

Emerging automotive cluster in Vienna – Bratislava region

RADOSLAV MIZERA
Bratislava University of Economics
Faculty of International Relations
Dolnozemska cesta č. 1, 852 25 Bratislava
Slovak Republic
mizera@euba.sk

Abstract

Cluster-based approach has been a well-preferred instrument in regional development policies for more than a decade. Nowadays, we are observing a new shift in the so-called „Economies in transition“, where cluster policies are gradually being applied. However, we can still notice certain differences for instance between old and new EU members.

In the article we use analytical tools in order to map automotive cluster in Vienna region (Austria) and Bratislava region (Slovakia). We also draw certain conclusions about state of the automotive cluster in the Vienna-Bratislava region. As a method of description we use diamond model (Porter 1998). We also look at the cluster's strengths and weaknesses and at further potential of its regional competitiveness.

Key words: regional development; competitiveness; automotive cluster; cross-border clusters; diamond model; European Union

1 Introduction

Bratislava (Slovakia) and Vienna (Austria) are the two closest capital cities in the world. They are connected by Danube River and the air distance between their closest edge parts is less than one hour, if driving at the speed of 60 kmph. With a train speed of 360 kmph, this distance could be overcome in about 10 minutes – just enough to enable daily face-to-face and soul-to-soul contacts between business people, decision makers, researchers, inhabitants, and other stakeholders.

The so-called Twin-City region of Vienna and Bratislava could represent an innovative and sustainably developing cross-border region, which utilizes its potential for competitiveness through given synergies. The prerequisite for such a development could be the incorporation of technological platforms into its regional innovation system, what would also reflect the aims of innovation and cluster-based policies of the EU. But giving the hand to policymakers, there is a need for more comprehensive research in identifying the potential of the cross-border cooperation, perspective industrial sectors, and barriers to the creation of cross-border social networks and more specifically to the emerging industrial clusters.

The purpose of this article is to **answer the following question**. What changes in the industrial structure can we observe in Bratislava region and Vienna region with respect to automotive industry between years 1997 and 2004? Supplementary questions are the

following two: To what extent can we speak about the emerging cross-border automotive cluster in the relevant region with respect to its potential and limitations? What are the main factors of such development? The answers to the questions can be found in the subsequent chapter.

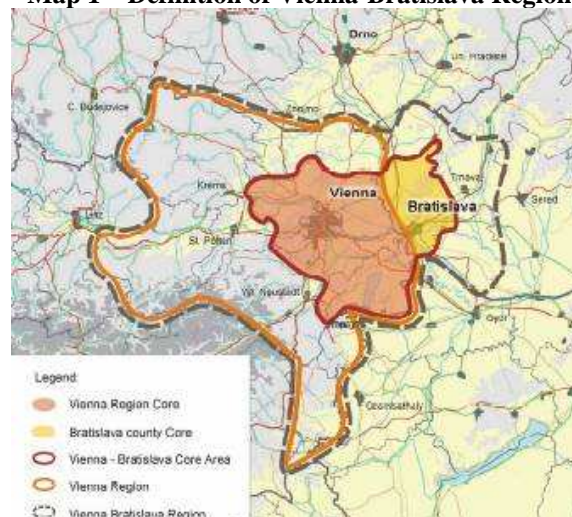
2 Automotive cluster in Vienna-Bratislava Region

In this part we focus on the emerging automotive cluster in Vienna-Bratislava region (also VBR). Firstly, we clearly define the scope of the region and briefly compare on economic basis its distinctive parts – subregions. Secondly, we use analytical instruments that help us identify already established and emerging clusters. This way we can evaluate the dynamism and structural changes in the region's industry. Furthermore, we closely look at the automotive cluster in both Bratislava region and Vienna region, and draw conclusions about its strengths and weaknesses with analysis based on the diamond model.

2.1 Defining the region

We use the definition from the OECD [1][2], according to which the region consists of two national parts. Bratislava region (Slovakia) comprises following two entities (regions or counties on the NUTS 3 level) – Bratislava county and Trnava county. Vienna region (Austria) is made of three territorial entities – Burgenland, Lower Austria and city of Vienna. This concept of Vienna-Bratislava region should enable us “to make comparisons and references across borders” [2, p. 12]. Moreover, Vienna region is a label for international marketing purposes, designed to promote the region as a business location. Bratislava region as a label has not been established yet, but establishment of the common Vienna-Bratislava regional label could overcome this lack.

Map 1 – Definition of Vienna-Bratislava Region



Source: [2, p. 13]

The number of inhabitants living in the VBR in year 2001 was 4.5 million (2.9 million living in its core consisting exclusively of the city of Vienna and Bratislava county)¹. Next table shows income per capita disparities between subregions and national averages.

