

SZENT ISTVÁN UNIVERSITY – GÖDÖLLŐ
Doctoral School of Management and Business Studies

**EXAMINATION OF THE ESTABLISHMENT OF ECONOMY DEVELOPMENT
NETWORKS AND CLUSTERS IN THE INTERNATIONAL SECTORAL SYSTEM**

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RESEARCH BACKGROUND AND OBJECTIVES

The foundation of my the goals of my research and the driving force to write my thesis is that I make an activity that in some ways can lead to the improvement of the quality of life if mankind. Ambitious ideas I had, but in our youth we can be bravely idealists, and although my goals were shamefully huge I started my research with this attitude. I wanted to create a thesis that unfold the idea of the quality of life and can improve it (maybe not globally but) at least in the regions of my home country.

The question that mostly represent me and my interests can be compose as: Is there any improving effect of regional concentration and specialization on quality of life, and if there is, can we support this with economic policy?

At the moment there is no solid research that combines quality of life with economic performance and corporate business, so emphasize to identify the most commonly used factors of quality of life and categorize them according to their background. After this we can find out such uniformed principles as the importance of material welfare that can appear in every model of quality of life. Quality of life is a responsibility of the individual and the society for this we should investigate in on both levels. Besides I presumed that the weight of these factors are changing from time to time, and that change goes along with the effect of the governance on economy what is driven by the evolution of the different state theories applied. During the drawing up of the research plan I've found a quite general problem that we cannot define the sectors in a region which generates the greatest positive effects on well-being, and it is really hard to describe what really the enhancement of the quality of life is. I was also curious if there are any models that diagnose what is good for the people in a region from economical and non-economical point of view. In order to get proper knowledge on that field I tried to define and separate the categories of quality of life, well-being and welfare and also to show their embeddedness and relations to each other. This whole area of research was new to me because professional economists usually don't handle such problems as quality of life although the determination of optimal production and consumption structure should lead to the increase of the quality of life. This increase can be obtained as a resultant of the work and co-operation of the economic actors and systems, but the role and weight of these actors has changed throughout the history significantly. In order to identify some of these actors I dedicated a subchapter to the state and governance theories. In this subchapter I made a bridge between the quality of life and economic policy. My presumption was that the quality of life as a key performance indicator sooner or later will have greater weight in political programs than ever before and the expectation from the voter side will arise that politicians should increase quality of life through their activities.

After the 90's more and more survey has been performed to identify the objective and subjective factors of the quality of life and some of them were supported or created by supranational entities as the UN or global companies as the Gallup. Their goal was to have a global perspective on this topic. Along the static description I think it is important to investigate the underlying factors of quality of life and also to have a view on the differences of developed and emerging countries. In this period of time a different research field has started to flourish namely network and cluster researches what amused me under my undergraduate studies that's why I've choose this topic as my master thesis. In my Ph.D. thesis I summarized the three most interesting topics that are rarely combined, economic policy, quality of life and concentration of industries.

After the review of the literature I declare the research directions and dimension later in the methodological chapter I also go through the applicable tools and methods that can be used for the thesis. The actual focus of the topic (because of the novelty of this research) is the appearance of economic factors in quality of life. Can we presume that material welfare is always a leading factor of quality of life? To state my hypotheses the literature of this field of science created the basis for me. My first literature chapter create a good overview to this topic and the indices used by the researcher and I want to make a summary about the importance of material factors in quality of life.

After the recognition of the basic principles of quality of life I want to create a framework that shows the different disciplines that are concerned in this topic and among the scientific disciplines I focus on structural politics. In the next subchapter I try to create a summary which can be read by the experts of public administration and economists in order to create a link in their mind between quality of life and policy. This thesis has a praxeological approach, which means that I examine the results of economic decisions and the contribution of economic policies such as cluster policies to welfare and well-being. To have a clear overview on that theme I write a subchapter about the methods, measuring dimension and tools that can be used to identify clusters. Previously several great dissertations have been written about this topic so my primary goal is not the have another one about clusters rather to gather the important data that is needed to create my own approach to this topic. A decision of economic development is complex and can be interpreted on the long-term while quality of life is rather instantaneous we should compare quality of life data with the result of the decision in the past to have a better overview. To have the good domain of geographical locations and the relevant time-frame that have available data for calculations I also made pre-researches. This can lead us to a pile of data where quality of life and concentration of industries can be examined. During my literature review I tried to gather the information about micro-, macro, regional-, cluster or company level, but reliable data was only accessible on the lowest level for regions.

To analyze the structure of economy I used an approach that is based on a nearly two decade old motto, knowledge driven economy. This approach helped me to interpret my data on a special knowledge level splitted sectoral level. This approach has the advantage that it is not focusing on single branches (such as automotive branch, etc.) but tries to focus on the level of knowledge in different branches in order to create a general strategy based on this distinction. My opinion is that this path can finally connect educational policy, economic policy and structural policies and we can define which sector should be subsidized to reach the maximum enhancement on quality of life. My results confirm that some regions do not align into the trend that high-knowledge intensity sectors drive their economic performance, sometimes the cumulative experiences of low knowledge intensity sectors can guarantee the development of a region as well. Simply that means that it is not necessarily the high-tech sectors that generates the most welfare, traditional industries of developed services can easily create good living in Europe's several region. In parallel the trivial phenomena appears that regions with abundance of knowledge and specialization will create flourishing communities. During my research I have to choose corner stones that define the areas that can be examined with tools and methods already used. This is the way where the complex investigation of quality of life was simplified into welfare and finally GDP per capita and specialization into clusters and finally to employment based location quotient. This is the hardest part of research where we meet our constraints.

In the initial part of the research topics such as economic development, regional specialization or quality of life seemed to be so complex and various that I had to reduce my zeal and find easily obtainable and testable variables in order to have a successful research. The goal of the

research is to have a link between the formation of regional economic entities and regional welfare and quality of life dimensions. This link can give a tool into the hands of policy makers in order to help their work in generating welfare in a country. Throughout the research I presumed that the goal of every human is to maximize the well-being of its environment and itself during their daily tasks and operations. Therefore I described the responsibility of the individual, the group, the region and the governance in this thesis.

I draw up as a hypothesis that the concentration of a sector in a region can have an influence on the quality of life. When creating my research plan I assumed that higher knowledge intensity sectors of manufacturing and services have greater contribution to welfare.

The answer to this question could be the greatest benefit of this thesis, because if an “economic panacea” can be found the development and convergence of every region can be improved. When there are no global solutions I assume that regionally we can have specialized solutions that help and speed up the improvement of a region. Although the question of the relationship between welfare and sectoral concentration is still there, their multidimensional interaction and the difference in temporality is still an issue. An easy question could be: After how many years can we see beneficial effects on quality of life if a region starts to specialize. Or: Can quality of life react flexible to the changes in economy? After my research I got to the conclusion that there is a time shift in this phenomena, the correlation is not linear and the changes are not elastic. I assumed that knowledge driven economy has greater effect on quality of life than traditional economy but this cannot be proven generally. Moreover regional specialties in labor market and industrial traditions seem to have great impact.

According to what I stated above my research goals can be summarized as follows:

1. Synthesizing literature of welfare and the most commonly used dimensions of quality of life studies.
2. Reviewing the economic forces influencing the quality of life especially state structures and economic policy.
3. Summarizing the research methods of business conglomerates which are influenced by regional policies among structural policies especially the methods of sectoral cluster analysis.
4. According to the research methods calculating the concentration of the different sectors and introducing the correspondence between the quality of life measures and the concentration indices.
5. Introducing further possible research fields or the extensions of the current investigation.

Based on my research goals and own investigation I draw up my hypothesis:

1. The dimensions of well-being, quality of life and welfare are examined regarding different methodologies of different studies but material welfare has always an effect on quality of life and well-being.
2. Material welfare has a measurable impact on quality of life, nevertheless its effect can vary widely according to several influencing conditions.
3. The concentration of different sectors in a region has an impact on the regional welfare and a spin-off effect on the quality of life as well.
4. The role of the state and governance effects through economic policy on material welfare but the magnitude of its effect changes on time.

