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Economic analysis of machine tool industry in Ukraine and EU: factors of sustainable development

The article focuses on the sustainable development principles in machine tool industry as a part of mechanical engineering. The machine tool impact on the production technologies in economics is stated. The current situation in the machine tool industry is observed in Ukraine and European Union. Difficulties and handicaps, possible ways of monitoring and overcoming problematic situations by using tools of sustainability and ecological care are analysed. This work also considers the governmental programmes for environmental protection in the machine tool manufacturing.

Keywords: sustainable development, mechanical engineering, machine tool industry, blue competence, ecology.

Introduction. Sustainable development (SD) of national economy is mainly defined by the technological innovation of mechanical engineering (ME) [9]. Economy needs constant growth of production output as well as growth of the quality. The effective increase of the mechanical production can be achieved by using high-duty, precise machine tools. Machine Tool Industry (MTI) is the basic building blocks of the industrialisation of a country.

Previous Research. Wide range of questions connected with the ME and SD were observed in the works of Ukrainian and foreign scientists. Among them there are such world economists, as Nicholas Meese, Chris McMahon, Wolfgang Winkler, Jiuping Xu, Zongmin Li, Geoffrey P. Hammond, etc. In Ukraine this problematic is investigated by B. M. Andrushkiv, O. F. Balatskiy, O. G. Bilorus, B. V. Burkinskiy, M. G. Chumachenko, V. M. Geets, B. M. Danilishin, M. I. Dolishniy, L. Ye. Dovgan, I. I. Lukinov, L. G. Melnyk, and others.

All above mentioned scientists made a great contribution to the field of ME and SD, or SD of ME, as a common industry. MTI has not been separately investigated yet.

Setting a task. The task of this work is to analyse the status of MTI in the ME, its SD in the modern conditions. It will be also researched through the comparison of MTI in Ukraine and EU.

Main Plot. MTI influences basic technologies of ME. At the same time ME defines technology in the real sectors of the economy, like machinery, chemistry, steel production, oil, gas, etc. These technologies go through all manufacturing processes. They also determine clean and environmental friendly production. Short scheme is shown in figure 1 [9].

Playing an important role in the national economy, MTI is highly injured by all changes, political and economic, which occur in the country.

During post-Soviet period, MTI in Ukraine showed the continuous growth during the last years which ended in 2008. The world economic crisis leads to the big decrease on the demand as well as on the production. The positive signs appeared only since 2010.

The growth in the EU MTI continued until 2008. But European manufacturers showed their reaction to the crisis through innovation and the extensive use of flexible labour hours. The recovery in the European MTI was triggered off by the strong demand in the Asian markets. Consequently, the growth in the Europe is becoming broad-based and more sustainable. Main figures are shown in figure 2 [4; 5].

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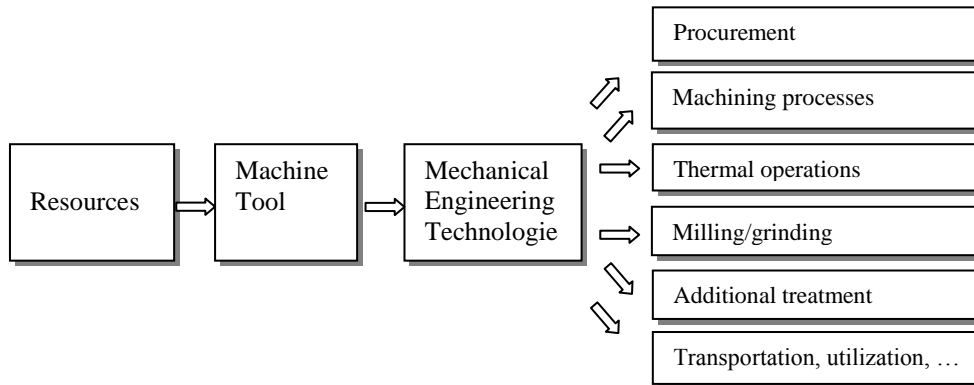


Figure 1. The basic technological processes

While Ukrainian Machine Tool factories are making weak steps for export to Russia and Belarus, the European Machine Tool manufacturers have a leading (44-46%) global market share in the production of machine tools, well ahead of Japan (18%) and China (15%). The European countries remain the main exporters of machine tools.

