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COMPETITIVENESS OF LITHUANIAN MANUFACTURING INDUSTRY

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Abstract

Nations and their industries (by the activities of certain enterprises) compete globally to sustain and increase their standard of living. International competitiveness is however a multifaceted concept, which can lead to differences in measurements and definitions. The conference paper is aimed at the analyses of competitiveness of Lithuania's manufacturing industry among European Union member state countries using several methodologies and corresponding measures. The research is based on the quantitative statistical data analyses. Methodological approaches used to analyse competitiveness of industries are summarized, some characteristics and limitations of measuring competitiveness by the quantitative data analyses are discussed. Theoretical considerations of competitiveness and related conceptual issues are however not considered in the paper.

Keywords: competitiveness, industry, competitive advantage.

Introduction

A person, a group of persons, an enterprise, a group or enterprises, a region, a state, a group of states (an union) are seeking to gain competitive advantage over others in order to improve their living conditions, to sustain and ensure ongoing existence (Grebliauskas, Ramanauskas, 2007).

Competitiveness could be defined as cumulative outcome of a number of influencing factors (Brooksbank, & Pickernell, 1999). Labour market conditions, transport costs, company size, research intensity and many other indicators traditionally could be measured as representing factors of industry competitiveness.

Another research direction in competitiveness analyses is aimed to measuring *de facto* (*ex post*) data of economic performance. The paper is concentrated on the latter way. Factors of competitiveness are very specific and diverse from industry to industry and hardly could be generalized within the scope of the present paper. Performance indicators are general and results are easy to compare among industries. So, here we are looking at the outcomes of factors, but are not dealing with the factors influencing competitiveness.

The **objective** of the paper is to find most competitive sectors of Lithuanian manufacturing industry.

Research **methods** used are based on the statistical data analyses. The data provided by the Eurostat and Statistics Lithuania databases are used. Years 2004-2007 are covered. Indexes and other indicators showing relative competitive advantage of the particular branches of European Union countries' manufacturing industry are calculated. Then comparison of indicators of all EU countries is made. All calculations are made using data aggregated in 2 digit level NACE (rev 1.1) classification of economic activities.

Assessment of competitiveness

The competitiveness of an industrial firm or sector depends on (or is determined by) products' and services' quality, on customer's satisfaction, on productivity and effectiveness of internal processes, on innovation and improvement activities, on employees' satisfaction and empowerment. The overall economic performance is therefore the complex result of a great number of different and interdependent factors related to all of the aspects (technological, organizational, structural) of the business activity (Lipovatz, Mandaraka, Mourelatos, 2000). Authors are talking about factors influencing competitiveness.

Factors determine, in some way, actual performance which leads to the certain situation that could be better or not comparing it to the particular situations of competing bodies (firms, regions, states). Factors, real performance, and resultant situation are measured using certain indices and specific indicators.

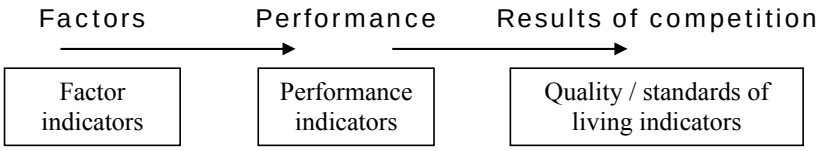

Figure 1. Different ways of competitiveness assessment

Thus we can talk about three very distinct ways of analyses, when dealing with assessment of competitiveness. Bienkowski (1988) refers to *country's long run ability to compete* (as country's long run potential

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for growth and the creation of an economic structure which adjust flexibly to the rapidly changing pattern of world demand) and *competitive standing* (as foreign trade performance and related matters). From the latter point of view the competitive standing of a country improves, when a country's share in world trade or on particular foreign markets improves and/or when a stable or even slightly lower export volume or market share is compensated by a more favourable export composition (i.e. improved terms of trade).

Business environment as one of the factor' of competitiveness (and one of the dimensions of country's long run ability to compete), formed by the political decisions of governmental institutions, are most often considered if dealing with the issues of national competitiveness. Territory plays an important role in providing competitive environmental tools to individual companies. But, according to Camagni (2002), the most important role is in the processes of knowledge accumulation and in the development of interpretative codes, models of co-operation and decisions on which the innovative progress of local companies is based. All these functions formulate favourable for competitiveness factors. Camagni (2002) summarizes pointing that "competitiveness depends on factors, which are not only found in the physical externalities, accessibility or environmental quality, but also in relational capital and the learning capacity expressed by the territory". According to Garelli (2003), some nations support competitiveness more than others by creating an environment which facilitates the competitiveness of enterprises and encourages long-term sustainability.