5. The governance can alter the concentration of different sectors through economic policy therefore it can change the regions welfare and quality of life.
6. Sectors with different level of knowledge intensity has different effects on regional welfare and some of these knowledge intensive sectors can make benefit for every region by enhancing welfare.
7. Sectoral centers that changes welfare significantly are located in a well demarcated geographical location.

When I examined the regions in some parts I observed concentration in every sector so it means that one region can attract employees from several branches and severe differences in development could appear.

After all of these questions and directions we could ask: What is the responsibility of a young economist researcher in all these fields and complex social issues? My short answer is: The completion of a research that can serve quality of life and help decision makers in their job.

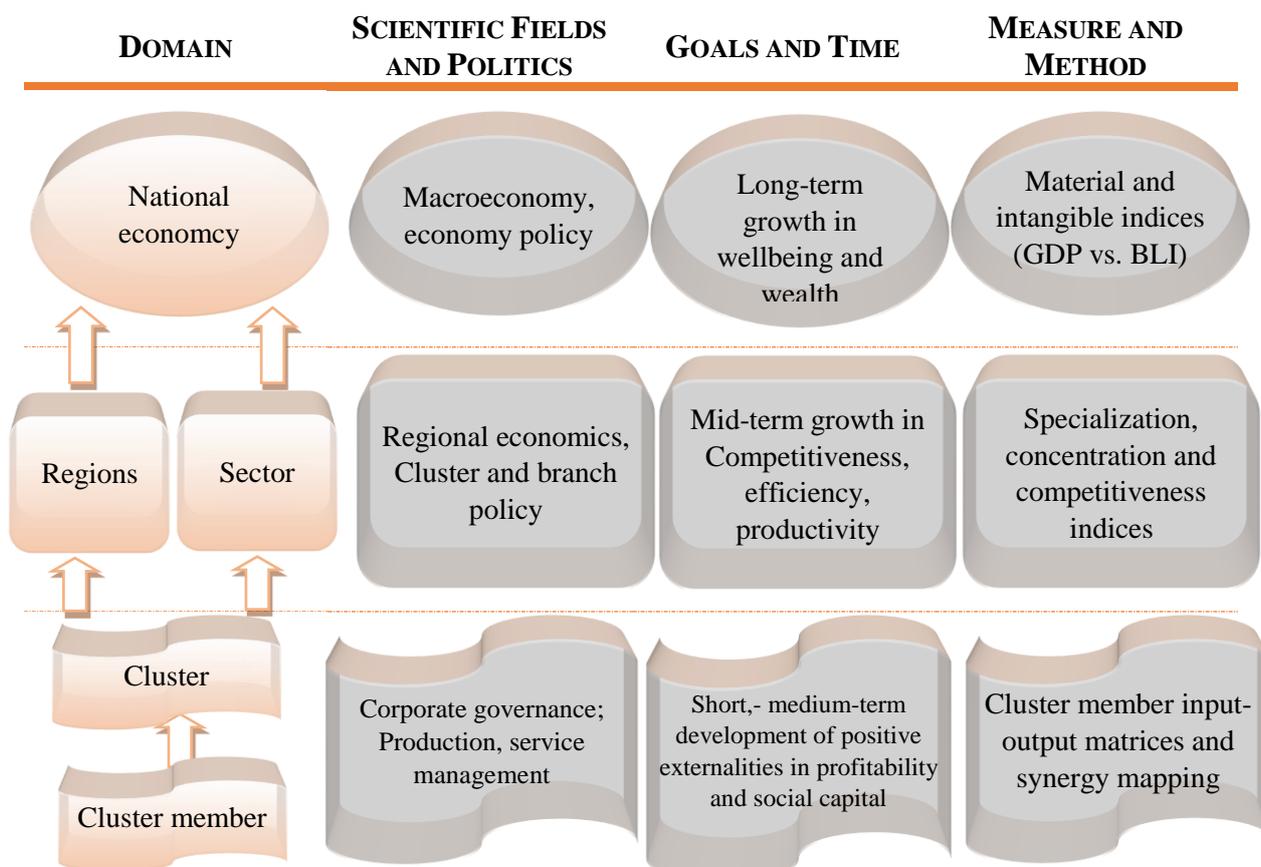
MATERIAL AND METHOD

The goal of the dissertation is to measure the impact of the actions of economic policy on the quality of life, especially the relationship between regional specialization and welfare. The contribution of these factors to quality of life is difficult for several reasons, as observed in the literature chapter in the thesis. Therefore I compared the most common index the per capita GDP with the index of regional and sectoral specialization. We can easily accept that among scarce resources no every initiative can be supported which can elevate welfare so we should define the sectors with the greatest contribution to the quality of life. Through my investigation I examined which sector's concentration brings the greatest effect on local per capita GDP. The literature specifies those branches and sectors (traded, basic, export branches) (Lengyel 2010) that can lead a region into success. Porter (2003) names all the 41 sectors (Porter 2003 p.565) that are able to cluster in the U.S. Ketels and Sölvell (2005) defined 38 traded clusters which used four-digit NACE rev 2. (Statistical classification of economic activities in the European Union) classification, where 302 subsectors have been considered from all the 615. Ketels and Protsiv (2014) provided there summary on cluster mapping methodology where 51 traded clusters have been declared, which overlaps 70% of the subsectors and 80% of the employees of these sectors within the previous studies. Beside these sectors Eurostat also separates different branches according to their knowledge intensity which will be introduced later.

If we accept the theory of innovation driven development and the statements of Porter (2003) about traded cluster, then we should only focus on the impact of these branches on quality of life. Ketels and Sölvell (2005) have made already these kinds of studies about the regional economic performance and clusters. In a broader perspective it is conceivable that small local clusters with non-traded activities (such as craftsmanship or culinary products) can connect local suppliers and producers and these clusters can have impact on their surrounding region as it was observed by tourism by Szanyi et al (2009). In this thesis these kind of non-traded clusters are no investigated. When selecting and standardizing the data I seek to observe sectors that are able create traded clusters and through their concentration they can contribute to regional development.

Definition of the domain of the research model

As a first step of this subchapter I would like to show my deductive model which consists of the different levels of the topic I was focusing on and the different methods that could be used for the study. Observation and modelling of clusters can be performed in different size ranges (Kocziszky 2007, Lengyel 2010). It can be interpreted on cluster member level (micro level), on a regional level (regional or mezzo level), on the level of the sector where the cluster is working (regional – branch level), on a national scale (macro level), or in the whole branch as well (macro – branch level). The observation and the effect of the cluster can be interpreted also on these different levels which is represented on the next figure.



1. Figure 1: Cluster hierarchy of objectives and methods
 Source: Author's edit - 2015

I define clusters as a bunch of directly or indirectly interrelated companies concentrated in a region. Therefore my primary criteria for clusterization is spatial proximity and relational proximity as a secondary factor although I fully accept both approaches (Lengyel 2010). According to my approach relational proximity can be guaranteed directly with cluster broker systems and activities while site selection is based on a more complex cooperation on financial factors and strategy. So I think that it is much easier to create relationship between the companies co-located in a region then attracting the interrelated companies into the same region, although both activities are needed for a good cluster policy. I also questioned, why is it important to have all the interrelated companies in one place? The answers are provided by the theories of agglomeration advantages by several authors (Porter 1998, Lengyel 2003, Lengyel 2010, Patik - Deák 2005, Kocziszky 2013).

The definition used in my study for clusters considers spatial proximity as hard constraint because I accept that the goal of the clusters is the development of the region. A well-organized regional cooperation is not only a great employer but it can also generate local values, change mindset and become a leader of economy in the region. In this study I investigate the role of cluster in the European regions therefore I assume the spatial proximity of the companies is a crucial point and their effect on welfare and quality of life is also generated in the local regions.

Regional economics and management studies together provide us a wide range of knowledge but only the two approach together can define clusters absolutely properly. Micro-level research

can use business economics models, management theories or tools of microeconomics, but a regional study must focus on spatial economic approaches while the cluster policy itself will be connected to mostly macro economical disciplines.

During my thesis and research I will focus on the regional approach while at the proposals and methodological recommendation I will suggest some possible future research topics for a new management base approach.

