#### COMPARATIVE ANALYSIS OF SERVICES BRANCHES IN NEISSE EUROREGION

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#### **Abstract**

The article deals with the branch structure in the individual parts of the Neisse Euroregion with an emphasis on the services industry. The introductory part of the article refers to dissimilarities and difficulties of comparing special-purpose or natural regions, the territory of which is not identical with the administrative regions. The second part of the article investigates significance of the individual economic branches using the specialization indexes and location quotients. The results of the analyses prove that the biggest portion of the regional workforce is employed by the tertiary sector in all three parts of the euroregion. The branch structure in the German and Polish parts of the euroregion is similar to a great extent. The Czech part differentiates with significantly higher employment in the manufacturing industry. Each national part of the euroregion is simultaneously specialized in certain specific branch of services.

#### Introduction

The services belong to a dynamically developing sector of the national economies of the advanced countries. In the United States, for instance, the services sector creates more than 80% of job positions, in Europe 70%. [5] The services sector then underwent a specific position in the transitive economies which featured extremely high share of the manufacturing industry in GDP, resp. in employment, before 1990. In former Czechoslovakia, the share of the services in GDP was roughly 36% in 1990, similarly in Poland - approximately 37%. In connection with fast restructuring of the economies, the share of the services in GDP increased in the Czech Republic to 54% and in Poland to 51% by 1995 [3] and it currently achieves about 60% in the Czech Republic [1], resp. 65% in Poland. [2] For the sake of comparison, the share of the services in the neighbouring Germany is roughly 71% of GDP. [10]

The purpose of the article is to compare the branch structure of the economy in the neighbouring areas of the three countries of the Neisse Euroregion with an emphasis on the services sector. However, the comparison is complicated by the fact that the "Neisse Euroregion" does not constitute an administrative, but a specific-purpose region. The administrative regions are determined for purposes of the public administration organization and performance, whereas the specific-purpose regions are established for purposes of dealing with common problems of a certain territory, which is not usually identical with the administrative arrangement thereof. [4]

On the Czech side, the Euroregion members include most of the municipalities of the Liberec Region, but also some municipalities within the Šluknov area of the Ústí nad Labem Region. The situation on the German side is simpler, as the Euroregion members include the entire districts of Bautzen and Görlitz in the state of Saxony. The Polish members include the most of the municipalities in the Jeleniogórski sub-region in the western part of the Lower Silesia Province. The statistical data is, however, reported at the level of administrative regions. The starting base of both region types comprises the municipalities as the footstones of each

region, however, minimum statistical data is reported at the municipality level. This is the reason why it was necessary to make certain simplification, as the employment data by branch is not publicly available for the individual municipalities, but for larger territorial units (according to the Nomenclature of Territorial Units for Statistics, usually for the NUTS 3 level regions). So the subject of comparison was the Liberec Region in the Czech Republic, both of the above-mentioned districts in Germany and the Jeleniogórski sub-region in Poland. The above-mentioned administrative units, however, cover majority of the Neisse Euroregion (see Table 1).

**Tab. 1:** Characteristics of Surveyed Territory in 2010

Part of Euroregion	Number of Municipalities	Area in sq. km	Population
Czech part of euroregion	135	2,581	437,884
Liberec Region	215	3,163	439,483
German part of euroregion	120	4,497	598,435
Bautzen and Görlitz districts	120	4,497	598,435
Polish part of euroregion	50	5,358	569,228
Jeleniogórski Sub-region	51	5,571	574,700
Total for euroregion	307	12,436	1,605,547
Total for administrative regions	386	13,231	1,612,618

Data sources: Statistical Yearbook of the Euroregion Neisse 2011 – Statistical Office in Wroclaw, 2011; Time series of the Liberec Region – Czech Statistical Office, Regional Office in Liberec, 2012; Regional Data, Districts statistics of Saxony 2011 – Statistical Office of Saxony, 2012.

