MUNI
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XXII. MEZINÁRODNÍ KOLOKVIUM O REGIONÁLNÍCH VĚDÁCH. SBORNÍK PŘÍSPĚVKŮ

22ND INTERNATIONAL COLLOQUIUM ON REGIONAL SCIENCES. CONFERENCE PROCEEDINGS

Place: Velké Bílovice (Czech Republic)
June 12-16, 2019

Publisher: Masarykova univerzita (Masaryk University Press), Brno

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Publikace neprošla jazykovou úpravou. / Publication is not a subject of language check.
Za správnost obsahu a originalitu výzkumu zodpovídají autoři. / Authors are fully responsible for the content and originality of the articles.

KNOWLEDGE INTENSIVE BUSINESS SERVICES (KIBS) AND POTENTIAL OF REGIONS IN VISEGRAD GROUP COUNTRIES

Znalostně náročně obchodní služby (KIBS) a potenciál regionů ve státech Visegradské skupiny

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Annotation

The article examines the knowledge intensive business services (KIBS) branch and the differences in their spatial distribution in the examples of the regions in Visegrad group countries. The localization of KIBS shows that the services are more concentrated in metropolitan areas and economically developed regions, from where they can be used by organizations and companies located on less economically developed regions. From the regional innovation system theory point of view, the structure of the institutional environment in the region, localization of universities and R&D institutions interconnected with the organizations in the networks with the support of the state institutions from public resources, have a positive influence on the development of KIBS in regional economies. These factors and agglomeration effects are more characteristic for metropolitan and economically growing regions.

Key words
knowledge intensive business services, region, Visegrad

Anotace

Článek hodnotí rozdíly v prostorovém rozložení znalostně náročných obchodních služeb (KIBS) na příkladu regionů NUTS II. v zemích Visegrádské skupiny. Lokalizace KIBS ukazuje, že služby jsou více soustředěny v metropolitních oblastech a v ekonomicky rozvinutých regionech, odkud je mohou čerpat společnosti a podniky, lokalizovanými v méně ekonomicky rozvinutých regionech. Z pohledu teorie regionálního inovačního systému má struktura institucionálního prostředí v regionu, lokalizace vysokých škol a institucí VaV propojených s organizacemi v sítích s podporou státních institucí z veřejných zdrojů pozitivní vliv na rozvoj KIBS v regionálních ekonomikách. Uvedené faktory a aglomereční efekty jsou právě charakteristické spíše pro metropolitní a ekonomicky rostoucí regiony.

Klíčová slova
znalostně náročné služby, region, Visegrad

JEL classification: *R11, R12, L10*

1. Introduction

Knowledge Intensive Business Services (KIBS) have recorded significant growth in the last years.They increasingly contribute to employment and production in post-communist countries because KIBS are important in these economies for the productivity and competitiveness of production chains and work as a knowledge base of the economy (Cascaldi, Faber & Kishna 2013; Capik & Drahokoupil, 2011). The importance of Knowledge Intensive Business Services for transitive economies consists of the fact that KIBS has become innovation spreaders (Bolisani & Scarso, 2009) because they transfer knowledge to other sectors (Den Hertog, 2000), which positively contributes to the transformation of the economic structure.

The growing importance of KIBS for the economic growth of Central European countries and post-communist economies shows in the interest ofresearch the role of these services in the modernisation of economies and innovation processes (Blažek & Csank, 2015), because they are expected to help integrate the regions of post-communist countries into global production networks. The research of KIBS in post-communist economies at the regional level can thus be considered an interesting topic, bringing about new information on the qualitative changes in transitive economies. Many works point out the benefit of KIBS for the development of the innovative environment (Corrocher, Cusmano & Morrison, 2009; Koch & Stahlecker, 2006; Simmie & Strambach, 2006); the significance of KIBS for the economy also grows as a result of the development of new technologies, which subsequently open further opportunities for the development of new services and innovations. For transitive economies in Central Europe, KIBS should thus become one of the tools for the increase inthe competitiveness and modernisation of economies.

The research of KIBS is focused on the spatial distribution of KIBS and the analyses of KIBS branches in various territorial units, ranging from the macro-regional (economic groupings and specific states) up to the regional and local level, as well as spatial specialization on T-KIBS branches. The innovations do not emerge in an isolated way in the global and knowledge-based society, but rather as a consequence of linearly interconnected activities from the regional level up to the global level. In the global economy, the developed regional economies are also often the bearers of regional specialization in the field of KIBS in different paths of internalisation (Toivonen, Tuominen, Smedlund & Patala, 2009).