Researches on economic concentration in the past

Several Hungarian researcher made studies on concentration of economic activities in the recent years (Patik 2007, Szanyi et al (2009) Szakálné 2012, Lukács 2013, Komarek 2012) and they provided great summary of the tools and methods as well. Because of that I will only focus on the used tool and the sample, only a short introduction to the suggested methods will be revised in the following subchapter. The goal of this dissertation is not to give a new methodology but rather to use a common one to investigate the effects of clusters, networks and business conglomerations on material welfare. The novelty of the study is the critical examination of the location quotient where I summarized the advantages and disadvantages of LQ in the thesis.

Researches on the effects of the Hungarian industrialization started in the 1960's showing the basic attributes of the Hungarian regions and the structure of settlements (Kóródi J. – Márton G. 1968; Bartke – Kóródi (1968), Abonyi-Krajkó-Móricz (1976). Starting from 1989 to 2004 (between the change to market economy till the join to EU) all the comprehensive studies that later define the cluster policies in Hungary are performed by the researchers (Rechnitzer (1984), Nemes-Nagy (1990, 1997, 2003) Jeney – Szabó (2001); Rédei–Jakobi–Jeney (2002), Gecse-Nikodémus (2003)). Right before joining the EU the studies about clusterization has been done (Lengyel-Grosz 2003, Lengyel-Rechnitzer 2004, 2013) and after that the Hungarian specialties have been also introduced by the researchers (Patik (2005), Patik-Deák (2005), Szanyi et al (2009), Lengyel – Szanyi (2011)).

Methodological experiences

Patik (2007) decided to research the link between the actors of clusterization where she used input-output matrices, graph analysis, labor based concentration indices and also qualitative case studies. Patik (2007 p. 58) and Lukács (2013 p. 62) after studying the summary of Patik-Deák (2005) made their own assumptions about the required indices and methods of cluster mapping in Hungary. Lukács (2013) also examined the usability of input-output matrices, the cluster graphs combined with cluster and focus sector analysis, but finally she used a special form of LQ.

If we would like to measure spatial concentration of companies all kinds of location quotients (labor based LQ, entrepreneurial LQ), Herfindahl Index, Dissimilarity Index (Major-Nemes-Nagy 1999), Hoover- and Krugman index, Entropy and Redundancy measures (Theil-index), Lorenz-curve, Gini-coefficient, and finally the Ellison-Glaeser concentration index (Ellison-Glaeser 1997, Szakálné 2009) could be used. Herfindahl index and Dissimilarity Index is primarily used for the measuring of sectoral concentration and specialization (Ellison-Gleaser 1997, Szakálné 2012) calculated on different basis (Jeney-Szabó 2001)¹, but the formula can used also to measure regional concentration(Hegyi-Kéri 2012, Komarek 2012). These indices

¹ The number employed in industry (main); the total industry sales (USD); Industrial export sales (USD) data, more than 20 employees, county-based industrial organizations (companies)

are also suitable to control competition and fusions (Uhrin 2010), sectoral competitiveness (Harsányi 2007) and market analysis (Naffa – Kaliczka 2011). Dissimilarity Index Dissimilarity Index can be easily converted differential specialization index or to Hoover spatial inequality measure (Jeney-Szabó 2001). The basis for the Herfindahl can be the market share of business, number of employees, the distribution of turnover, or some natural objects are the result of the test, which's concentration is the projection basis of our study. The greatest different between the common LQ used by Komarek (2012) and the labor-based LQ that the projection basis is not the number of employees but the size of the territory. Specialization index of Abonyi-Krajók-Móricz (1976) scan also measure sectoral specialization (for e.g.: using labor data) considering the standard deviation of the inputs. Agglomeration index can be also considered as a special type of LQ (named as AQ Porter 2003), but it is more similar to the differential specialization index and the sectoral corrected specialization index.

The sample data that was used for the thesis gives the opportunity to calculate labor based LQ, Herfindahl index and Dissimilarity index as well. All the three indices can show us the same effects that I am interested in in my study I have chosen LQ for my researches. The critical observation of the usage of LQ is not represented in the thesis book just in the dissertation.

Characteristics of the database

Eurostat has a so called high-tech industry and knowledge intensive service database² which was used and filtered to the employment data in order to calculate labor based LQ. The database lasts from 1994 to 2008 and shows the employment in the different knowledge intensive sectors on regional levels of NUTS0, NUTS1 and NUTS2 in 33 countries. The separation of the different sectors according to their knowledge level is based on a sectoral and a product based approach. Sectoral breakdown is based on the R+D costs and the added value of the certain industry using NACE rev. 1.1.³ Data and so called high-tech, medium high-tech, medium low-tech, and low-tech industries appear in manufacturing. Considering reliability and accessibility of the data NACE uses only divisional, and two-digit sectoral breakdown. By using this knowledge based approach I tried to avoid the failure that is mentioned by Szanyi et al (2009) that referred to intensity of work and the sectoral breakdown. About the failures of using simply a sectoral breakdown Monfardini et. al (2012) made a comprehensive summary. I wasn't focusing on designing a new and more appropriate identification of the different branches but to study their link with quality of life so I accepted the mentioned knowledge based breakdown of NCAE. For services knowledge intensive and less knowledge intensive sectors are identified and the basis of this calculation is the share of employees with tertiary education. In the research period the classification changed twice⁴, so NACE Rev. 1.1 and NACE rev. 2. Could give a different approach to knowledge intensity. Eurostat realized that and the database has been corrected so the categories are identical for the whole period of the study.

Besides sectoral approach product based approach is also considered in this database. Product based approach handles R+D costs and revenue according to Standard International Trade Classification (SITC Rev.4.)⁵. Standard International Trade Classification also changed in that period so in 2007 SITC rev. 3 has been converted into SITC rev. 4.

² http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=htec_emp_reg&lang=en

³ NACE Rev.1.1: Nomenclature Générale des Activités Economiques dans les Communautés Européennes, (Statistical classification of economic activities in the European Community) – The Statistical classification of economic activities in the European Community between 2002 and 2008

⁴ NACE (1963- 1990), NACE 1 (1990-2002). NACE Rev. 1.1 (2002-2008) than NACE Rev. 2 from 2008

⁵ <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=28>

Eurostat used for the correction the following data:

- The Community Innovation Surveys carried out every two years (Community Innovation Survey - CIS)
- The high-tech trade data users (Comext) database,
- using employment data of Human Resources in Science and Technology Human Resources in Science and Technology (HRST)
- The European Employment Survey (EU Labor Force Survey - LFS)
- Sector of Business Statistics (Structural Business Statistics - SBS)
- And the European Patent Office.

Spatial breakdown is based on NUTS2 level and for EU, possible EU join and EFTA countries considering classification of NUTS2010/EU27 which is used by the European Commission regulations of 1059/2003 and 31/2011 and all the data is modified according to these classifications. Although Szanyi et al (2009) declares that data at NUTS2 cannot be considered as relevant for regional level I accept the approach of Ketels and Sölvell (2005) and I used that aggregation level mainly because of the availability of the data.

Reviewing the data I found some difference between the regional data that I summarized as follows. Data from NUTS 2 level in Denmark has changed significantly in 2006 therefore I rejected to analyze the Danish results. Several regional changes in the NUTS3 level also appeared for example in Saxony-Anhalt from Germany, Canary Islands in Spain, in 40 LAU1 small regions in Poland but these changes happened on a lower aggregation level then my focus so it doesn't effected my results. There was a total recodification for Sweden in 2006 but only the names not the actual spatial borders changed itself. These kinds of changes also happened in Northern-Eastern Scotland, in the Scottish Highlands and in different areas of the United Kingdom.

Considering all the possible regional labor data I analyzed 465⁶ regions for 14 years according to the knowledge intensive approach interpreted before for 15 different sectors. This could mean 97.650 pieces of data. The knowledge based differentiation also has different levels from I only used the lowest observable level (shown on the next figure) where we have four manufacturing and six service sectors. From my research results all the possible intermediate levels (manufacturing + service, high-tech/medium-tech/low-tech) levels can be derived.