Results of competition can be measured using most broad and general indicators of overall living quality in the country. Garelli (2003) notes that "ultimately competitiveness is about raising the level of prosperity of people, which can be defined as a combination of the standard of living, accumulation of wealth and quality of life". Prosperity is important because it also emphasizes the non-economic aspects of competitiveness. Competitiveness cannot be reduced to productivity or profits. Intuitively, everybody understands that a country which does not share the wealth it creates with its people or does not insure an adequate health and education infrastructure nor maintain political and social stability, will not successfully thrive in the long-term (Garelli, 2003).

As already was noted, here we will look at some performance indicators of manufacturing industry sectors of European Union member countries, trying to find most competitive sector of Lithuanian manufacturing industry. Here we are not dealing with the factors that have determined such situation.

The methods for competitiveness assessment by measuring economic performance

Grebliauskas, & Ramanauskas (2007) points that there is common to measure international competitiveness of nations or industries using *productivity data*. Or in other words, according to authors, productivity is being seen as most important factor of competitiveness. But, following the same authors, we can see productivity measures as functions of innovation, technological change, transition in institutions and institutional structure. So, productivity has many initial factors influencing it, thus we will use it here as indicator of actual performance of industry sector, leading to resultant situation of long run international competition.

The indicators of productivity though are calculated very simply integrate many influencing factors (i.e. the level of profitability and wages and some others) and could be interpreted very broadly. Productivity measured by value added represents profitability of the industry and wage level, thus also showing even the level of live quality in the countries being considered.

Further in the article, analysing competitiveness of Lithuanian manufacturing industry, we will look at the 2004-2006 year data of *labour productivity* (i.e. gross value added per person employed).

Exports contribute to overall GDP growth: higher imports reduce the increase in output relative to the growth in demand. A longer-term increase in imports relative to exports may imply a decline in the competitiveness of domestic producers (The Economist, 2006).

Considering international trade as one of the most important *ex post* competitiveness indicator, following measures will be used to assess competitiveness of particular sectors of Lithuanian manufacturing industry compared to other EU countries:

- *Revealed Comparative Advantage (RCA) Index* (that measures country's comparative advantage in a trade of a particular product (or production from certain industry);
- *Grubel-Lloyd Intra-Industry Trade (IIT) Index* (measures the capacity of the countries involves in trade to benefit from the exploitation of economies of scale);
- *Specialization index* (shows the level of specialization in particular industry sector);
- *Trade Openness index* (indicates the level of international competition).

According to Clark, Sawyer, and Sprinkle (2005), the ideal measure of comparative advantage would to compare fully allocated production costs for individual industries across countries (as it is suggested by the *comparative advantage international trade theory*, Krugman, & Obstfeld, 2003). Since it is not possible

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to make such a comparison, the relative competitive structures of countries are being evaluated using a *"revealed" comparative advantage* (RCA) index. It assumes the comparative advantage of countries and can be proxied by a ranking of industries by their relative export performance. It allows determining where the comparative advantage of a country lies relative to the EU economy as a whole by using an index that expresses the share of industry *i*'s in countries *j*'s exports relative to the industry's share in total EU exports:

$$RCA_{ij} = (x_{ij} / X_j) / (x_{iw} / X_w) \qquad (1)$$

RCA_{ij} – revealed comparative advantage index for industry *i* of country *j*:

x_{ij}, X_j, x_{iw}, X_w – are exports value of industry *i* of country *j*, total exports value of country *j*, total export of industry *i* from all EU member state countries, and total EU export respectively.

RCA ratio that exceeds 1 means that certain industry is more important in the country's exports than it is in total European Union trade, implying that the country has a comparative advantage in the activity relative to the EU as a whole competitive environment. When the RCA ratio equals 1, the share of industry i in country *j*'s total exports equals the industry's share in total European exports. An RCA index value less than 1 means industry i is less important in country *j*'s exports than it is in total European Union international trade, implying a comparative disadvantage in the activity relative to the rest of the Union.

When industries in each country are ranked in descending order by RCA index values, activities having comparative advantage will appear at the top of the list and comparative disadvantage industries at the bottom of the list (Clark, Sawyer, Sprinkle, 2005).