¹ The total area of the VBR is roughly 30,000 m², what is approximately equal to 2/3 of the area of the Slovak Republic. City of Vienna has the highest population density from all five subregions, which is almost 3,800 inhab./km². City of Bratislava spreads through a relatively large area, what results in about three times lower population density as it is in the case of Vienna.

Table 1 – Income Disparities within the Vienna-Bratislava Region (2004)

<i>Region or State</i>	Vienna	Burgenland	Lower Austria	<u>Austria</u>	Bratislava	Trnava*	<u>Slovakia</u>
€ GDP/cap. (PPP)	38,632	19,305	22,434	27,666	27,802	12,677	12,196
% from the EU-27 average	180	90	104.4	128.7	129.3	59	56.7

Source: Eurostat [3], *Source: ŠÚSR [4]

From the previous table we can make a deduction that considerable income disparities exist among relevant subregions in the VBR. Bratislava has the second highest regional GDP per capita after Vienna. On the other hand, Trnava and Burgenland do not achieve average income levels of the EU-27. The regional GDP per capita of Lower Austria remains slightly above the EU-27 average.

Theory of *new economic geography* [5], as well as *cluster theory* [6], incorporates in its concept the importance of geographical proximity of business actors, social capital and externalities on economic outcomes and welfare creation within regional economic complexes. But the creation of economic value doesn't represent the only aim for which regions should be striving. Besides, the attractiveness of the locality and quality of life are also necessary preconditions for business and R&D localization, which turns at the end effect into more economic output. For the future stake of the region, the ability to draw talents [7] by cultural and environmental amenities remains crucial. Our aim is not to analyze the whole complexity of such development factors. Additional research has already been done for this purpose. However, we do not intend to underestimate the importance of the quality of life on the overall performance of regions and therefore we mention the relevance of this dimension too.

2.2 Location quotient and shift-share analysis

Both analytical tools are widely used for the identification of emerging clusters and changes in the industrial structure. We have done the analysis of structural changes in VBR industry with the use of employment data (NACE 2 digits) between years 1997 and 2004. Both national parts have been examined separately. Our additional contribution was putting together the employment data for the whole Vienna-Bratislava region into one common table.

Location Quotient (LQ) method identifies the export base of regional industries [8] [9] [10] and can be expressed followingly:

$$LQ_i = (e_i/e)/(E_i/E) ,$$

where

LQ_i – Location Quotient for industry i

e_i – regional employment in industry i

e – total employment in the region

E_i – employment in the region on the upper level in industry i

E – total employment in the region on the upper level

Following two tables show the LQ results for both national parts – Vienna region and Bratislava region in years 1997 and 2004.

Table 2²

Employment Structure - Number of Employees (32 Branches)						
LQ for Years 1997 and 2004 (Austria and Vienna Region)						
NACE	1997		1997		2004	
	Vienna Region	Austria	LQ	LQ	Vienna Region	Austria
Total	1 316 314	2 968 509			1 318 484	3 078 548
A/B Agriculture, Hunting, Forestry, Fishing	10 639	26 191	0,92	1,01	11 474	26 601
C Mining	4 110	14 455	0,64	0,65	3 610	13 023
D Manufacturing	225 458	609 596	0,83	0,77	192 727	585 119
E Electricity, Gas and Water Supply	8 172	31 173	0,59	0,69	8 079	27 313
F Construction	114 202	266 519	0,97	0,93	94 034	235 524
G Wholesale, Retail Trade, Repairs and Personal Goods	212 610	485 456	0,99	0,98	209 526	498 633
H Hotels and Restaurants	52 215	142 768	0,82	0,82	56 164	159 022
I Transport, Storage and Communication	106 253	222 852	1,08	1,12	103 228	214 352
J Financial Intermediation	54 208	109 626	1,12	1,14	53 517	109 883
K Real Estate, Renting and Business Activities	114 894	203 488	1,27	1,27	160 729	294 362
L-Q Public Administration, Education, Health/Social Work, Other Service Activities	413 553	856 385	1,09	1,09	425 402	914 731
NACE-2	Vienna Region	Austria	LQ	LQ	Vienna Region	Austria
Total	1 316 314	2 968 509			1 318 484	3 078 548
D Total	225 458	609 596	0,83	0,77	192 727	585 119
... Technologies	83 841	199 244	0,95	0,81	70 933	205 282
... 15/16: Food Products, Beverages and Tobacco	31 676	79 500	0,90	0,86	27 340	74 145
... 17: Textiles and Textile Products	6 119	20 756	0,66	0,67	4 441	15 407
... 18: Clothes	6 905	16 830	0,93	1,00	4 110	9 638
... 19: Leather and Leather Products	1 558	7 944	0,44	0,68	1 613	5 562
... 20: Wood and Wood Products	14 153	36 736	0,87	0,82	11 994	34 128
... 21: Pulp, Paper and Paper Products	5 221	18 014	0,65	0,65	4 898	17 633
... 22: Publishing and Printing	15 743	29 660	1,20	1,18	12 897	25 567
... 23/24: Chemicals and Chemical Products, Coke and Petroleum	14 995	32 889	1,03	0,98	14 002	33 419
... 25: Rubber and Plastic Products	11 567	23 815	1,10	1,02	11 015	25 174
... 26: Non-metallic Mineral Products	9 398	30 187	0,70	0,66	7 846	27 955
... 27: Basic Metals	6 148	28 309	0,49	0,43	6 117	33 321
... 28: Fabricated Metal Products	24 047	70 793	0,77	0,72	22 469	72 421
... 29: Machinery and Equipment N.E.C.	21 397	63 008	0,77	0,71	20 198	66 200
... 30-33: Electrical and Optical Equipment	36 899	68 589	1,21	0,99	25 916	61 433
... 34/35: Manufacture of Transport Equipment	10 549	34 756	0,68	0,57	10 817	44 230
... 36/37: Manufacturing N.E.C.; Recycling	9 083	47 809	0,43	0,42	7 054	38 886
K Total	114 894	203 488	1,27	1,27	160 729	294 362
... 70: Real Estate	31 212	44 137	1,59	1,53	26 284	40 046
... 71: Renting	1 990	3 854	1,16	1,07	2 159	4 720
... 72: IT Services	9 086	13 610	1,51	1,47	18 161	28 932
... 73: Research and Development	5 194	6 986	1,68	1,60	6 553	9 536
... 74: Business Activities	67 412	134 901	1,13	1,19	107 592	211 128