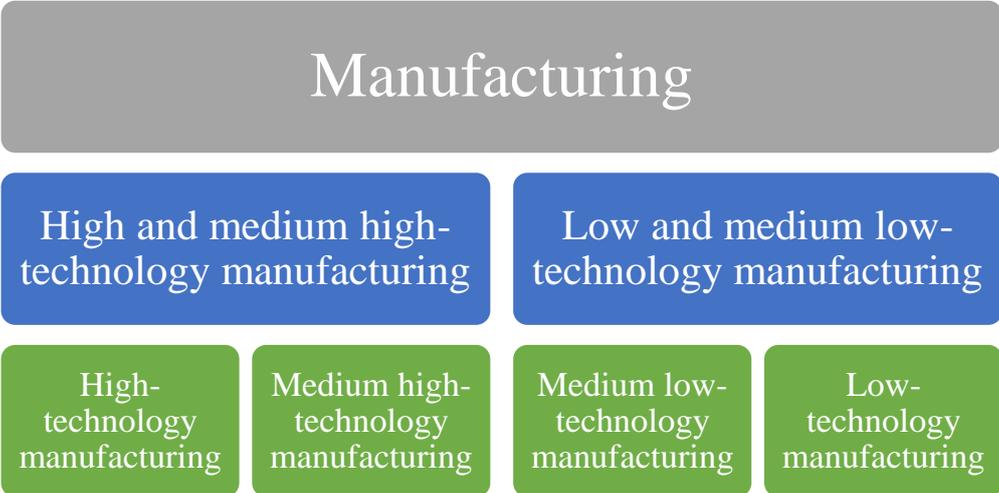
Besides that for NACE rev. 1.1. National level data between 1994 and 2008 are also available but this level is considered as too abstract from my point of view as well. ⁷ All data have been revised by the Eurostat in 23.06.2013 and metadata has been checked in 19.09.2014.

For the comparison and the correlational study I used the NUTS2 level of GDP per capita data of Eurostat. Not every single piece of information was available in parallel so no every correlational comparison could be performed. After the pre-check of the data I left only 20 country from the 33 that where in the database. The reason for that was the outlier data of employment and the lack of data of GDP per capita in most of the cases. After the reclassification of the statistics in some regions severe drops and increases had appeared in employment data so I had to clean these data. According to all the mentioned factors I had to interpret my results only to that 20 countries with reliable data.

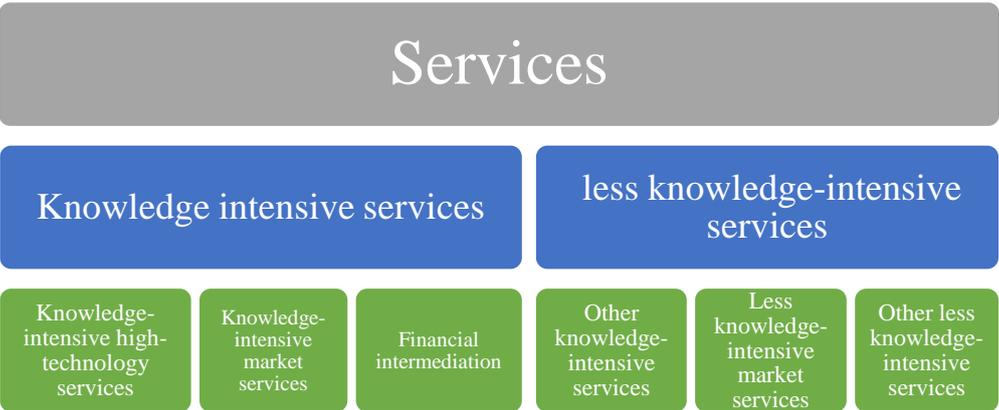
⁶ Which includes NUTS 2-inch-wide data for all 28 EU countries as well as EFTA and candidate countries data.

After clearing all the data and adopting them to NUTS2 level I started my correlational calculations with the use of SPSS Statistics 23. After the cross-check for significance (p parameter) I summarized the data for four manufacturing and six service sectors.

All the following results will be interpreted to these sectors and to the mentioned regions.



2. Figure 2: Investigated knowledge intensive sectors in Manufacturing
Source: Author’s edit - 2015



3. Figure 3 Investigated knowledge intensive sectors in Services
Source: Author’s edit - 2015

In the analytical part I combined different methods to interpret my results. I researched and presented:

- Regional results,
- Sectoral results,
- And country specifics if necessary.

I also made graphical illustration where significant data was available for the specific regions.

When I had the first look on my results I realized that standard deviation of the correlation coefficient is quite high and there are also negative values as well. When interpreting the negative results my standpoint was that the change in the labor market and in the specialization cannot decrease regional welfare but these changes doesn’t create positive effects on welfare as the other sectors do. Having a simple example there can be specialized sectors where the

concentration grows rapidly but it doesn't have high added value and other sectors decline so the GDP declines as well. Therefore the sign of correlation will be that the direction of the change of the variables is the opposite which could mean that these sectors ruin welfare which is not true. In most of the countries I didn't have all the data for all the sectors and in some sectors there were only negative values. In this case we should assume that these sectors with negative coefficient doesn't define the development pattern of the regions or maybe more powerful factors (capital, information, and other resources) distorted the picture. My general interpretation would be that from the sectors where we have negative correlations we should transfer employees into sectors where we definitely have positive correlations. This level of elasticity in the labor market is not imaginable and in market economy this kind of job orientation cannot be performed.

Through the research I insisted on the principle that if there are significant data from 4 different sectors for one region then I can have a short assumptions about the results but with less data than this I cannot construct these ideas. I approached to sectoral result with a similar discipline. If there are data from quarter of the regions of on nation level I asses a tendency for the sectors otherwise I reside from that. In the next chapter I will present results for national and regional level for different sectors and if possible I will also have some suggestions for the countries as well.

In order to summarize all the results I tried to present the similarities between the countries showing the regions where the concentration of a certain sector showed the same effect as in another. Whenever I refer to correlation as a result I always consider that as the correlation between regional per capita GDP measured on purchasing power parity and labor based location quotient.

RESULTS

Country-specific and regional results

In my dissertation I had reliable results finally for 20 countries and for every country I gave opportunities in specialization and I also highlighted the connection between specialization and the quality of life. In this thesis book according to the limits of its extent I only give a short overview about the results.

The standard deviation of the correlation between the two variable was quite high. According to the average correlation of the whole sample we can assume that there are several sectors which are the main pillars of the economy which contributed to welfare in almost every cases. These were for instance medium-high tech manufacturing where the average correlational index was 0.169 or high-tech manufacturing with the average result of 0.145. In services knowledge-intensive market services (0.139) and financial intermediary (0.115) showed the highest correlation. As mentioned these are average values and all are in the level of low correlation. According to these findings I assume that there is no general solution in economic policy which can enhance quality of life or reduce differences in the society. It is important to highlight that the median values of the aforementioned sectors were between 0.55 and 0.65 which shows a slightly different picture if we consider high standard deviation. In the period of the research there were no great differences in the total employment in any sector but a tendency of the decrease of manufacturing and the evolution of services is inevitable. There is a certain geographical pattern which shows greater representation of knowledge intensive sectors in Western-Europe but in the thesis I didn't investigated the relationship of neighboring regions which can show possible spin-offs in the different sectors. A possible spin-off could be investigated for instance in high-technology manufacturing. With the sectoral approach I got the results that hot-spots, where regional correlation in the sector is relatively high appear more often in the so called "Blue Banana" region but also the emergence of Eastern-Central Europe was there in the data. I assume that these effects are multidirectional so where quality of life is high the well-operated branches will develop further and the cumulated competitive advantages will generate more and more positive effects that will lead to the status quo of these regions.