Intra-Industry Trade is defined as the simultaneous export and import of commodities of the same industry group. The interest in IIT arose mainly because the traditional international trade theory of comparative costs, dealing with homogenous products, is incapable of explaining the simultaneous exports and imports to a country of the same statistical category (Ekanayake, 2008).

The most widely used measure of intra-industry trade is the Grubel-Lloyd (G-L) index (see Lloyd&Grubel, 2003).

$$IIT_i = 1 - \left(|X_i - M_i| / (X_i + M_i) \right) \qquad (2)$$

IIT_i – intra-industry trade Grubel-Lloyd index;

X_i and M_i – are data of exports and imports values of the industry *i* in the country under analyses.

IIT index in (2) measures the intensity or proportion of intra-industry trade in industry *i* with certain country (or group of them, as EU). If all trade in industry *i* is intra-industry trade, i.e., $X_i = M_i$, then $IIT = 1$. Similarly, if all trade in industry *i* is inter-industry trade, i.e., either $X_i = 0$ or $M_i = 0$, then $IIT = 0$. Thus, the index of intra-industry trade takes values from 0 to 1 as the extent of intra-industry trade increases.

Indexes of *specialization* and *trade openness* will also be calculated. The specialisation index (SI) is a supplementary measure of trade performance to be put alongside the revealed comparative advantage (1) measure. It is calculated as (European Commission, 2003; Ng, & Sun, 2007):

$$SI_i = P_i / C_i \qquad (3)$$

C_i – consumption or the value of industry *i*'s production sold in internal market (incl. imports).

P_i – total value of industry *i*'s production in the analysed country.

The specialisation index (SI) is closely related to the trade balance where a value greater than 1 indicates high performance of the particular industrial sector. It reflects the trading situation of the whole economy, i.e. not just the competitiveness of the industry but also macroeconomic factors such as the exchange rate.

Trade openness (TO) index is often used as an indicator of a country's openness to new ideas and competition from abroad (European Commission, 2003; Awokuse, 2008).

$$TO_i = (X_i + M_i) / P_i \qquad (4)$$

Imports are also important for competitiveness because it provide much needed factors of production employed in the export sector. Also, the transfer of technology from developed to developing countries via imports could serve as an important source of economic growth and competitiveness (Awokuse, 2008).

Indicators of business environment, describing very important factors determining competitiveness of the country's economic activities are not covered in the present analyses due to the limited scope of the research. The analysis does not encompass local and foreign investment indicators, governmental (and Industrial) expenditures on research and development and some others, which are important if business environment as a factor of competitiveness is being considered.

Analyses of data on labour productivity and international trade of Lithuanian manufacturing

Following NACE rev 1.1 classification of economical activities manufacturing industry is classified in 22 sectors. Two of them – manufacture of tobacco products and manufacture of coke, refined petroleum products and nuclear fuel – were excluded from the analyses of competitiveness of Lithuanian manufacturing industry due to the data confidentiality reasons.

Analysing the most recent data of production value of the remaining sectors, it was found that few of them are very small counting less than 1 percent of production value in the structure of whole manufacturing industry. So, these sectors also were excluded from further consideration. Fourteen sectors remained.

Lithuanian manufacturing industry is dominated by the two sectors: manufacture of food and beverage and manufacture of chemicals and chemical products, if measured by the industrial production produced during the year 2008 value (Figure 2). It could be expected that largest sectors should be most competitive.

