Sectoral and regional dimensions of industrialisation in East Central Europe

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Abstract:
The manufacturing is one of the most significant driving factors within the export oriented economies of the East Central European countries. The secondary sector basically determines the growth potential of the whole economy and the labour market conditions.
The new millennium represented a turning point in the industrial trends of East Central Europe. The industrial decline (deindustrialisation) of the 1990s was replaced by increase (industrialisation). The dynamic industrial restructuring has had severe sectoral and regional effects.
The paper gives contributions to the analysis of the industrial trends of four East Central European countries (named Visegrád countries) during the 2000-2008 period.

Key-words: East Central Europe, Visegrád countries, industry, secondary sector, manufacturing, structural change, regional differences

JEL code: O14, O18

I Introduction
Since the turn of the decades 1970-80, a considerable spatial and structural transformation can be observed globally in industrial production. The major changes have been induced by opening up the economies of China, the Eastern Block and then of India. The Asian and Eastern European countries integrating into the global economy have provided hundreds of millions of workers and consumers as well as abundant sources of resources and raw material supplies. In addition, the accelerating technical development has exerted a significant effect on the special location and structure of the secondary sector.
The shares of economic centres in the global industrial production have changed even in the new millennium.

Fig.1 Share of different units in the global industrial value added

Source: authors’ compilation based on World Bank data

This global transformation has not left the industries of the East Central European countries untouched either. The rapid change in geographical (East-West) orientation has lent an individual characteristic and development path to this region. During the transition period, the forces of de-industrialisation and re-industrialisation acted jointly, although with a shift in terms of space and sector.
As a result, the production sectors of the Visegrád countries (Czech Republic, Poland, Hungary and Slovakia) underwent considerable changes (Barta 2002; Kiss 2010). It is important to state and emphasize that in spite of the vigorous tertiarisation of the economies, the industry has maintained its significance in the economies of the region, both in terms of the employment of workers and of the production of value added (Enyedi 2009). The performance of the manufacturing determined fundamentally export capacity (the extent of volume), and had a direct effect on the growth of the entire economy (other sectors) as well as the revenue level (Horváth 1999).

All this justifies a detailed structural and regional examination of the secondary sector, with special regard to the manufacturing.

II Conceptual and theoretical background

The secondary sector includes the sectors of the production, processing and the construction industries. These activities transform the raw materials and primary products of the primary sector into usable and consumable forms. The widening of the secondary sector is a consequence of the industrial revolution within a given national economy. The phenomenon of industrial production and employment gaining ground is called industrialisation. According to the explanation in the encyclopaedia, the concept means the introduction of large-scale mechanised technology into the national economy of a given country.

From the early 19th century to the middle of the 20th century, the developed countries saw an expansion of the industries of the secondary sector parallel with a reduction in the role of the agrarian sphere and an expansion of the services. The underlying reasons for the growth of the industry expressed in absolute numbers were considerable changes in sectors and structure (Szalavetz 2007). The structural changes lent a cyclic motion to the development of the entire economy (Kondratiev- or k-cycles). From the 19th century on, a variety of industries played the driving role (textile industry, steel making, chemical industry, vehicle manufacturing, information technology, others).

In the middle of the 20th century, the countries of the developed world reached what is called the post-industrial phase, where the role of the secondary sector became secondary behind that of the tertiary sector (services). The primary cause of the process is that the number of those employed in the industry decreased together with the value produced. Issues of the labour market, regulation and budget contributed to the cutting down and decrease. The phenomenon is called de-industrialisation and is typical of several regions in North America and Western Europe (Rodwin-Sazanami 1991). It caused the largest decline in output and labour market disturbances in the regions with heavy industry or mono-structure production (Mid-England, Northern Spain, Northern Italy, Luxemburg, Ruhr-region, etc).

Today Asia creates tough competition not only through the newly industrialised countries for the manufacturers in Europe and North America, but the fast development of China and India further increases the gravitational effect of the Far East and Southern Asia. That is why in the western world the economic policy objectives frequently include re-industrialisation, for the performance of the secondary sector often exerts a direct influence on the creation of value and jobs, which is of strategic significance concerning social and trade policies as well (Kocziszky 2008; Barta 2008).