## 1 Research Methodology

The subject of the research was the branch structure in the neighbouring administrative regions, which roughly correspond to the Neisse Euroregion. The significant branches are identified in the literature using various methods - specialization index, location quotient, shift-share analysis, locational Gini coefficient, Ellison and Glaeser's agglomeration index or Maurel-Sédillot index. A summary of these methods is provided, for instance, in document [12].

For purposes of this survey, we used the specialization indexes and location quotients. The **specialization index**  $S_i$  according to the equation (1) is a simple ratio index comparing the overall employment in a certain branch in the region with the total number of employees in the given region. This is basically the most frequently applied form of the location quotient numerator. **The location quotient**  $LQ_i$  then compares a certain branch characteristic at a lower and higher territorial level, see equation (2). [9] The most frequent branch characteristic is the number of employees, however, we can also use the added value, labour costs, etc. In this specific case, we used the details of number of employees according to the European classification of economic activities NACE Rev.  $2^1$ , which ensures compatibility of comparisons between various countries. The data was sourced from the yearbooks of the Czech Statistical Office, Statistical Office of Wroclaw, Central Statistical Office of Poland, State Statistical Office for Saxony and Federal Statistical Office of Germany.

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<sup>&</sup>lt;sup>1</sup> NACE (the acronym for "Nomenclature statistique des activités économiques dans la Communauté européenne") is the "statistical classification of economic activities in the European Community" and is the subject of legislation at the European Union level, which imposes the use of the classification uniformly within all the Member States. [6]

The territorial units were determined using the NUTS<sup>2</sup> classification by Eurostat. The basic surveyed unit was the NUTS 3 level region, i.e. the Liberec Region in the Czech Republic, the Bautzen and Görlitz districts in Germany and the Jeleniogórski sub-region in Poland. As the data available for the sub-regions in Poland is published only at relatively aggregated level, the calculations were made also at the NUTS 2 level, which is the Lower Silesia Province. A higher territorial unit always means the national level.

$$S_i = \frac{e_i}{\sum_i e_i} = \frac{e_i}{e} \tag{1}$$

$$LQ_i = \frac{e_i / e}{E_i / E} \tag{2}$$

Where

 $e_i$  number of employees in the branch i in the region of NUTS 2 or NUTS 3 level,

e total number of employees in the region of NUTS 2 or NUTS 3 level,

 $E_i$  number of employees in the branch i at a national level,

E total number of employees at a national level.

The LQ value exceeding 1 shows a relative regional specialization, i.e. the given branch employs higher share of regional workforce than at a national level. The opposite is the case if LQ is lower 1.

### 2 Branch Analysis Results

In the first stage of the research, the most significant economic branches were determined at the section level (see Table 2) according to the NACE classification in terms of their share in employment in the individual parts of the Neisse Euroregion. In the second stage, the location quotients were calculated for an identical branch structure. Comparability of the input data turned out to be a certain problem. The data for all NACE sections were available in Germany only at the Saxony state level (NUTS 1), the data was available in the Czech Republic for the Liberec Region (NUTS 3) and in Poland for the Lower Silesia Province (NUTS 2). The data for the Bautzen and Görlitz districts (NUTS 3) in Germany was available with higher but still acceptable level of aggregation. This fact is associated with organization of the public administration and regional policy in the individual countries, which subsequently reflects in the level of details of the reported statistical data. In this respect, the main carriers of the public administration in Germany are the states (corresponding to NUTS 1 level) and then districts (NUTS 3). The government regions at the NUTS 2 level have just very limited powers. The key role in Poland is played by provinces (NUTS 2 level) and then districts (LAU 1), the sub-regions of the NUTS 3 level are established artificially for statistical purposes. The public administration in the Czech Republic is executed by the regions (NUTS 3) and then municipalities with extended power, which range between the LAU 1 (district) and LAU 2 (municipality) levels according to the NUTS classification. The cohesion regions

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<sup>&</sup>lt;sup>2</sup> NUTS (the acronym for "La Nomenclature des Unités Territoriales Statistiques") is a hierarchic system of classification of the territorial units of the EU member countries for purposes of harmonizing the regional statistics, social and economic analyses of regions and formation of the EU regional policy. [7] There are currently 3 main levels of NUTS classification; lower territorial units are then identified as LAU (local administrative unit).