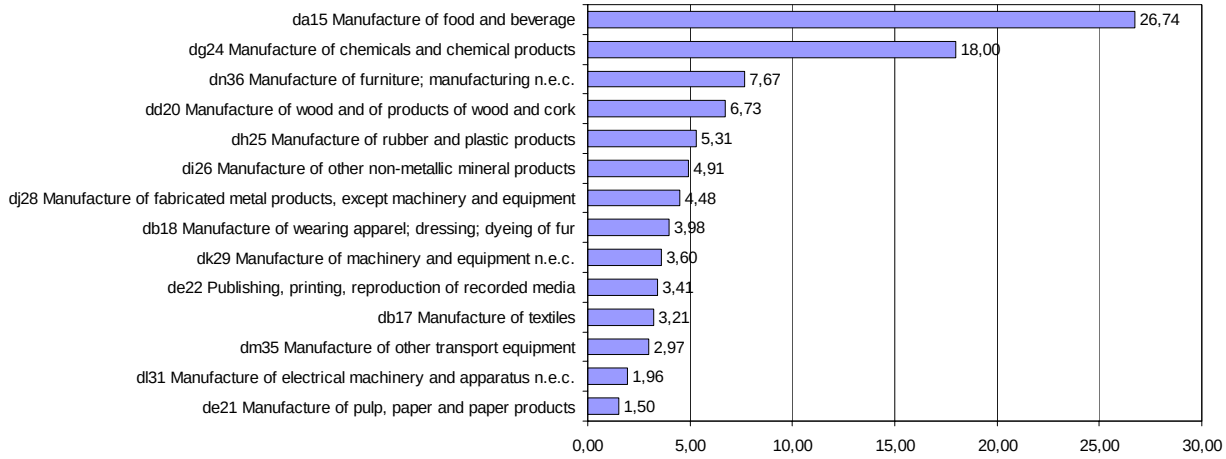

Figure 2. The structure of Lithuanian manufacturing industry by the value of production, 2008 year data[1]

But true competitiveness, rest on productivity (European Commission, 2003), not on the absolute amount of production. As already was noted above we will look at the productivity data of Lithuanian manufacturing industry in such a context (Table 1).

Productivity measures reveal the fundamental flaw in market-share based thinking. Productivity allows a nation to support a strong currency, and with it a high standard of living. Exports of low-priced products, which support only subsistence wages, are not sufficient to make a nation prosperous. It is the productivity to manufacture high-quality products that support rising wages that really matters. The productivity of domestic industries has a major influence on the cost of living and the cost of doing business, not to mention the level of wages in the domestic economy (European Commission, 2003).

As it is seen in the Table 1, two above mentioned largest as well as all other Lithuanian manufacturing industry sectors, according to the most recent data available from the Eurostat database, are not nearly enough productive to be competitive among European Union countries. We even can see easily, that most of the Lithuanian manufacturing industry sectors being analysed are ranked in the most lowest positions among the other European Union countries. Rankings are made among the number of countries which data were provided in the source database. Manufacture of chemicals and chemical products (NACE code dg24) and manufacture of rubber and plastic products (dh25) could be mentioned here as sectors with comparative high labour productivity. These sectors are amounting 25 and 27 percents respectively of average European Union member states productivity of these sectors. But, if compared to the average productivity of the three most productive European countries, manufacture of chemicals and chemical products amounts just 8 percent, manufacture of rubber and plastic products – just 16 percent comparing to the labour productivity in Ireland, Belgium, Sweden, Luxemburg or Denmark.

Indicator of labour productivity (measured by gross value added per person employed) disclosed that in average productivity of Lithuanian manufacturing industry amounts just about 22% of average productivity among European Union member states and just about 12% if compared to average of the thee most productive countries (Table 1).

[1] *Source: Database of statistical indicators. Statistics Lithuania.* http://db1.stat.gov.lt/statbank/

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Table 1. Labour productivity (Gross value added per person employed, in thousand Euro) of Lithuanian manufacturing industry compared to the other European Union member state countries, 2004-2006 [2]

Manufacturing industry sector (by NACE rev. 1.1 clasification)	Lithuania			Rank 2006[3]	EU25 2004	Three most productive countries, 2006	Top three average
	2004	2005	2006				
da15 Manufacture of food and beverage	:	8.8	10.3	12 (12)	42.4	Netherlands, United Kingdom, Belgium	65.0
db17 Manufacture of textiles	6.0	6.1	6.5	23 (23)	29.0	Denmark, Netherlands, Finland	54.0
db18 Manufacture of wearing apparel; dressing; dyeing of fur	4.1	4.5	4.9	22 (22)	20.0	Denmark, Sweden, Belgium	49.0
dd20 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	5.0	5.7	6.5	22 (22)	28.4	Luxemburg, Belgium, Finland	65.1
de21 Manufacture of pulp, paper and paper products	11.0	12.1	12.7	23 (23)	59.0	Finland, Austria, Sweden	97.3
de22 Publishing, printing, reproduction of recorded media	8.8	9.8	9.5	23 (23)	52.0	Ireland, Austria, United Kingdom	150.7
dg24 Manufacture of chemicals and chemical products	17.0	26.5	24.7	21 (23)	90.0	Ireland, Belgium, Sweden	266.0
dh25 Manufacture of rubber and plastic products	9.3	11.2	16.2	21 (24)	44.6	Belgium, Luxemburg, Denmark	74.0
di26 Manufacture of other non-metallic mineral products	9.1	9.9	15.2	24 (24)	48.0	Luxemburg, Netherlands, Ireland	89.3
dj28 Manufacture of fabricated metal products, except machinery and equipment	6.3	7.7	9.1	24 (24)	39.0	Luxemburg, Austria, Netherlands	63.7
dk29 Manufacture of machinery and equipment n.e.c.	7.6	8.6	10.5	23 (24)	49.3	Ireland, Austria, Luxemburg	77.3
dl31 Manufacture of electrical machinery and apparatus n.e.c.	10.3	7.3	13.0	21 (23)	48.0	Ireland, Finland, Austria	79.6
dm35 Manufacture of other transport equipment	9.3	10.6	12.5	20 (22)	51.1	United Kingdom, Ireland, Germany	78.3
dn36 Manufacture of furniture; manufacturing n.e.c.	6.1	6.0	6.8	22 (22)	28.9	Denmark, Germany, Un. Kingdom	50.0