At the macro-regional level, the significance of the production of the KIBS sector is documented by the fact, that the most advanced economies are capable of absorbing the production of the KIBS sector of the economy with a stronger impact on achieving economic growth. Whereas at the macro-regional level there are many analyses at the state level, there is inspiring research at the regional and micro-regional level (Ženka, Novotný, Slach & Ivan, 2015), that analyze the local groupings of organizations and institutions from the KIBS area, and the differences in their spatial distribution. However, limited availability of data is an issue, and data is usually only available from individual quality research. The research of the spatial distribution of KIBS documents the increased integration with strong industrial clusters (according to Thomi & Böhn 2003) that may also dampen the negative impact of the peripheral nature of a specific region in which the cluster is located. Localization of the KIBS organization also reflects specific factors, such as the attractiveness of the location (Schricke, Zenker, & Stahlecker 2012), regional labour market potential, performance of the regional economy, as well as soft factors, such as the availability of tacit knowledge (Merino & Rubalcaba, 2013). Gallego, Maroto (2016) emphasise the environment of face-to-face contacts and thus also the factor of geographic proximity of KIBS firms and production plants. The sector of T-KIBS firms existing outside production plants also points out the changes in the organisation of production relationships and the production chain, which leads to the formation of regionally specific structures from the spatial standpoint. The result is that the regions have differently developed KIBS and the innovation potential that establishes spatially diversified assumptions for the regional economy growth. The KIBS concentration level, particularly for IT and technological services, R&D and innovation activities, has therefore become the key element for the increased competitiveness of the production organizations in the region. It is the absence or inferior quality of the production services, which are often regarded as one of the grounds for the economic stagnation of the transition economies or peripheral regions.

The object of the article is to identify the existing differences in KIBS at the regional level, and the differences among the regions with their potential for development of the regional innovation system. The research objects will be applied in the analysis of the regions of Visegrad countries and the objects will also respond to the question of which regions are the most developed in KIBS.

2. The hierarchy of the spatial distribution of KIBS: from global production chains down to regional innovation systems

Two main tendencies in the spatial arrangement of the economy meet in the KIBS location at the territorial hierarchy levels. The first tendency is the globalization that facilitates the expansion of the organizations on the global markets. When the global processes and the role of KIBS are viewed theoretically, the theory of global production chains may be employed (Coe, Dicken & Hess, 2008), which explains the spatial organization of the production relationships and their influence on the global and macro-regional markets. The theory points to the fragmentation of the production processes in the global economy and operates with patterns executed by the supranational organizations in the optimization of the geographical location of the production (Blažek, 2012), usually effected by direct foreign investment.

The global production chains remove the spatial barriers when using regionally localized T-KIBS. The chains create impulses for the differentiation of the offer of services, and offer improved expansion of export to companies that use regionally specific segments of KIBS, particularly with the innovations in IT and R&D, because KIBS does not need to be localized in the same place as their customers. Complex and sophisticated production comes from the cooperation with many organizations from different countries; the production substantially uses the know-how of KIBS organizations from the different states involved in the global production chain.

The other tendency is the regionalization process because the conditions for an increased level of regional specialization of the economies are established under the global economy due to the reduced barriers for export to foreign markets. Research of regional economies in the Czech Republic shows the different trends of economic development on the micro-regional level (Ženka, Novotný, Slach & Květoň, 2015). According to Blažek and Csank (2007), the phase of divergent development has ended; there are no significant changes to the regional differences because the structure of growth and the stagnating regional economies have stabilized. It could be stated that KIBS increase the innovation performance of the regions (Lau & Lo, 2015) as well as that developed regional economies reinforce the development of KIBS, which may be a mutually integrated development process.

2.1 Data and methods

The analysis is based on the research goal and data, which can be divided into two areas – human sources of KIBS and the economic potential of the regions. The group of indicators, consists following data:

- $GDPEA_{(1-n)}$ - represents gross domestic product per capita that provides a representative insight to the economic potential of the region (in Eur per capita)
- $AHRST_{(1-n)}$ - share in university students (ISCED) in the IT field per work force in %
- $AKIBS_{(1-n)}$ - share of employment in KIBS on employment total (in %)
- $RDEX_{(1-n)}$ - Intramural R&D expenditure (GERD) in Euro per Inhabitant

The analytical part first applies the method of aggregate assessment, which is beneficial in that it summarizes the assessment of different data for selected territorial units. This article analyzes data at the regional level NUTS II. in Visegrad countries. It is suitable to use a wide range of indicators to analyse the regional potential; these are sufficiently representative with longer statistical monitoring. The paper uses a group of selected indicators that sufficiently describe the main developmental changes in the selected fields in connection with qualitative ranges in the regions.

