FUTURE PERSPECTIVES OF COMPETITIVENESS OF LATVIA'S MASHINERY AND METALWORKING INDUSTRY

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Abstract: Machinery and metalworking is a strategic sector (further MMS) with high value added. Its operations require wide knowledge and deep skills. MMS supplies all sectors of national economy with machines, equipment, spare parts and manufacturing systems and related services, as well as needed technologies and human capital and knowledge.

The EU research outlines the following criteria for future competitiveness of MMS:

- Problem solving competence;
- Customized knowledge;
- Technological excellence;
- Quality and confidence;
- Personnel quality and costs;
- Education and training;
- Investment in capital goods.

The dominance of low cost approach so far compensated weakness in other competitiveness factors. The recent rapid increase of wage levels, raw material and service costs ask for more and more efforts local companies should introduce to keep their competitiveness. As a result the industry strategy will be shifted to innovation, investment in new technologies and qualified labour.

Keywords: Machinery and metalworking sector; competitiveness, productivity, added value, high technology, medium-high technology life-long learning system.

Introduction

Recent years have introduced rapid changes in Latvia's economy. Globalisation more and more is linked to higher competition. Rapid development of Asian markets reflects growth of internal demand and increase of production costs, thus influencing local processing industry, including machinery and metal processing sector (MMS). However, all recent studies were made before essential restructuring started, in a period of the most optimistic forecasts and high GDP growth, and could not be used to forecast sector development. Strategic development plan of MMS was designed also in wealthy age, in 2005. Latest analysis ordered by Ministry of Economics in 2007 to Baltic Consulting Ltd. "Section perspectives of processing industry, forecasted restructuring till 2020" is based on updated information. As a consequence, new research in today's economic situation with aim to update MMS strategic development plan obtain increasing importance.

1. Mechanical engineering sector till 1990ies

In 1930s, before World War II, the manufacturing sector had relatively little impact to Latvia's economy: only 13.5 percent of the labour force was employed in industry. Major industrial sectors at that time included agro business, food processing, light industries, woodworking, and building materials. Since 1950s Latvia began to industrialize and became the most industrialized Baltic state. By 1990 processing industries accounted for nearly half of the GDP and a little less than one-third of employment.

The most rapid industrial development took place in the following areas: machine building and the electronics, chemicals, and electric power industries. Changes in the structure of the Latvian industrial sector are shown in Table 1.

Table 1. Share of Industrial Output and Employment by Sub-sector, Selected Years (percent).

Sub-sector	Share of Industrial Output					Share of Employment
	1970	1975	1980	1985	1990	1990
Electric Power	1.4	1.2	1.6	1.8	2.1	1.8
Engineering (including machine building and electronics)	21.3	21.8	25.5	25.9	26.3	38.9
Chemicals	5.9	6.2	6.6	7.2	7.2	5.7
Wood and Paper	7.7	5.8	5.1	6.0	5.6	9.6
Building Materials	3.5	3.8	3.0	3.2	3.2	4.6
Light Industries	25.2	25.1	22.6	20.1	18.0	17.0
Food Industries	27.6	27.7	25.8	25.8	24.9	12.7
Other (including research and technical colleges)	7.4	8.4	9.8	10.0	12.7	9.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: The figures shown are probably underestimated due to underreported production for military use. Source: State Statistical Bureau, World Bank.

According to World Bank report the share of the engineering sector, which was insignificant in the early 1950s, had increased to 21.3 percent of industrial output by 1970. By 1985, engineering had become the largest industrial sector, and by 1990 it contributed 26.3 percent to industrial output and almost 39 percent of industrial employment. The share of communication equipment and electronics increased from less than 6 percent of industrial output in the 1970s to more than 9 percent by the end of the 1980s.

Altogether in 1990, the non-traditional industries of engineering and chemicals contributed more than 33 percent to industrial output and more than 44 percent to industrial employment. During the 1970s, the industrial sector grew by an annual average rate of 5 to 6 percent (in constant prices). In the 1980s, the growth rate slowed down to about 3 to 4 percent per year. Taking account of the increase in the industrial labour force, which was moderate, as well as the rapid increase in capital stock per worker, the net increase in productivity in the 1980s appears to have been low, indicating low efficiency in the use of capital and human resources. At the end of 1990ies situation in engineering sector turned to gigantic enterprises with extensive way of operation and overall stagnation.