However, it is not indifferent in what way industrialisation and the revitalisation of the secondary sector takes place in Europe, particularly in East Central Europe.
If the mono-structural manufacturing industry based on mass-production is to (re-)appear, it is possible to talk about the phenomenon of re-industrialisation. If, however, the settlement of production with a diversified structure under modern conditions (infrastructure, management, labour market, others) can be witnessed, we can speak about neo-industrialisation (Landesmann-Székely 1995). The emerging ‘new’ production and sectoral structure will thus determine the labour market situation, income level, the economic development path of a smaller region or even of an entire national economy for a longer period.

Inspired by the above ideas, the authors wish to find the answers to three research questions:

- What tendencies can be discovered in the industries of the countries of East Central Europe in the period of 2000-2008?
- Is it possible to talk about industrial restructuring and which type of re-industrialisation has emerged?
- What sectoral and regional dimensions did the re-structuring have?

The examination has been expanded to cover the Visegrád countries. For the calculations the data in the on-line sources of OECD Factbook, EuroStat and the World Bank were used (EuroStat 2009; OECD 2008).

The examination of the secondary sector did not include the construction industry, only the 19 branches of manufacturing. The data available allow monitoring the period 2000-2008.

In spite of the fact that the financial crisis of 2008 opened a new chapter in the history of the development of the world economy, the analysis of its effects will be neglected here partly due to the currently limited availability of the data, and partly to the complexity of the issue.

III Structural changes in the industries of the Visegrád countries

The political changes of 1989 launched dramatic de-industrialisation processes in East Central Europe. The crash of the markets within the Council of Mutual Economic Assistance, the non-realisation of investments, the lack of competitiveness, the unfavourable sectoral structure and the economic slump in Western Europe led to a marked decrease in industrial output.

By 1993 and 1994 the significant decrease in the industrial value added came to an end, but the annual change index continued to show a fluctuation and volatility (Illés 2002). With the exception of Hungary, the other three Visegrád countries experienced several years when the industrial value added decreased. These declines can be traced back to structural problems and to a variety of the effects of the different privatisation methods (Dabrowski et al 2004). The form of privatisation fundamentally determined the development of the volume of foreign capital investment. Although Hungary was exempt from these structural declines in the 1990s, the ‘investment boom’ following the accession to the European Union in 2004 and the dramatic industrial growth emerging as its consequence could not be experienced here, which also has its underlying causes in the structural problems.

In spite of the fact that the ratio of industrial value added against GDP (Gross Domestic Product) decreased in most cases, industrial output still exerts a decisive impact on the performance of the entire economy. This is proved by the strong concurrent movements of the annual changes in the GDP and in the industrial value added. The high correlation values of the two figures (Cz: 0.90; Hu: 0.92; Pl: 0.92; Sk: 0.41) provide proof of this.
But what were the extent and intensity of industrial re-structuring in reality? In order to give the right answer to that question, an analysis of the manufacturing was done at sectoral level, on the basis of the types of indicators used above (value added and employers). The compatible data currently available (EUROSTAT) are for the period 2000-2008. For better understanding, the industries were grouped by their technology intensity. In the grouping the EUROSTAT methodology was followed. The figure below shows the percentage changes in the number of workers and value added from 2000 to 2008 by the individual categories and countries (Table 1).

![Fig.2 Shares of employers within manufacturing by technology intensity (in 2000 and 2008)](source: authors’ compilation based on EUROSTAT data)

In the eight years examined, with the exception of Poland, where an increase of 12% was registered, there were no significant changes in the number of workers in the manufacturing, however, their distribution by industries showed considerable modifications by the end of the period. Low-tech industries (with low technology intensity) showed a significant loss in their weight in the labour market. Medium-low-tech activities (with medium-low technology intensity) produced identical tendencies in the Visegrád countries. In the period examined, all economies showed a marked increase in the number of workers employed.

By contrast, the medium-high-tech segment (with medium-high technology intensity) showed the largest average growth with a considerable scatter among the growths of the individual national economies. The labour market roles of high-tech industries (with high technology intensity) – with the exception of Slovakia – increased during the period, which hints at a favourable change of direction in the restructuring of the industry.

The average and aggregate values prove the dynamic restructuring among the workers of the industry in the Visegrád countries. This is proved by the sectoral lists as well, which present the sectors with the largest growth and decrease on the other hand.