Source: Own calculations based on [11] [12]

Table 3³

Employment Structure - Number of Employees (32 Branches)						
LQ for Years 1997 and 2004 (Slovakia and Bratislava Region)						
NACE	1997		1997		2004	
	Bratislava Region	Slovakia	LQ	LQ	Bratislava Region	Slovakia
Total	359 971	1 447 278			344 181	1 224 357
A/B Agriculture, Hunting, Forestry, Fishing	24 758	135 388	0,74	0,78	13 091	59 362
C Mining	3 144	21 486	0,59	0,64	1 701	9 449
D Manufacturing	79 653	435 646	0,74	0,78	78 936	361 323
E Electricity, Gas and Water Supply	12 508	45 316	1,11	0,97	11 404	41 876
F Construction	22 051	80 508	1,10	1,01	12 698	44 773
G Wholesale, Retail Trade, Repairs and Personal Goods	21 197	72 876	1,17	1,21	28 972	85 466
H Hotels and Restaurants	4 090	11 649	1,41	1,35	4 289	11 324
I Transport, Storage and Communication	35 172	126 233	1,42	1,09	31 447	102 784
J Financial Intermediation	15 078	32 849	1,85	2,03	18 198	31 906
K Real Estate, Renting and Business Activities	25 254	59 176	1,72	1,74	29 296	59 788
L-Q Public Administration, Education, Health/Social Work, Other Service Activities	117 068	426 151	1,10	0,98	114 149	416 306
NACE-2	Bratislava Region	Slovakia	LQ	LQ	Bratislava Region	Slovakia
Total	359 971	1 447 278			344 181	1 224 357
D Total	79 653	435 646	0,74	0,78	78 936	361 323
... Technologies						
... 15/16: Food Products, Beverages and Tobacco	13 923	50 219	1,11	0,92	9 801	37 808
... 17: Textiles and Textile Products	2 676	20 818	0,52	0,45	1 938	15 212
... 18: Clothes	3 000	28 636	0,42	0,41	2 876	24 809
... 19: Leather and Leather Products	623	18 066	0,14	0,20	807	14 508
... 20: Wood and Wood Products	971	13 679	0,29	0,19	462	8 772
... 21: Pulp, Paper and Paper Products	1 127	13 363	0,34	0,29	1 411	7 514
... 22: Publishing and Printing	4 450	8 547	2,03	1,85	3 759	7 222
... 23/24: Chemicals and Chemical Products, Coke and Petroleum	13 488	32 270	1,68	1,51	6 887	16 195
... 25: Rubber and Plastic Products	1 712	14 314	0,48	0,55	2 397	15 617
... 26: Non-metallic Mineral Products	5 573	25 147	0,89	0,82	4 734	20 662
... 27: Basic Metals	3 186	32 298	0,40	0,22	1 716	27 781
... 28: Fabricated Metal Products	4 928	25 137	0,79	0,72	5 045	24 927
... 29: Machinery and Equipment N.E.C.	5 872	70 809	0,33	0,49	5 553	40 370
... 30-33: Electrical and Optical Equipment	8 239	38 541	0,86	0,82	12 826	55 972
... 34/35: Manufacture of Transport Equipment	6 910	27 578	1,01	1,82	15 379	30 007
... 36/37: Manufacturing N.E.C.; Recycling	2 975	16 224	0,74	0,88	3 465	13 947
K Total	25 254	59 176	1,72	1,74	29 296	59 788
... 70: Real Estate	3 674	12 759	1,16	1,13	2 226	7 004
... 71: Renting	295	916	1,29	2,52	623	878
... 72: IT Services	1 782	4 492	1,69	2,09	3 592	6 127
... 73: Research and Development	7 395	12 694	2,34	2,00	5 546	9 842
... 74: Business Activities	12 108	28 319	1,72	1,71	17 309	35 937