After regaining independence, in 1991 manufacturing industry was heavily influenced by reforms of transition to market economy and rapid privatisation. Almost all former gigantic state owned enterprises were unable to meet competition and adapt to market economy. As a result they became insolvent and in many cases unique machinery was sold off by liquidation administrators for a metal price. Management buy-outs didn't help to rise up additional investment; local firms were not involved in country's telecom infrastructure modernisation, but foreign investors were reluctant to acquire firms because of their large debts aroused in a period of hyper inflation and barter deals with Russia. It took several years that newly established fresh SMEs started to replace stagnating base of former state owned industry.

Today Latvian manufacturing industry has ~16% share in GDP (2006) which is a low figure compared to ~25% in EU. MMS's share in Latvia's GDP is significant - ~4%. One job in MMS generates 3-5 new jobs in supplying and benefiting sectors thus giving total indirect share in GDP 15%.

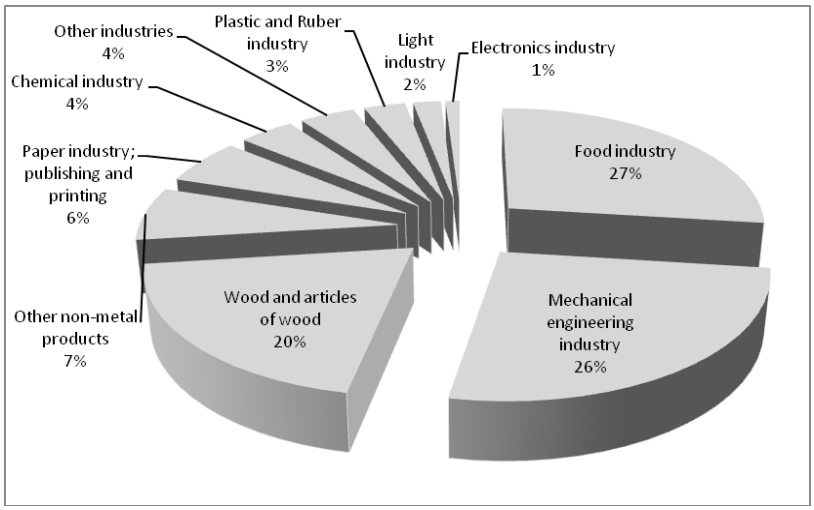

Figure 1. Latvian manufacturing industry in 2007; source: Association of Mechanical Engineering and Metalworking Industries of Latvia.

MMS companies are classified according to business activities:

- NACE 27 - Manufacture of basic metals
- NACE 28 – Manufacture of metal products
- NACE 29 – Manufacture of machinery and equipment
- NACE 31 – Manufacture of electrical machinery and apparatus
- NACE 33 – Manufacture of medical; precision and optical instruments, watches and clocks
- NACE 34 – Manufacture of motor vehicles, trailers and semi – trailers
- NACE 35 – Manufacture of other transport equipment
- NACE 37.1 – Scrap recycling

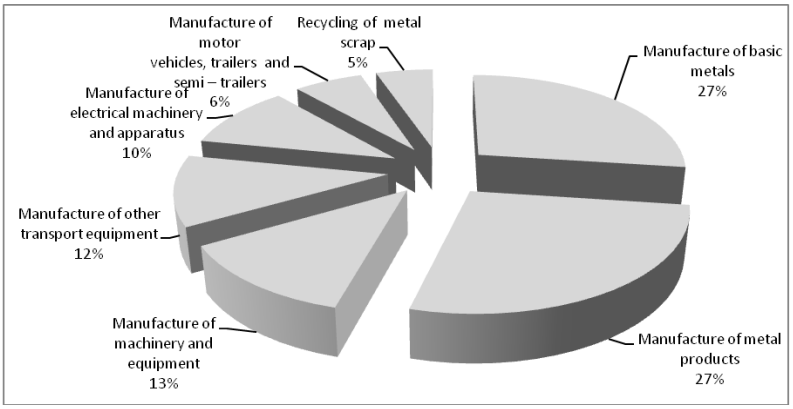

Figure 2. Structure of mechanical engineering sector in 2007; source: Association of Mechanical Engineering and Metalworking Industries of Latvia