The goal for classification of the regions into groups is aimed at defining the categories of the regions by the developmental level of Knowledge Business Intensive Services enviroment for each region. An aggregate indicator (I_{KIBS}) was designed for two years (2013 and 2016), both the indices were calculated according to the following formula:

$$I_{KIBS13(1-n)} = \left(\frac{GDPEA_{13(1-n)}*100}{GDPEA_{max13}} + \frac{AHRST_{13(1-n)}*100}{AHRST_{max13}} + \frac{AKIBS_{13(1-n)}*100}{AKIBS_{max13}} + \frac{RDEX_{13(1-n)}*100}{RDEX_{max13}}\right)/4$$

$$(1)$$

$$I_{KIBS16(1-n)} = \left(\frac{GDPEA_{16(1-n)}*100}{GDPEA_{max16}} + \frac{AHRST_{16(1-n)}*100}{AHRST_{max16}} + \frac{AKIBS_{16(1-n)}*100}{AKIBS_{max16}} + \frac{RDEX_{16(1-n)}*100}{IRD_{max16}}\right)/4$$

$$(2)$$

where:
$I_{KIBS13(1-n)}$ - Index of KIBS potential in 2013; $I_{KIKB16(1-n)}$ - Index of KIBS potential in 2016; 1-n - regions in Visegrad countries; X_{max} – maximal value of indicator

The second part of analysis was focused on the application of the correlation analysis to the variables mentioned above. The reason for the use of the correlation analysis was to find out which mutual relationships exist among the monitored values and how intensively they are influenced in this relationship.

2.2 Results

The value of the KIBS Index (Table 1) was the highest in the regions such as Prague, Central Hungary, Bratislava and Masovia, where the capital city is located. Above-average values also include regions with developed metropolitan areas, such as the Southeast Region or Lower Silesia. Better results are also achieved by regions in the close to large metropolitan centers, for example the Central Bohemia Region.

Table 1: Index of Knowledge Intensive Business Services (I_{KIBS13}, I_{KIBS16}) and selected normalized indices of Visegrad regions