Industries creating the largest numbers of jobs in comparison:

- NACE code 34: Vehicle, transportation equipment manufacturing (181.5%);
- NACE code 30: Business machine and computer manufacturing (156.4%);
- NACE code 25: Rubber and plastic goods manufacturing (149.3%).

Five industries where the number of workers decreased:

- NACE code 18: Clothes and fur product manufacturing and textile dying (62.2%);
- NACE code 17: Textile manufacturing (71.1%);
- NACE code 24: Chemicals and chemical products, artificial fibres and chemical fibres manufacturing (87.7%);
- NACE code 26: Non-metal mineral products manufacturing (90.9%);
- NACE code 27: Metal raw material production (96.2%).

In the Czech labour market a marked movement covering the entire vertical structure of industrial workers was to be observed. What happened in Hungary was smaller both in volume and in extent. In
Poland, industrialisation affected in a uniform, balanced way the industries with low, medium and high technology intensity. In Slovakia an interesting phenomenon was to be observed, for both the low and the high technology intensity industries suffered losses in the labour market, and the jobs in the industry were mainly created in the sectors with medium technology utilisation.

The question arises: in the context of the above, what differences can be found between the sectoral performances in terms of value added?

In the interval of 8 years, the value added increased in the majority of the industries, although the rate of growth varied. Only among the low-tech industries can be found an industry (the textile industry), where the value added decreased at current price.

In the medium-low-tech and medium-high-tech industries similar trends emerged as in the labour market processes, with a high, above average rate of growth. Among medium-high-tech activities, the increase in value added shows a highly varied profile, from below average in Poland to outstanding in Slovakia.

The ranking of the sectors covering the Visegrád countries developed as follows in terms of value added. The sectors producing the largest growth and the smallest increase demonstrate the economic restructuring in these terms as well.

Industries with the largest growths:
- NACE code 30: Business machine and computer manufacturing (152.7%);
- NACE code 18: Clothes and fur product manufacturing and textile dying (112.2%);
- NACE code 17: Textile manufacturing (135.5%).

The industrial restructuring of the Visegrád countries also affected the sectoral distribution of the production of value added. The Czech Republic and Hungary showed similarities not only in the comparison in terms of workers, but also in terms of value added. The marked growths of the two countries were driven by the medium-tech industries, with the low-tech and high-tech segments lagging behind. In Hungary the slower industrial growth was accompanied by more marked trends in restructuring. In Poland the increase in value added was the slowest, however the individual industries played well-balanced roles in the moderate expansion. In the period 2000 - 2007 Slovakia presented the highest rate of industrial growth, with the technology-intensive industries being the engines of the growth.

On the basis of the multi-aspect comparison of the national economies it can be stated that the process of industrial restructuring can be observed in all the four Visegrád countries. More similarities than differences can be recognised between the economies, even if unique characteristics of certain sectors can be found. The data allow the conclusion that the strong industrialisation in the Visegrád countries in the period 2000-2008 produced significant structural changes. The winners of this structural change are the mid- and high-tech sectors. This can be regarded as a favourable development, for it suggests a modernisation of the production and processing structure (neo-industrialisation).
IV Regional dimensions of industrial restructuring

De-industrialisation, then the new expand of industry did not affect the regions of the Visegrád countries equally. The market processes of the transition period increased the inequalities in development between the individual regions. The calculations bear out that among the regions outside the capitals, where tertiarisation was the strongest, the economies of the regions were able to start on a lasting growth path where the industrial restructuring had taken place and thus jobs were retained and the region was able to get involved in the European and global division of labour.

The regions (NUTS 2 units, there are 35 in the Visegrád countries) were examined in terms of the changes in the number of workers in the manufacturing and the volume of value added in the period 2000–2008.

The changes in the number of workers in the secondary sector on a national level were described previously, now the regional dimension of the changes is being presented. Each of the four Visegrád countries shows a different configuration. Hungary and Slovakia are a couple of contrast, for while in Hungary all the regions – although to different extents – were affected by the labour market de-industrialisation (decreasing employment in the industry), in the northern neighbouring country the powerful industrialisation that can be demonstrated at national economy level made its positive effect felt in all the regions. In Hungary the largest decrease was shown by Central Hungary, as a result of the powerful tertiarisation of Budapest. A similar extent of decrease can be registered in the Southern Dunántúl. The decrease was of the smallest extent in Central Dunántúl. In Slovakia the number of jobs in the industry increased to the greatest extent in the western areas close to Bratislava, and to the smallest extent in the capital itself.

