeshalom are in a special position. Although due to their geographical position they fall into the gravitational zone of Mosonmagyaróvár the gravitational force value of Győr is almost approaching the value of Mosonmagyaróvár. This can be explained by the strong functions of Hegyeshalom and Dunakiliti 'stealing' spatial trajectories from the nearby settlements of Mosonmagyaróvár while secondary and tertiary spatial trajectories are targeted at Győr *(Annex 4)*.

Individual and microregional closure with cohesion and centralisation values are valid indicators of spatial structure. The values of individual closure and cohesion are far higher here than in Répcesík as for example because these villages with larger population are able to provide basic functional services for themselves. Just to mention some villages with the highest cohesion values Kunsziget, Dunaszeg, and Hegyeshalom have strong functional roles. Typically agglomeration villages such as Győrújfalu have low individual closure and cohesion values as due to their strong links with cities they have several outbound spatial trajectories.

The low value of microregional cohesion calls the attention for the demands of urban functions, i.e. the microregion needs two cities for compactness. High cohesion values are not accompanied with high centralisation values. This means that settlements with strong functional competences are not operating as microregional centres. For example the cohesion and centralisation values of Dunaszeg are both high but the settlement is still unable for functioning as a real centre *(Table 6)*.

Table 6

The cohesion and centralisation values of the settlements of Szigetköz

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving microregion	Total departing	Inbound	Total	Cohesion	Centra-lisation
Abda	19	2	44	65	3	68	27.94	12.50
Bezenye	15	4	44	63	5	68	22.06	20.83
Darnózseli	15	24	57	96	3	99	15.15	7.14
Dunakiliti	16	17	83	116	17	133	12.03	34.00
Dunaszeg	19	4	40	63	17	80	23.75	42.50
Dunaszentpál	13	10	38	61	2	63	20.63	8.00
Feketeerdő	9	18	46	73	1	74	12.16	3.57
Győrladamér	10	10	38	58	1	59	16.95	4.76
Győrújfalu	12	5	37	54	1	55	21.82	5.56
Győrzámoly	16	5	39	60	4	64	25.00	16.00
Halászi	9	9	43	61	21	82	10.98	53.85
Hédervár	15	13	59	87	16	103	14.56	36.36
Hegyeshalom	30	7	28	65	14	79	37.97	27.45
Kimle	20	8	59	87	8	95	21.05	22.22
Kisbajcs	11	12	30	53	17	70	15.71	42.50
Kisbodak	10	29	44	83	0	83	12.05	0.00
Kunsziget	25	6	34	65	1	66	37.88	3.13
Levél	17	8	43	68	3	71	23.94	10.71
Lipót	7	22	48	77	8	85	8.24	21.62
Máriakálnok	16	5	55	76	1	77	20.78	4.55
Mecsér	17	6	57	80	0	80	21.25	0.00
Nagybajcs	16	7	34	57	13	70	22.86	36.11
Püski	14	12	49	75	16	91	15.38	38.10
Rajka	13	11	39	63	4	67	19.40	14.29
Vámosszabadi	10	11	31	52	1	53	18.87	4.55
Vének	9	16	41	66	1	67	13.43	3.85
Total	383	281	1160	1824	178	2002	*33.17*	

Source: Settlement-level questionnaire.

During the past ten years the role of cities did not change but the role of borders did. The spatial relations towards Austria and Slovakia became more balanced in case of commuting. Austria's importance has grown in this aspect. The microregion's internal relation system has changed, with the turning of Dunakiliti, Kunsziget and Hegyeshalom into economic and employment centres as well as Dunaszeg and Kisbajcs into spatial organisers. At the same time however spatial trajectories are dispersed and no multifunctional subcentres have been formed in the microregion.

2.4. The spatial relationship analysis in the urban zone of Győr

Rábcatorok Microregional Development Association has been founded in the mid–1990s with the cooperation of seven settlements situated northwest from Győr. The member settlements are as follows: Ikrény, Enese, Kunsziget, Öttevény, Rábapatona, Abda and Börcs. For a rural geographer who would like to contribute to the development of rural space by performing practice-oriented activities the research of this small rural space of seven settlements with its spatial trajectories was a good field for empirical research. I carried out this research by using the information of residential questionnaires. My objective was to collect a sample of 1000 interviews on the basis of predefined criteria. Unfortunately, as Kunsziget was unable to organise the preparation of questionnaires, only six settlements were interviewed instead of the original seven and the number of samples was 934 only. The nearly one thousand replies amount up to almost one fourth of the total households as an average. The microregions falls into the gravitational zone of three cities, of them the importance of Győr is the highest as the microregion is practically a part of the city's agglomeration. We have investigated the microregion's gravitational degree to the three cities and the different types of residential shifts. Commercial and service spatial trajectories (including the spatial trajectories of financial services) are good indicators of the most frequent directions of shifts. We have traced cultural spatial trajectories, the usual ways of selling goods at the market, the spatial relations of recreation in a similar way to the previously mentioned microregions. The residential survey enabled us even to reveal the spatial network of relatives. Some questions of the survey were inquiring on cross-border residential relations as well.

2.4.1 The microregion within the sphere of three cities

As it has been defined by earlier researches the microregion of our research is a part of the inner and outer rings of Győr agglomeration (*Hardi,* 2002). We involved the elements of space-time geography into the questions of residential

interviews, thus we collected data concerning the timing, the destination cities and the distribution of visits taken from the different villages.

Győr has dominance in all the six settlements as this city is the destination for 66% percent of all urban settlement targeted spatial trajectories. The distribution of spatial trajectories between the other two cities is 23% and 21% in favour of Csorna. The difference is the greatest not in the volumes but rather in the frequency of visits. Győr is typically visited for the maintaining daily contacts. With the exception of Enese the number of all settlements' daily contact number is higher than the total sum of weekly, monthly or less frequent than monthly visits. This is a definite mark of the high importance of commuting and of the presence of internal agglomeration ring within the microregion.

The other two cities are less frequently visited from the seven villages of our research, the most typical frequency value of visits is once in a month or less. The number of these spatial trajectories is even less than the number of spatial trajectories targeted at Győr within the same time slice. Therefore we can firmly state that according to the responses of our questionnaire Győr has primacy over the microregion's cities.

2.4.2 The spatial trajectories of administration

As we have mentioned our instruments are insufficient for investigating a complete and comprehensive relation system covering all of its elements. For this reason of the spatial trajectories of administration and official case clearances we have analysed those related to the administration of unemployment, health service, social, police and judicial affairs. It may seem as we are repeating ourselves but the situation here is the same as in the previous case: the spatial trajectories of all settlements are self-targeted or aimed at Győr.

2.4.3 Commercial spatial trajectories

Our investigation of commercial spatial relations comprises the spatial trajectory analysis of visits to various special shops (18 in total) and petrol stations. The research ended with the result that – not surprisingly – Győr is the commercial centre of the microregion. Although their number is less other inbound and outbound spatial trajectories are worth for a detailed investigation too. A part of the residential spatial trajectories of Abda and Ikrény are crossing the border: the purchasing of cars is connecting them to Austria, and the visits to petrol stations for filling up cars are connecting them to Slovakia. This latter phenomenon is resulting

from petrol price differences only.[4] The commercial functions of Abda and Öttevény are attracting residents of Börcs from outside the microregion.