Region NUTS II.	GDPEA 13	HRST 13	AKIBS 13	RDE 13	IKIBS 13	GDPEA 16	HRST16	AKIBS 16	RDE 16	IKIBS 16
Prague	92.3	35.7	49.4	100.0	69.3	98.9	100.0	50.9	100.0	87.5
Central Bohemia	39.5	21.4	34.0	26.2	30.3	43.8	57.4	33.0	29.0	32.6
Southwest	39.5	19.8	28.5	26.3	28.5	41.9	53.0	28.8	22.9	29.3
Northwest	33.4	15.5	29.1	5.9	21.0	34.3	44.5	29.3	4.4	22.5
Northeast	36.2	18.6	29.8	24.4	27.2	39.3	54.1	30.5	18.1	28.4
Southeast	41.9	21.9	33.2	46.6	35.9	43.9	64.4	32.5	43.6	36.9
Central Moravia	35.8	16.9	29.1	24.1	26.4	38.7	52.5	27.5	17.2	27.2
Moravian-Silesian	36.8	18.4	30.0	18.7	26.0	40.6	54.2	30.3	16.3	28.3
Central Hungary	57.1	26.9	44.1	37.0	41.3	55.5	77.2	48.2	32.4	42.7
Central Transdanubia	31.8	16.7	28.4	11.1	22.0	34.6	45.9	26.7	10.4	23.5
Western Transdanubia	35.8	16.6	26.0	7.7	21.5	40.0	48.2	26.2	7.4	24.4
Southern Transdanubia	24.1	15.4	37.1	7.9	21.1	24.0	44.1	39.7	3.2	22.2
Northern Hungary	21.7	14.0	35.0	4.6	18.8	24.2	40.9	34.9	3.8	20.8
Northern Great Plain	24.5	15.3	36.8	9.2	21.5	26.1	40.5	37.5	8.1	22.4
Southern Great Plain	24.5	15.7	33.5	9.1	20.7	26.1	44.8	32.8	13.7	23.5
Lódź	33.0	22.1	28.5	9.2	23.2	34.6	57.5	29.0	7.3	25.7
Masovia	56.9	26.5	40.1	28.1	37.9	59.0	76.3	39.9	32.5	41.6
Lesser Poland	31.4	19.3	31.0	15.0	24.2	33.7	59.1	31.3	15.9	28.0
Silesia	37.0	21.2	30.3	8.6	24.3	38.5	58.7	29.3	7.4	26.8
Greater Poland	37.9	17.0	25.3	12.0	23.1	40.4	54.0	25.9	9.5	26.0
West Pomerania	29.4	16.0	34.9	4.0	21.1	31.1	54.3	34.2	3.3	24.6
Lubusz	29.4	17.1	31.0	2.1	19.9	31.1	48.0	30.3	2.2	22.3
Lower Silesia	39.7	18.4	34.2	10.2	25.6	41.2	60.8	33.1	11.1	29.2
Opole	28.5	15.1	28.6	2.1	18.5	29.6	50.5	27.5	3.2	22.2
Kuyavia-Pomerania	29.1	15.3	28.2	4.4	19.3	30.4	49.7	29.2	4.4	22.7
Warmia-Masuria	25.3	16.1	32.1	4.5	19.5	26.4	47.7	30.8	2.7	21.5
Pomerania	34.2	19.8	33.5	13.6	25.3	35.9	61.9	33.4	12.7	28.8
Holy Cross Province	25.9	20.6	27.1	2.9	19.1	26.6	52.0	27.7	5.2	22.3
Lublin	25.1	20.0	30.5	9.2	21.2	25.5	52.9	29.0	8.6	23.2
Subcarpathia	25.1	17.0	28.5	9.2	20.0	26.1	52.7	29.7	10.8	23.9
Podlaskie	25.9	17.4	29.8	3.6	19.2	26.3	54.5	28.6	6.4	23.2
Bratislava	100.0	35.4	50.9	66.1	63.1	100.0	94.0	45.8	67.9	61.5
West Slovakia	38.1	16.5	27.1	5.6	21.8	38.9	53.5	28.6	12.3	26.7
Central Slovakia	32.0	18.0	32.5	8.5	22.8	33.3	50.3	34.6	13.9	26.4
East Slovakia	27.7	16.0	32.1	7.6	20.8	29.1	45.7	34.4	7.9	23.4

Source: own research based on EUROSTAT

However, the weaker potential for Knowledge Intensive Business Services delivery may have a higher degree of urbanization but with larger structural problems, such as the Northwest and Lodz regions, which are still undergoing the economic transformation typical for the old industrial regions. The under-average potential in the

KIBS segmatics consists of non-metropolitan regions, with little industrial and peripheral regions within individual states, as is evident from the Polish regions (Warmia-Masovia, Lubusz) or Hungarian (Northern Hungary).

The results of the correlation analysis show (Table 2.) a statistically significant dependency between the Index of Knowledge Business Intensive Sservices and R&D expenditure and the level of GDP per capita. On the other hand, the dependency between the share in university students in the IT field concentration of Knowledge Business Intensive Sservices was not found. The reason may be the fact that the regions with a higher share of students attract graduates from other regions because it offers a higher number of jobs and a well developed IT sector environment and R&D
.
On the other hand, the comparison of the correlation between KIBS and the other indicators did not show a higher dependence of the values. Statistically the dependence was shown to be stronger among the other monitored indicators ether than in their relation to the KIBS concentration.

Table 2: Correlation dependency of regional indicators in the Czech Republic

	GDP EA13	HRST13	AKIBS13	RDEX13	*IKIBS13*	GDPEA16	HRST16	AKIBS16	RDEX16	*IKIBS16*
GDPEA13	1.000	.684**	.109	.682**	*.854**	.988**	.759**	.087	.700**	*.880**
HRST13	.684**	1.000	.202	.676**	*.740**	.670**	.843**	.162	.660**	*.763**
AKIBS13	.109	.202	1.000	.341*	*.342*	.106	.237	.932**	.291	*.280
RDE13	.682**	.676**	.341*	1.000	*.920**	.713**	.614**	.313	.907**	*.853**
IKIBS13	.854**	.740**	.342*	.920**	*1.000	.861**	.720**	.308	.856**	*.932**
GDPEA16	.988**	.670**	.106	.713**	*.861**	1.000	.732**	.083	.717**	*.879**
HRST16	.759**	.843**	.237	.614**	*.720**	.732**	1.000	.170	.623**	*.832**
AKIBS16	.087	.162	.932**	.313	*.308	.083	.170	1.000	.296	*.272
RDEX16	.700**	.660**	.291	.907**	*.856**	.717**	.623**	.296	1.000	*.894**
IKIBS16	.880**	.763**	.280	.853**	*.932**	.879**	.832**	.272	.894**	*1.000

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).
Source: own research based on EUROSTAT

The negative correlation was associated with the unemployment rate with respect to the other variables. The higher dependency was also found between the macro-economic indicator segment (GDP per capita) in years 2013 and 2016 and with the share of students in the IT field (the correlation is significant at 0.01 level). In most cases, the regions with a higher Index of KIBS shows a higher GDP level per capita and higher R&D expenditure.

