The development of post-crisis domestic machine-building industry

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Abstract* – *The article is devoted to consideration and evaluation of some aspects of development of Ukrainian machine-building industry; the performance indexes of basic export oriented sub-industries, tendencies and prospects of railway machine-building development are analyzed; the comparative statistical datas and dynamics of modifications are indicated; strength and weakness and management development problems of domestic machine-building enterprises in a post-crisis period are considered.

Key words – machine-building industry, production, export, post-crisis period, management development, market.

I. Introduction

Machine-building is one of leading Ukrainian industries and plays an extraordinarily important role in development of its economy. Products of machine-building enterprises are the resource base of scientific and technical progress and used in all types of economic activity. Important macroeconomic indexes of industrial manufacturing effectiveness in general depend on the level of machine-building and the level of domestic enterprises involvement in world manufacturing. With the country withdrawal from the world economic crisis, the majority of machine-building enterprises are faced with several challenges, which need to be addressed in order to maintain positive dynamics of growth and competitive position in the rapidly changing world market. The scientists, who made a significant contribution to the research of the domestic machine-building enterprises development problems, emphasize in their writings the necessity for effective use of the machine-building potential and the increase of the level of industry export potential use. They also offer solutions to problems that are specific to the machine-building industry of Ukraine. However, despite the extreme urgency of the subject and the necessity for the situation continual monitoring on the market of this product, it is important to analyze the machine-building industry enterprises results and to identify their competitive advantages to strengthen competitive positions in international markets.

II. The state of domestic machine-building in a post-crises period

At present, Ukrainian government as the world governments are discussing the ways to solve economic problems and prevention threats: the risk of recession, instability of public finance, the problems with state crediting and fiscal deficit financing, growth of unemployment. The definition of the effective financial solvency system is the realization of the stabilizing and stimulating programs to support economic growth. The positive dynamic of Ukrainian economy in post-crisis period is caused by export-oriented industries activity, one of them is machine-building industry. The post-crisis period brought favorable market conditions to the machine-building industry and leading players started to increase their profitability since 2010 [1].

Machine-building is one of the leading industries of Ukrainian economy. The companies of the industries are engaged in manufacturing of machinery and equipment for virtually all types of industrial activities. Depending on the final product, machine-building industry divides on heavy machine-building (metallurgy, mining, oil and gas, chemical machinery, engines and turbines), transportation (railway, automotive, aircraft, and ship), machine-building for agriculture and manufacturing of electrical, electronic and optical equipment. The most developed sub-industries are railway machine-building, heavy machine-building and machine-building for agriculture.

The majority of manufacturing companies are situated in the East of Ukraine, which is within short distance from raw materials supply base, mainly steel. Major machine-builders purchase raw materials directly from local or regional suppliers. Few plants are self-sufficient being part of large vertically-integrated industrial holdings.

Ukrainian machine-building sector's output is mainly export-oriented with Russia (42%) and other CIS states being the principal markets. However, a significant portion of export goes to the CEE, Middle East, Africa, China and India. A few producers sell machines globally that increases the sales territory.

The key export product groups are turbines and engines, railway and trolley locomotives and road equipment, pieces of apparatus and railway cars, electrical cars and equipment [2]. Domestic market consumes substantial part of machines for agriculture, metallurgy and mining.

For the last ten years machine-building industry demonstrates excellent results, outputs increased by 2,5 times compared to 2000 year, despite significant 45% volume decrease during financial crisis in 2008 and 2009 [3].

During 2010-2011 is one of the strongest manufacturing performances (annual industrial index grew by 36.1% in 2010 and 17.2% in 2011) due to steady economic recovery (GDP enjoyed 5.2% growth in 2011 vs. 4.2% in 2010) [3], [4]. Sustainable growth of demand for machinery and equipment in Ukraine as well as in main export markets (Russia and other CIS countries) led to 23.9% CAGR in post-crisis period Eq.(1).

$$CAGR = \left[\left(\frac{y_i}{y_0}\right)^{\frac{1}{t_i - t_0}} - 1\right] * 100\% \qquad (1)$$

y_0 - finish value; y_i -start value; $t_i - t_0$ -number of years.