2.4.4 The spatial trajectories of financial and other services

While commercial spatial trajectories were assessed for special shops the orientation of service related spatial trajectories can be grouped into two categories. Besides the spatial relations of traditional services the spatial orientation of financial services were investigated in our research. The results of research were not surprising. The only difference in this case was that in other microregions financial services were much more bound to cities. Here with the exception of Ikrény the number of self-targeted spatial trajectories is higher than those targeted at urban settlements or Győr and the high number of self-targeted spatial trajectories indicates that the microregion has no settlements of outstanding financial importance. Basic financial services are available in all settlements of the microregion and the improvement of local financial services decreased the number of city targeted financial spatial trajectories.

Our survey comprised various inquiries on the local residents' route preferences for using car repair, hairdresser, cosmetics and tailor, dressmaker and library services. With the exception of Börcs in all settlements of our research sample the number of self-targeted spatial trajectories is exceeding the number of outbound spatial trajectories. Abda and Öttevény have strong servicing and commercial functions. The residents of Börcs select Abda and Öttevény besides Győr as final destination for their service related spatial trajectories but for all the other settlements Győr is the only destination of service related spatial trajectories.

2.4.5 The spatial trajectories of cultural and sports events

Our investigation of recreational spatial trajectories comprised spatial trajectory analyses on theatre, cinema, cultural, sports events with classical music concert and art exhibition oriented activities. The results are definitively supporting the primacy of Győr in these areas but a significant number of settlements have self-targeted (reflexive) spatial trajectories, which is a clear sign of the increasing power of local societies and of the increasing importance of their programmes. On the other hand it should not be forgotten that several respondents left this question unanswered or used only a minor part of answering options. This may mean that they have no free time or have no need or sufficient income for spending their leisure time in the way as listed above. Another problem is that villages – perhaps

[4] Our investigation was carried out in year 1995.

because of the incorrect flow of information are not interested in each other's cultural and sports events. However, some spatial trajectories are targeted at Budapest and Sopron, Győr-Moson-Sopron County's second cultural centre.

2.4.6 Family relationships

The investigation of the local residents' family and friendship relations is sensible in the context of personal interviews only. Maybe these spatial trajectories are revealing the strongest and deepest relations among settlements that may be much more intense than any relations of economic or administrative type.

From the 879 valid responses for on inquiries assessing family relations a general impression of a quite compact area is drawn. Although our respondents marked 238 geographical location including nine non-Hungarian settlements to have relatives or friends their, this number rated to the total number of friend and family relations is 0.7% only. The microregion's closure is well illustrated by the fact that 30.6% of total family relations are bound to seven settlements. Győr is the leader regarding the number of relationships as 21.4% of total family relations are bound to Győr. This high percentage is explained by two trends: on the one hand by massive migrations into cities in the 1950s, 60s and 70s and on the other hand by the suburbanisation of the past fifteen years.

We can localise an external ring of settlements in the microregion's vicinity where some family relations are bound to. The settlements of this external ring are as follows: Kóny, Lébény, Mosonszentmiklós, Győrszemere and Győrújbarát. However it covers only 7.1% of total relationships.

Börcs, Abda, Kunsziget and Öttevény have a rather similar pattern of family and friendship relations with the same number and orientation of friend and family relations. The number of family relations is lower than of friendships between Enese and Rábapatona but Rábapatona and Ikrény have strong family ties, which may originate from the past when the two settlements were merged. Respondents from Enese have the weakest family ties with the microregion's other settlements.

2.4.7 Crossborder spatial trajectories

The extreme importance of crossborder relations is explained by the microregion's geographical location. It is very close to the 'north-western gate' opening up to two countries: Slovakia and Austria. The microregion's geographical location grants better conditions for building crossborder relations than any other areas of Hungary. Local residents using the advantages of these two countries' better accessibility must have paid regular visits to the neighbour countries for various

purposes but we do not know the exact frequency and neither the exact residential proportion of visits to these countries.

70% of our respondents pay regular visits to Austria and 40% to Slovakia. Very interesting tendencies are covered by this average figure. The residents in the vicinity of M1 motorway are the most active travellers. The proportion of visitors to Austria is 71% from Abda and 84% from Öttevény. Similar values are reported from Börcs and Rábapatona. Lower values are reported from Enese and Ikrény only but they are still over 50%. The average frequency of our respondents' trips to Austria is less than once a month but they keep on planning further trips to there.

46% of our respondents are regular travellers to Slovakia. More than 50% of the locals travel there from Abda, Börcs and Öttevény. From the other three settlements this figure is 30%. The frequency of trips to Slovakia is similar to those to Austria as 88% of travellers visit Slovakia with a periodicity of less than once in a month. In the majority of trips shopping was mentioned as the main motive.

2.4.8 Summary of spatial relations

The network of spatial relations truly reflects a microregion's spatial relations. By the assessment of the intensity of spatial shift trajectories we can detect the weak and strong nodes of connection, the microregion's gravitational directions i.e. the whole entirety of the spatial structure.

On the basis of orientation spatial trajectories can be separated into four groups. Self-targeted (internal), Győr-targeted, targeted at other settlements of the microregion (intraregional) and targeted at other (external) places. The microregion's relational matrix *(Table 7)* indicates that a good level of basic provisions keeps a significant number of spatial trajectories inside a place. The location at a greater distance from Győr increases the settlement's self-targeted (internal) spatial trajectories. In Enese for example the ratio of internal spatial trajectories exceeds 50% while in Rábapatona and Öttevény it is a bit less than 50%. These places have well operating basic functions with high values of cohesion. In Börcs, a settlement with poor physical accessibility from Győr due to its non-transit position in the public road network accessible through Abda only, the ratio of self-targeted spatial trajectories is 33% only. Börcs is differing from the other six settlements in its environment in its strongest linkage to Abda, a settlement with microregional functions. Börcs has low cohesion value and Abda is performing central functions for Abda compensating in this way its relatively poor local commercial and service provisions. Börcs is the departure point for the highest ratio of spatial trajectories targeted at the settlements of Rábcatorok microregion. This is a clear evidence for the dependence of Börcs on other settlements and traces down the settlements past institutional relations (workplaces, agricultural cooperative, common councils, out-

migrations) with them. Ikrény is a specific case in the microregion's settlement network. This settlement's has the strongest linkages to Győr (61% of all the spatial trajectories). This phenomenon originates on the one hand from the proximity of Győr and from the starting suburbanisation process here (*Thomson–Mitchell,* 1998). This brings several conflicts into the life of local society. Enese is the microregion's most peripheral settlement. 4% of its spatial trajectories are originating from Kóny, the neighbour settlement and Csorna, the nearest city.

To sum it up the results of research have proved that the microregion's spatial relations are strongly bound to Győr which verifies our 'hypotheses'. The relation system of the geographical space of the seven settlements is rather homogenous with the settlements' identical route selections. The spatial trajectories targeted at other places than Győr are rather dispersed and their number is very few. This can be verified by the low 2.3% ratio of outbound spatial trajectories from the microregion. The intensity and orientation of residential spatial trajectories are shown by *Figure 3*.