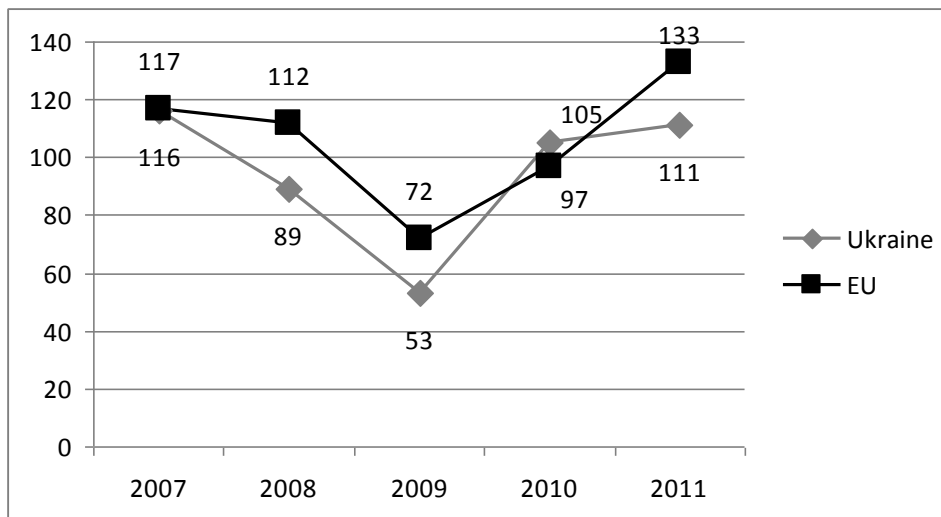


Figure 2. Industrial production index for the previous periods in 2007-2011

When growing Ukrainian manufacturers face negative factors that influence the overall development [7]: (a) limited inner demand; (b) insufficient paying capacity of the customers; (c) shortage of operating assets; (d) lack of real financial resources; (e) uncontrolled growth of the prices for the components, materials and energy resources; (f) massive outflow of experienced engineers and other workers; (g) backwardness of legislative and normative base; (h) overloaded fiscal system, etc.

To overcome these difficulties MTI in Ukraine requires greater support of the authorities. Despite that at the beginning of 2012 the Ukrainian government closed the Ministry Of Industry, passing its functions to the Ministry of Economics. The activity of Ukrainian Machine Tool Association, Ukrverstatoinstrument, is not sufficient enough.

To meet the nowadays challenges Ukrainian manufacturers have to pay more attention to the innovative features of their product. While the world trend is to switch into the serial machines with the small changes by the customer's demand, Ukrainian machine tool factories should seek the special multipurpose machining centres. These centres combine maximum possible operations. Modern machines should provide greater efficiency with the high accuracy. Not only mechanical part is important, but also electronic (CNC) as well as improvement of ergonomics and design.

Both machine tool companies in Ukraine and Europe need to stay close to their customer base to embark on joint innovation projects with them and to set up effective channels for sales, distribution and business services (e.g. maintenance and repair).

Small and medium enterprises, which cover more than 80% of European machine tool companies, are lacking the human and financial resources to expand internationally, but also they are deprived of management competences to cope with risks in unpredictable markets in emerging countries.

The share of European machine tool production has been in decline over the last decade, owing mainly to the shift of markets to Asia. The market access for European imports is being restricted as soon as they can supply the imported technology domestically.

Europe needs to keep the manufacturing know-how generated by the MTI by keeping production in Europe. Manufacturing can help tackle the current economic challenges. Europe is facing today including slow growth and unemployment, reminding that manufacturing is a source of innovation, competitiveness and jobs. This is a pre-requisite to master industrial innovation and to benefit from first-mover advantages to produce sufficient product for an aging society and all other value-added products in Europe. Europe is in fierce competition with emerging countries for leadership in these industries.

The current situation in the financial Ukrainian and European markets results in a real threat to the manufacturing sector. Affected by the new rules, the banking sector limits access to finance not only for MTI, but also for the end-user sectors. Taking money out of the system will inevitably hurt the industry.

When growing and meeting all the challenges machine tool industry should be innovative also in the sustainable development. The first big steps made to this direction by the European Union.

At the 17th of February, 2012 the European Machine Tool Industry, represented by CECIMO (European Association of the Machine Tool Industries), launches a European initiative on sustainability: the Blue Competence (BC) Machine Tools initiative [1]. The machine tool industry is the first mechanical engineering sector to embark on a broad-based campaign on sustainability at European level. This initiative is addressed to manufacturing companies producing machines or subsystems for processing metal and related materials in Europe.

Machine tool builders which participate in the BC Machine Tools initiative commit themselves to optimize the use of energy and other resources to enable faster, better and higher quality manufacturing in end-user industries. The industry has agreed on common principles and procedures which participating companies will follow to achieve reduction of resource and energy use, implement improved management systems for handling waste and recycling, as well as implementation of sustainability principles in its own production.