MMS is one of the fastest growing sub-sectors in Latvia. It forms 82% of manufacturing value added. About 70% of the industry's manufacturing aggregate amount is exported. The "backbone" of the industry in Latvia consists of small and medium-sized enterprises. The products they offer are specialised and individualized. The industry is mainly export focused; even small firms are participants of the global market.

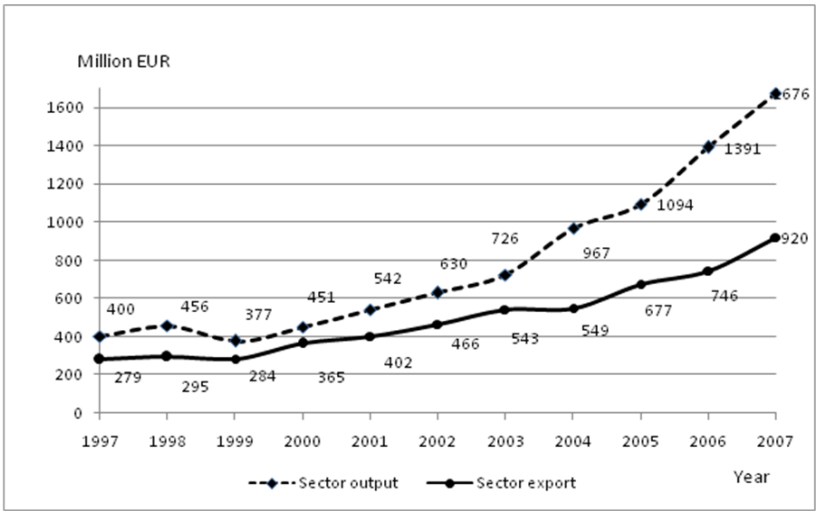

Figure 3. Sector output and export (million EUR); source: Association of Mechanical Engineering and Metalworking Industries of Latvia.

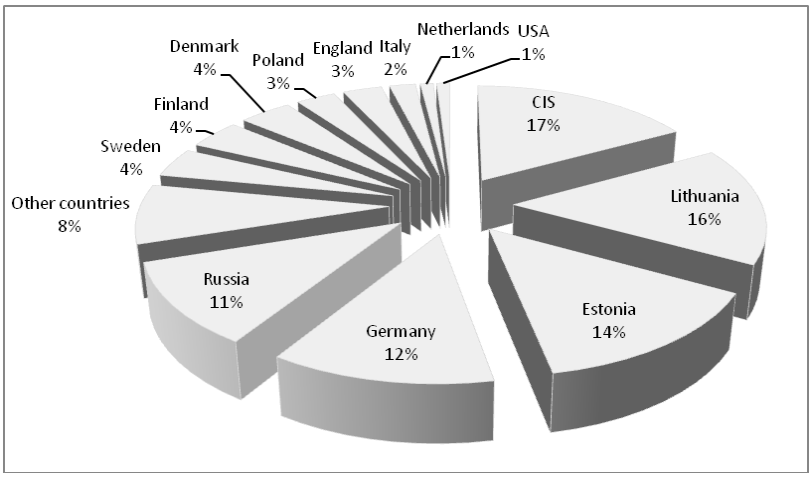

Figure 4. MMS Export countries in 2005source: Association of Mechanical Engineering and Metalworking Industries of Latvia.

Sectors of production of metals and metal articles constitute approximately one-tenth of the total value added of manufacturing. Exports account for almost three-fourths of the total sold products of these sectors. The domestic market share has been showing a tendency of expansion recently. Development of construction has resulted in increased demand for finished metal articles.