(NUTS 2) then exist in the Czech Republic mainly for purposes of the EU regional policy and were established by artificial connection of several regions. The different historical development of the territorial arrangement of the individual countries then makes the mutual comparison of the branch structure difficult to a certain extent.

Tab. 2: Summary of Analyzed Branches

<b>Branch Code</b>	Branch Description	
A	Agriculture, forestry and fishing	
B+C+D+E	Industry (Mining and quarrying, Manufacturing, Electricity, gas, steam and	
	air conditioning supply, Water supply, sewerage, waste management and	
	remediation activities)	
of which C	of which Manufacturing	
F	Construction	
G	Trade, repair of motor vehicles	
Н	Transportation and storage	
I	Accommodation and food service activities	
J	Information and communication	
K	Financial and insurance activities	
L	Real estate activities	
M	Professional, scientific and technical activities	
N	Administrative and support service activities	
O	Public administration and defence, compulsory social security	
P	Education	
Q	Human health and social work activities	
R	Arts, entertainment and recreation	

Source: Central Statistical Office of Poland, Warsaw, 2011

For the above-mentioned reasons, it was decided to aggregate the branch groups G, H, I, also M, N and O, P, Q. With respect to the focus of the article on services, the industrial branches were observed only as a whole. Following this modification, we had employment data available at the NUTS 3 level even for Germany, however, not for Poland. The branch characteristics for the Polish part thus had to be determined at the level of the entire Lower Silesia Province.

Prior to interpreting the analysis results, we need to realize that the location quotients indicate whether the respective branch employs less than proportional, overproportional or proportional share of workforce in the region compared with the national level. The location quotients thus do not determine the absolute significance of the branch in the region. This information is provided by the specialization indexes, provided in Table 3.

This Table indicates that the biggest portion of the regional workforce is employed by the services sector in all of the surveyed regions. Having summed the employment data in G through R branches (individual services branches), we find out that the services employ more than 48% of the workforce in the Liberec Region, the total share of the services in the total employment in the German districts is 63% and 58% in the Lower Silesia Province. The Liberec Region is also the most industrial region of all parts of the euroregion. It was also verified that the differences in employment shares in services among the regions are statistically significant at the significance level  $\alpha = 5\%$  (p-values < 0.0001).

Unlike the specialization indexes, the location quotients inform whether certain branch is concentrated in the region. Table 4 indicates that the Czech, German and Polish part of the euroregion employs overproportional share of employees in construction industry. In

comparison with the national reality of the Czech Republic and Germany, the Liberec Region and both German districts have significantly higher employment in industry. On the contrary, the employment in industry is significantly lower in the Lower Silesia Province compared to the entire Poland.

**Tab. 3:** Region Specialization Indexes (%)

Branch	Liberec	Bautzen	Görlitz	German part	Lower Silesia
	Region	District	District	of euroregion	Province
A	2.03	2.19	2.65	2.39	0.76
B+C+D+E	36.72	27.62	24.27	26.16	24.96
of which C	33.65	25.25	21.34	23.54	20.18
F	11.02	8.76	7.56	8.23	6.59
G+H+I	19.26	20.67	19.72	20.26	23.49
J	1.34	1.07	0.78	0.94	1.89
K	1.29	1.47	1.79	1.61	3.04
L	0.60	0.66	0.85	0.74	1.38
M	4.07	8.84	7.26	8.15	8.14
O+P+Q	19.85	25.22	30.11	27.36	18.99
R	2.03	3.48	5.03	4.15	1.16