Revealed comparative advantage index (Table 2) shows that manufacture of food, textiles, apparel, products of wood, rubber and plastic products, furniture and other products in Lithuanian manufacturing industry is comparatively more important than in the rest of European Union as in whole competitive environment. These sectors have high values of RCA index, showing, for example, that Manufacture of wood and of products of wood and cork (dd20) is 7-8 times more significant (measuring by the exports value) in the structure of Lithuanian industry than in the whole European Union wide industry.

Table 2. RCA indexes of Lithuanian manufacturing industry sectors, 2004-2007 year data[4]

NACE[5]	2004	2005	2006	2007	NACE	2004	2005	2006	2007
da15	2.745	2.763	2.817	2.797	**dh25**	1.889	1.966	2.081	1.871
db17	2.638	3.000	2.853	2.498	**di26**	0.955	1.091	1.067	0.930
db18	2.419	5.289	4.581	3.488	**dj28**	1.081	1.186	1.129	1.037
dd20	8.672	7.773	7.028	7.764	**dk29**	0.397	0.447	0.456	0.459
de21	0.697	0.783	0.835	0.819	**dl31**	1.164	0.946	0.876	0.713
de22	0.792	0.850	0.978	0.950	**dm35**	1.100	0.676	0.706	0.491
dg24	0.713	0.742	0.758	1.006	**dn36**	2.842	2.681	2.722	2.578

[2] *Source: Apparent labour productivity (Gross value added per person employed) data. Eurostat database. http://epp.eurostat.ec.europa.eu/*
[3] *Ranking is made among the number of countries data of which was provided for the year 2006.*
[4] *Source: External trade data. Eurostat database. http://epp.eurostat.ec.europa.eu/newxtweb/*
[5] *Full titles corresponding codes of NACE (rev 1.1) classification entries are given in Table 1.*

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It is hardly possible to interpret RCA index in forthright way. High values show that the structure of Lithuanian manufacturing industry is dominated by the traditional labour intensive industries, but this does not mean high competitiveness. These sectors export low value added (Table 1) products, which might be competitive in the markets due to smaller prices, but this export does not contribute to the final 'results of competition' (as they are called in the Figure 1), not providing Lithuanian people with higher wages, not ensuring higher living standards. Lithuanian, as very small economy's, industry (amounting just about 0,25% of the total European Union (25 countries) GDP[6]) hardly could gain higher international market shares and better competitive positions competing on the price bases. Specialization, high value added products international niches, internal effectiveness – are most important elements in the long-run industry development strategy to increase competitiveness of Lithuanian manufacturing industry.

Table 3. Intra-Industry Trade, Specialization and Trade Openness indexes of Lithuanian manufacturing industry sectors, 2006-2008 year data[7]

NACE[8]	Intra-Industry Trade indes			Specialization Index			Trade Openness Indes		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
da15	0,970	0,948	0,990	0,872	0,901	0,835	0.820	0.830	0.886
db17	0,885	0,902	0,929	0,604	0,616	0,550	2.227	2.162	2.285
db18	0,562	0,722	0,783	1,534	1,194	1,041	1.180	1.375	1.436
dd20	0,734	0,811	0,806	1,266	1,139	1,122	1.052	1.058	1.034
de21	0,632	0,634	0,633	0,360	0,349	0,379	2.692	2.806	2.55
de22	0,899	0,864	0,919	1,038	1,050	0,989	0.272	0.270	0.259
dg24	0,735	0,862	0,958	0,426	0,599	0,734	2.784	2.237	1.969
dh25	0,842	0,854	0,899	0,652	0,627	0,642	1.540	1.628	1.637
di26	0,638	0,571	0,671	0,688	0,665	0,689	0.781	0.819	0.840
dj28	0,706	0,700	0,776	0,621	0,642	0,562	1.479	1.390	1.610
dk29	0,587	0,628	0,698	0,191	0,193	0,224	5.310	5.287	4.617
dl31	0,834	0,830	0,870	0,481	0,411	0,354	2.541	2.889	3.135
dm35	0,957	0,996	0,879	0,707	0,774	0,671	1.773	1.722	1.867
dn36	0,597	0,619	0,609	1,141	1,076	1,187	0.979	0.972	0.928