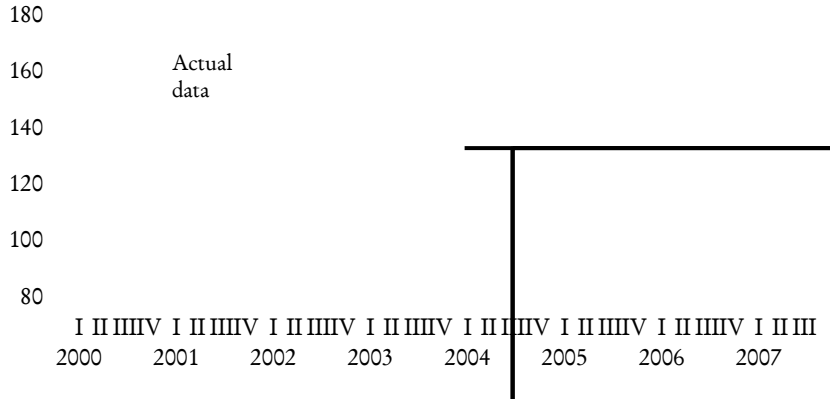

Figure 5. Quarterly Growth Dynamics of Production of Metals and Metal Articles (level of 2000 =100); source: http://www.em.gov.lv/em/2nd/?cat=137

Metals and metal articles produced in Latvia are highly competitive around the world and most of them are traded in the EU member states (almost 80% of exports) and almost a half of the products are exported to the EU-15 markets.

Production of machinery and equipment was a rapidly growing sector until 2005, and its production volumes had almost doubled over the period of 2000-2005. However, its growth rates have not been increasing since 2005, and the production volumes decreased in 2006 and 2007.

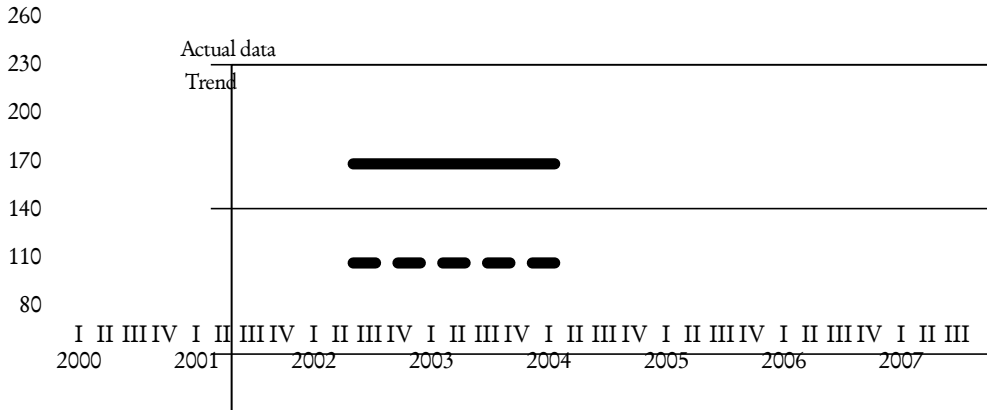

Figure 6. Quarterly Growth Dynamics of Production of Machinery and Equipment s (level of 2000 =100); source: http://www.em.gov.lv/em/2nd/?cat=137

It is a typically export-oriented sector, as almost three-fourths of its products are being exported. The main sales markets of the sector are the EU member states, and almost a half of the products for exports to the EU are directed to Lithuania and Estonia. A relatively big share of the sector's exports is related to the markets of CIS countries.

Production of electrical and optical equipment has been developing rapidly over the recent years. Production volumes of the sector have almost doubled in the last five years. Fast growth in this sector is also observed in 2007.