Source: prepared by author

Tab. 4: Location Quotients for NUTS Regions

Branch	Liberec	Bautzen	Görlitz	German part	Lower Silesia
	Region	District	District	of Euroregion	<b>Province</b>
A	0.75	1.34	1.62	1.46	0.75
B+C+D+E	1.22	1.28	1.12	1.21	0.83
of which C	1.25	1.27	1.07	1.18	0.82
F	1.67	1.32	1.14	1.24	1.17
G+H+I	0.85	0.94	0.90	0.92	1.13
J	0.54	0.34	0.25	0.30	0.99
K	0.70	0.43	0.53	0.47	0.92
L	0.49	0.97	1.23	1.08	1.00
M	0.54	0.87	0.72	0.80	1.22
O+P+Q	0.88	0.98	1.17	1.06	0.69
R	1.54	2.45	3.55	2.93	0.74

Source: prepared by author, data origin: Czech Statistical Office, 2012; Central Statistical Office of Poland, Warsaw, 2011; Statistical Office in Wroclaw, 2011; Federal Statistical Office of Germany, Wiesbaden, 2011; Statistical Office of Saxony, 2012

Looking closer at the services branch, it is apparent that the employment in most of the services branches in the Liberec Region does not reach the national level (the location quotients in the G through Q branches are significantly below the value of one). The only exception is the **branch of arts, entertainment and recreation activities**, which employs overproportional share of the workforce. An interesting fact is that the same branch reaches high LQ values even in the German part of the euroregion. Based on this, we can conclude that the entertainment and recreation entities concentrate in these regions (such as rendering of cultural and sports services). This fact is influenced by positive natural conditions for tourism growth (mainly the Jizera Mountains and Krkonoše Mountains on the Czech side, lakes in Upper Lusatia, Zittauer Gebirge Natural Park and an extensive network of cycling paths on the German side). The entertainment "industry" is mainly located in the regional city of Liberec (Babylon Centre). The employment in this branch on the Polish side is less than

proportional, which is a surprising result at the first glance with respect to the natural conditions similar to those in the Liberec Region. However, further analysis indicates overproportional employment in accommodation and food services. We can also assume that tourism on the Polish side is just reflected in other statistical structure of provided services.

We can state roughly proportional employment in the area of trade, transportation, warehousing, accommodation and food services on the German side. Besides the above-mentioned recreation and entertainment services, higher employment concentration was also identified in the area of real estate and public services (public administration, education, health services). On the contrary, significantly less share of employees than the German average works in information, communication, financial and professional services.

The Lower Silesia Province features relatively proportional structure of employment in the services that does not significantly differ from the Polish average. Higher employment concentration was identified with professional, scientific and technical activities (services for enterprises), as well as in area of trade, transportation, warehousing, accommodation and food services. On the contrary, this region has relatively lower employment concentration in case of public services. In case of the Lower Silesia Province, we should consider the fact that it is a large territorial unit that can hide detailed information about the local employment concentration. This is the reason why the employment was analyzed for a lower territorial level – the Jeleniogórski sub-region (NUTS 3) – even at the expense of the need for bigger data aggregation, as the data was available only for four basic groups of the branch. Identical aggregation was performed even for the Czech and German parts of the euroregion (see Table 5).

Tab. 5: Location Quotients for Individual Parts of Neisse Euroregion

Branch	Liberec Region	German districts	Jeleniogórski Sub-region
A	0.75	1.46	1.57
B+C+D+E+F	1.30	1.22	1.15
G+H+I+J	0.82	0.84	0.84
K+L	0.62	0.58	0.64

Source: prepared by author, data origin: Czech Statistical Office, 2012; Central Statistical Office of Poland, Warsaw, 2011; Statistical Office in Wroclaw, 2011; Federal Statistical Office of Germany, Wiesbaden, 2011; Statistical Office of Saxony, 2012

The details in Table 5 reflect the reality of the Neisse Euroregion territory the most, with an exception concerning the borders of the administrative regions described in the article introduction; however, they are summarized the most at the same time.