The dynamic of GDP, growth index and machine-building (MB) sales are represented on Fig 1.

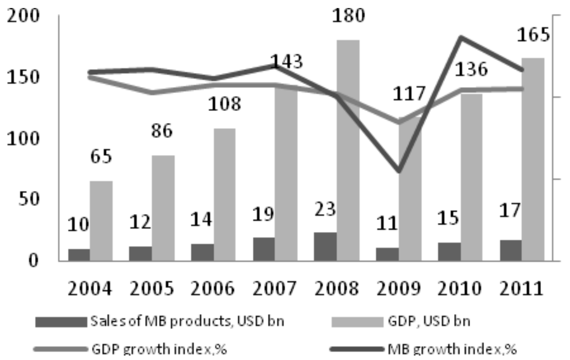

Fig. 1. Dynamic of machine-building products sales vs. GDP
Source: Ukrstat [3], [4].

Machine-building economic growth, fixed in a post-crisis period is characterized by positively strengthening dependence of domestic economy on international markets, their price but not technological competition, export-oriented industries investing, etc. The dependence has also a negative influence on economic activity; it becomes sensitive to the world market's fluctuations which is risky for the Ukrainian unstable economy [1].

III. The perspectives and development of domestic machine-building in a post-crises period

Statistically, one of the most long-range and export-oriented machine-building sub-industries in Ukraine is railway machine-building, which can be divided to two main categories: railcars, diesel and electric locomotives.

The main producers on the railcar market are: Kryukiv machine-building plant, Dniprovagonmash, Stahanov machine-building plant and Azovmash, they divided the production market with total share of 90% and 88% of total production in 2009 and 2010, respectively [5]. Most of them are export oriented and produce freight and passenger railway cars. There are some competitive advantages of main domestic produces: wide selection of railway products (freight wagon and carriages), complete manufacturing and selling cycle, capacity to perform singular and large production orders.

Domestic production of railcars and locomotives enjoyed rapid increase in demand posting the highest sub-industry growth of 132% in 2010 based on the extensive modernization programs being undertaken by governments of Ukraine, as well as Russia and Kazakhstan [3].

Increased domestic production of freight and passenger railway cars and locomotives in a post-crisis period caused by increased export to CIS countries [2]. Luganskteplovoz is the leader of locomotive production in Ukraine and is CIS export oriented (more than 95% of sales are directed to Russia and Kazakhstan). After world economic crisis 2008-2009 production decrease industry rapidly recovered and even outperformed pre-crisis level of locomotives produced showing railway machinery index growth by 136% and 28% in 2010 and 2011, respectively Fig.2. Ukrainian sub-industry of railway machine-building have increased its output significantly and is running now at almost 100% of its capacity.

According to the results of economic research performed by (*Doloitte analysis*), the great demand for railway machine-building products, during last two years, was caused by the following reasons: Ukrainian railway park is flooded by obsoleted locomotives and railcars (90% of electric locomotives, 99% of freight diesel locomotives and 88% of railcars of Ukrzaliznytsia are fully depreciated), this situation is typical for Russia and Kazakhstan; delayed demand during 2008-2009, when state and private companies postponed purchases due to financial stress and other aspects caused by world economic crisis, the ongoing boom in regional demand for railroad rolling stock which is expected to continue in the medium term due to massive replacement and renovation programs, growing railcar prices, increasing rail freight rates (Ukraine's national railway operator Ukrzaliznytsia announced intended purchase of 10 thsd freight railcars in 2012); renewal of railway system due to preparation for Olympic Games in Sochi 2016 and 2018 FIFA World Cup, both will take place in Russia [3].

Ukrzaliznytsia has an acute need to replenish its passenger railcar fleet. Over the last 10 years total passenger fleet in Ukraine fell by nearly 33%, or 3,620 units, 200 of which were removed from service in October 2011. At the same, during the last decade Ukrzaliznytsia bought just 550 passenger railcars. As a result, the total passenger cars fleet in Ukraine now comprises about 7,025 units, 17% of which are being repaired [3].