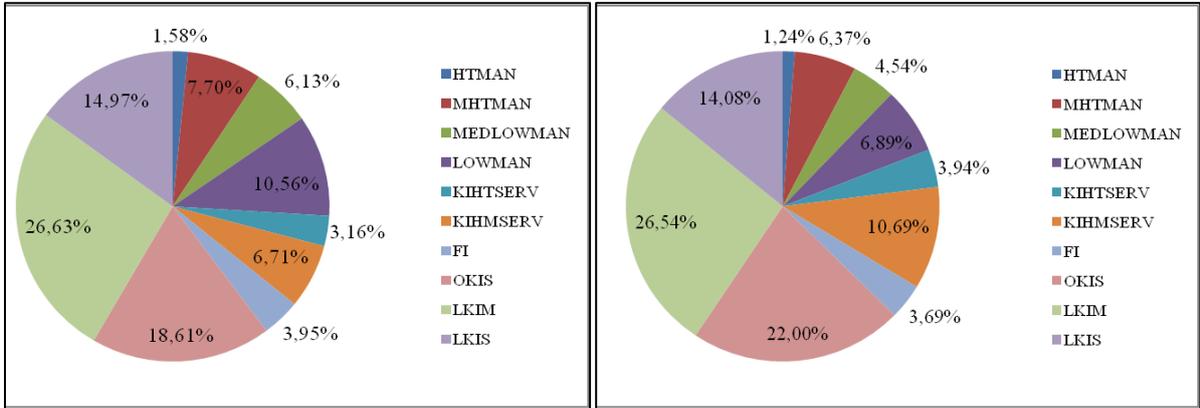
The positive effect of the strong automotive sector in Bayern and Baden-Württemberg appeared and also the hot-spots of tourism have been highlighted in the Mediterranean coastal area. Not every sector has revealed its strength through the analysis, for example the SCC business evolution in the center region of Hungary or the importance of the European space and aviation industry in France doesn't show up. This effect can be easily interpreted. The well-developed regions cannot show any sign because what I investigated was the parallel change of the two variables, so if a sector doesn't specialized itself but it provided great per capita GDP data it is hardly visible in my results. The mature industrial areas and clusters maybe cannot attract more employee into the region so it is not viable through LQ but their effect on welfare is high. Only the dynamics of the change of labor market resulted that no positive signs have been found.

European sectoral results

In order to interpret the results on the scale of the European Union not only on national level I created the maps of the different sectors where I signed the regions with positive correlation

with a red „hot-spot” to see where these regions are located. Although I must highlight the constraints of this approach. Only the homogenous knowledge intensive clusters are shown in these maps so horizontal co-operations cannot be visualized in this way and the details of the database may also give some difficulties when we would like to create regional policies based only on this approach. To create a better map we should have four-digit deep employment data that could be used below the regional level, but this data was not available for the whole EU. There are some regions where we instinctively would search for hot-spots that doesn't appear on these maps (Swiss bank sectors for instance). The lack of data is responsible for these kinds of deficiency but altogether the results have shown many times the existing or potential co-operations between border regions, and in many cases the great industrial regions have been detected which gives a positive impact on quality of life. In this study I didn't want to show neighboring relationship but the approach is highly suitable for that as well with some changes.

Just to have a clear understanding about the labor changes in the period I summarized the change of the share of labor market in the starting and ending period of the study regarding the different sectors which is shown on the next figure.



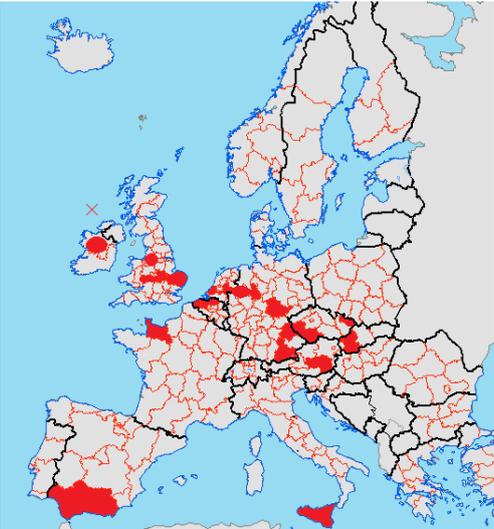
4. Figure 4: The weight of the sectors in the labor market for the sample countries between 1994-2008
Source: Author's edit - 2015

Figure 4 well represents that significant change in the investigated period happened only a several times. The share of every manufacturing sector and the other less knowledge intensive services dropped, while the knowledge-intensive market services and the other knowledge intensive services had a higher rate with 4 percent. This is of course an average data for all the countries for the whole period but it is easy to accept that in the total employment structure there were slightly less changes than in the regional specialization and concentration. Employment based location quotient changed more dramatically from time to time as the whole labor structure in Europe therefore the only general finding is the shift from manufacturing to services.

High-technology manufacturing

This sector consists of pharmacy, computer, electronic device and optical product manufacturing, just as aerospace equipment production. Starting with the last group: there is no reliable data available from Midi-Pyrenees region (FR62), the center of European aircraft manufacturing, therefore the effect of Airbus factory on this map is not visible. The involvement of Southern-German and Czech industrial regions is however perceptible, and Greater Manchester region is outstanding as well. If we would like to create a production chain of geographical and sectorial sense from the actors of this sector Hungary is in a fortunate position

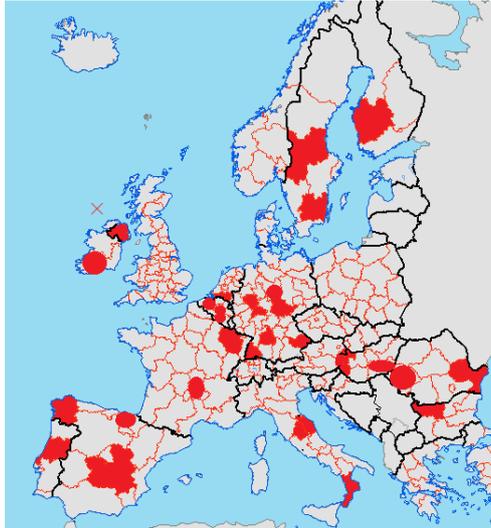
due to the fact that two neighboring countries (Slovakia and Austria) and also Germany – our most important partner in economic relations – demonstrate positive effect in this area. A North-German, Dutch, Belgian cooperation in this area also seems conceivable. The Spanish and Italian results, given they geographically separately occur, might be of interest to national economic policy. It is important to emphasize that high-technology manufacturing incorporates a much narrower category than an average person or even a policy maker would expect. This sector ignores biotechnology or engineering industries in calculations, while they could play leading role in any developed economy, therefore may not always the developing of most value added industry is the most useful when drawing up an economic policy path. The above described is shown on Figure 5.



5. Figure 5: Positive correlation regions in high technology manufacturing sector
 Source: Author’s edit using Eurostat GISCO 2014 - 2015

Medium high-technology manufacturing

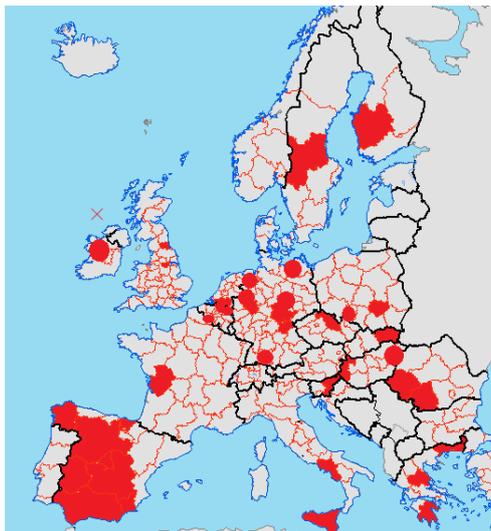
The strength of disciplines operating with already existing knowledge elements are especially important for an economy in evolving a stable industry. Medium high-technology manufacturing includes automotive industry, in particular, which is key element of Hungarian and European (mostly German) economies. This sector also includes all machine production activities, chemical industry and armaments production. Compared to the previous sector we can find medium high-technology manufacturing centers in more countries, specialization of Bavaria and Baden-Württemberg provinces in Germany, Western-Hungarian region in Hungary, and Western-Romanian region including Timisoara also appears to be effective in improving welfare. The greatest focal points are the Belgian-French-Dutch-German borders which are part of the classically developed Ruhr Area and also the so called “Blue Banana” including the most developed European areas. This is the area which showed a “positive-labeled” region in every sector. One of Ireland’s regions also showed positive correlation between industrial sectors and GDP, which could be a result of the “Irish Miracle”. In Hungarian context the German cooperation still seems to be good solution, and the rapidly growing Timisoara and West-Romanian region could establish an innovation chain as well. The above described is shown on Figure 6.



