The Evaluation of the Potential of Lithuanian Manufacturing Industry Structure on the basis of CI Index

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Industry is a significant strategic part of every country economics. Achievements of activities in industry influence an overall level and the growth of economics and welfare of a country. Therefore it is important and beneficial to analyze the structure of industry and its changes; to be aware of activities that are most significant in the structure of industry of a particular country. The analysis of the structure of industry allows us to determine the most significant branches of industry. Finally, the determination of the most significant branches of industry and changes of their significance allows evaluating the potential of the structure and the importance of that structure of industry in overall view of economics. Nowadays the results, changes and dynamics of industry are important in order to evaluate capabilities of national industry companies and also to compete in open global economy.

Lithuanian industry structure was formed as a result of economic transformation in conditions of global market competition and economic integration to the European Union. The market failures and imperfections are revealed in the industry of Lithuania, especially in the areas of progress of science and technique, information technologies and management. The significance of low value-added industries in Lithuania is obvious, and higher technologies are not used in such level as in the developed countries. It is essential that Lithuanian industrial companies identify their comparative advantage in the products of traditional branches of industry. Nowadays industry companies are forced to seek for the means to withstand global competition. Considering the results of restructuring the industry, it is important to evaluate a set of factors, affecting industry's activity and structure.

Some of the applied tools to measure the structure of industry were the evaluation of export specialization, as suggested by Balassa (1965), analyzing knowledge intensive in manufacturing industry by using the index of knowledge composition of export (Sheehan, Tikhomirova, 1996), also using the method of export unit values (Brunner, Cali, 2006) and others.

This paper presents the analysis of changes of Lithuanian industry structure in 2000-2008 and the evaluation of the potential of the structure of manufacturing industry by using modified Indices of the Long Run Income Potential of Industry Structure. In order to assess the changes in the structure of manufacturing industry five key characteristics of industries - value added, wage per employee, export growth, export intensity and output growth - are outlined and used in this study. The results of Indices of the Long Run Income Potential of an industry structure reveal the possibilities of Lithuanian industry branches to operate and generate increasing incomes in the long term.

Keywords*: industry, industry structure, potential of industry structure.*

Introduction

By analyzing the changes in the industry structure, it is necessary to evaluate the set of key characteristics through which it is possible to describe the changes. The conception of industry structure characterizes industry composition, characteristics and the environment in which the industrial companies operate. The changes of industry structure depend on a certain market concentration degree, conditions to the entrance of a market, production differentiation and companies diversification. The change of industry structure, influenced by constantly dynamic environment, became a difficult process. The problem of the detail analyses of an industry structure is significant, because small open economies, which are characterized as small national markets, are insufficient to support even a single company of optimal scale in many industries. Most industries of small economies are exposed to international competition and become vulnerable to changes in international markets. Deeper understanding of the structural changes of industry is useful for the implementation of national industrial policy.

The results of the researches of industry structure and the theoretical issues of the analysis and methodology were presented by foreign scientists Misra (2006), Janissen, Thomson, Clark and Geer (1998), Sheehan and Tikhomirova (1996), Tikhomirova (1997), Brunner and Cali (2006), Schott (2004), Hallack (2004), Carlton, Perloff (1994), Szirmai, Bai and Ren (2005). The issues of Lithuanian industry problems in the scientific literature are closely related to the competitiveness aspects and problems of industries, industrial companies or regions (Snieska, 2008, Snieska, Bruneckiene, 2009, Pukeliene, Maksvytiene, 2008, Bernatonyte, Normandiene, 2009, Saboniene 2009, Banyte, Salickaite, 2008, Kazlauskaite, Buciuniene, 2008, Vaidogas, Juocevicius, 2008, Rutkauskas, 2008). Nevertheless, after performing the analysis of scientific literature, it became evident that there has been limited research carried out on Lithuanian industrial

structure (Dumciuviene, 2001, Glinskiene, Daraskeviciute, Lipinskiene, 2006).

The estimation of the potential of a manufacturing industry structure and the analysis of its changes are significant scientific problems. The paper is targeted towards solving this problem and it is considered to analyze the changes of Lithuanian manufacturing industry structure in the context of the economic integration to the EU and globalization in the changing economic conditions in Lithuania.

Object of scientific research – the structure of a manufacturing industry.

The main aim of this paper is to present the analysis of an industry structure in 2000–2008 and to reveal the potential of manufacturing industry.

Research tasks of the paper are to analyze the conceptions and main issues of measuring industry structure and potential on the basis of contemporary theories, to perform the analysis of modified CI index (the Index of the Long Run Income Potential of Industry Structure) of Lithuanian industry during 2000–2008.

Methods of the scientific research that have been employed in the paper are the scientific analysis and summarizing of literature, mathematic calculations and a comparative analysis of statistic indexes.

The paper is organized as follows: the first part outlines the theoretical basis of factors, affecting the changes of industry structure. The second part provides the overview of estimation of Index of the Long Run Income Potential. The results of the selected indices of Lithuanian manufacturing industry are presented in the third part.