In the Czech Republic and Poland the processes within the industry have a more mixed spatial print. In the Czech Republic the regions of the capital and the country/rural regions are sharply divided. While in Prague the number of industrial workers decreased both in the absolute and the relative extent, it increased in the other seven regions. The region of Střední Čechy (close to the capital) and the region in the North-West (Severovýchod) benefited most from the labour market expansion of the industry. In Poland the wider surroundings of Warsaw (Mazowieckie) showed the largest increase, in addition, the number of workers in the secondary sector increased in most of the regions of the country (ten). At the same time in six regions the number of workers in the industry decreased (in central Lódzkie, in South-Eastern Malopolskie and Lubelskie, in Opolskie in Śląskie, and in the Northern Zachodniopomorskie and Kujawsko-Pomorskie).

In terms of value added, each region showed an increase, although the values show a significant scatter. It is a general phenomenon that the increase of the industrial value higher than the national average took place in the regions of the capital or around the capital (the exception being Mazowieckie in Poland). This is a particularly outstanding performance when it was taken into consideration above that central regions are characterised by a decreasing or stagnating number of industrial workers. It can be read from the two processes that the capitals are likely to excel in attracting and retaining knowledge- and technology-intensive industries creating a high value added. In addition, the figures disclose that the regions around the capitals also enjoy the benefits of the spatial restructuring of the industry. This lends itself particularly well to measuring in the Czech Republic and Slovakia: in Střední Čechy and Západné Slovensko (Western Slovakia). These trends are less characteristic of Poland.
In the Czech Republic, in addition to the dynamic growth of the capital and the regions around it, Moravskoslezsko achieved a higher level of expansion rate. In Hungary, in terms of value added Northern Hungary and Central Dunántúl showed a higher growth, although below average; thus in this case the traditional (north-eastern – south-western) industrial axle of the country is reflected. It is interesting that in Slovakia the dynamics of the expansion of the industrial value is given not by the region of Bratislava, but by the regions in Western and Eastern Slovakia, where the largest increase in value added could be registered in the complete Visegrád population. The most complex picture in this comparison is also provided by Poland. Among the Visegrád countries Poland has the lowest value added increase while thus the slower rate is better distributed in spatial terms, for the industrial value added increased in 8 regions at a rate above the national average. It is conspicuous that in these regions employment in the industry also increased by a larger rate in the period examined. It follows that in these regions the expansion of production in the labour-intensive industries provided the foundation for this development.

As a result of the transformation the following regional economic configurations had developed in the Visegrád countries by 2006. The group of the central regions is easy to separate in terms of sectoral distribution. In these regions the role of the tertiary sector is outstanding concerning both the labour market and the value added. In the case of Bratislava and the region of Warsaw (Mazowieckie) it is possible to recognise individual features. In the former the industry can be regarded as significant in value creation, while in the latter the role of the agriculture as employer becomes important due to the peripheral, rural regions. This group also includes the region of Szczecin (Zachodniopomorskie).

The majority of the remaining 31 regions (27) possess secondary sectors more significant than average, considering both the labour market and the value added.

Fig.3 The role of the industry in the economies of regions (% 2008)

Source: authors’ compilation on the basis of EUROSTAT data

In the Czech Republic and Slovakia the country regions (outside the capital) show a particularly strong, individual industrial character in both aspects. Only in Western Slovakia (Západoslovensko), in the ‘larder of the Highlands’, does agriculture appear as a characteristic sector in terms of value added.

Hungary and Poland present more mixed pictures with more and more diverse regions. In Hungary the earlier (south-west – north-east) industrial axle is still evident, but the industrial character appears combined with agriculture also outside of these regions. It is only in Southern Dunántúl (Dél-Dunántúl) that the agriculture is an employer with above average weight. In Poland, particularly in the east, the agricultural profile appears markedly and it gradually weakens towards the west. In the easternmost regions the labour market and economic roles of the
primary sector are also characteristic. At the same time in Silesia (Slaskie, Dolnoslaskie) and in the south (Malopolskie), as well as in the western and south-western regions (Lubuskie) the industry has maintained its priority role.