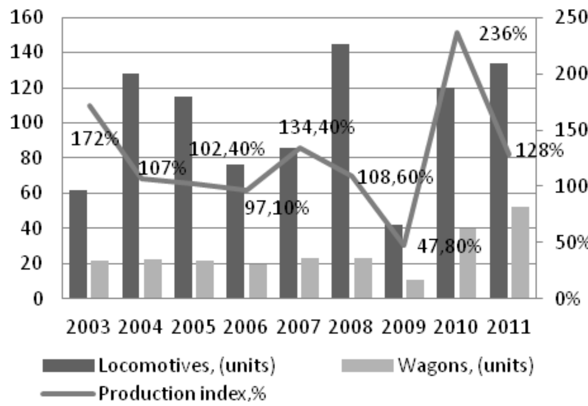

Fig. 2. Dynamic of locomotives and wagons production.
Source: Ukrstat [3], [4].

The machine-building export activity results demonstrate positive tendencies in a post-crisis period among certain commodity lines: freight and passenger railway cars, diesel and electric locomotives and accessory equipment.

According to the data of State Statistics Service of Ukraine in 2012 there are 5 main exporters of domestic machine-building products: Russia with total export– 3193, Kazahstan – 385, Belorussia – 75, Latvia- 33, Uzbekistan – 19 and others - 109 (bn.USD). The key export belongs to Russia and Kazahstan (84% i 10% total export of railway machine-building products, respectively) (Table I) [4]. Majority of purchases are made by state monopolist companies Russian Railways (Russia) and Kazakhstan Temir Zholyetc (Kazakhstan).

TABLE I

LOCOMOTIVES EXPORT OF UKRAINIAN PRODUCERS

USD, thsd	2009	2010	2011	%in total
Russia	55431	94369	206419	94,2
Kazahstan	1264	9845	1765	0,8
Belorus	-	60	-	0
Azerbaijan	-	50	230	0,1
Other	469	3754	10744	4,9
Total	57164	108079	219158	100

Source: Deloitte analysis [4]

There are 5 main importers of domestic machine-building products according to the data of State Statistics Service of Ukraine in 2012: Russia with total import – 288,9, Czech– 72, Chin– 39,7, Poland – 36,5, USA – 26,4 and others – 31,9 (bn.USD) [3], [4].

Ukraine mostly meets its own demand for railway machinery except for some spare parts for locomotives which are predominantly supplied by Russia (58% of total imports of railway machinery products in 2011), however, it still exists in increased import dependence compared to pre-crises 2008.

In a period of world economy renewal when the world economic crisis completes, production volume will be increased. The research maid by National Institute for Strategic Studies [2] informs that world industrial-production growth in 2010 was 4,6 % (USA - 3,3 %, Germany – 9,0 %, France – 3,5 %, China – 11 %, Russia – 8,3 %, Brazil - 11,5 %). To maintain the leading position as machine-building producers different countries implements certain tools to provide international competitiveness and restore machine-building production. There are powerful state supports of machine-building enterprises in the developed countries, which, mainly, gets them as a financial aid and provides easy access to credit with debt restructuring (e.g. General Motors gets state support of 50bn.USD in 2009) [2].

Researches [1], [2], [3] states, that, competitive expansion caused by higher-than-expected growth of foreign machine-building enterprises in well-developed countries threats domestic industry to increase import of machine-building products to Ukraine; to change machine-building market sharing inside and outside the country.

In order to avoid the negative influence, to the machine-building enterprises, they need to be, quickly adapted to the changes of the world state of affairs, taking into account of scientifically technological lag and imperfect corporate and strategic management, etc.

To summarize the problems of the state and development of Ukrainian machine-building industry in post-crisis period, we offer SWOT analysis, which includes research results of National Institute for Strategic Studies, investment consulting center Doloitte analysis and self-research (Table II).