² Changes in the values of location quotients have not been that remarkable in Vienna region. More or less, all branches of the economy, according to the NACE one digit division based on the employment data, kept their positions. Real estate, ... (K) sector's branches retained their dominant positions and the sector has overall improved its position a little. Only LQ of Renting (71) and R&D (73) decreased, though Business activities slightly increased their LQ. When looking at the industry, only Publishing and printing (22) represented an export base in the Vienna region. This cannot be said about the Manufacturing of transport equipment (34/35).

³ Some considerable changes have occurred in the structure of Bratislava region's industry. Real estate, ... (K) sector's branches retained their dominant positions and some of them even changed their LQ values considerably – with the increase in Renting (71) and IT services (72) but decrease in R&D (73). In the industry, Manufacturing of transport equipment (34/35) almost doubled its LQ value from 1 to 1.8, so we can easily identify the emergence of the automotive cluster in this case.

Source: Own calculations based on [11] [12]

Shift-share Analysis (RS) is an instrument for the evaluation of changes in the regional employment and industrial structure during specific period of time in respect to a national average [8] [9] [13]. This method is widely used for the identification of emerging and existing clusters. Shift-share analysis can be expressed followingly:

$$\Delta e_i = e_i [(N^*/N) - 1] + e_i [(N_i^*/N_i) - (N^*/N)] + e_i [(e_i^*/e_i) - (N_i^*/N_i)],$$

where

Δe_i – the change in the regional employment in industry i

e_i – regional employment in industry i at the beginning of the period

e_i^* – regional employment in industry i at the end of the period

N^* – total national employment at the end of the period

N – total national employment at the beginning of the period

Following two tables show the results of the spreadsheet type shift-share analysis.

Employment Structure - Number of Employees (32 Branches)								
Shift-Share Analysis 1997-2004 (Austria and Vienna Region)								
NACE	1997		2004		1997		2004	
	Vienna Region	Vienna Region	Austria	Austria	PS	IM	RS	
Total	1 316 314	1 318 484	2 968 509	3 078 548	48 801	14 888	-61 512	
A/B Agriculture, Hunting, Forestry, Fishing	10 639	11 474	26 191	26 601	182	-15	669	
C Mining	4 110	3 610	14 455	13 023	-635	228	-92	
D Manufacturing	225 458	192 727	609 596	585 119	-10 854	1 801	-23 679	
E Electricity, Gas and Water Supply	8 172	8 079	31 173	27 313	-1 712	700	919	
F Construction	114 202	94 034	266 519	235 524	-13 744	463	-6 887	
G Wholesale, Retail Trade, Repairs and Personal Goods	212 610	209 526	485 456	498 633	5 843	-72	-8 855	
H Hotels and Restaurants	52 215	56 164	142 768	159 022	7 208	-1 263	-1 996	
I Transport, Storage and Communication	106 253	103 228	222 852	214 352	-3 769	-284	1 027	
J Financial Intermediation	54 208	53 517	109 626	109 883	114	13	-818	
K Real Estate, Renting and Business Activities	114 894	160 729	203 488	294 362	40 296	11 013	-5 474	
L-O Public Administration, Education, Health/Social Work, Other Service Activities	413 553	425 402	856 385	914 731	25 872	2 303	18 326	
NACE-2	Vienna Region	Vienna Region	Austria	Austria	PS	IM	RS	
Total	1 316 314	1 318 484	2 968 509	3 078 548	29 442	8 175	-24 513	
D Total	225 458	192 727	609 596	585 119	-10 854	1 801	-23 679	
... Technologies	83 841	70 933	199 244	205 282	2 678	-137	-15 448	
... 15/16: Food Products, Beverages and Tobacco	31 676	27 340	79 500	74 145	-2 374	241	-2 203	
... 17: Textiles and Textile Products	6 119	4 441	20 756	15 407	-2 372	795	-101	
... 18: Clothes	6 905	4 110	16 830	9 638	-3 189	238	156	
... 19: Leather and Leather Products	1 558	1 613	7 944	5 562	-1 056	589	522	
... 20: Wood and Wood Products	14 153	11 994	36 736	34 128	-1 157	152	-1 154	
... 21: Pulp, Paper and Paper Products	5 221	4 898	18 014	17 633	-169	58	-674	
... 22: Publishing and Printing	15 743	12 897	29 660	25 567	-1 815	-358	-813	
... 23/24: Chemicals and Chemical Products; Coke and Petroleum	14 995	14 002	32 889	33 419	235	7	-1 235	
... 25: Rubber and Plastic Products	11 567	11 015	23 815	25 174	603	57	-1 213	
... 26: Non-metallic Mineral Products	9 398	7 846	30 187	27 955	-990	295	-857	
... 27: Basic Metals	6 148	6 117	28 309	33 321	2 222	-1 134	-1 119	
... 28: Fabricated Metal Products	24 047	22 469	70 793	72 421	722	-169	-2 131	
... 29: Machinery and Equipment N.E.C.	21 397	20 198	63 008	66 200	1 415	-331	-2 283	
... 30-33: Electrical and Optical Equipment	38 899	25 916	68 589	61 433	-3 173	-677	-1 133	
... 34/35: Manufacture of Transport Equipment	10 549	10 817	34 756	44 230	4 201	-1 325	-2 608	
... 36/37: Manufacturing N.E.C.; Recycling	9 083	7 054	47 809	38 886	-3 957	2 261	-334	
K Total	114 894	160 729	203 488	294 362	40 296	11 014	-5 474	
... 70: Real Estate	31 212	26 264	44 137	40 046	-1 814	-1 079	-2 055	
... 71: Renting	1 990	2 159	3 854	4 720	384	63	-278	
... 72: IT Services	9 086	18 161	13 610	28 932	6 794	3 435	-1 164	
... 73: Research and Development	5 194	6 553	6 986	9 536	1 131	766	-538	
... 74: Business Activities	67 412	107 592	134 901	211 128	33 801	4 291	2 088	