Factors affecting the changes of industry structure

The industrial activity and the structure of the industry depend on its internal factors, particularly on the country's competitive market conditions and the impact of the macroeconomic environment. The formation and strengthening of competitive advantages in industry depend on dynamic, competitive market forces, economic, cultural, legal, security and other environments.

R&D development is the most important factor which has a significant impact on the manufacturing industry efficiency and competitiveness in the domestic and foreign markets and promotes structural changes of industry. R&D intensity is analyzed and applied in various research models as a key indicator in evaluating the changes in an industry structure (Tikhomirova, 1997; Sheehan, 2000; Baldwin, Hanel, Sabourin, 2000; Ghosal, 2004; Silva, 2007).

Baldwin, Hanel and Sabourin (2000) examined how several factors contribute to an innovative activity in the manufacturing sector. Baldwin, Hanel and Sabourin (2000) evaluated these industry factors for the analysis of the innovative activity in manufacturing firms:

- technological opportunities (measuring by the percentage of R&D agreements with universities or R&D institutions);

- competitive conditions (measuring the potential competition by grouping firms according to whether they face more of fewer competitors).

Baldwin, Hanel and Sabourin (2000) offered to divide manufacturing industries into groups, in accordance with the level of the researches scope.

Ghosal (2004) identified the following key industry structure factors:

- research and development intensity;
- advertising intensity;
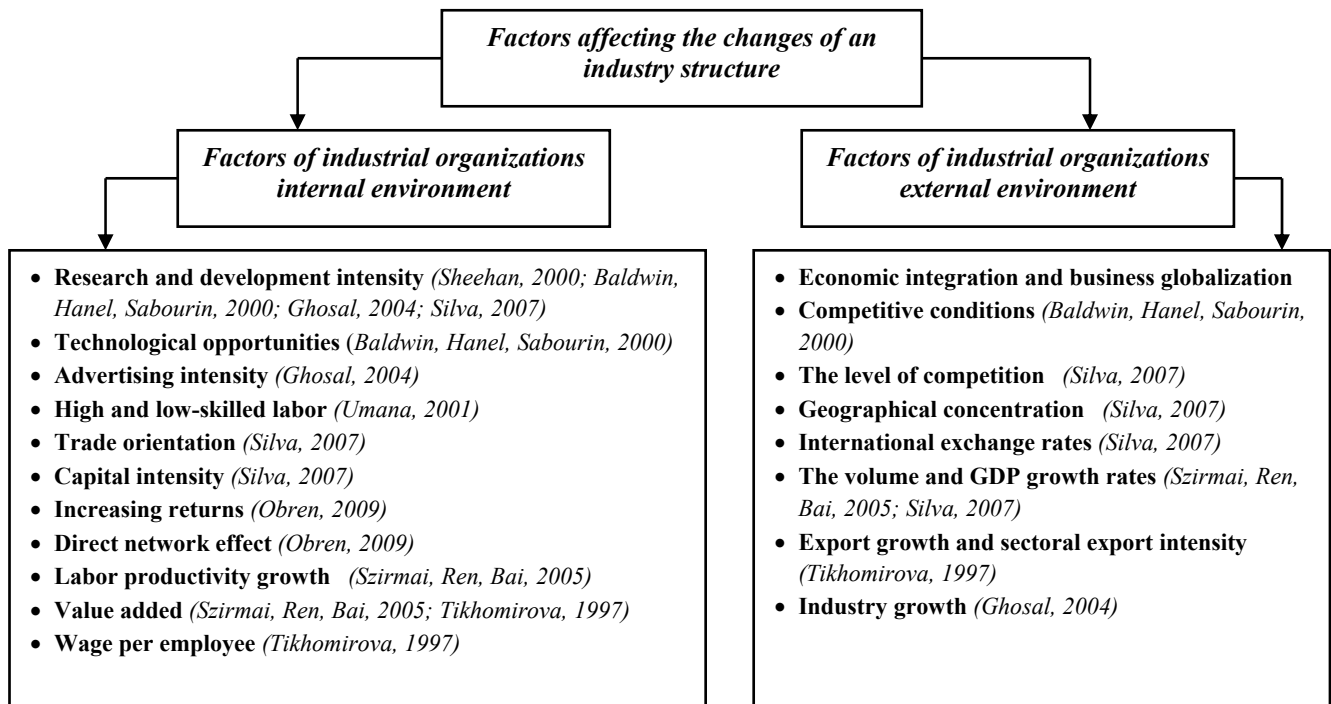- industry growth rate, calculated as the average of real sales growth rate.

Sheehan (2000) maintains, that the shift from goods industries to the knowledge and person based industries in terms of the composition of GDP or employment is a fundamental feature of the knowledge economy, but while there is some increases demand for services as final products, activities related to the creation, production of goods still lie in the heart of advanced economies.