Table 7

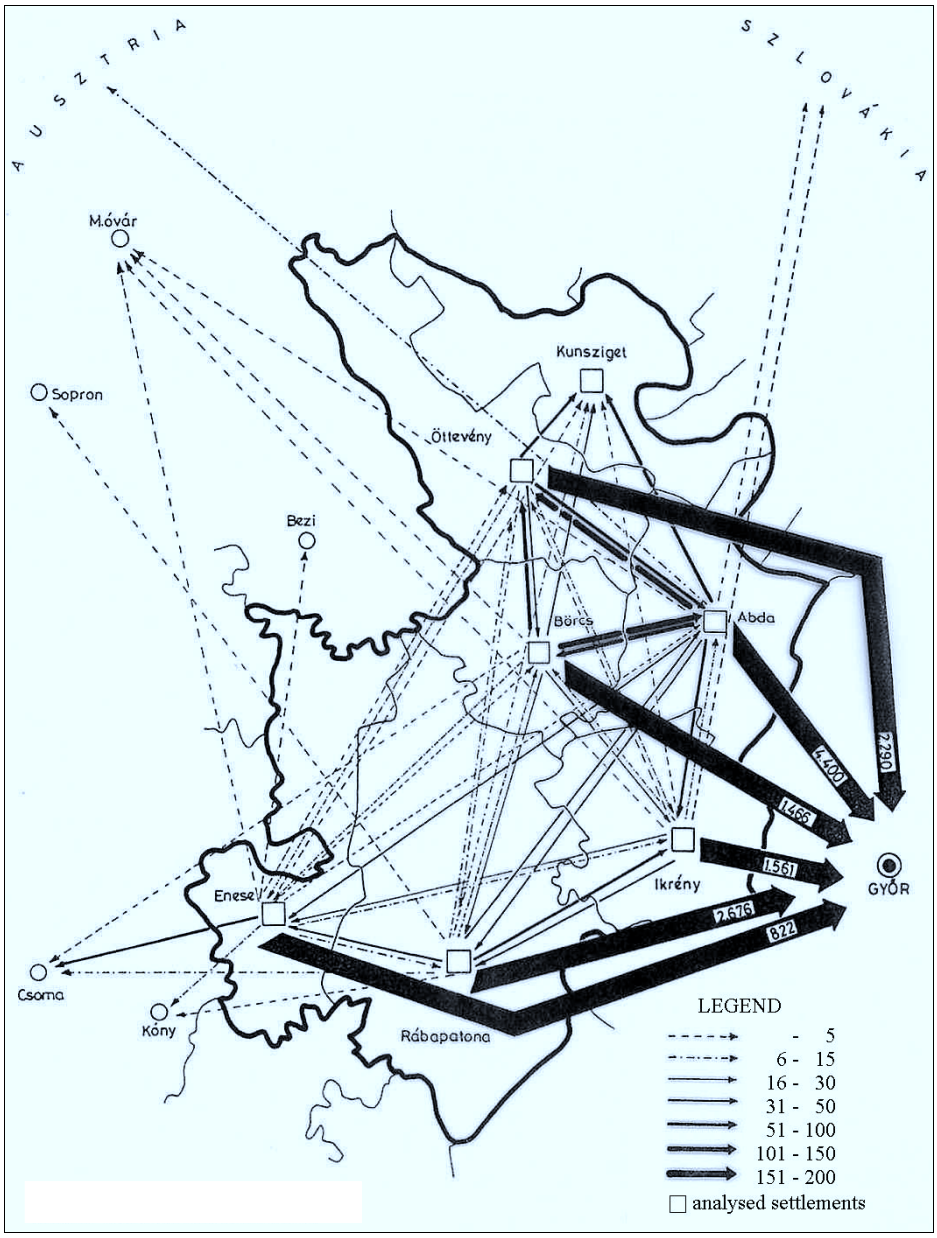
The relational matrix of the spatial trajectories of the settlements in Rábcatorok microregion

Settlement	Abda	Börcs	Enese	Ikrény	Öttevény	Rába-patona	Total
Local inside spatial trajectory	39.9	33	51.7	35.1	44.9	47.9	41.6
Spatial trajectories to Győr	53.5	52.3	42	60.6	49.2	48.2	50.6
Abda	–	6.9	0.2	0.5	2.2	0.6	1.3
Börcs	1.3	–	0.2	0.5	2.2	0.6	1.3
Enese	0.4	0.2	–	0.8	0.2	0.8	0.4
Ikrény	0.7	1	0.8	–	0.3	1.2	0.6
Kunsziget	1.4	1.5	0.1	0.1	1.5	0.1	1.3
Öttevény	2.2	3.7	0.2	0.1	–	0.1	1.3
Rábapatona	0.4	0.8	0.8	1.7	0.2	–	0.3
Intraregional spatial trajectory	6.4	14.1	2.3	3.7	5.5	3.1	5.5
Other spatial trajectory	0.2	0.6	4	0.6	0.4	0.8	2.3
Total spatial trajectories	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Residential questionnaire.

Figure 3

The intensity and breakdown of residential spatial trajectories in Rábcatorok microregion



Source: Residential questionnaire.

3 Conclusion

Spatial trajectory analysis proved to be a good research method for the assessment of functional relations between villages. settlement groups in rural microregions through the investigation of residential shift directions. The results of these researches provided useful data for the newly founded microregions on the spatial structure of their microregion and assisted to microregional planning and development processes by their comprehensive information on new spatial structures. This method is quite suitable for assessing spatial shift changes resulting from the socio-economic transformation of Hungary and also contributed to the definition of the geographical and administrative borders of microregions through measuring inter-settlement gravitational forces.

Today when the definition and distribution of the authority scope of multifunctional microregions is an everyday routine, the presented method mapping residential relationships seems to be suitable for avoiding major conflicts. Spatial trajectory analysis is a well worth for use instrument for local and microregional development because – as it has been demonstrated – can successfully locate and identify the microregional core settlements (centralisation) and can provide a well founded scientific basis or arguments for their further development.

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Annex 1

The spatial trajectories and closure values of the settlements of Répcesík microregion

Settlement	Local inside trajectories	Intra-regional spatial trajectories	Trajectories to Sopron	Trajectories to Szombathely	Trajectories to Kőszeg	Trajectories to Foreign place	Trajectories to Other	Spatial trajectories leaving microregions	Number of total departing trajectories
Bő	8	15	0	18	2	3	24	47	70
Bük	10	19	7	17	13	6	6	49	78
Csapod	7	2	11	0	0	3	35	49	58
Csáfordjánosfa	1	26	10	2	0	2	21	35	62
Csepreg	13	10	0	13	11	6	1	31	54
Csér	0	16	7	2	0	1	11	21	37
Ebergőc	5	7	24	0	0	3	23	50	62
Egyházasfalu	9	28	22	8	1	6	2	39	76
Gór	1	23	0	11	1	1	17	30	54
Gyalóka	1	33	7	8	1	3	1	20	54
Horvátzsidány	8	9	0	22	28	3	0	53	70
Iván	7	7	14	3	0	3	28	48	62
Kiszsidány	0	29	0	15	24	2	1	42	71
Lócs	0	32	1	12	2	2	21	38	70
Lövő	10	13	28	13	0	2	6	49	72
Nagylózs	8	7	24	2	0	2	21	49	64
Nemeskér	5	27	29	14	0	0	8	51	83
Ólmod	1	24	0	6	24	4	0	34	59
Peresznye	4	20	1	17	21	4	0	43	67
Pusztacsalád	0	20	16	2	0	2	20	40	60