Table 4⁴

Source: Own calculations based on [11] [12]

⁴ Closer observation of the data for Manufacturing (D) helps us to draw following statements. There has been an intensive process of restructuring in the Vienna region during the years 1997 and 2004. Almost all branches of the manufacturing were affected more negatively than at Austrian level. Around 23,000 jobs would have been generated, if there was the same growth pattern in the relevant branches of the Vienna region as in Austria. These theoretical decreases in the employment are divided among these branches: Electrical and optical equipment (30 – 33) with more than 7,000 jobs; Fabricated metal products (28) with more than 2,100 jobs; Machinery and equipment N.E.C. (29) with almost 2,300 jobs; Food products, beverages and tobacco (15 – 16) with little more than 2,200 jobs; Manufacture of transport equipment (34 – 35) with more than 2,600 jobs; Basic metals (27) with more than 1,000 jobs; etc. Only two manufacturing branches were able to generate somewhat more jobs, than there would have been generated, if these industries grew at the average Austrian growth rate. These branches are: Clothes (18) and Leather ... (19). The branches related to technologies in general had a negative RS balance of 15,448 jobs. As regarding to the automotive sector, no clustering could be observed during this period. Moreover, automotive industry seemed to diminish in its employment size.

Table 5⁵

Employment Structure - Number of Employees (32 Branches)
Shift-Share Analysis 1997-2004 (Slovakia and Bratislava Region)