Table 5 indicates that industry and construction play an important role in employment in all of the three parts of the euroregion. Agriculture and forestry are also overproportionally concentrated on the German and Polish side. Comparing the LQ results for the Lower Silesia Province and Jeleniogórski sub-region, we discover more significant position of agriculture, forestry and industry right in this territory that is a part of the euroregion. On the contrary, market services<sup>3</sup> do not show significant concentration in this comparison. However, the results are disguised to a certain extent by aggregation of the market services branches only into two basic groups. The table also indicates that position of the market services in the individual parts of the euroregion is similar to a great extent. Differences in the LQ values for the services branches G through J between the German and Polish parts of the euroregion are

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<sup>&</sup>lt;sup>3</sup> The services are usually divided to market and non-market services. According to the OECD classification, the market services include G through N branches.

not statistically significant at the significance level  $\alpha = 5\%$  (p-value > 0.05); the difference between the Czech and German, resp. Polish, part of the euroregion is statistically significant, however, it is not too fundamental.

We can summarize that the industry is overproportionally concentrated in all three parts of the euroregion, the most in the Liberec Region. Agriculture and forestry are overproportionally concentrated in the German and Polish part of the euroregion, on the contrary, employment in this branch is significantly less than proportional on the Czech side. The market services as a whole do not employ above-average share of employees in any part of the euroregion in comparison with the national levels. However, the services in all three parts of the euroregion employ absolutely the biggest portion of workforce. Identical statement is applicable also to employment in services in the Czech Republic, Germany and Poland. Besides, the previous analyses indicate that certain specific services branches are overproportionally concentrated in the Czech and German part of the euroregion (such as the arts, entertainment and recreation services). The situation relevant to the Polish part of the euroregion could not be verified due to absence of the regional statistics, it can be concluded only indirectly based on the employment data of the entire Lower Silesia Province.

#### **Conclusion**

Based on the completed analysis, we can conclude that the biggest portion of the regional workforce in all of the surveyed regions (Liberec Region, Bautzen and Görlitz districts, Lower Silesia Province) is employed by the services sector. The biggest one in the German part (63%), followed by the Polish part (58%). On the contrary, the Liberec Region is more focused on the manufacturing industry, however, the services constitute the most important employer even in this region and the local industry employs only 37% of workforce, the rest is employed by the construction sector, agriculture and forestry. Overproportional share of employees in all regions is employed by the construction sector.

The tertiary sector concentration in the Liberec Region is below the average compared to the national level, the only exception is the branch of arts, entertainment and recreation activities, which arises from the positive natural conditions of the region.

The services sector in the German districts of the euroregion is generally stronger than in the Liberec Region and its structure is similar to the one in the Lower Silesia Province. The German part mainly concentrates the branch of the arts, entertainment and recreation activities, as well as real estate and public (mostly non-market) services.

In the Lower Silesia Province, the employment in services proportionally corresponds to the Polish reality. This region has a stronger concentration of the branch of professional, scientific and technical activities, as well as trade, transportation, warehousing, accommodation and food services. The Jeleniogórski sub-region itself, located in the western part of the Lower Silesia Province, however, shows a higher share of employment in agriculture, industry and construction and a lower share of employment in services compared to the employment structure of the Province.

We can summarize that the branch structure is more similar in the German and Polish part of the euroregion. The Czech part differentiates with more distinct significance of industry in the total employment.

Interesting is the view of the services sector in terms of demands for knowledge. In general, the knowledge demanding services include telecommunication, data processing, science, research, business services, real estate services, banking, insurance, education, health services, recreation and arts services. [8]

In this respect, we can conclude that the knowledge demanding services employ roughly 29% of the entire workforce in the Czech part of the euroregion, roughly 39% in the German part and roughly 33% on the Polish side. So it is majority of the services personnel in all cases. This mainly concerns the branch of arts and recreation services on the Czech and German side, as well as real estate services, education and health services on the German side and professional, scientific and business services on the Polish side of the euroregion. The share of the other services less demanding for knowledge in the total employment is 19% (Liberec Region), 24% (German part of euroregion), resp. 25% (Polish part of euroregion).