Innovations and further developments form the basis which ensures competitiveness. Primarily, innovations circle around the core topics: improving the living conditions, efficient use of resources, environmental protection and – in conjunction with all this – improvement of cost effectiveness. An improved cleanability of components by better accessibility or upgraded surfaces will reduce maintenance and energy costs. Optimising the efficiency or a more compact design enhance the cost effectiveness of machinery and plant.

The BC Machine Tools initiative aims to trigger a mindset shift in the machine tool

industry and beyond. The underlying principle suggests that the industry increasingly builds its competitiveness on ecological performance. This does not represent a shift away from traditional elements of competitiveness such as precision, speed or reliability, but it adds up to these strengths a new core element: 'sustainability'.

The BC initiative first started in Germany; it covers all the mechanical industry and is operated by VDMA, the German Engineering Federation, under the tag 'Engineering a better world'. The VDW (German Machine Tool Builders' Association) is representing its branch in the process of setting up laws and decrees concerning environmental protection. In this context the VDW is participating in the making of decrees and technical regulations on the basis of the German law for water conservation (Wasserhaushaltsgesetz) and has also formulated specific positions concerning the decree for electronic waste disposal (Elektronikschruttverordnung) [2].

In the Ukrainian MTI the term sustainability still doesn't exist. But with the governmental programmes the important directions in resource saving, ecology, air emission, waste utilization are stimulated [8]. The "State Programme of Industry Development for 2003-2011 years" focuses only on the principles of economic stimulation to provide resource and energy saving technologies, the needs to transfer to the ecological international standards, demands for ecological products formation and services. But this programme did not take into account world economic processes, which become more visible through the influence of globalization and competence intensification in the industrial output markets.

The new concept called "Nationwide Purpose-Oriented Programme of Industry Development in Ukraine until 2017" considers wider approaches for the environmental protection. This State Programme would become more efficient. The main goal is regulatory and legal support of energy saving through the standards system, energy audit, state examining, control for resource usage, recording energy-consuming production and through the increase of energy effectiveness of manufacturing.

Transition to the international standards of ecological safety is expecting. Monitoring of factories' ecological influence to the environment will be intensified. For that purpose ecological control management has been already established on each machine tool manufacturing. Methods for ecological parameters improvement will be more active. The state concept provides:

- basic scale of fees for environmental pollution. This fee also considers costs on environmental recovery as well as people health;
- improvement of ecological and economic mechanism. It stimulates implementation of environmental friendly technologies, wide usage of ecological audit;
- setting up more efficient ecological control. The main purpose is to manage anthropogenic load, efficient use of natural resources and distribution of productive forces;
- implementation of ecologically effective methods of manufacturing, principals of corporative social responsibility for clean production. This leads to volume reduction of waste and emission and comprehensive usage of raw material resources, as well as recyclable materials;
- improvement of waste accounting system. It counts waste formation, accumulation and utilization;
- development of environment state monitoring system;
- introduction of economic stimulation system. It helps to reduce hazardous waste reduction and to improve the ecology of manufacturing;
- spreading of soft lender system for ecological projects. It comes through state loans, state ensuring of commercial banks' loans returning and interest rates compensation.

Conclusions. Manufacturers in Europe which start operating under the principles of the BC Machine Tools initiative agree to meet pre-determined ecological, economic and social values and principles, while implementing sustainable production solutions in their production plants, products and business services with the aim of achieving greener manufacturing. The initiative keeps in line with EU policy developments and priorities.

Ukrainian machine tool factories should look for the innovations in their product to remain updated with the world trends. They should keep to the existed norms and standards of environmental protection, using the main demands from the governmental Programmes.

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Економічний аналіз верстатобудування в Україні та Європейському Союзі: фактори сталого розвитку

У статті розглядаються принципи сталого розвитку у верстатобудуванні як частині машинобудування. З'ясовано вплив верстатів на технології виробництва в економіці. Зображене теперішнє становище верстатобудування в Україні та Європейському Союзі. Відображені труднощі та можливі шляхи вирішення проблем через сталість та турботу про навколишнє середовище. В цій роботі приділено увагу до урядових програм захисту довкілля на верстатобудуванні.

Ключові слова: сталій розвиток, машинобудування, верстатобудування, екокомпетентність, екологія.

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Экономический анализ станкостроения в Украине и Европейском Союзе: факторы устойчивого развития

В статье рассматриваются принципы устойчивого развития в станкостроении как части машиностроения. Определено влияние станков на технологии производства в экономике. Показано текущее состояние станкостроения Украины и Европейского Союза. Описаны трудности, возможные пути решения проблем через устойчивость и заботу об окружающей среде. В этой работе уделено внимание правительственным программам по защите окружающей среды в станкостроении.

Ключевые слова: устойчивое развитие, машиностроение, станкостроение, екокомпетентність, екологія.