NACE	1997		2004		PS	IM	RS
	Bratislava Region	Slovakia	Bratislava Region	Slovakia			
Total	359 971	1 447 278	344 181	1 224 357	-55 446	9 593	30 062
A/B Agriculture, Hunting, Forestry, Fishing	24 756	13 091	13 988	59 362	-18 909	5 007	2 236
C Mining	3 144	1 701	21 486	9 449	-2 994	1 233	318
D Manufacturing	79 653	78 936	435 646	361 323	-18 486	4 897	12 872
E Electricity, Gas and Water Supply	12 508	11 404	45 316	41 876	-856	-94	-155
F Construction	22 051	12 698	80 508	44 773	-8 888	-900	435
G Wholesale, Retail Trade, Repairs and Personal Goods	21 197	28 972	72 876	85 466	3 131	531	4 113
H Hotels and Restaurants	4 090	4 289	11 649	11 324	-81	-33	313
I Transport, Storage and Communication	35 172	31 447	126 233	102 784	-5 832	-701	2 809
J Financial Intermediation	15 078	18 198	32 849	31 906	-235	-199	3 553
K Real Estate, Renting and Business Activities	25 254	29 296	59 176	59 788	152	108	3 781
L-Q Public Administration, Education, Health/Social Work, Other Service Activities	117 066	114 149	426 151	416 306	-2 449	-256	-213
NACE-2	Bratislava Region	Bratislava Region	Slovakia	Slovakia	PS	IM	RS
Total	359 971	344 181	1 447 278	1 224 357	-18 334	6 042	15 617
D Total	79 653	78 936	435 646	361 323	-18 486	4 897	12 872
... Technologies							
... 15/16: Food Products, Beverages and Tobacco	13 923	9 801	50 219	37 808	-3 087	-354	-681
... 17: Textiles and Textile Products	2 676	1 938	20 818	15 212	-1 394	674	-17
... 18: Clothes	3 000	2 876	28 636	24 809	-952	551	277
... 19: Leather and Leather Products	623	807	18 066	14 508	-885	762	307
... 20: Wood and Wood Products	971	462	13 679	8 772	-1 220	872	-161
... 21: Pulp, Paper and Paper Products	1 127	1 311	13 363	7 514	-1 455	961	677
... 22: Publishing and Printing	4 450	3 759	8 547	7 222	-330	-360	-1
... 23/24: Chemicals and Chemical Products; Coke and Petroleum	13 488	6 867	32 270	16 195	-3 998	-2 721	98
... 25: Rubber and Plastic Products	1 712	2 397	14 314	15 617	324	-168	529
... 26: Non-metallic Mineral Products	5 573	4 734	25 147	20 662	-1 116	122	155
... 27: Basic Metals	3 186	1 716	32 298	27 781	-1 123	678	-1 024
... 28: Fabricated Metal Products	4 928	5 045	25 137	24 927	-52	11	158
... 29: Machinery and Equipment N.E.C.	5 872	5 553	70 809	40 370	-7 571	5 047	2 205
... 30-33: Electrical and Optical Equipment	8 239	12 826	38 541	55 972	4 335	-609	861
... 34/35: Manufacture of Transport Equipment	6 910	15 379	27 578	30 007	604	4	7 860
... 36/37: Manufacturing N.E.C.; Recycling	2 975	3 465	16 224	13 947	-566	149	908
K Total	25 254	29 296	59 176	59 788	152	109	3 781
... 70: Real Estate	3 674	2 226	12 755	7 004	-1 430	-226	209
... 71: Renting	295	623	916	878	-9	-3	340
... 72: IT Services	1 782	3 592	4 492	6 127	407	242	1 161
... 73: Research and Development	7 395	5 546	12 694	9 842	-709	-952	-188
... 74: Business Activities	12 108	17 309	28 319	35 937	1 895	1 362	1 944

Source: Own calculations based on [11] [12]

Following table summarizes employment data for the Vienna-Bratislava region.

Table 6

Employment Structure - Number of Employees (32 Branches) % Change 1997-2004 (Bratislava-Vienna Region)			
NACE	BV Region '97	BV Region '04	Change in %
Total	1 676 285	1 659 586	-1,00%
A/B Agriculture, Hunting, Forestry, Fishing	35 397	25 933	-26,57%
C Mining	7 254	5 478	-24,48%
D Manufacturing	305 111	273 725	-10,29%
E Electricity, Gas and Water Supply	20 680	19 987	-3,35%
F Construction	136 253	107 110	-21,39%
G Wholesale, Retail Trade, Repairs and Personal Goods	233 807	236 070	0,97%
H Hotels and Restaurants	56 305	60 552	7,54%
I Transport, Storage and Communication	141 425	134 657	-4,79%
J Financial Intermediation	69 286	71 044	2,54%
K Real Estate, Renting and Business Activities	140 148	186 427	33,02%
L-Q* Public Administration, Education, Health/Social Work, Other Service Activities	530 619	538 549	1,49%
NACE-2	BV Region '97	BV Region '04	
Total	1 676 285	1 659 586	-1,00%
D Total	305 111	273 725	-10,29%
... Technologies			
... 15/16: Food Products, Beverages and Tobacco	45 599	38 006	-16,65%
... 17: Textiles and Textile Products	8 795	6 757	-23,17%
... 18: Clothes	9 905	7 519	-24,09%
... 19: Leather and Leather Products	2 181	2 486	13,96%
... 20: Wood and Wood Products	15 124	12 347	-18,36%
... 21: Pulp, Paper and Paper Products	6 348	6 245	-1,62%
... 22: Publishing and Printing	20 193	16 476	-18,41%
... 23/24: Chemicals and Chemical Products; Coke and Petroleum	28 483	22 119	-22,34%
... 25: Rubber and Plastic Products	13 279	13 568	2,17%
... 26: Non-metallic Mineral Products	14 971	12 481	-16,63%
... 27: Basic Metals	9 334	7 970	-14,61%
... 28: Fabricated Metal Products	28 975	27 434	-5,32%
... 29: Machinery and Equipment N.E.C.	27 269	25 828	-5,28%
... 30-33: Electrical and Optical Equipment	45 138	37 186	-17,62%
... 34/35: Manufacture of Transport Equipment	17 459	26 908	54,12%
... 36/37: Manufacturing N.E.C.; Recycling	12 058	10 395	-13,79%
K Total	140 148	186 427	33,02%
... 70: Real Estate	34 886	28 449	-18,45%
... 71: Renting	2 285	2 374	3,90%
... 72: IT Services	10 868	21 085	94,01%
... 73: Research and Development	12 589	11 992	-4,74%
... 74: Business Activities	79 520	122 527	54,08%

* Only A - O (NACE) data for the Slovak side available

Source: Own calculations based on [11] [12]

⁵ We can clearly identify an emerging automotive cluster from the table (RS = +7,860 in RS column in row 34/35 Manufacture of transport equipment). Then only row 29 – Machinery and Equipment N.E.C. has shown higher than +2,000 RS value. It is interesting, that from previous LQ analysis we could not deduct such results.