6. Figure 6: Positive correlation regions in medium-high tech manufacturing
 Source: Author's edit using Eurostat GISCO 2014 - 2015

Medium low-technology manufacturing

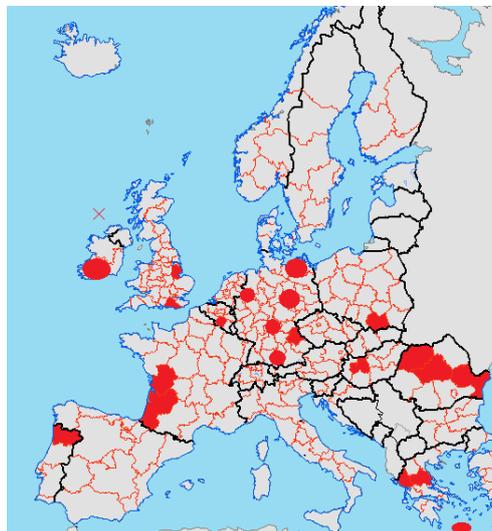
As in most of the cases when investigating manufacturing several German regions – Ruhr Area, Belgian-Dutch borders – showed positive correlation, and so did the majority of Spain. From Hungary's point of view the cooperation with Slovakia may be interesting as this sector, including metal industry, metal manufacturing and rubber industry, shows strong correlation with GDP per capita in Eastern-Slovakian and Northern Great Plain region in Hungary as well. Here the map draws the attention to the establishment of a new industrial relation system. This sectors appears in several regions in Visegrad countries and neighboring EU countries as a "hot spot", therefore in addition to specialization it highlights the importance of cooperation as well. The above described is shown on Figure 7.



7. Figure 7: Positive correlation regions in medium low-tech manufacturing
 Source: Author's edit using Eurostat GISCO 2014 - 2015

Low-technology manufacturing

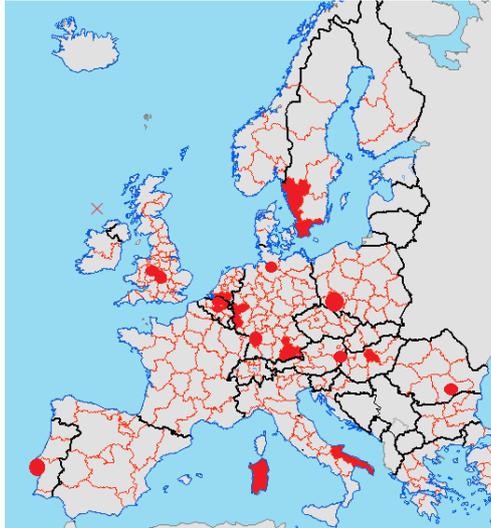
Low-technology manufacturing covers the entire segment of light industry, the food and beverage industry and the subset of all manufacturing industrial activities which are not included in the previous segment. While in 1995 average 10.56% of employed people worked in this sector, to 2008 this percentage dropped to 6.89%. This value, however, still remains the 5th largest occupational category in the countries examined. No conclusion can be drawn on supranational level, but on national level Germany's sporadic structured industry and Romania's industrial structure is clearly visible. In Romania it is practically the largest hot spot: it showed the biggest positive correlation on the most extensive area. In case of Ireland, as in all manufacturing areas, I found positive correlation here as well. In Hungary the Western-Hungarian region is prominent from low-technology manufacturing perspective. However it is important to realize that the decline of economic performance of agriculture, and the increase of the role China's light industry in the recent decades resulted in the decline of textile and clothing industry (part of low-technology manufacturing) all over Europe. The above described is shown on Figure 8.



8. Figure 8: Positive correlation regions in low-tech manufacturing
Source: Author's edit using Eurostat GISCO 2014 - 2015

Knowledge-intensive high-technology services

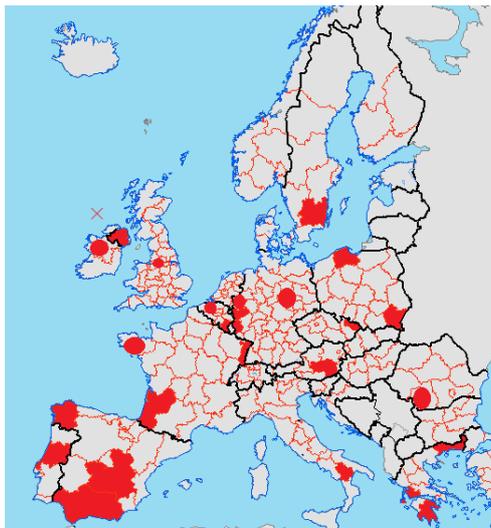
High-technology services typically include information-technology and film industry, as well as certain R&D activities. Cologne in Germany as a regional center, Munich as an R&D center, and Lisbon metropolitan region stands out in these areas. As high-technology manufacturing neither this sector was a major employer, in 2008 average 3.94% of employed people worked in this sector. During maintaining the idea of knowledge-based economy, however, we can expect this sector to strengthen and the profiled centers to grow further. The above described is shown on Figure 9.



9. Figure 9: Positive correlation regions in knowledge-intensive high-technology services
 Source: Author's edit using Eurostat GISCO 2014 - 2015

Knowledge-intensive market services

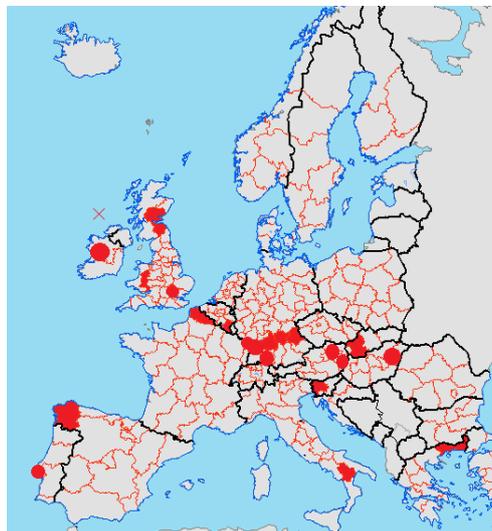
The fastest growing in the sample was this sector, which includes air and water transportation, legal and business consulting, market research and other scientific and technical activities as well. It is obvious that with the retreat of industrial production the demand for services related to corporate management has increased at the same time that has also been profitable and useful in terms of regional development. Well-performing regions in manufacturing sector also proved to be hot spots in this category as well, namely the Belgian-Dutch-German-French border areas and three regions of Spain. Here I would like to highlight the region of Galicia was a hot spot in nearly all sectors, also Andalusia and Castilla-La-Mancha regions are performed well in the analysis. Unfortunately none of the Hungarian regions show up in this comparison, even though the sector increased with average 3.53% from 1996 to 2008 reaching the highest growth among all sectors. The above described is shown on Figure 10.



10. Figure 10: Positive correlation regions in knowledge-intensive market services
 Source: Author's edit using Eurostat GISCO 2014 - 2015

Financial intermediation

In case of financial intermediation I expected that metropolitan regions and adjacent existing financial centers will appear as hot spots in all analyzed countries. However my expectations haven't met because not all analyzed regions provided significant results. London as the largest financial center in Europe and Edinburgh as regional center in the UK, Vienna in Austria, Bratislava in Slovakia and Lisbon in Portugal show up as hot spots. I observed a very specific segregation in east-west direction in Germany that followed the borders of the two largest and wealthiest provinces, Bavaria and Baden-Württemberg. I find it conceivable that the relatively wealthy population and successful entrepreneurial sector in these areas showed higher demand for financial services which resulted in such a concentration in this regions. At the same time, however, I exclude the possibility that the formation of developed financial system resulted in further increase in welfare in the respective regions. I left the Hungarian hot spot on Figure 11, but it is important to mention that average LQ index of this region was around 0.76 while the value of Central-Hungarian region including Budapest was 1.5 but I did not find significant correlation between the measured factors there. The above described is shown on Figure 11.