In summary it can be stated that industry shows outstanding significance in half of the regions (in eighteen) and has a characteristic role in ten more. In the Czech, Slovakian and Silesian regions with significant industrial traditions and capacities, where it was possible to modernise the production structure via the appearance of foreign working capital in the second half of the transition period, the industry continues to have an outstanding significance. The capital regions having a dominance of the tertiary sector differ substantially from this, and so do the eastern regions in Poland and the southern regions in Hungary with their agricultural characteristics.

V Concentration of production
The question of concentration is another fascinating aspect of industrialisation. The level of concentration can be applied both in sectoral and regional context. The Herfindhal-Hirschman index offers an easy method to quantify the diversification:

\[ H = \sum_{i=1}^{n} s_i^2 \]

in which \( s_i \) = the share of i territorial unit or sector.

The calculations have been made for sectors and regions using employment and value added data. Generally it can be stated that both levels of concentration of value added and the employers tended to increase. Naturally the rates are varying among countries.

By the sectoral comparison the employers and value added as well show continuous increase during 2000-2008, which means reduction in diversification. First it must be emphasized that all the figures have small values.

The sectoral distribution of industrial productions is more concentrated by its values than its employers. (i.e. the value added indices have higher values than the employment). Comparing the countries Hungary with Slovakia possess higher rate of concentration (i.e. higher rate of specialization) than Czech Republic and Poland.

The quantification of regional concentration indicates higher rate than the sectoral ones. This time also significant differences can be found among countries. Seeing the values

The specialization and concentration are the most prevailing effects of the
industrialization during the period 2000-2008, which have reduced the diversification both in sectoral and regional ways.

VI Conclusion
In the past two decades the role of industrial activities has shown significant modifications both in inter- as well as in intra-sectoral comparison. The first half of the 1990s was characterised by a strong de-industrialisation in terms of both the economy and of the labour market. The process generated severe social tensions (increase in unemployment and decrease of the income level). By the 2000s, accession to the European Union, the convergence of the Visegrád countries, the recovery of the global economy and the inflow of capital resulted in a considerable expansion of the production capacities in East Central Europe, a simultaneous increase in the number of jobs in the industry as well as in the volume of the exports of goods. This period (2000-2008) involved a restructuring within the secondary sector. As a result of the medium- and high-tech industries gaining ground, we can talk about a re-industrialisation of the neo-industrialisation type.

The regional comparison at the same time has shown that the favourable macro-economic processes cover significant spatial differences within the industry. The regions of the capitals (with high-tech activities) and the regions with a favourable geographical location and considerable industrial traditions can be regarded as the winners of the transition. In these areas foreign capital resulted in restructuring, an increase in the efficiency of labour and an expansion of production. At the same time mention must be made of the losers of the transition, of the regions where the restructuring generated by the domestic and international (capital) resources failed to materialise. Thus the share of the industry in the economies of these regions decreased or stagnated at a low level. This exerted a negative effect both on employment and the income producing capacity.

The various spatial elements, or groups of regions established as a result of the analysis can be described in short as follows:
- The capital regions (‘absolute winners’) where the economy demonstrated a dynamic growth, labour is flexible and active, the services sector is wide, and production capacity is well-developed with an infrastructure serving it.
- The secondary beneficiary (potential converging) regions, which enjoy favourable geopolitical location (mostly western), are urbanised, possess considerable and modernised industrial traditions and capacities as well as a well-developed services sector (although of a smaller weight) and are thus successfully involved in the European division of labour and value creation.
- The regions that are the losers of the transition (‘potential laggards’) are the regions with less favourable geographical location, lying on the (inner or outer) periphery, where the economic restructuring is still ongoing, which results in an unfavourable sectoral division of the economy and unfavourable labour market conditions.

The performance of the manufacturing remains of outstanding significance concerning the future sustainable economic development of East Central Europe. That is why it is a priority task to retain and take advantage of the industrial competitive advantages, primarily against the highly developed competitors in Western Europe and North America. To achieve that, the most important tasks seem to be attracting working capital, developing an investor-friendly environment, developing the infrastructure, easing the dual company
structures (by supporting SMEs) and ensuring the appropriate vocational and professional training meeting the market demand.

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