2.3 Mapping the automotive cluster in Vienna-Bratislava region with diamond model

Automotive cluster in the Vienna-Bratislava region has not been mapped or even initiated yet, when not taking into consideration partial efforts on both national sides. Austria has far richer experience in identifying, initiating and supporting industrial clusters than Slovakia. Styria automotive cluster is mentioned as a best practice in some scientific articles [14] [15]. Even when Austria has comparably lower production of vehicles as Slovakia, its direct in indirect employment in automotive sector is far higher. In 2009, Slovakia should produce something between 870,000 to 1,020,000 cars a year. In Austria the annual car production is 250,000. On the other hand, 175,000 people are directly and indirectly employed in automotive industry in Austria. In Slovakia it is now almost three times less, while rough estimations predict for the future an increase of total automotive employment up to 85,000 or even 100,000 workers [16]. This high employment intensity in case of Austria is possibly an outcome of higher density of SMEs in automotive sector. Moreover, Slovakia has developed mainly the OEM based production. Regarding the automotive industry's turnover, this has been almost € 20 billion in Austria and around € 3,5 billion in Slovakia in year 2001.

Further analysis of the cluster uses the Porter's diamond model, which is a well established and preferred instrument to map, describe a manage industrial clusters. While using its basic elements, we can easily describe the weaknesses and strengths of a cluster, what is the actual intent of this research. Next four sub-chapters represent the diamond with its internal and external interlinkages.

2.3.1 Factor conditions

The Vienna-Bratislava region is situated in the core part of CENTROPE and Central European Region. This favorable location and close connection to other states with higher share of automotive industry, namely Czech Republic, Hungary and Poland, is on of the basic advantageous factor conditions. Regarding the state of the infrastructure, Slovakia plans further improvements in its highway system, though the train network is relatively well developed. Austria's transport infrastructure doesn't need further improvements at the moment, however, better connection between Vienna and Bratislava remains to be of concern. FDI inflow into Slovakia's automotive sector has been mostly influenced by the availability of skilled workers demanding lower wages. Hourly wage in Slovakia in 2005 was about ten times lower than in Germany (\$ 3.4 vs. \$ 33.9). Problematic is now the availability of skilled workers. This on one hand pushes the wages up, but on the other hand it is an incentive for a migration of workers from neighboring states as Ukraine and Romania.

There are also considerable differences in both parts of the region as far as research & development and communication infrastructure is regarded. There has been continuous decrease in relative R&D expenditures and in the count of researchers in Slovakia during the last decade. Only city of Bratislava has relatively higher R&D intensity due to centralization of tertiary education and research networks or institutes. The same is a rule in case of Austria and Vienna. But when we compare Austria and Slovakia, the mentioned differences become more noticeable. Slovakia shows one of the lowest performances of R&D expenditure in total (GERD) in Central Europe [17]. With regard to automotive sector, due to its importance the situation can be somewhat more positive. New science centers are supposed to be established at four Slovak universities in Bratislava, Košice, Trenčín and Žilina in the near future.

2.3.2 Demand conditions

According to the view of Michael E. Porter (1998), sophisticated local demand contributes significantly to the innovation ability of local cluster-based companies. Specific needs of consumers are reflected in the innovation process within region or cluster. Vienna city has one of the highest per capita incomes in the EU and Bratislava city has the second highest per

capita income from all new member states. Therefore, higher purchasing power within the VBR could positively influence the innovation process of the automotive cluster too. This might be an important factor in introduction of innovative concepts, for instance in promotion of environmentally friendlier cars – as hybrid or electric vehicles. The dynamism of the income growth in Slovak part of the region is rather positive, although the convergence of Trnava county's income level to regional average still lags behind. Lastly, it is important to point at the tradition of the automotive industry in the region, which is one of the oldest in the world.

2.3.3 Related and supporting industries

In Austria, the automotive supplier network is relatively dense, if compared to Slovakia. In Slovakia, there are about 100 suppliers within the automotive industry. In Austria this number is seven times higher. Nevertheless, seven from ten most important automotive suppliers are present in Slovakia. These are mostly first tier suppliers that closely cooperate with OEMs. For instance, with KIA's, a Korean car manufacturer's, settlement in northwestern part of Slovakia, twelve suppliers from Korea also started operating their business in this region. Slovak owned suppliers have not developed strong ties to OEMs so far. This will be probably a longer process demanding more effort and innovativeness from Slovak enterprises.

Austrian automotive SMEs are forming networks, coordinating their activities and intensifying research and development or innovativeness. Such a favorable environment is also created due to financial and institutional support that is available to these companies.