Higher dependency with significance at 0.05 level was also expressed between the concentration of the share in university students in the IT field and level of GDP per capita or R&D expenditure per inhabitant, than between KIBS. On the other hand, the comparison of the correlation between KIBS and the other indicators did not show a higher dependence of the values, statistically the dependence was shown to be stronger among the other monitored indicators rather than in their relation to the KIBS concentration.

3. Discussion and Conclusion

The KIBS sector is experiencing dynamic development in these recent years in the Visegrad countries, concentrated especially in the fields of IT services. However, it still falls short in transitive economies, behind the developed economies of Western Europe. The object of the article is to identify the existing differences between regional labour markets of T-KIBS at the regional level and the differences among the regions in their potential for development of the regional innovation system by using KIBS. The article contributes the research of the services with a direct influence on the support of innovation development and the growth of competitiveness. This was achieved by analysing the environment of regional economies and the relationship between their economic potential and the sector of technological KIBS. The benefit of the article consists in the discerning of the differences and regularity in the distribution of KIBS in the territory and their connection to further regional socio-economic indicators and the specific types of regional economies.

The development of the regional differences was analysed with the use of a data file aimed at the main macroeconomic indicators, and the indicators representing the regional labour markets in the field of information technologies. The localisation of T-KIBS shows that these services have a tendency to concentrate in regions with metropolitan areas or in their close vicinity and less in peripheral or non-metropolitan regions in Visegrad countries.

Specific positions have regions such as Moravian-Silesian Region, Nordwest and Lodz regions, these regions are old industrial regions with the most negative impact in the course of economic transformation. This is because both regions have had to significantly re-structuralize their industries and re-orientate them from smokestack industries to new ones, such as automotive, electric engineering (Novák & Drdová, 2013), and particular services, including KIBS, which absorbed a high number of employees dismissed from the industry.

The regional differences in KIBS development are higher than in the economic potential of the regions. The summary assessment of the potential of the regional economies points to the relative interconnection with the regional labour market and KIBS. A region with a long developed economy and higher gross domestic product has created better conditions for the development of KIBS, even through the innovation activity. Further causes of regional differences in the concentration of technological KIBS are related to the restructuring and modernisation of regions, which have been accelerated by the regionally differentiated influx of direct foreign investment, marked by higher performance of the IT services sector, where this investment was aimed more at metropolitan areas. The result of the correlation analysis reveals a statistically significant dependency between KIBS development and the economic potential of the regions. It could be stated that KIBS may be regarded as an indicator of regional development. According to Gallego, Maroto (2016), the quick spreading of information and communication technologies and services decreases the requirement for the geographical proximity of companies.

However, due to the externalities and agglomeration effects, such as spillover effects and educational profiles, the authors consider the spatial closeness of company co-localisation an important factor of the development of the KIBS sector and regional specialisation. It is possible to state that the regional differences are in the technological concentration. KIBS development support should aim at, in addition to the infrastructure support for R&D, the support of human and social potential, and at establishing the conditions to develop the local labour markets in the field of KIBS.

From the practical standpoint, the results of the research of spatial differentiations in the potential of KIBS may help public administration in forming regional tools of innovative policies. These are for supporting the growth of innovation performance, because the level of concentration of KIBS is frequently linked to the level of regional innovative potential and other indicators, which have a direct influence on the development of the economic potential of the regions.

The research results have certain limits consisting of the selection of indicators, which were limited by the availability of relevant data from the area of technological company performance. The data for the sector of technological companies is published in a limited scope. In addition, the connectivity between the potential of the regional labour market and the development of the KIBS sectors addresses the problem of different capacities and university specialisation. Here, students must complete education in the area of technologies and information technology in main metropolitan areas, because the relevant study programmes at regional universities are less developed for technological KIBS. A theme for further research may be the implementation of different data, which will represents other components of advanced business services or regional economic indices.

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