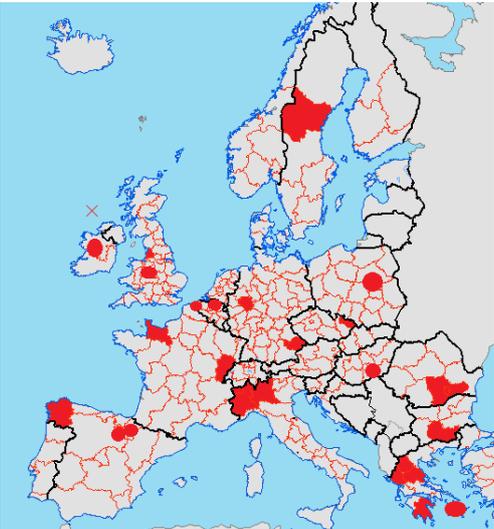


11. Figure 11: Positive correlation regions in financial intermediation
Source: Author's edit using Eurostat GISCO 2014 - 2015

Other knowledge-intensive services

This sector reached the second highest growth among the countries of the sample, but not without reason, because the increase of government's involvement resulted in the growth of public administration's importance, meanwhile demand for services related to education, health, arts and sports activities has also increased during the development of welfare states. In terms of the German sample the importance of this sector increased significantly, with 4.56%, yet it hasn't become driving force in the economy, we can hardly find any hot spots among the German regions. The sectoral distribution of hot spots is highly disperse here as well, therefore development of cross-border services is not supported by the analysis. However, this doesn't mean it wouldn't be necessary because we know on the basis of our everyday experiences that both in healthcare and education appears a suction effect that established health tourism and increases the number of foreign students especially in higher education. Future economic policies should pay attention to other knowledge-intensive services as well due to the reason that changes in consumption patterns may result in further

growth in importance of this sector, therefore it could play an important role in increasing welfare. The above described is shown on Figure 12



12. Figure 12: Positive correlation regions in other knowledge intensive services
Source: Author’s edit using Eurostat GISCO 2014 - 2015

Less knowledge-intensive market services

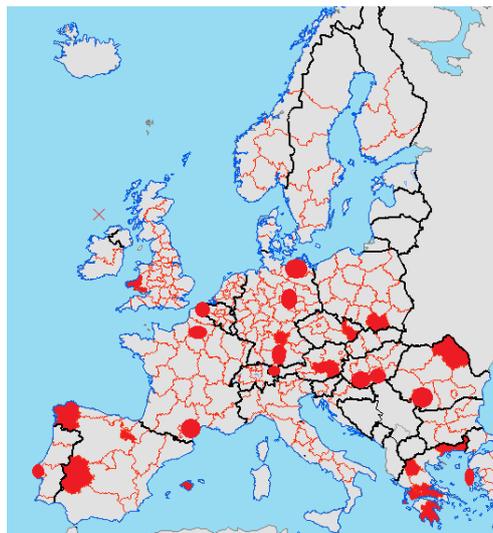
In the whole sample throughout the whole timeline of the study this sector has the biggest labor power employing around 26% of all the employed people in Europe. This is easy understand because wholesale and retail activates, logistics and warehousing but also some part of tourism is classified into this sector. Following the patterns of the industrial centers the most of the well-developed German regions have hot-spots in these areas. For Hungary it can be interesting that on our western border and on the Austrian and Slovenian part I found positive correlation and maybe these sectors have export opportunities in the future. The hot-spots in France appeared in the densely populated regions with lot of industrial services and also in the juristically attractive landsides. These are represented on Figure 13.



13. Figure 13: Positive correlation regions in less-knowledge intensive market services
Source: Author’s edit using Eurostat GISCO 2014 - 2015

Other less knowledge-intensive services

In this sector all the services are gathered which cannot be categorized into the ones above, where least knowledge is adopted for the work. The main parts of this sector is household work, postal activity, other services and everything that cannot be categorized to elsewhere. As a fact that this sector does not have high added value but it exists in every economy the disperse distribution of the hot-spots is reasonable. The interesting thing of this maps is that sectors with low knowledge intensity within Greece have „good performance” according to correlation. It does not mean of course that lower knowledge sectors are the body of the Greek economy but we can say that during a period of increasing welfare these activities went through a concentration progress. That described above are shown in Figure 14.



14. Figure 14: Positive correlation regions in other less knowledge intensive services
Source: Author's edit using Eurostat GISCO 2014 - 2015

Results of the research

The research focused on the correlational relationship between employment based locational quotients (LQ) and the per capita GDP where I examined the data of 33 countries between 1994 and 2008. The goal was to see clearly the relationship between knowledge intensive sectors and clusters and the chosen index of welfare.

The fourth subchapter showed the literature background of regional development and specialization, clusterization. In the next subchapters I summarized the results of the previous studies and finally my own findings. The value of LQ in the investigated period of time change more often and had higher volatility than the per capita GDP, but from a regional aspect there were accentuated regions with better performance in the sector as the others. This means that the maximum single and the maximum average LQ is coming from the same region. As in example this happened from 10 out of 10 times in Austria and 7 out of 10 times in Hungary. Similar effects were observed for maximum single and maximum average GDP as well. There was just one exception in Greece where maximum single per capita GDP and the average maximum didn't come from the same region. In every other region the region with the most welfare had (naturally) the highest average welfare as well. From this we can assume that there are no outlier data which cannot be interpreted by the average for GDP per capita. Although the speed and magnitude of change of LQ is higher than then as was for per capita GDP, out of 190

sectoral result in 166 the maximum and the average LQ was in the same region, no great reallocation of labor between regions or sectors were observed.

T1: According to labor data between 1994 and 2008 compared with GDP per capita data with my correlational studies I assumed that the distribution of material welfare is not as elastic in time and space then the localization quotient that was used to represent the concentration of knowledge intensive sectors. The variation of both dependents can vary according to territorial attributes.

In the dissertation I provided regional and sectoral data as well as my new results. I think that it can be important to highlight that some regions perform better than the other because of their specialization. But is also important to mention if we can identify sectors that can help to enhance quality of life in several regions. According to my results there is no panacea for this problem, every region has its own attributes (which is not investigated in the dissertation) which makes regions more successful than the others. But after summarizing the results I concluded that sectors with the highest average correlational result have special roles. In this approach from manufacturing sectors medium-high technology manufacturing had the highest value with the correlation factor of 0.169 and high-technology manufacturing with 0.145. From services knowledge-intensive market services with 0.139 showed the highest value and financial intermediation was the second with 0.115. Although it is important to highlight that every 10 sector had an average weak correlation so there were no sectors that had significantly more effective impact than the others. According to this I state my second thesis.

T2: Concentration of all sectors with different knowledge intensity showed weak correlation on an average level, but medium high-technology manufacturing and high-technology manufacturing from the industrial side and knowledge intensive market services and financial intermediation from service side showed the highest correlation with per capita GDP. These results can be interpreted as an average and of course regional differences occur and show different results in the different regions.

According to the regional interpretation of the results I used another approach showing the hot-spots where high correlation between the LQ and the per capita GDP was signed by the data. After the collection of all sectoral data I found that there are significantly more hot-spots in the regions of Germany, Belgium, Netherland and Eastern-France that in all the other regions. Within all the manufacturing and service sectors at least one hot-spot where identified in these regions. Altogether I found 42 cases where the regions of the so called „Blue Banana” appeared. Also there is a tendency that more and more regions in Eastern-Central Europe appears in the regions. These findings were observed especially within knowledge intensive market services, high technology manufacturing and in less-knowledge intensive market services.

T3: Hot-spots (regions with positive correlation between quality of life and regional LQ) in every sector of manufacturing and services can be found in one of the most developed pat of Europe, namely in the „Blue Banana” region, but mainly in knowledge intensive market services and knowledge intensive high technology services hot-spots are oriented towards Central-Eastern Europe. With these results I confirmed that developed regions have concentrated and specialized industry, but the type of specialization is influenced by geographical, industry cultural and other factors

I can summarize my final thesis with the general assumption that there is no uniformed economic policy that can be delivered in every region in order to develop them. I assume that that according to the sectoral history of the region every place has its own special attributes

therefore its development cannot be driven with top-down initiatives when there is no suitable industrial milieu for that. It cannot be proven as well that the higher knowledge intensive sectors are always the cornerstones of the economy, but in long-term we should consider their support as a strategic goal. To this thesis also the results of the previous thesis has been considered.