Silva (2007) analyzed an international trade and the changing demand for skilled workers in high-tech manufacturing industries. Various criteria are used to define high-tech industries, such as research and development expenditures as a percentage of sales, technical sophistication of products and a degree of human capital employed. High-tech sectors are commonly believed as able to employ high shares of skilled labor and exhibit a high degree of innovation in designing new products and production processes. Thus, Silva (2007) confirms that a competitive advantage of high-tech sector depends on the R&D development.

Silva (2007) used a regression analysis for the studies and outlined, that the changes in exchange rates and trade orientation have similar effects across high-tech and traditional manufacturing industry groups.

According to Silva (2007), a measure of capital intensity is included in the control of differences in industry asset structures. Capital intensity exceeding affects the increase of the demand for skilled labor, in order to apply new technologies (Haskel, Slaughter, 2002; Berman, 1994; Wood, 1998).

Obren (2009) analyzed links between industry changes and increasing returns and used a generalized linear model for the analysis of the changes of industry branches. The results of study confirmed the hypothesis, that industries with increasing returns experience greater frequency of change than industries with constant returns.

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                    │ Factors affecting the changes of an │
                    │       industry structure        │
                    └─────────────────────────────────┘
        ┌──────────────────────────────┐   ┌──────────────────────────────┐
        │ Factors of industrial organizations │   │ Factors of industrial organizations │
        │      internal environment     │   │      external environment     │
        └──────────────────────────────┘   └──────────────────────────────┘
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Factors of industrial organizations internal environment	Factors of industrial organizations external environment
• **Research and development intensity** *(Sheehan, 2000; Baldwin, Hanel, Sabourin, 2000; Ghosal, 2004; Silva, 2007)* • **Technological opportunities** *(Baldwin, Hanel, Sabourin, 2000)* • **Advertising intensity** *(Ghosal, 2004)* • **High and low-skilled labor** *(Umana, 2001)* • **Trade orientation** *(Silva, 2007)* • **Capital intensity** *(Silva, 2007)* • **Increasing returns** *(Obren, 2009)* • **Direct network effect** *(Obren, 2009)* • **Labor productivity growth** *(Szirmai, Ren, Bai, 2005)* • **Value added** *(Szirmai, Ren, Bai, 2005; Tikhomirova, 1997)* • **Wage per employee** *(Tikhomirova, 1997)*	• **Economic integration and business globalization** • **Competitive conditions** *(Baldwin, Hanel, Sabourin, 2000)* • **The level of competition** *(Silva, 2007)* • **Geographical concentration** *(Silva, 2007)* • **International exchange rates** *(Silva, 2007)* • **The volume and GDP growth rates** *(Szirmai, Ren, Bai, 2005; Silva, 2007)* • **Export growth and sectoral export intensity** *(Tikhomirova, 1997)* • **Industry growth** *(Ghosal, 2004)*

Figure 1. Factors affecting the changes of an industry structure

Obren (2009) maintained that industries with direct network affect a significant value of information in their output and experience higher frequency of change than other industries. Szirmai, Ren and Bai (2005) applied the method of unit values ratios for a comparative analysis value added and labor productivity of industry and considered such factors as industry growth rates, a share of GDP per capita and labor productivity growth in gross value added.

Nevertheless, for a deeper analysis of the industry structure, its changes or reasons, all factors that are associated with both internal and external environment of industrial organizations should be viewed (Figure 1).

Index of the Long Run Income Potential of Industry Structure

One of the approaches of analyzing changes an industrial structure as a whole was developed by Tikhomirova (1997). She suggested a framework, which was used to describe the changes with a particular emphasis on the long-run income potential of industry structure. Five key characteristics of industries were outlined and used to analyze all branches of a manufacturing industry. These characteristics were used in order to estimate the Index of the Long Run Income Potential of Industry Structure for assessing changes in the structure of trade and production of different countries. Tikhomirova (1997) maintains that the index is an analytical tool for the evaluation of manufacturing and is based on the proposition that, other things are equal, a country with an industry structure showing a high value of the index should be able to generate a high level of per capita income for citizens. Other things are never equal (the degree of value added or the level of R&D may be much lower in different countries). It is not claimed that a high or rising value of this index is invariably associated with high and increasing per capita income, nor that individual countries should pursue an industry structure with a high value of this index as the optimal development strategy. The components of index serve to highlight relevant features of industries, and the index provides a perspective on changes in the structure of trade and production in different countries. So, the index is a descriptive tool, which is capable to compress five different dimensions of an industry structure in a quantitative form, readily available with a comparison over time and across countries.

Five components, which were used in the analysis, are presented in Figure 2. The overall rationale for the analysis is that the level of sustainable income which can be provided by an industrial structure is related to the level of value added per employee and to the extent to which the benefits of that value added can be transferred to employees in the form of wages, rather than retained by the owners of capital.