Annex 1 continued

Settlement	Local inside trajectories	Intra-regional spatial trajectories	Trajectories to Sopron	Trajectories to Szombathely	Trajectories to Kőszeg	Trajectories to Foreign place	Trajectories to Other	Spatial trajectories leaving microregions	Number of total departing trajectories
Répceszemere	5	11	11	1	0	3	41	56	72
Répcevis	2	18	11	13	12	4	1	41	61
Röjtökmuzsaj	6	5	24	0	0	3	35	62	73
Simaság	3	15	4	8	3	1	31	47	65
Sopronhorpács	8	16	18	9	5	3	4	39	63
Sopronkövesd	8	8	30	0	1	5	20	56	72
Szakony	3	29	9	12	1	5	1	28	60
Tömörd	1	28	1	21	6	4	5	37	66
Und	3	30	22	8	3	7	5	45	78
Újkér	7	13	24	11	2	6	6	49	69
Völcsej	6	25	26	12	0	2	5	45	76
Zsira	5	17	13	14	14	4	2	47	69
Total	155	582	394	294	175	105	402	1370	2107

Annex 1 continued

Settlement	Inbound trajectories	Total number of trajecto-ries	Gravity of Sopron	Gravity of Szombathely	Gravity of Kőszeg	Gravity of foreign countries	Other gravity	closure of settlement	Microregiona l closure
Bő	17	87	0.00	25.71	2.86	4.29	34.29	11.43	32.86
Bük	46	124	8.97	21.79	16.67	7.69	7.69	12.82	37.18
Csapod	6	64	18.97	0.00	0.00	5.17	60.34	12.07	15.52
Csáfordjánosfa	4	66	16.13	3.23	0.00	3.23	33.87	1.61	43.55
Csepreg	166	220	0.00	24.07	20.37	11.11	1.85	24.07	42.59
Csér	1	38	18.92	5.41	0.00	2.70	29.73	0.00	43.24
Ebergőc	2	64	38.71	0.00	0.00	4.84	37.10	8.06	19.35
Egyházasfalu	2	78	28.95	10.53	1.32	7.89	2.63	11.84	48.68
Gór	2	56	0.00	20.37	1.85	1.85	31.48	1.85	44.44
Gyalóka	1	55	12.96	14.81	1.85	5.56	1.85	1.85	62.96
Horvátzsidány	43	113	0.00	31.43	40.00	4.29	0.00	11.43	24.29
Iván	55	117	22.58	4.84	0.00	4.84	45.16	11.29	22.58
Kiszsidány	2	73	0.00	21.13	33.80	2.82	1.41	0.00	40.85
Lócs	1	71	1.43	17.14	2.86	2.86	30.00	0.00	45.71
Lövő	79	151	38.89	18.06	0.00	2.78	8.33	13.89	31.94
Nagylózs	3	67	37.50	3.13	0.00	3.13	32.81	12.50	23.44
Nemeskér	6	89	34.94	16.87	0.00	0.00	9.64	6.02	38.55
Ólmod	2	61	0.00	10.17	40.68	6.78	0.00	1.69	42.37
Peresznye	4	71	1.49	25.37	31.34	5.97	0.00	5.97	35.82
Pusztacsalád	4	64	26.67	3.33	0.00	3.33	33.33	0.00	33.33

Annex 1 continued

Settlement	Inbound trajectories	Total number of trajecto-ries	Gravity of Sopron	Gravity of Szombathely	Gravity of Kőszeg	Gravity of foreign countries	Other gravity	closure of settlement	Microregiona l closure
Répceszemere	7	79	15.28	1.39	0.00	4.17	56.94	6.94	22.22
Répcevis	4	65	18.03	21.31	19.67	6.56	1.64	3.28	32.79
Röjtökmuzsaj	6	79	32.88	0.00	0.00	4.11	47.95	8.22	15.07
Simaság	18	83	6.15	12.31	4.62	1.54	47.69	4.62	27.69
Sopronhorpács	42	105	28.57	14.29	7.94	4.76	6.35	12.70	38.10
Sopronkövesd	5	77	41.67	0.00	1.39	6.94	27.78	11.11	22.22
Szakony	16	76	15.00	20.00	1.67	8.33	1.67	5.00	53.33
Tömörd	2	68	1.52	31.82	9.09	6.06	7.58	1.52	43.94
Und	5	83	28.21	10.26	3.85	8.97	6.41	3.85	42.31
Újkér	6	75	34.78	15.94	2.90	8.70	8.70	10.14	28.99
Völcsej	6	82	34.21	15.79	0.00	2.63	6.58	7.89	40.79
Zsira	15	84	18.84	20.29	20.29	5.80	2.90	7.25	31.88
Total	578	2685	18.70	13.95	8.31	4.98	19.08	34.98	34.98

Source: Settlement-level questionnaire.

Annex 2

Orientation of the spatial trajectories and closure values of the settlements of Lake Balaton Resort District

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Total
Ábrahámhegy	2	69	16	87	6	93
Badacsonytomaj	10	57	24	91	84	175
Balatonalmádi	6	11	29	46	50	96
Balatonberény	2	73	18	93	1	94
Balatonboglár	28	33	25	86	139	225
Balatoncsicsó	1	36	16	53	2	55
Balatonföldvár	9	37	13	59	39	98
Balatonfűzfő	8	12	33	53	21	74
Balatongyörök	1	73	14	88	3	91
Balatonhenye	1	52	9	62	1	63
Balatonmáriafürdő	5	53	10	68	9	77
Balatonrendes	0	69	14	83	0	83
Balatonszárszó	6	47	13	66	32	98
Balatonszemes	5	59	25	89	84	173
Balatonszentgyörgy	5	53	6	64	8	72
Balatonszőlős	2	45	19	66	1	67
Bálványos	4	56	13	73	0	73
Buzsák	5	52	17	74	8	82
Dörgicse	3	52	38	93	2	95
Fonyód	24	25	29	78	54	132
Gyenesdiás	8	33	4	45	37	82
Hegyesd	0	45	23	68	0	68
Hegymagas	2	44	4	50	1	51
Héviz	16	27	11	54	99	153
Hidegkut	0	34	40	74	0	74
Kapolcs	4	45	20	69	7	76

Annex 2 continued

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Total
Karád	4	39	43	86	8	94
Keszthely	32	8	20	60	483	543
Kéthely	6	52	7	65	0	65
Látrány	8	54	15	77	33	110
Lesencefalu	0	58	9	67	0	67
Lesencetomaj	1	48	15	64	10	74
Litér	13	20	42	75	1	76
Marcali	18	9	23	50	204	254
Mindszentkálla	1	46	4	51	2	53
Monostorapáti	5	39	24	68	15	83
Nagycsepely	0	52	3	55	2	57
Nagyrada	6	25	43	74	0	74
Nagyvázsony	6	3	27	36	24	60
Nemesgulács	6	33	4	43	2	45
Nemesvámos	4	1	43	48	9	57
Ordacsehi	0	77	11	88	1	89
Örvényes	0	53	23	76	0	76
Paloznak	1	40	35	76	0	76
Pécsely	7	39	31	77	70	147
Rezi	1	61	25	87	0	87
Révfülöp	9	34	18	61	54	115
Salföld	2	72	9	83	0	83
Ságvár	1	32	12	45	0	45
Sármellék	5	42	23	70	16	86
Siófok	21	2	18	41	334	375
Siójut	0	53	11	64	0	64
Somogybabod	0	55	22	77	1	78
Somogysámson	2	60	20	82	0	82
Somogytúr	*4*	*59*	*10*	*73*	*2*	*75*