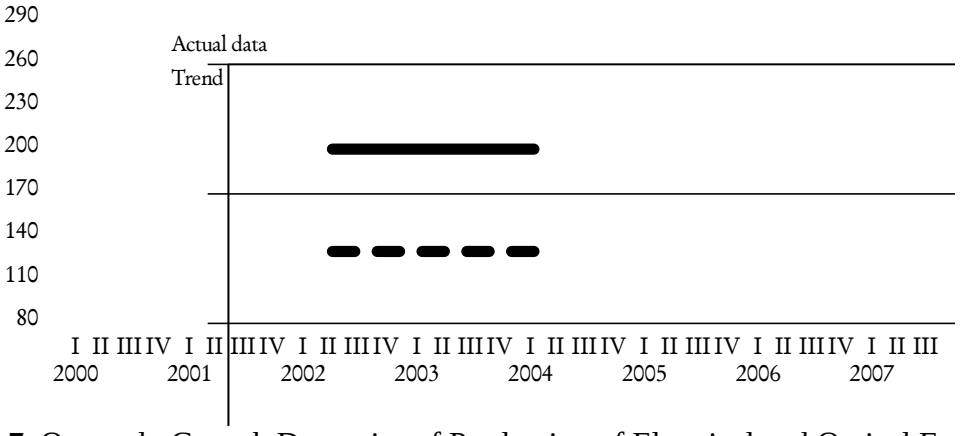

Figure 7. Quarterly Growth Dynamics of Production of Electrical and Optical Equipment (level of 2000 =100)**;** source: http://www.em.gov.lv/em/2nd/?cat=137

After joining the EU, growth of the sector slightly slowed down but remained on a steady level (6-8%). The sector has stable trading partners in the CIS countries, Estonia and Lithuania.

2. Future perspectives of Latvian mechanical engineering sector

Competitiveness of Nations is determined by particular sector's competitiveness. Therefore it is important to analyse critical success factors of each sector's competitiveness. European mechanical engineering is a world leader with 41 % of global output; Europe is the world's largest producer and exporter of machinery, including complete plant exports.

This broad sector is responsible for about 8 per cent of EU employment. 2 per cent of its turnover is spent on R&D. Over 80 per cent of the firms in the sector in the EU are SMEs of less than 20 employees. SMEs in machinery and equipment sector account for the same share of employment as large firms. There has been substantial innovation in this sector in recent years and the innovation potential remains high. This is essentially due to the use and application of micro-electronics. At the same time the production process in average remains labour intensive and, in particular, skilled labour and engineers are required. Since the mid-1970s a new generation of computer aided machines have been developed and overtime diffused in the sector. Different machines can be combined together - for example production machines together with conveyor systems, robots and testing machines - to form computer controlled systems. These systems offer much greater flexibility than was available before. The application of micro-electronics and the integration of computers into production has resulted in substantial changes in the nature and range of products offered. CAD (Computer Aided Design) and PPS (Production Planning Systems) have been adopted in most firms.

Responsiveness to customers is becoming increasingly important and customers are increasingly demanding services together with the products, such as training, specialized software, and maintenance. This opens up the possibility of a high degree of specialization in production which offers good opportunities to SMEs. Diffusion of the main computer technologies available is underway and should underpin the demand for mechanical engineering products in the next period. Another source of current and future demand is the increasing demand for environmental technology and firms in the mechanical engineering sector are the main suppliers of this.

The EU research outlines the following criteria for future competitiveness of machinery and metalworking sector. Internal competitive factors under company control:

- **The company – creator of wealth**. The following analysis suggests that the majority of key factors determining the competitiveness of mechanical engineering firms depend on the firms themselves. Others are generated in the interplay between the company and its business environment. A few are imposed by that environment and innovation culture on the company. The key factors to increase competitiveness would be management knowledge, leadership and innovation culture in company.
- **Ability to solve customers' problems.** Today manufacturing a good machine and selling it is not enough, the manufacturer must also do everything necessary to ensure that production on the line where his machine is installed fulfils his customer's business objectives throughout the machine's life. What counts for the buyer of a machine are not the technical characteristics of the machine as such but its capacity to carry out the tasks assigned to it by the buyer. Customers buy performance, not equipment.
- **Key know-how supply.** Within the mechanical engineering product range the EU has a competitive edge in customized equipment, special models and turn-key plant supply. The secret of a company's competitiveness in these types of supply lies with possession of unique engineering know-how and a capacity to exploit and develop it beyond the reach of competitors.
- **Technological edge.** It is appropriate to distinguish between key, IPR-protected know-how and overall technological level. In the second case a manufacturer

achieves a technological edge over another by carrying a technology available to both to a higher level of excellence, thus enabling him to offer a better performing product. Whilst key know-how is embodied into customized, specialized pieces of equipment, maintaining a technological edge is necessary for competitiveness in all kinds of engineering equipment, in speciality as well as in mass-produced standard equipment, in high- as well as in medium- and low-tech equipment. The optimal application of a simple technology gives a competitive advantage as well. If Europe remains competitive on many medium-tech products it is thanks to technological perfection. Staying ahead requires not only a very high degree of product innovation but also innovative thinking applied to the manufacturing process and, indeed, in all company functions. Organizational innovation, with flexible, task-oriented decision structures, is a growing part of overall innovation.