According to Tikhomirova (1997), for a given level of value added or wages per employee, the long-run potential of an industry structure must also be associated with the extent to which that structure relates to the growth and changes in the global economy.
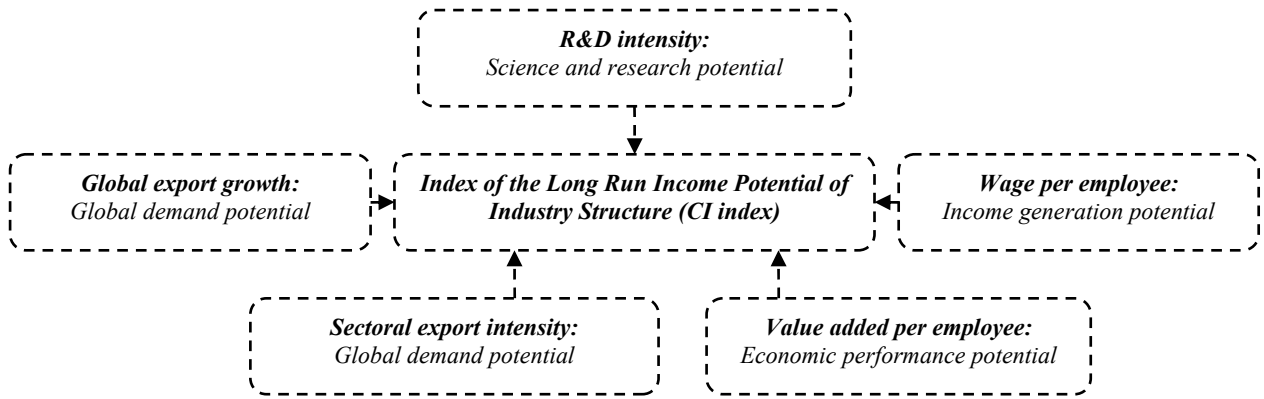
Figure 2. The components of Index of the Long Run Income Potential

These elements are captured by a changing global demand for products and by the degree of R&D intensity in an industry.

These five indicators can be of different relative significance depending on specific conditions in particular countries. In this approach the component's weights are equal to one and the overall composition rank is derived as an arithmetic mean of these five ranks.

So, the branches of manufacturing industry are ranked according to each indicator and the higher value of an indicator is associated with the higher ranking value.

Numeric value of the overall rank indicates the combined effect of all five components. Finally, the branches of manufacturing industry are sorted according to the overall composite rank in a descending order. In order to evaluate an industrial structure and structural changes, proportions between the components of this structure need to be assessed by considerable sectoral shares of manufacturing industries and their changes. The application of the values of the overall composite rank allowed the development of the Index of the Long Run Income Potential of Industry Structure:

$$CI_T^i = \frac{\sum_j^n (X_j^i I_j)}{\sum_j^n X_j^i} \tag{1}$$

where:
CI – the Index of the Long Run Income Potential of Industry Structure:
i – a country,
j – the industry,
n – the total number of manufacturing industries,
I – the value of the overall composite industry rank,
X – exports.

If manufacturing exports were equally divided across industries,

$$X_j^i = \frac{X_T^i}{n} = \frac{\sum_j^n X_j^i}{n} \tag{2}$$

where:
X_T^i – total manufacturing exports for the country i.

$$CI_T^i = \frac{\sum_j^n \left[\left(\dfrac{\sum_j^n X_j^i}{n} \right) I_j \right]}{\sum_j^n X_j^i} = \frac{\sum_j^n X_j^i \sum_j^n I_J}{n \sum_j^n X_j^i} = \frac{\sum_j^n I_j}{n} = \overline{CI_T}$$

$$\overline{CI_T} = \frac{\sum_j^n I_T}{n} = \frac{I_T}{n} \tag{3}$$

where:
$\overline{CI_T}$ – the average value of Income potential ($X_j^i = \frac{X_T^i}{n}$),

I_T – the sum of the values of the overall composite industry rank for all manufacturing industries.

The value of $\overline{CI_T}$ can be used as a base for benchmarking the value of the Index of Income Potential:

$$RCI_T^i = \frac{CI_T^i}{CI_T} = \frac{\sum_j^n \left(X_j^i I_j \right)}{\left(\sum_j^n X_j^i \right) \overline{CI_T}} \tag{4}$$

where:
RCI – the Rebased Index of Long Run Income Potential of Industry Structure.

If the value of CI is equal to the average value, the RCI is equal to 1. CI and RCI reveals the evaluation of manufacturing exports, but the same approach can be applied for the evaluation of value added, gross output, employment and other factors. Tikhomirova (1997) outlined that high index values indicate that the industrial structure is biased towards the areas of higher income generating potential or industries characterized by high values of the overall composite rank have high values of sectoral shares of total manufacturing. This implies that such a structure is favorable for generating high levels of welfare, but actual income levels achieved by different countries depend on their ability to utilize the potential of

manufacturing sectors with high values of the composite rank. The analysis of an industrial structure and of structural changes can provide a good basis for the studies of economic performance in different countries.

The results of evaluation of the potential of Lithuanian manufacturing industry structure

On the basis of the methodology presented by Tikhomirova (1997), this paper uses the modified *CI* indices to explicitly assess the potential of Lithuanian manufacturing industry structure.