Annex 2 continued

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Total
Szentantalfa	3	25	21	49	11	60
Szentbékkálla	1	61	13	75	1	76
Szentgyörgyvár	0	48	28	76	1	77
Szentkirályszabadja	0	30	37	67	0	67
Szigliget	7	52	13	72	4	76
Szólád	4	64	12	80	1	81
Szőlősgyörök	0	75	11	86	0	86
Tagyon	0	29	22	51	0	51
Tapolca	33	9	17	59	634	693
Táska	2	65	17	84	0	84
Tihany	8	30	19	57	4	61
Tótvázsony	2	26	39	67	13	80
Vállus	1	73	6	80	0	80
Várvölgy	5	54	16	75	7	82
Vászoly	2	40	19	61	1	62
Veszprémfajsz	0	13	43	56	0	56
Vigántpetend	0	48	27	75	1	76
Visz	5	63	13	81	0	81
Vonyarcvashegy	5	51	17	73	11	84
Zalakaros	12	6	52	70	40	110
Zalavár	2	29	6	37	2	39
Zamárdi	5	52	36	93	1	94
Total	417	3301	1557	5275	2691	7966

Annex 2 continued

Settlement	Gravity of Veszprém	Gravity of Kaposvár	Gravity of Nagykanizsa	Gravity of Budapest	Gravity of foreign countries	Other gravity	Closure of settlement	Microregional closure
Ábrahámhegy	8.05	0.00	0.00	2.30	4.60	3.45	2.30	81.61
Badacsonytomaj	9.89	1.10	0.00	0.00	3.30	12.09	10.99	73.63
Balatonalmádi	47.83	0.00	0.00	2.17	6.52	6.52	13.04	36.96
Balatonberény	0.00	2.15	2.15	2.15	4.30	8,60	2.15	80.65
Balatonboglár	0.00	18.60	0.00	6.98	2.33	1.16	32.56	70.93
Balatoncsicsó	26.42	0.00	0.00	1.89	1.89	0.00	1.89	69.81
Balatonföldvár	0.00	3.39	0.00	5.08	5.08	8.47	15.25	77.97
Balatonfüzfő	43.40	0.00	0.00	5.66	5.66	7.55	15.09	37.74
Balatongyörök	1.14	0.00	1.14	2.27	3.41	7.95	1.14	84.09
Balatonhenye	3.23	0.00	0.00	3.23	6.45	1.61	1.61	85.48
Balatonmáriafürdő	0.00	5.88	2.94	1.47	1.47	2.94	7.35	85.29
Balatonrendes	8.43	0.00	0.00	2.41	3.61	2.41	0.00	83.13
Balatonszárszó	0.00	10.61	0.00	3.03	3.03	3.03	9.09	80.30
Balatonszemes	0.00	15.73	0.00	3.37	3.37	5.62	5.62	71.91
Balatonszentgyörgy	0.00	4.69	0.00	0.00	3.13	1.56	7.81	90.63
Balatonszőlős	22.73	0.00	0.00	3.03	3.03	0.00	3.03	71.21
Bálványos	0.00	4.11	0.00	2.74	1.37	9.59	5.48	82.19
Buzsák	0.00	12.16	1.35	1.35	6.76	1.35	6.76	77.03
Dörgicse	24.73	0.00	0.00	7.53	3.23	5.38	3.23	59.14
Fonyód	0.00	19.23	6.41	3.85	2.56	5.13	30.77	62.82
Gyenesdiás	0.00	0.00	0.00	0.00	6.67	2.22	17.78	91.11
Hegyesd	27.94	0.00	0.00	1.47	0.00	4.41	0.00	66.18
Hegymagas	2.00	0.00	0.00	2.00	2.00	2.00	4.00	92.00
Héviz	3.70	0.00	0.00	1.85	5.56	9.26	29.63	79.63
Hidegkut	51.35	0.00	0.00	1.35	1.35	0.00	0.00	45.95
Kapolcs	17.39	0.00	0.00	1.45	0.00	10.14	5.80	71.01
Karád	0.00	16.28	0.00	0.00	0.00	33.72	4.65	50.00
Keszthely	1.67	0.00	6.67	1.67	3.33	20.00	53.33	66.67
Kéthely	0.00	4.62	0.00	0.00	4.62	1.54	9.23	89.23

Annex 2 continued

Settlement	Gravity of Veszprém	Gravity of Kaposvár	Gravity of Nagykanizsa	Gravity of Budapest	Gravity of foreign countries	Other gravity	Closure of settlement	Microregional closure
Látrány	0.00	7.79	0.00	1.30	7.79	2.60	10.39	80.52
Lesencefalu	1.49	0.00	0.00	1.49	2.99	7.46	0.00	86.57
Lesencetomaj	4.69	0.00	0.00	1.56	1.56	15.63	1.56	76.56
Litér	49.33	0.00	0.00	2.67	0.00	4.00	17.33	44.00
Marcali	0.00	22.00	6.00	2.00	0.00	16.00	36.00	54.00
Mindszentkálla	1.96	0.00	0.00	3.92	1.96	0.00	1.96	92.16
Monostorapáti	26.47	0.00	0.00	2.94	0.00	5.88	7.35	64.71
Nagycsepely	0.00	1.82	0.00	0.00	0.00	3.64	0.00	94.55
Nagyrada	0.00	0.00	41.89	0.00	4.05	12.16	8.11	41.89
Nagyvázsony	58.33	0.00	0.00	2.78	5.56	8.33	16.67	25.00
Nemesgulács	4.65	0.00	0.00	0.00	0.00	4.65	13.95	90.70
Nemesvámos	89.58	0.00	0.00	0.00	0.00	0.00	8.33	10.42
Ordacsehi	0.00	4.55	0.00	1.14	5.68	1.14	0.00	87.50
Örvényes	14.47	0.00	0.00	2.63	2.63	10.53	0.00	69.74
Paloznak	36.84	0.00	0.00	2.63	3.95	2.63	1.32	53.95
Pécsely	25.97	0.00	0.00	2.60	1.30	10.39	9.09	59.74
Rezi	0.00	0.00	2.30	1.15	2.30	22.99	1.15	71.26
Révfülöp	13.11	0.00	0.00	1.64	6.56	8.20	14.75	70.49
Salföld	3.61	0.00	0.00	2.41	2.41	2.41	2.41	89.16
Ságvár	0.00	11.11	0.00	0.00	0.00	15.56	2.22	73.33
Sármellék	0.00	0.00	10.00	0.00	0.00	22.86	7.14	67.14
Siófok	0.00	12.20	0.00	12.20	4.88	14.63	51.22	56.10
Siójut	0.00	1.56	0.00	0.00	1.56	14.06	0.00	82.81
Somogybabod	0.00	10.39	0.00	1.30	5.19	11.69	0.00	71.43
Somogysámson	0.00	7.32	9.76	0.00	3.66	3.66	2.44	75.61
Somogytúr	0.00	6.85	0.00	1.37	2.74	2.74	5.48	86.30
Szentantalfa	42.86	0.00	0.00	0.00	0.00	0.00	6.12	57.14
Szentbékkálla	6.67	0.00	0.00	4.00	4.00	2.67	1.33	82.67
Szentgyörgyvár	0.00	0.00	13.16	0.00	0.00	23.68	0.00	63.16