We also need to point out certain limitations of the comparison. The employment data was available only at the level of the branch sections; a more detailed analysis would require getting the data at least at the department levels (i.e. two-digit numerical codes) of the branches and at the NUTS 3 level for all regions of the surveyed territory. Unfortunately, we can state in this case that details of the reported statistical data decrease with the level of the surveyed regions. More detailed data is available only at a national level. Despite, the completed comparison gives a basic figure of the services structure in the territory of the Neisse Euroregion.

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# KOMPARATIVNÍ ANALÝZA ODVĚTVÍ SLUŽEB V EUROREGIONU NISA

Článek se zabývá odvětvovou strukturou v jednotlivých částech Euroregionu Nisa s akcentem na sektor služeb. Úvodní část článku poukazuje na rozdílnosti a úskalí komparace účelových či přirozených regionů, jejichž území není totožné s administrativními regiony. Ve druhé části článku byla zkoumána významnost jednotlivých ekonomických odvětví pomocí indexů specializace a koeficientů lokalizace. Z výsledků analýz vyplývá, že ve všech třech částech euroregionu zaměstnává nejvyšší podíl regionální pracovní síly terciární sektor. Odvětvová struktura v německé a polské části euroregionu je do značné míry podobná. Česká část se odlišuje významně vyšší zaměstnaností ve zpracovatelském průmyslu. Každá národní část euroregionu je zároveň specializována na určité specifické odvětví služeb.

# EINE KOMPARATIVE ANALYSE DER DIENSTLEISTUNGSBRANCHEN IN DER EUROREGION NEISSE

Dieser Artikel beschäftigt sich mit der Branchenstruktur in den einzelnen Teilen der Euroregion Neiße mit besonderem Akzent auf dem Sektor Dienstleistungen. Der einführende Teil des Artikels weist auf die Verschiedenheit und Klippen beim Vergleich der zweckmäßigen und natürlich gewachsenen Regionen, deren Gebiet nicht mit den administrativen Verwaltungseinheiten identisch ist. Im zweiten Teil des Artikels wird die Bedeutsamkeit einzelner ökonomischer Branchen mit Hilfe des Spezialisierungs- und des Lokalisierungskoeffizientenindex untersucht. Aus den Ergebnissen der Analysen geht hervor, dass in allen drei Teilen der Euroregion der größte Anteil der regionalen Arbeitskräfte vom tertiären Sektor eingenommen wird. Die Branchenstruktur im deutschen und tschechischen Teil der Euroregion ist in einem beträchtlichen Maß ähnlich. Der tschechische Teil unterscheidet sich bedeutend durch eine höhere Beschäftigungsrate in der bearbeitenden Industrie. Jeder nationale Teil der Euroregion ist zugleich auf einen spezifischen Zweig der Dienstleistungen spezialisiert.

#### ANALIZA PORÓWNAWCZA SEKTORA USŁUG W EUROREGIONIE NYSA

Artykuł poświęcony jest strukturze branżowej w poszczególnych częściach Euroregionu Nysa przy szczególnym uwzględnieniu sektora usług. Na wstępie wskazano różnice oraz problemy związane z porównaniem regionów funkcjonalnych lub naturalnych, których obszar nie jest tożsamy z regionem administracyjnym. W drugiej części opracowania badano znaczenie poszczególnych branż gospodarki przy pomocy wskaźników specjalizacji oraz lokalizacji. Z przeprowadzonych analiz wynika, że we wszystkich trzech częściach euroregionu największy udział zatrudnienia jest w sektorze usług. Struktura branżowa w niemieckiej i polskiej części euroregionu jest w dużym stopniu podobna. Czeska część odróżnia się znacznie wyższym zatrudnieniem w przemyśle przetwórczym. Każda narodowa część euroregionu jest jednocześnie wyspecjalizowana w konkretnej specyficznej branży usługowej.