For the estimation of Lithuanian manufacturing industry *CI* indices five indicators were used in the analysis:

- value added per employee;
- average wage per employee;
- export growth (%);
- export shares of particular industries in total industry export (%);
- output growth (%).

R&D intensity is an important criterion for the development of particular industries and provides information about the degree of the sophistication of an industrial output and of the knowledge embodied in the goods produced. The R&D requires a highly skilled, educated labor force. R&D intensity is the indicator of science and research potential taking into account the

significance of knowledge intensity for future development. Nevertheless, statistics do not provide data about R&D intensity in Lithuanian manufacturing industries.

Value added generated in a particular economy is a criterion of economic performance and a welfare indicator. This indicator presents the ability of a nation to generate value added production, employing resources in the most productive and efficient ways. The industries associated with high value added also provide high levels of income and wage levels. Export growth, output growth and export shares of manufacturing industries in total export provide information about demand conditions and are the important characteristics for the evaluation of the potential of particular industries.

All components were averaged for a three years period in order to eliminate the influence of annual variations. The components weights in this analysis were equal to one of an overall composition ranks which were derived as an arithmetic mean of all five ranks – value added, wage per employee, export growth, export share and output growth. The numeric value of the overall rank indicates the combined effect of all five components. The overall composition ranks of manufacturing industries are presented for three periods in order to estimate changes every three years (Table 1).

Table 1

Overall composition ranks of value added, wage, export growth, export share, output growth of manufacturing industries in

Lithuania

Manufacturing industries	Overall composition rank *(I)* 2000–2002	Overall composition rank *(I)* 2003–2005	Overall composition rank *(I)* 2006–2008
Manufacture of food products, beverages and tobacco	7.0	6.8	7.6
Manufacture of textiles and textile products	5.0	4.4	3.0
Manufacture of leather and leather products	3.0	1.4	2.0
Manufacture of wood and wood products	7.4	5.4	5.8
Manufacture of pulp, paper and paper products; publishing and printing	6.6	7.0	7.0
Manufacture of chemicals, chemical products and man-made fibres	9.0	10.4	13.0
Manufacture of rubber and plastic products	9.6	9.0	8.2
Manufacture of other non-metallic mineral products	4.8	7.6	7.6
Manufacture of basic metals and fabricated metal products	7.4	8.4	8.4
Manufacture of machinery and equipment n.e.c.	7.2	6.8	7.4
Manufacture of electrical and optical equipment	9.0	7.0	5.6
Manufacture of transport equipment	10.4	9.2	11.2
Manufacturing n.e.c.	4.6	7.6	4.2

Source: calculated by the author according to the data of The Department of Statistics to the Government of the Republic of Lithuania.

The value of the overall composite rank is a general indicator of income generating potential of manufacturing industries and it is a useful criterion according to which the industries can be allocated in a certain order and the relative positions of the industries which can be evaluated. Particular industry characteristics are important to evaluate their impact to overall rank.

The analysis reveals the high positions of overall compositions ranks of Chemicals and chemical products industry, also Transport equipment industry. Both

industries have a growing trend of overall ranks during 2000–2008 and all five components have relative high ranks among other industries. Rubber and plastic products industry has a very high ranking value added per employee but a low share of export, so the overall composition rank of this industry had a decreasing position during 2000–2008. The results of value added are high in Pulp, paper and paper products industry, but other characteristics are lower among other industries. Basic metals industry has an increasing growth of export volumes and output, so an

overall rank is relatively high, and it has a growing trend. Electric and optical equipment industry is characterized by relatively good ranks of value added per employee, average wage and export share, but overall rank has rapidly decreased. Manufacturing of machinery and equipments has lower value added per employee, but other characteristics are still good. Traditional industries – Wood and wood products, Food products and beverages, Textiles and textiles products have high exports shares among other industries and low value added and average wage volumes. The overall rank among traditional industries is the best in Food products and beverages industry, so the overall rank is increasing. The overall rank of Wood and wood products

industry has a decreasing trend. The combination of a high export growth and high export shares ranks gives cause to expect the increasing strength of these industries in the future. It is notable for Chemicals and chemical products industry, Basic metals industry, Transport equipment industry, Machinery and equipment industry.

For assessing the structure and changes of total manufacturing, consisting of 13 industries, the Index of the Long Run Income Potential of Industry Structure *CI* was applied in this study (Table 2). In this approach *CI* reveals the changes of manufacturing export.