Annex 2 continued

Settlement	Gravity of Veszprém	Gravity of Kaposvár	Gravity of Nagykanizsa	Gravity of Budapest	Gravity of foreign countries	Other gravity	Closure of settlement	Microregional closure
Szentkirályszabadja	53.73	0.00	0.00	1.49	0.00	0.00	0.00	44.78
Szigliget	5.56	0.00	0.00	1.39	2.78	8.33	9.72	81.94
Szólád	0.00	5.00	0.00	2.50	1.25	6.25	5.00	85.00
Szőlősgyörök	0.00	4.65	0.00	2.33	4.65	1.16	0.00	87.21
Tagyon	43.14	0.00	0.00	0.00	0.00	0.00	0.00	56.86
Tapolca	18.64	0.00	0.00	1.69	0.00	8.47	55.93	71.19
Táska	0.00	13.10	1.19	1.19	2.38	2.38	2.38	79.76
Tihany	19.30	0.00	0.00	1.75	7.02	5.26	14.04	66.67
Tótvázsony	55.22	0.00	0.00	1.49	1.49	0.00	2.99	41.79
Vállus	1.25	0.00	0.00	1.25	1.25	3.75	1.25	92.50
Várvölgy	0.00	0.00	0.00	2.67	4.00	14.67	6.67	78.67
Vászoly	19.67	0.00	0.00	3.28	3.28	4.92	3.28	68.85
Veszprémfajsz	76.79	0.00	0.00	0.00	0.00	0.00	0.00	23.21
Vigántpetend	28.00	0.00	0.00	0.00	0.00	8.00	0.00	64.00
Visz	0.00	7.41	0.00	0.00	4.94	3.70	6.17	83.95
Vonyarcvashegy	1.37	0.00	0.00	2.74	2.74	16.44	6.85	76.71
Zalakaros	0.00	0.00	51.43	2.86	7.14	12.86	17.14	25.71
Zalavár	0.00	0.00	2.70	0.00	5.41	8.11	5.41	83.78
Zamárdi	0.00	16.13	0.00	11.83	2.15	8.60	5.38	61.29
Total	11.70	3.51	2.16	2.14	2.86	7.15		70.48

Source: Settlement level questionnaire.

Annex 3

Cohesion and centralisation values of settlements in Lake Balaton Resort District

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Number of total spatial trajectories	Cohesion	Centralisation
Ábrahámhegy	2	69	16	87	6	93	2.15	7.79
Badacsonytomaj	10	57	24	91	84	175	5.71	55.63
Balatonalmádi	6	11	29	46	50	96	6.25	74.63
Balatonberény	2	73	18	93	1	94	2.13	1.32
Balatonboglár	28	33	25	86	139	225	12.44	69.50
Balatoncsicsó	1	36	16	53	2	55	1.82	5.13
Balatonföldvár	9	37	13	59	39	98	9.18	45.88
Balatonfűzfő	8	12	33	53	21	74	10.81	51.22
Balatongyörök	1	73	14	88	3	91	1.10	3.90
Balatonhenye	1	52	9	62	1	63	1.59	1.85
Balatonmáriafürdő	5	53	10	68	9	77	6.49	13.43
Balatonrendes	0	69	14	83	0	83	0.00	0.00
Balatonszárszó	6	47	13	66	32	98	6.12	37.65
Balatonszemes	5	59	25	89	84	173	2.89	56.76
Balatonszentgyörgy	5	53	6	64	8	72	6.94	12.12
Balatonszőlős	2	45	19	66	1	67	2.99	2.08
Bálványos	4	56	13	73	0	73	5.48	0.00
Buzsák	5	52	17	74	8	82	6.10	12.31
Dörgicse	3	52	38	93	2	95	3.16	3.51
Fonyód	24	25	29	78	54	132	18.18	52.43
Gyenesdiás	8	33	4	45	37	82	9.76	47.44
Hegyesd	0	45	23	68	0	68	0.00	0.00
Hegymagas	2	44	4	50	1	51	3.92	2.13
Héviz	16	27	11	54	99	153	10.46	69.72
Hidegkut	0	34	40	74	0	74	0.00	0.00
Kapolcs	4	45	20	69	7	76	5.26	12.50

Annex 3 continued

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Number of total spatial trajectories	Cohesion	Centralisation
Karád	4	39	43	86	8	94	4.26	15.69
Keszthely	32	8	20	60	483	543	5.89	92.35
Kéthely	6	52	7	65	0	65	9.23	0.00
Látrány	8	54	15	77	33	110	7.27	34.74
Lesencefalu	0	58	9	67	0	67	0.00	0.00
Lesencetomaj	1	48	15	64	10	74	1.35	16.95
Litér	13	20	42	75	1	76	17.11	2.94
Marcali	18	9	23	50	204	254	7.09	88.31
Mindszentkálla	1	46	4	51	2	53	1.89	4.08
Monostorapáti	5	39	24	68	15	83	6.02	25.42
Nagycsepely	0	52	3	55	2	57	0.00	3.70
Nagyrada	6	25	43	74	0	74	8.11	0.00
Nagyvázsony	6	3	27	36	24	60	10.00	72.73
Nemesgulács	6	33	4	43	2	45	13.33	4.88
Nemesvámos	4	1	43	48	9	57	7.02	64.29
Ordacsehi	0	77	11	88	1	89	0.00	1.28
Örvényes	0	53	23	76	0	76	0.00	0.00
Paloznak	1	40	35	76	0	76	1.32	0.00
Pécsely	7	39	31	77	70	147	4.76	60.34
Rezi	1	61	25	87	0	87	1.15	0.00
Révfülöp	9	34	18	61	54	115	7.83	55.67
Salföld	2	72	9	83	0	83	2.41	0.00
Ságvár	1	32	12	45	0	45	2.22	0.00
Sármellék	5	42	23	70	16	86	5.81	25.40
Siófok	21	2	18	41	334	375	5.60	93.56
Siójut	0	53	11	64	0	64	0.00	0.00
Somogybabod	0	55	22	77	1	78	0.00	1.79

Annex 3 continued

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Spatial trajectories leaving the research area	Total departing	Inbound	Number of total spatial trajectories	Cohesion	Centralisation
Somogysámson	2	60	20	82	0	82	2.44	0.00
Somogytúr	4	59	10	73	2	75	5.33	3.08
Szentantalfa	3	25	21	49	11	60	5.00	28.21
Szentbékkálla	1	61	13	75	1	76	1.32	1.59
Szentgyörgyvár	0	48	28	76	1	77	0.00	2.04
Szentkirályszabadja	0	30	37	67	0	67	0.00	0.00
Szigliget	7	52	13	72	4	76	9.21	6.35
Szólád	4	64	12	80	1	81	4.94	1.45
Szőlősgyörök	0	75	11	86	0	86	0.00	0.00
Tagyon	0	29	22	51	0	51	0.00	0.00
Tapolca	33	9	17	59	634	693	4.76	93.79
Táska	2	65	17	84	0	84	2.38	0.00
Tihany	8	30	19	57	4	61	13.11	9.52
Tótvázsony	2	26	39	67	13	80	2.50	31.71
Vállus	1	73	6	80	0	80	1.25	0.00
Várvölgy	5	54	16	75	7	82	6.10	10.61
Vászoly	2	40	19	61	1	62	3.23	2.33
Veszprémfajsz	0	13	43	56	0	56	0.00	0.00
Vigántpetend	0	48	27	75	1	76	0.00	2.04
Visz	5	63	13	81	0	81	6.17	0.00
Vonyarcvashegy	5	51	17	73	11	84	5.95	16.42
Zalakaros	12	6	52	70	40	110	10.91	68.97
Zalavár	2	29	6	37	2	39	5.13	6.06
Zamárdi	5	52	36	93	1	94	5.32	1.72
Total	417	3301	1557	5275	2691	7966	46.67	

Source: Settlement level questionnaire.