- **Quality, reliability.** The customer buys engineering equipment for reasons of quality and reliability above all. Quality and reliability of supply refers in the first place to the performance and durability of the product but also to delivery and service.
- **Production breadth**. Mechanical Engineering is the second sector by number of products after the Chemical Industry. But the range of mechanical products is not only a question of number but even more of breadth. Production breadth has a competitive value at both company and country/bloc levels. The typical end-user of mechanical equipment needs several types of equipment, models or sizes. It is practical for him to purchase all he needs from a single supplier. Streamlining contacts with suppliers is a real cost saver that outweighs to some degree higher sale price. Using different products from the same supplier has technical advantages too, like interoperability. Breadth of supply is also a powerful means of making customers loyal to a brand.
- **Production depth.** Further processing a product adds to its value. The added value is measured by the sales value (output) less the purchase cost of the intermediate consumption (inputs). It is equivalent to the value of the factors (labour, materials) used in the processing plus eventual profit. Production depth is measured as the share of value added on output value.
- **Company size.** SMEs are well suited for the production of speciality equipment. Manufacturing of such products does not require long production lines or big factory halls. It is carried out most efficiently by small, well-coordinated teams of highly skilled and specialized staff in flexible production cells. Also the diversity of products and applied technologies in mechanical engineering is so great that it fosters the development of small, specialized production collectives. In general, smaller production units have competitive advantages and disadvantages. SMEs are generally superior to large generalists in their own field of specialization, they are innovative, have shorter lead times in product development, are close to their customers and know them better, are flexible in adapting to individual customers' demands and quicker in responding to changing market conditions. On the other hand they admittedly have handicaps, e.g. in financing, basic research, product breadth or servicing distant markets. This competitive analysis covers companies with 20 employees or more.

Competitive factors in the interaction between the company and its environment.

- **Price.** It has been often said that sale price is a less important competitive factor in the engineering business than the sort of factors discussed in the previous sections – problem solving and marketing ability, production breadth and depth, quality and reliability. On balance this is a fair statement, but it requires certain clarifications.

Due to their uniqueness it is very difficult or impossible to compare price bids on customized and special equipment and draw conclusions on the relative importance of price for an order. Even in the sale of standard pieces of equipment from a catalogue, other factors like quality and date and conditions of delivery play major roles. Price is most important for the sale of standard, long-batch equipment, less important for special, short-batch equipment and least for equipment with exclusive technology.