Table 2

Indexes of the Long Run Income Potential of Industry Structure in Lithuania 2000–2008

Manufacturing industries	2000–2002	2003–2005	2006–2008
Manufacture of food products, beverages and tobacco	0.83	0.83	1.03
Manufacture of textiles and textile products	1.21	0.71	0.32
Manufacture of leather and leather products	0.04	0.01	0.01
Manufacture of wood and wood products	0.89	0.77	0.75
Manufacture of pulp, paper and paper products; publishing and printing	0.11	0.12	0.14
Manufacture of chemicals, chemical products and man-made fibres	0.84	1.08	1.82
Manufacture of rubber and plastic products	0.34	0.37	0.40
Manufacture of other non-metallic mineral products	0.08	0.12	0.12
Manufacture of basic metals and fabricated metal products	0.35	0.50	0.60
Manufacture of machinery and equipment n.e.c.	0.30	0.39	0.55
Manufacture of electrical and optical equipment	0.70	0.59	0.43
Manufacture of transport equipment	1.52	1.34	1.52
Manufacturing n.e.c.	0.14	0.33	0.17
Index of the Long Run Income Potential of Industry Structure *CI*	**7.35**	**7.16**	**7.86**
The average value of *CI*	7		
Rebased Index of Long Run Income Potential of Industry Structure *RCI*	**1.05**	**1.02**	**1.12**
Base level of *RCI*	1		

Source: calculated by the author according to the data of The Department of Statistics to the Government of the Republic of Lithuania.

The application of the Index of Long Run Potential shows trends in the structure of manufactured exports of Lithuanian industry. The average value of *CI* index was equal to 7 and the results of *CI* indexes of Lithuanian manufacturing industry were higher than average value. *CI* index had a decreasing trend in 2003–2005 in a comparison with 2000–2002, but the index increased in 2005–2008. Most significant inputs to *CI* index were made by Chemicals and chemical products industry, Transport equipment industry and Food products as well as beverages industry. These industries can be described as able to generate the increasing income in future. The increase of significance of Chemicals and chemical products industry is evident during 2000–2008. Basic metals industry, Machinery and equipment industry, Rubber and plastic industry have growing trends of inputs to *CI* index. The results decreased in Electrical and optical equipment industry. The biggest fall during the analyzed period was observed in traditional branches – Textiles and textile products industry, Wood and wood products

industry. The analysis of *CI* changes is important for the evaluation of development trends of every particular manufacturing industry and it allows to assess the significance of the particular industry in the country. Rebased Index RCI allows to estimate the Income potential of manufacturing exports in comparison to the base level in different countries or regions.

Conclusions

Considering changes of industry structure, a set of significant factors should be viewed for a deeper analysis of an industry structure. Most of these factors are associated with internal and external environment of industrial organizations, such as technological opportunities, high and low-skilled labor, capital intensity, labor productivity growth, competitive conditions, export intensity and others. R&D development is the most significant factor, which has an important impact on the manufacturing industry efficiency and competitiveness in

the domestic and foreign markets. It affects structural changes in the industry. R&D intensity is analyzed and applied in researches as a key indicator for the evaluation of changes in the industry structure.

The analysis of Lithuanian manufacturing industry was performed in order to describe the changes with a particular emphasis on the long-run income potential of an industry structure. Five key characteristics – value added per employee, average wage per employee, export growth, export share and output growth – were outlined and used for this purpose. Nevertheless, it was not possible to use the data of R&D intensity of Lithuanian manufacturing industries in the case of it being out of data.

The overall composition rank indicates the combined effect of all five components and is a general indicator of income generating potential of manufacturing industries. It is a useful criterion according to which the manufacturing industries can be allocated in a certain order.

The analysis of Lithuanian manufacturing industry reveals the high positions of overall compositions ranks of Chemicals and chemical products industry and Transport equipment industry, all five components have relative high ranks among other industries. Rubber and plastic products industry has a very high rank of value added per employee but low share of export. Basic metals industry has an increasing growth of export volumes and output. Electric and optical equipment industry is characterized by relatively good ranks of value added per employee, average wage and export share, but overall rank rapidly decreased. Traditional industries – Wood and wood products industry, Food products and beverages industry,

Textiles and textiles products industry have high exports shares among other industries and low value added and average wage volumes. The combination of high export growth and high export shares ranks gives cause to expect the increasing strength of these industries in the future, so it is notable for Chemicals and chemical products industry, Basic metals industry, Transport equipment industry, Machinery and equipment industry.

The Index of the Long Run Income Potential of Industry Structure *CI* was applied in this approach in order to reveal the changes of manufacturing export. *CI* indexes of Lithuanian manufacturing industry had a decreasing trend in 2003–2005 as compared with 2000–2002, but the index increased in 2005–2008. The most significant inputs to *CI* index were made by Chemicals and chemical products industry, Transport equipment industry and Food products as well as beverages industry. These industries can be described as being able to generate increasing income in the future. Basic metals industry, Machinery and equipment industry, Rubber and plastic industry had the growth trends of inputs to *CI* index. Most decreasing results during the analyzed period were observed in traditional branches – Textiles and textile products industry, Wood and wood products industry.

The analysis of *CI* changes is important for the evaluation of development trends of every particular manufacturing industry and it allows to assess the significance of a particular industry in the state.