Annex 4

The orientations and closure values of the spatial trajectories of Szigetköz settlements

Settlement	Local inside spatial trajectories	Intraregional spatial trajectories	Győr	Mosonmag-yaróvár	Other	Spatial trajecto-ries leaving microregion	Total departing
Abda	19	2	39	1	4	44	65
Bezenye	15	4	11	31	2	44	63
Darnózseli	15	24	20	35	2	57	96
Dunakiliti	16	17	25	41	17	83	116
Dunaszeg	19	4	38	0	2	40	63
Dunaszentpál	13	10	36	0	2	38	61
Feketeerdő	9	18	3	40	3	46	73
Győrladamér	10	10	36	1	1	38	58
Győrújfalu	12	5	37	0	0	37	54
Győrzámoly	16	5	36	0	3	39	60
Halászi	9	9	7	33	3	43	61
Hédervár	15	13	30	29	0	59	87
Hegyeshalom	30	7	6	16	6	28	65
Kimle	20	8	25	30	4	59	87
Kisbajcs	11	12	29	0	1	30	53
Kisbodak	10	29	13	26	5	44	83
Kunsziget	25	6	26	0	8	34	65
Levél	17	8	6	31	6	43	68
Lipót	7	22	13	28	7	48	77
Máriakálnok	16	5	11	38	6	55	76
Mecsér	17	6	28	18	11	57	80
Nagybajcs	16	7	33	0	1	34	57
Püski	14	12	12	34	3	49	75
Rajka	13	11	4	29	6	39	63
Vámosszabadi	10	11	29	1	1	31	52
Vének	9	16	36	0	5	41	66
Total	383	281	589	462	109	1160	1824

Annex 4 continued

Settlement	Inbound	Total	Gravity of Győr	Gravity of Moson-magyaróvár	Other gravity	Closure of settlement	Microregional closure
Abda	3	68	60.00	1.54	6.15	29.23	32.31
Bezenye	5	68	17.46	49.21	3.17	23.81	30.16
Darnózseli	3	99	20.83	36.46	2.08	15.63	40.63
Dunakiliti	17	133	21.55	35.34	14.66	13.79	28.45
Dunaszeg	17	80	60.32	0.00	3.17	30.16	36.51
Dunaszentpál	2	63	59.02	0.00	3.28	21.31	37.70
Feketeerdő	1	74	4.11	54.79	4.11	12.33	36.99
Győrladamér	1	59	62.07	1.72	1.72	17.24	34.48
Győrújfalu	1	55	68.52	0.00	0.00	22.22	31.48
Győrzámoly	4	64	60.00	0.00	5.00	26.67	35.00
Halászi	21	82	11.48	54.10	4.92	14.75	29.51
Hédervár	16	103	34.48	33.33	0.00	17.24	32.18
Hegyeshalom	14	79	9.23	24.62	9.23	46.15	56.92
Kimle	8	95	28.74	34.48	4.60	22.99	32.18
Kisbajcs	17	70	54.72	0.00	1.89	20.75	43.40
Kisbodak	0	83	15.66	31.33	6.02	12.05	46.99
Kunsziget	1	66	40.00	0.00	12.31	38.46	47.69
Levél	3	71	8.82	45.59	8.82	25.00	36.76
Lipót	8	85	16.88	36.36	9.09	9.09	37.66
Máriakálnok	1	77	14.47	50.00	7.89	21.05	27.63
Mecsér	0	80	35.00	22.50	13.75	21.25	28.75
Nagybajcs	13	70	57.89	0.00	1.75	28.07	40.35
Püski	16	91	16.00	45.33	4.00	18.67	34.67
Rajka	4	67	6.35	46.03	9.52	20.63	38.10
Vámosszabadi	1	53	55.77	1.92	1.92	19.23	40.38
Vének	1	67	54.55	0.00	7.58	13.64	37.88
Total	178	2002	32.29	25.33	5.98	36.40	

Source: Settlement-level questionnaire.

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QUESTIONNAIRE

on spatial relation analysis

within the framework of research „ACTUALIZATION OF CONCEPTION OF REGIONAL DEVELOPMENT ON SZIGETKÖZ AREA AND MOSONI DANUBE"

Name of settlement:	_ _
Name of respondent:	_ _
Status of respondent:	_ _
Name of the interrogator:	_ _
Date of filling	_ _ _ _ _ _ _ _

Győr, 2003

1. Administrative offical relations

1. Seat of the informant settlement of actuary and rural district:

…….

2. Seat of authorities of settlements:

Name of settlement:

1. Tax affairs …….
2. Court and prosecutor …….
3. Medical authority …….
4. Building affairs …….
5. Environment affairs …….
6. Housing affairs …….
7. Authority of labour …….
8. Authority of education …….
9. Authority of finances …….
10. Police-office …….
11. Regional deputy of police …….
12. Social affairs …….
13. Water conservancy …….

2. Commercial relations

1. What is your opinion about the level of support of the consumption in the settlement?

1. Very good
2. Good
3. Average
4. Bad
5. Very bad

2. *Please name those settlements, where the inhabitants satisfy their needs because of incompletion of settlement!*

		Settlement	Settlement	Settlement
1.	Grocery			
2.	Butchery			
3.	Shop of clothes			
4.	Shoe shop			
5.	Shop of manufactured goods			
6.	Household and cosmetic commodities			
7.	Electricity and electronic products			
8.	Agricultural small appliances, tools			
9.	Feed, fumigant			
10.	Cheap bazaar trade			
11.	Food discount			
12.	Car trade			
13.	Gas depot			
14.	Other: ……..			

H = if there is in a place; in other case please fill in the name of settlement!
If there are many profiles in a unit, please mark the number of profiles after the name of unit!

3. Service relations

1. *What kind of bank is available in the settlement?*
   Name the banks of the settlement!
   .....

2. *In which settlement(s) do the inhabitants have access to bank services (e.g.: credit transactions etc.) listed below?*
   Please sign the local services with an X, in other case fill in the name of settlement!

Bank services	In a place	Settlement	Settlement	Settlement
1. ATM				
2. Credits, loans				
3. Money transfer				
4. Account management				
5. Other				

3. How far is the nearest gas station? Please name its owner!

	Name of settlement	Owner
1. in 5 km		
2. 6–10 km		
3. 11–20 km		
3. 21–30 km		
4. over 30 km		

4. Which is the nearest and (or) the most often used car service?

1. The nearest: ……

2. The most often used: ……

4. Agriculture

1. In which settlement's market do you purchase and sell the products, services, listed below:
Please name the settlement, in the further column sign the answer with X!

Settlement	Animal	Plant	Weekly market	Monthly market
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

5. Educational and cultural relations, local society

1. *Does a kindergarten operate in the settlement?*
   1. Yes, it does.
   2. No, it doesn't.

   1.1 In case the answer is „yes": Does it happen that the parents take their children into another settlement's kindergarten? In this case please name the settlements exactly!

      1. Yes, it does.
         Name of settlement:……
      2 No, it doesn't.

   1.2 In case the answer is „no", hich settlements could come into question?

      Name of settlement:……..……..

2. *Does a school operate in the settlement?*
   1. Yes, it does.
   2. No, it doesn't.

   2.1 In case the answer is „yes": Does it happen that the parents take their children into another settlement's school? In this case please name the settlements exactly!

      1 Yes, it does.
         Name of settlement…….
      2. No, it doesn't.

3. *In case the school is not operating in the settlement, in which year did it close ?*
   _ _ _ _ year

4. *Are there any plans for its relocation?*
   1. Yes, there are.
   2. No, there aren't.