Other indexes, considering international trade performance, lead to other conclusions. Intra-Industry trade index shows (Table 3) that above already mentioned manufacturing of food (da15), textiles (db17), as well as chemical products (dg24) and rubber and plastic products (dg25) sectors and some other are engaged in the intra-industry international trade (that is important in the context of international competition and show that products are differentiated and adapted for specifics of international demand). Even low value added products has certain international market shares, since consumers' tastes are conditioned by their income levels. These tastes yield demands and this demand structure generates a production response. This situation could ensure certain competitive position, but does not lead to final, resultant national competitiveness.

But specialization index corrects such conclusions showing that most part of international trade of these industries are dominated by the imports; local production slightly exceeds the value of local consumptions just in the cases of manufacture of wearing apparel; dressing; dyeing of fur (db18), manufacture of wood and wood products (dd20) and manufacture of furniture (dn36) industry sectors. It could be concluded, that Lithuanian manufacturing industry has particular competitive standing due to exports of above just mentioned industries. Trade openness index (Table 3) could support such notions showing reasonable openness to international trade and subsequent competition. It means that sectors are open to innovations, international trade is sufficiently intensive, but, on the other hand, international trade turnover is more or less covered by the local production (that is not the case for the manufacture of machinery and equipment (dk29) and manufacture of electrical machinery and apparatus (dl31) sectors, not mentioning those earlier excluded from the analyses due to the very small comparative part in the structure in the overall industry).

This short analyse shows that it is impossible to measure and assess competitiveness using one indicator, index or measure. As with imports for example: serving as a vehicle for technology transfer, it can

[6] *Source: Gross domestic product. Eurostat database.* http://epp.eurostat.ec.europa.eu/
[7] *Source: Database of statistical indicators. Statistics Lithuania.* http://db1.stat.gov.lt/statbank/
[8] *Full titles corresponding codes of NACE (rev 1.1) classification entries are given in Table 1.*

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also affect productivity growth through its effect on domestic innovation via import competition (Awokuse, 2008). So, it is important to search for integrated methods considering wide range of aspects.

Conclusions

As above analyzed statistical data showed, Lithuanian manufacturing industry could hardly yet compete (if considering final national competitiveness ends) with the national economies of most developed European Union countries first of all due to the very low productivity ratio. Comparison of gross value added per employee in Lithuania with average of the members of European Union shows that Lithuanian industry's productivity is approximately five times less. Comparing to the most developed countries such as Belgium, Netherlands, Sweden, Ireland and others the difference is even bigger exceeding seven or eight times.

Despite this, it could not be concluded that Lithuanian industry is not competitive at all. International trade data showed that Lithuanian industry has certain competitive standing in the international trade relations. Due to comparatively high specialization in the manufacture of apparel, wood products and furniture sectors and reasonable trade openness, it could be concluded that these industries are most competitive. Also important but with the lower ratio of specialization index is manufacture of food sector.

But productivity measures enforce conclusion that such pattern of competitive standing does not leads to final ends of competitiveness such as growing wages, higher living standards and others. The strategies of development of Lithuanian manufacturing industry should be aimed at the ends of specialization, higher value added products niche demand utilization, shifting from cost to differentiation competitiveness.

Camagni (2002) notes, that it is obvious that individual companies are the entities that compete and act in the international market. But these companies and these entrepreneurs are to a large extent generated by the local context. However, endowments of natural resources and relative availability of traditional factors like labor and capital play a minor role. What really count nowadays are two orders of factors and processes (Camagni, 2002): in an aggregate, macroeconomic approach, increasing returns linked to cumulative development processes and the agglomeration of activities; in a microeconomic and micro territorial approach, the specific advantages strategically created by the single firms, territorial synergies and cooperation capability enhanced by an imaginative and proactive public administration.

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