2.3.4 Firm strategy, structure and rivalry

Transparent and effective business environment contributes to the regional development. When we take into consideration the presence of the Slovak car manufacturers in system supplies to OEMs, which is actually low, we can conclude that the effort of the Slovak government has mostly focused on attracting foreign-based supplier companies. This strategy doesn't have to be necessarily a wrong one, but the means to achieve it could have had rather distortional effects on the sector's economy, because they were using the practices of subsidization and probably bribery too. The knowledge spillovers from the car production represent positive externalities for locally situated companies, no matter if they are of foreign or national origin. This is a benefit in fact. But well-balanced clusters involve the participation of both groups on equal basis. Therefore, more effort has to be given to the creation of a favorable business environment, which could then enable an involvement of Slovak players in the whole value-chain. Furthermore, competition as well as cooperation between Austrian and Slovak firms could enhance the competitiveness of the automotive cluster on global markets.

3 Conclusions

The purpose of the article was to present the research of the changes in the industry structure that occurred in the Vienna-Bratislava region. Special focus was given to the automotive sector, where we tried to identify the emergence of an automotive cluster with the use of proper empirical instruments. In fact, there is a positive evidence for the establishment of the automotive cluster in Slovak part of the region. However, the analysis used did not indicate growth patterns in the automotive sector in Austrian part of the region. But based on the diamond model (Porter 1998) we could compare the automotive cluster of both national parts and form a basis for the regional cross-border automotive cluster. Slovakia and Austria do exhibit different state of the cluster development and also different experience with cluster-based policies, where the latter has a more developed cluster framework than the former. Connection of the both national parts into one cross-border cluster could generate synergies and enhance the competitiveness of the whole cluster on global markets. However, what is further recommended is to study the emergence of social and cultural networks through utilization of social and cultural capital. Also it is recommended, that institutions for collaboration and the scope of their activities within the regional automotive sector needs to be researched to a greater extent.

References

- [1] OECD: *Vienna-Bratislava - Austria/Slovak Republic (Territorial Reviews)*. Paris: OECD, 2003. 159 p. ISBN 92-64-10468-2
- [2] Vienna City Administration: *Vienna – Bratislava Region: Austrian Background Report for the OECD-Review 2003 and Assessment and Recommendations of the OECD*. Vienna: Vienna City Administration, 2003. 161 p. ISBN 3-902015-55-1
- [3] Eurostat: *Regional Gross Domestic Product per Inhabitant (PPS)*. Available at: <http://epp.eurostat.ec.europa.eu>, 8.10.2007
- [4] Štatistický úrad Slovenskej republiky: *Štatistická ročenka regiónov Slovenska – 2006*. Bratislava: ŠÚSR, 2007
- [5] Maier, G. – Tödting, F.: *Regional- und Stadtökonomik 2: Regionalentwicklung und Regionalpolitik*. Vienna: Springer Verlag, 2002. 263 p. ISBN 3-211-83716-7
- [6] Porter, M. E.: *On Competition*. Boston: Harvard Business School Press, 1998. 485 p. ISBN 0-87584-795-1
- [7] Florida, R.: *Competing in the age of talent: Quality of place and the new economy*. Pittsburgh: Richard King Mellon Foundation, 2000. 53 p.
- [8] McLean, M. – Voytek, K. P.: *Understanding your economy: Using analysis to guide local strategic planning*. Chicago: Planners Press. P. 51 – 66
- [9] Blair, J. P.: *Local economic development: Analysis and practice*. London: SAGE Publications, ISBN 0-8039-5376-3
- [10] Jáč, I. – Rydvalová, P. – Žižka, M.: *Inovace v malém a středním podnikání*. Brno: Computer Press, 2005. 174 p. ISBN 80-251-0853-8
- [11] Štatistický úrad Slovenskej republiky (data sent on personal request in 2006).
- [12] Available at: www.wibis-steiermark.at, 2006.
- [13] Hoppes, R. B.: Regional versus Industrial Shift-Share Analysis – with Help from the Lotus Spreadsheet. In: *Economic Development Quarterly*, č. 3, 1991. P. 258 – 267
- [14] Ketels, C.: European clusters. In: *Structural Change in Europe 3 – Innovative City and Business Regions*, Hagbarth Publications 2004, 5 p.

-
- [15] Bergman, E.M., Lehner, P.: *Industrial cluster learning platforms: Methodology and Case Studies of four local Austrian industry clusters*. Vienna: SRE, 1998. 46 p.
- [16] Ministerstvo hospodárstva Slovenskej republiky: *Rozvoj automobilového priemyslu SR ako generátor hospodárskeho rastu priemyslu a jeho reštrukturalizácie*. 2005.
- [17] European territorial cooperation: *Central Europe – Operational Programme*. Final version, May 2007. 139 p.