5. *Are there any plans for the relocation of the religious schools in the settlement?*
   1 Yes, there are.
   2. No, there aren't.
   3. Our settlement isn't concerned in this question.

6. *Is there any language course run in the settlement?*
   1. Yes, there is.
   2. No, it doesn't.

7. *Does elementary school with first four classes exist in the settlement?*
   1 Yes, it does.
   2. No, it doesn't.

   7.1 In case the answer is "no", in which settlement do children go to school?

   Name of settlement: .....

8. *Does elementary school with upper classes operate in the settlement?*
   1 Yes, it does.
   2. No, it doesn't.

   8.1 In case the answer is "no", in which settlement do children go to school?

   Name of settlement:……..……..

9 *Characteristics of secondary schools, visited by 14–18 years old students on the informant settlement (Please sign only the most important relation!*

	Name of settlement	Extern students (head)	Residences (head)
a) High school			
1.			
2.			
3.			
4.			
5.			
b) Vocational high school			
1.			
2.			
3.			
4.			
5.			
c) Vocational school			
1.			
2.			
3.			
4.			
5.			

10. The locations of cultural and sport events, visited by inhabitants of settlement mostly:

	Settlement	Settlement
1. Theatre		
2. Cinema		
3. Variety entertainment		
4. Sport events		
5. Disco, music events		
6. Other cultural events		
7. …….		
8. …….		

6. Tourism

1. *Is a recreation area, weekend house located in the settlement?*
   If the answer is "no", please fill in 0!
   …… pieces

2. *In the settlement operates:*
   If the answer is "no", please fill in 0!

   1. Private pension …… pieces
   2. Hotel …… pieces
   3. Camping …… pieces

3. *In case the answer is "yes":*

Units	Year of establishment	Number of employee (head)	Classification	Number of rooms
1.				
2.				
3.				
4.				
5.				

7. Public transport connection

1. *Which nearby settlements (town) are connected with your settlement through bus or train services, and how often?*
   Please fill the exact number of daily frequency of bus or train services in the adequate places!
   Among the neighbouring and cross border settlements, which has public transport connections with your settlement? Please name and fill in the frequency!

	Daily frequency	
	Train	Autobus
1. Nearest settlement: ----------		
2. Győr		
3. Sopron		
4. Mosonmagyaróvár		
5. Csorna		
6. Kapuvár		
7. Neighbouring settlement I. ----------		
8. Neighbouring settlement II. ----------		
9. Neighbouring settlement III. ----------		
10. Neighbouring settlement IV. ----------		
11. Neighbouring settlement V. ----------		
12. Cross border settlements I. ----------		
13. Cross border settlements II. ----------		
14. Cross border settlements III. ----------		
15. Cross border settlements IV. ----------		
16. Cross border settlements V. ----------		

8. Employment, labour market

1. Number of people working outside the settlement:
…… head

2. Of them:

	Where (settlement)	Head
1.	.....	……
2.	.....	……
3.	.....	……
4.	.....	……
5.	.....	……
6.	.....	……
7.	.....	……
8.	.....	……

3. Number of people coming to work into the settlement:
…… head

Of them:

	From where (settlement)	Head
1.	.....	……
2.	.....	……
3.	.....	……
4.	.....	……
5.	.....	……
6.	.....	……
7.	.....	……
8.	.....	……

9. Intersettlement relations

1. *In the opinion of inhabitants, which is the "nearest" settlement providing town or town level service?*

   1. ……
   2. ……
   3. ……

2. *Which are those settlements providing town or town level service, visited by inhabitants of informant settlement mostly.*
   The ranking, made by estimation on the ground of frequency on visitation:

   1. ……
   2. ……
   3. ……

3. *In your opinion, in which settlement are the inhabitants the most intensive connected among the neighbouring settlements?*
   (Goods purchasing, personal contacts, cousinship etc. Please rank!)

   1. ……
   2. ……
   3. ……

4. *Which settlement has no direct road connections with your settlement among the neighbouring settlements?*

   1. ……
   2. ……
   3. ……

   4.1 What do you think – if it happens –, to which settlement should have been built a road necessarily?

   1. ……
   2. ……
   3. ……

5. *Which Austrian settlements' inhabitants are visiting mostly your settlement?*

   1. ……
   2. ……
   3. ……

6. *And what are the purposes of their visits?*
    1. shopping
    2. business relations
    3. making contacts
    4. visiting the relatives
    5. other: ……

7. *Which Slovakian settlements' inhabitants are visiting mostly your settlement?*
    1. ……
    2. ……
    3. ……

8 *And what are the purpose of visiting?*
    1. shopping
    2. business relations
    3. making contacts
    4. visiting the relatives
    5. other: ……

9. *In which Austrian settlement are the inhabitants the most intensively connected? Please give the frequency by settlements! (1. daily, 2. weekly, 3. monthly, 4. few times a year.)*
    1. …… freq: …
    2. …… freq: …
    3. …… freq: …

10. *And what are the purposes of their visits?*
    1. shopping
    2. working
    3. visiting the relatives
    4. selling
    5. other: ……

11. *In which Slovakian settlement are the inhabitants the most intensive connected?* Please give the frequency by settlements! (1. daily, 2. weekly, 3. monthly, 4. few times a year.)
    1. …… freq: …
    2. …… freq: …
    3. …… freq: …

12. *What is the main purpose of visiting the settlements abroad?*
    1. shopping
    2. working
    3. visiting the relatives
    4. selling
    5. other: ……

13. Which border crossing points are the most often used by the inhabitants?
Please write up, since when it could be got across!

1. ……
2. ……
3. ……

14. Which border crossing border would you use?

1. ……
2. ……
3. ……

14. Has your settlement got official relations with Austrian settlements?

1. Yes, it has got.
2. No, it hasn't got.

15. Which settlement or settlements does your settlement keep contacts with?
In the case of named settlement, please describe the areas, covered by this cooperation!

	Area of cooperation			
Name of settlement	Municipal tasks	Certain business unit	Certain service unit	Other: ……
1.				
2.				
3.				
4.				
5.				

16. In which form and how often do they keep contacts?

Way of keeping contacts	Daily	Weekly	Monthly	Few times a year
1. Traditional postal (letter)				
2. Electronic (e-mail)				
3. Phone				
4. Personal meeting				
5. Other: …….				

17. Has your settlement got official relations with Slovakian settlements?

1. Yes, it has got.
2. No, it hasn't got.

18. Which settlement or settlements does your settlement keep contacts with?
In the case of named settlement, please write up the areas, covered by this cooperation!

	Area of cooperation			
Name of settlement	Municipal tasks	Certain business unit	Certain service unit	Other: ……
6.				
7.				
8.				
9.				
10.				

19. In which form and how often do they keep the contact?

Way of contact keeping	Daily	Weekly	Monthly	Few times a year
6. Traditional postal (letter)				
7. Electronic (e-mail)				
8. Telephone				
9. Personal meeting				
10. Other: ……..				

10. Physical planning of settlement

1. *Has the municipal office got any settlement development plans of physical structure and regulation meeting the requirements of the National Standards of Physical Planning and Architecture?*

    1. Yes, it has.
    2. No, it hasn't.

    1.1 In case the answer is "yes", when did the body of deputies approve it?
    _ _ _ _ year

    1.2 In case the answer is "no":

    1. It is under preparation.
    2. It is planned for preparation. When: _ _ _ _year
    3. It isn't planned.

2. If it isn't planned, please explain the reason why:
.....
.....

Thank you for your answers!

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