- **Investment in the Engineering Sector.** Here we refer to investment in mechanical engineering companies, not to investment in mechanical engineering equipment and plant. The majority of EU mechanical engineering companies are family-owned SMEs. These companies generally finance their activities with the owner family's capital, other private investors, bank loans and re-investment of part of the net profit. All these four sources of capital are insufficient. Private investors have limited financial resources and do not always want the firm to become very large for fear of losing control. Bank loans are expensive and, before granting them, banks demand collateral security that SMEs cannot always provide. In 2003 € 10,479 million were invested in the EU Mechanical Engineering Industry. This gives an investment intensity of 4.7 thousand euros per employee. Such a level of investment is too low compared to USA or Far East countries.
- **Labour costs.** Labour cost in EU mechanical engineering companies account for ¾ of value added. In other words labour is by far the biggest cost factor. Although this may surprise some, mechanical engineering is more labour intensive than capital intensive.
- **Labour productivity.** The real burden placed on companies depends not so much on the absolute value of labour costs but on the wage adjusted labour productivity. Research shows that high labour cost is positively correlated with high labour productivity.
- **Optimization of value chain.** The value chain or supply chain is the sum of value-adding processing of a product from raw material to finished product. It is represented by all the economic agents who take part in the processing from farmer or miner to vendor of the finished product. This concept also includes the relations among processors and among processing stages: the value-adding chain links supply sources, manufacturers, distributors and markets. "Chain" is a simplification: what we usually see in practice is a value network with loops and parallel paths. The optimization of the value-adding chain gives to all the involved economic agents a competitive advantage.
- **Outsourcing; delocalisation.** Outsourcing means that a processor purchases intermediate goods or services from an outside supplier that adds to the value of his processing. Contracting work out or sub-contracting is a similar concept. Since the length of the stretch in the value chain that a processor or sector processes in-house continuously changes in function of the relative prices of intermediate goods, there are is no stable definition of their own processing range or core business. This means that outsourcing essentially applies to purchases within their own processing range, not at its edges. This aspect is often overlooked by literature on outsourcing. Manufacturers have always contracted work out. In recent years the Manufacturing Industry has outsourced more and more manufacture of parts and sub-assemblies. Business services are also outsourced.
- **Industrial clusters; regional concentration.** Historically mechanical engineering was born in areas with a developed Steel Industry, which is understandable from the points of view of materials supply and work force skills. Steel mills are mostly

found near rivers or lakes that can supply water and power, with iron mines in the surrounding hills. Nevertheless, recent German studies in Cologne show destructive role of large steel processing cartels, too.

Geographical proximity of MMS firms in Latvia is relatively high in Daugavpils and Liepaja cities and Jelgava district.

Competitiveness of local firms in Latvia so far was driven by low cost factor, thus compensating lack of competitiveness factors described in above.

Last years showed rapid growth of average gross wage. According to CSB it increased from LVL 297 (EUR 422) in December 2005 to LVL 480 (EUR 683) in December 2007. Average wage growth trend in Latvia was by 14% higher compared to Lithuania and Estonia

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Rapid increase of inflation has stimulated jump up of other needed resource costs. In the period of 2000-2003 producer prices grew up slowly, but in 2004-2006 average growth was already 11%. In February 2008 producer prices has grown up by 29, 3% compared to February, 2006. It could be forecasted that producer price will keep growing, as oil prices and electricity tariffs (37% average by JSC "Latvenergo") will significantly increase. From 01.05.2008. gas price has grown up by 30% .

More problems to MMS causes crisis of real estate sector and following decrease of scale of building as construction has been the main promoter of internal demand for last years.

The main focus in new situation should be paid to:

- Increase of productivity;
- Shift to more technologically complex products with higher added value (from component to subsystem and system delivery).

Unfortunately, share of high-tech products in manufacturing industry was only 5,2% (in 2005). Manufacturing industry among others has demonstrated the most rapid investment growth in both high- tech (22,3%) and medium high - tech (18,8%) sub-sectors since 2004 during last three years.

Conclusions

Aggregation and synthesis of research analysis and available public statistical data allow us to make the following conclusions:

- The recent research works in MMS have been carried out before the dramatic changes in Latvia's economy took place
- The strategic documents of MMS are based on outdated data and materials
- MMS has lost its low price competitiveness; therefore higher attention must be paid to increase in productivity and production of technologically more complex products with high added value creating demand for highly skilled workforce
- The education system of engineering sciences is not yet production oriented

Recommendations to keep MMS competitiveness:

Analysis of MMS situation and corrections to the strategy of the sector should be carried out;

EU structural aid finance for period 2007-2013 should be invested in high- and medium-high technology sub-sectors using added value as one of key selection criteria in focused and efficient way;

Investments in human resources;

The highest educational institutions of Latvia should concentrate on specialists with existing higher degree education and prepare two and one-year study programmes of 2nd level higher professional education in engineering sciences

Using modern technologies expand the distance learning possibilities within natural sciences in order to allow the employed engineers acquire part of the study courses besides working in production

To develop life-long learning system in Latvia to provide opportunities for personnel training within whole employment period;

To arrange the education system in engineering sciences to harmonize it with needs of the industry.

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