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Asta Sabonienė

Lietuvos apdirbamosios pramonės struktūros potencialo vertinimas CI indeksu

Santrauka

Viena iš kiekvienai šaliai reikšmingų ekonomikos strateginių dalių – pramonė. Šalies pramonės šakų rezultatai lemia šalies ekonomikos augimą ir gerovės lygį, todėl yra naudinga analizuoti pramonės struktūrą ir jos pokyčius, giliau įvertinti, į kokias veiklas yra orientuota šalies pramonės struktūra. Ekonominės integracijos sąlygomis konkurencingos pramonės šakos įgyja vis didesnę reikšmę tarptautinėse rinkose. Todėl pramonės struktūros ir jos pokyčių analizė turėtų apimti ne tik vidinių, bet ir išorinių šalies pramonės plėtros galimybių vertinimą.

Reikšmingų pramonės šakų ir jų reikšmės pokyčių nustatymas leidžia vertinti pramonės struktūros potencialą, parodantį pramonės šakų galimybes generuoti pajamas, ir pramonės struktūros reikšmę šalies ekonomikai, o detalesnė identifikuotų reikšmingų pramonės šakų veiklos ir plėtros analizė galėtų padėti vertinti, ar esama tam tikros šalies pramonės struktūra yra orientuota į tas veiklas, kurios būtų paklausios ne tik šalyje, bet ir už jos ribų.

Daug dėmesio pramonės struktūros tyrimų metodikai ir pramonės struktūros tobulinimo problemai skiria užsienio mokslininkai Misra (2006), Janissen, Thomson, Clark ir Geer (1998), Sheehan ir Tikhomirova (1996), Tikhomirova (1997), Brunner ir Cali (2006), Schott (2004), Hallack (2004), Carlton, Perloff (1994), Szirmai, Ren ir Bai (2005).

Lietuvos pramonės struktūros klausimai mokslinėje literatūroje glaudžiai siejami su konkurencingumo aspektais. Šalies regionų, pramonės šakų, eksportuojamos produkcijos ir įmonių konkurencingumo klausimus analizuoja Snieška (2008), Snieška, Bruneckienė (2009), Pukelienė, Maksvytienė (2008), Sabonienė (2009), Banytė, Salickaitė (2008), Kazlauskaitė, Bučiūnienė (2008). Lietuvos pramonės struktūros pokyčius tiria Dumčiuvienė (2001), Glinskienė, Daraškevičiūtė, Lipinskienė (2006). Kita vertus, darbuose pasigesta sistemingos pramonės struktūros analizės, jungiančios analizuojamas pramonės rodiklių grupes į visumą.

Lietuvos apdirbamosios pramonės struktūros pokyčių ir potencialo analizė yra aktuali problema, siekiant įvertinti pramonės plėtros galimybes, išskirti pramonės šakas, galinčias ilguoju laikotarpiu generuoti didėjančias pajamas, prognozuoti pramonės šakų plėtros tendencijas. Straipsnyje Lietuvos pramonės struktūra tiriama 2000–2008 m. laikotarpiu, įvertinant reikšmingus pramonės šakų rodiklius: pridėtinę vertę, tenkančią vienam darbuotojui, vidutinį darbo užmokestį, eksporto augimą, šakos eksporto intensyvumą, gamybos augimą. Šių rodiklių analizė leidžia apskaičiuoti CI indeksą (angl. *The Index of the Long Run Income Potential of Industry Structure*), kuris įvertina skirtingų šalių ar regionų pramonės potencialą generuoti pajamas ateityje.

*Mokslinių tyrimų objektas***:** Lietuvos apdirbamosios pramonės struktūra.

*Straipsnio tikslas***:** atlikti Lietuvos apdirbamosios pramonės struktūros pokyčių analizę, siekiant nustatyti apdirbamosios pramonės šakų potencialą ir plėtros galimybes.

*Tyrimo metodai***:** literatūros mokslinė analizė ir apibendrinimas, matematiniai skaičiavimai, statistinių rodiklių lyginamoji analizė.

Lietuvos apdirbamosios pramonės struktūros ir potencialo tyrimui atlikti taikytas modifikuotas Tikhomirovos (1997) pramonės struktūros analizės metodas, kuris vertina pramonės struktūrinius pokyčius atsižvelgiant į pagrindinius veiksnius, apibūdinančius pramonės veiklos rezultatus. Tyrime

įvertinamos atskirų pramonės šakų rodiklių grupės: pridėtinė vertė, tenkanti vienam darbuotojui, vidutinis valandinis darbo užmokestis, eksporto augimas, šakos eksporto dalis visame apdirbamosios pramonės eksporte, gamybos apimčių didėjimas.