T4: According to the results of the research there is no uniformly economic policy that can lead to the improvement of quality of life on a national or supranational level, because sectors with different level of knowledge intensity contribute to quality of life on a different scale.

I review my hypotheses based on the research objectives in the context of my results:

1. The dimensions of well-being, quality of life and welfare are examined regarding different methodologies of different studies but material welfare has always an effect on quality of life and well-being.

After the summary of the theoretical background I assume that the role of material possessions in the quality of life could be considered as confirmed, and it is represented in the second chapter of the thesis and in Annex. 4.

2. Material welfare has a measurable impact on quality of life, nevertheless its effect can vary widely according to several influencing conditions.

The researches summarized in Chapter 2 confirmed this hypothesis as well, although none of that could be handled as my result, only as a synthesis of the literature. But because these questions are in the focus of my interest I write down my opinions in this topic.

3. The concentration of different sectors in a region has an impact on the regional welfare and a spin-off effect on the quality of life as well.

I accept this hypothesis with the comment that every region has its own specialties so its own sectoral attributes differ quality of life in a different way.

4. The role of the state and governance effects through economic policy on material welfare but the magnitude of its effect changes on time.
5. The governance can alter the concentration of different sectors through economic policy therefore it can change the regions welfare and quality of life.

Just as in the first two hypothesis after analyzing the previous research studies I accept these ideas, but they are not my own scientific results, rather I can use these statements as confirmation of my beliefs.

6. Sectors with different level of knowledge intensity has different effects on regional welfare and some of these knowledge intensive sectors can make benefit for every region by enhancing welfare.

I reject this hypothesis and according to these findings I draw up my fourth new result.

7. Sectoral centers that changes welfare significantly are located in a well demarcated geographical location.

I handle this hypothesis as confirmed, and considering national and sectoral results I accept that as my third new or novel result.

NEW AND NOVEL SCIENTIFIC RESULTS

- 1.** When analyzing labor data between 1994 and 2008 compared with GDP per capita data with my correlational studies I assumed that the distribution of material welfare is not as elastic in time and space then the localization quotient that was used to represent the concentration of knowledge intensive sectors. The variation of both dependents can vary according to territorial attributes.
- 2.** According to my researches concentration of all sectors with different knowledge intensity showed weak correlation on an average level, but medium high-technology manufacturing and high-technology manufacturing from the industrial side and knowledge intensive market services and financial intermediation from service side showed the highest correlation with per capita GDP. These results can be interpreted as an average and of course regional differences occur and show different results in the different regions.
- 3.** Hot-spots (regions with positive correlation between quality of life and regional LQ) in every sector of manufacturing and services can be found in one of the most developed part of Europe, namely in the „Blue Banana” region, but mainly in knowledge intensive market services and knowledge intensive high technology services hot-spots are oriented towards Central-Eastern Europe. With these results I confirmed that developed regions have concentrated and specialized industry, but the type of specialization is influenced by geographical, industry cultural and other factors.
- 4.** Because I haven't find a sector that's concentration moves along with the per capita GDP in every region of the sample I assume that there is no uniformed regional economic policy that can be used nationally or supranational to enhance the quality of life. Sectors with different levels of knowledge intensity contribute to quality of life on a different scale.

CONSEQUENCES AND RECOMMENDATIONS

This thesis could be considered as a first step of a far-reaching new research direction in the examination of the effect of economic decisions on quality of life. The investigation of the different parts of the quality of life showed the general goal of the indices used and I summarized these parts and interpreted them in details. I found out that the objective and subjective parts of quality of life can be simply separated and the concerned disciplines well show of their territories in the topic, but conclusion can be only made seeing the question in the whole context. The goal of the thesis is to examine the relationship between regional specialization and regional quality of life and as a first milestone I declared the link between welfare and quality of life, the dimensions and indices of measurement. These findings are summarized in the thesis' Annex 4. Which shows the most widely used indices. Only Happy Planet Index is the one among the ten most common indices that doesn't consider material welfare that can be connected to the development of a region. Among the other five uses per capita GDP as its primary material index and four of them some measures of consumption or income indices.

Governmental contribution to welfare can be observed mainly through economic policy therefore I emphasized the connection represented in a subchapter, showing the state functions and their effects on short and long term. As I stated I found nine different indices that mainly use per capita GDP or consumption and income indices as the representative measure for welfare, so I considered as a verification that material welfare is one main determinant of the quality of life, but the scale of welfare is highly dependent on the regions level of development.

In order to specify the link between the quality of life and economic policy I investigated the effect of the governance on these factors and I found out that the role of the state is still strong due to historical and cultural reasons and so indirectly it influences well-being heavily.

According to its role it cannot create tangible changes in all the dimensions of quality of life and its role corresponds with the values of the citizens and their beliefs about governance. In two subchapters I demonstrated that according to the different economic, cultural and social factors different development programs can exist within one country. The results of my research confirmed that all in all that different tools and methods used in the regions can fulfill the specific needs that are based on the attributes of the different regions. For economists it is an important message that GDP is still one the most widely used representative of welfare although its role and the underlying principles of its calculation can be questioned. It is for sure that not every part of GDP represents welfare and definitely not well-being. Consumption indices represent welfare for the individual in a better way and mainly it is also used as a measure of well-being as well. Another good measure is employment which was the basic data for me to calculate regional locational quotient which was lately compared with the change of per capita GDP. At the moment there are no uniformed concept about the objective and subjective elements of the quality of life and there is also no better representative of material welfare than GDP. I considered that this is the reason why the indices use this as their primary measure for welfare. I assume that subjective well-being, productivity and welfare have multidirectional relationship and these topics will create several very good research areas in the future. I think that because the lack of welfare (or the abundance of it) highly changes its role in quality of life. In developing regions it is more important than in countries with high living standards. I also showed among objective and subjective factors the individual and social categories of well-being which I think can be a fundamental part of future decision-making concepts and the investigation of the relationship of these factor can be appreciated highly.

If the trends of the past decades will still be there the role of the governance in the economy will grow further. The reinterpretation of the role of the governance could be based on a strong civil society and the actors of the economy, but their roles vary a lot from country to country, from region to region. I stated that the disappearance of the power of the state is not likely because it played a huge role through history and so it will have a significant effect on the quality of life of the people. In the concerning subchapter I showed the different „schools” of the different ideas that influenced the economic policy of the last century and they are powerful still today. I really hope that my findings can be used as sign-posts for the decision-makers and they can realize that there is no universal solution for everything. In my summary of the economic theories I represented the relation between economic concentration and welfare showing the different aspects of this topic. I also highlighted the failures of the modern states and based on this the different responsibilities can be separated in the process of changing quality of life. After summarizing the right theories I explained the advantages and disadvantages of location quotient and the proper way of its interpretation I couldn't find a better index that can be calculated from the databases which are available on a European scale. This was the way where cluster studies simplified themselves to the measurement of concentration and specialization and finally their comparison with GDP per capita with correlational calculations.

In the chapter of my results I showed the findings for every country involved in the study while representing the territorial attributes and the effects on regional development. After summarizing national results I showed 10 branch results for the 20 country. The two different aspect (national and branch) has been summarized at the end of the chapter and where I also represented my new scientific findings.

After revealing the connection between the variants and summarizing the results of the thesis we can accept there are no general good practices that can increase one regions welfare or can revive its economy. So the assumed “panacea” does not exist. Using this pharmaceutical metaphor there are still remedies with large spectrum such as the advancement of services which after achieving a certain level of development can easily enhance welfare in the whole territory. The concentration and de-concentration of branches and industries are parallel processes so evolution cannot be acquainted by simple monoculture economic models. Because of the exiguity on the labor market concentration in every branch cannot happen, but according to our mainstream economic paradigm constant growth can be achieved. The important message of this research is although concentration of industries and welfare are interrelated factors of society numerous other characteristics and attributes of the regions appear which can be part of new studies and researches connected to this topic

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