Siekiant įvertinti bendrus sudėtinius (t. y. visų penkių rodiklių grupių) pramonės šakų svorinius koeficientus, remiamasi logika, kad ta pramonės šaka, kurios atitinkamas rodiklis yra didžiausias, įgyja didžiausią svorinį koeficientą. Taigi kiekvienos apdirbamosios pramonės šakos bendras svorinis koeficientas apskaičiuojamas kaip tai pramonės šakai suteiktų svorinių koeficientų (penkių rodiklių atžvilgiu) vidutinė reikšmė. Tyrime analizuojami Lietuvos apdirbamosios pramonės bendrieji sudėtiniai svoriniai koeficientai, įvertinantys penkias analizuotas rodiklių – pridėtinės vertės, vidutinio darbo užmokesčio, eksporto augimo, eksporto dalies ir gamybos apimčių augimo – grupes.

Atlikto tyrimo rezultatai parodė, kad bendrasis sudėtinis svorinis koeficientas itin aukštas dvejose pramonės šakose – Chemikalų ir chemijos pramonės gaminių bei Transporto priemonių gamybos pramonės šakose. Šių pramonės šakų rodiklių augimas buvo pastebimas 2000–2008 m. laikotarpiu. Visi penki analizuotieji šių pramonės šakų rodikliai buvo santykinai aukščiausi iš kitų pramonės šakų. Guminių ir plastikinių gaminių pramonė pasižymi aukšta pridėtinės vertės, tenkančios vienam darbuotojui, apimtimi, tačiau jos eksporto dalis nedidelė. Pažymėtina tai, kad šios šakos sudėtinis svorinis koeficientas 2000–2008 m. nuolatos mažėjo. Plaušienos, popieriaus ir popieriaus gaminių pramonės pridėtinės vertės rodiklis aukštas, tačiau kitos charakteristikos yra žemesnės palyginti su kitomis pramonės šakomis. Pagrindinių metalų pramonė pasižymi didėjančiomis tiek gamybos, tiek eksporto apimtimis. Jos bendrasis sudėtinis koeficientas yra santykinai aukštas ir tiriamuoju laikotarpiu didėjo. Nors Elektrinės ir optinės įrangos pramonės pridėtinės vertės, vidutinio darbo užmokesčio ir eksporto dalies rodikliai pakankamai aukšti, tačiau 2000–2008 m. laikotarpiu sparčiai mažėjo. Mašinų ir įrangos gamybos pridėtinės vertės vienam darbuotojui apimtis nedidelė, tačiau kitos charakteristikos yra pakankamai aukštos. Tradicinės pramonės šakos – Medienos bei medienos gaminių, Maisto produktų ir gėrimų, Tekstilės ir tekstilės gaminių eksporto dalys yra didžiausios bendrame eksporte, tačiau žemi pridėtinės vertės ir vidutinio darbo užmokesčio rodikliai. Iš tradicinių pramonės šakų bendrasis svorinis koeficientas buvo didžiausias ir didėjo Maisto produktų ir gėrimų pramonės šakoje. Deja, Medienos ir medienos gaminių pramonės bendrasis svorinis koeficientas sumažėjo. Spartaus eksporto augimo ir didelės eksporto dalies rodiklių derinys atspindi aukšto šių pramonės šakų augimo galimybes ateityje. Tokios galimybės pastebėtos Chemikalų ir chemijos pramonės gaminių, Pagrindinių metalų, Mašinų ir įrangos bei Transporto priemonių gamybos pramonės šakose.

Įvertinus kiekvienos iš pramonės šakų svorinius koeficientus, skaičiuojamas CI indeksas (angl. *The Index of the Long Run Income Potential*). Aukštos CI indekso reikšmės rodo, kad pramonės struktūra apibūdinama kaip turinti potencialą generuoti didesnes pajamas arba kad pramonės šakos, apibūdinamos aukštomis bendro sudėtinio koeficiento reikšmėmis, turi aukštas sektorinių dalių reikšmes, atsižvelgiant į visą apdirbamąją pramonę. Tai leistų manyti, kad tokia pramonės struktūra yra pageidaujama, siekiant aukštesnio gerovės lygio. Lietuvos apdirbamosios pramonės CI rodiklis turėjo žemėjimo tendenciją 2003–2005 m., palyginti su 2000–2002 m., tačiau indeksas padidėjo 2005–2008 m. Didžiausi indėlius CI indeksui suteikė Chemikalų ir chemijos pramonės gaminių, Transporto priemonių ir Maisto produktų ir gėrimų pramonės šakos. Šios pramonės šakos gali būti apibūdintos kaip galinčios generuoti augančias pajamas ateityje. Chemikalų ir chemijos pramonės gaminių pramonės reikšmingumas yra akivaizdus tiriamuoju laikotarpiu. Aukštus indėlius CI indeksui suteikė Pagrindinių metalų ir metalo gaminių, Mašinų ir įrangos gamybos, Guminių ir plastinių gaminių pramonės šakos. Deja, mažėjo Elektrinės ir optinės įrangos pramonės šakos reikšmingumas. Mažiausiai reikšmingos Tekstilės ir tekstilės gaminių, Medienos ir medienos gaminių pramonės šakos. CI indekso pokyčių analizė yra svarbi vertinant visos apdirbamosios pramonės vystymosi tendencijas, atsižvelgiant į kiekvienos pramonės šakos potencialo pokyčius.