Post-crises period is challenging for enterprise in most aspects, but it is also an opportunity to reconstruct organizational system implementing efficient management for the enterprise development. Large machine-building manufacturing plants are examples of imperfect, complicated, hierarchical and generally ineffective management structure, they take into account quantitative indicators, such as: GDP, growth rates, production indexes, export and import sales, profitability, etc. It is important to pay attention to quality measures, such as: strategy management, organizational systems, systems of implementing innovative and technological projects, recruiting and staff development, corporate culture, etc. Marketing development that aimed to occupy geographical territory without flexibility and dynamism is not profitable.

An organization exists to transform strategy into economic results, but it can only do this if all its elements - production, management, staff, organizational structure, information and feedback - are congruent with each other and with the strategy.

It is necessary to adapt some measures of management consulting, such as: analysis of enterprise, organizational structure, audit of basic production and business processes in the context of management decisions acceptance and forming the business-model of value added.

An ineffective management of domestic machine-building enterprises requires changes in organization of business: abolition of "planners" mentality; transformation of bureaucratic control system in process-oriented organization which works for customer needs, but not for the production-process.

Still important is a discussion about introduction a business-process management on the modern domestic machine-building enterprise that levels competitiveness not only in well-developed countries but in Ukraine as well.

Conclusion

Machine-building is one of the most important industries of Ukrainian economy, which produced highly technological and innovative products with the high level of value added, Railway machine-building is export-oriented, has been showing positive trends in all sub-sectors since 2010 driven by post-crisis recovery of CIS countries. The post-crisis period brought favorable market conditions to the industry and leading producers started to increase their profitability and the whole machine-building industry as well.

In spite of positive observed tendencies in machine-building industry, there are some problems which require an immediate intervention: significant level of obsolescence of rolling stock and increase in both passenger and freight traffic and its slow update of the fixed assets which is 70%, lack of modern technologies use and modernization with the purpose to increase products competitiveness and decline of its prime cost; imperfect system of corporate management which is based just on the quantitative economic results, but not strategic management.

TABLE II

SWOT ANALYSIS OF MACHINE-BUILDING INDUSTRY IN UKRAINE

Strength	Weaknesses
▪ Significant potential of scientific development based on educational level of staff; ▪ Developed metallurgy industry together with significant reserves of raw materials that satisfy production needs; ▪ Unique process patents; ▪ Wide range of machine-building products; ▪ Competitive price of domestic machine-building products compare to the world prices; ▪ Best practices of domestic government enterprise re-engineering; ▪ Meeting demand of machine-building products ; ▪ Long historical ties, international relations and technological cooperation with large clients, firm position on CIS markets; ▪ Convenient geographic location to the main machine-building exporters.	▪ Slow application of contemporary technologies and modernization of machine-builder's fixed assets; ▪ The depreciation rate of fixed assets equals 70%, significant physical obsolesce; ▪ High duration of manufacturing cycle disabled floating assets accumulation; ▪ Domestic machine-building industry has a technological dependency on international suppliers on CIS market; ▪ Low consumer properties and competitiveness of domestic machine-building products; ▪ Imperfect, complicated, hierarchical and generally ineffective management structure of large machine-building manufacturing plants ; ▪ The industry contains a great part of government property that complicates shaping a unified enterprise management strategy.
Opportunities	**Threats**
▪ Technological development based on domestic research and technology parks; ▪ Public Private Partnership in renewal of obsolete locomotives and railcars park in Ukraine as well as in Russia and Kazakhstan; ▪ Marketing development to Africa and Asia; ▪ Renewal of railway system due to preparation for Olympic Games in Sochi and 2018 FIFA World Cup, both in Russia; ▪ Adaptation of venture capital; ▪ Access to credit with debt restructuring; ▪ Use of domestic and foreign management consulting experience in re-engineering on large machine-building manufacturing plants.	▪ Increase of components and raw materials cost; ▪ Significant part of sales goes to Russia, which makes the viability of the industry dependent on political relations between two countries; ▪ Competitive expansion caused by higher-than-anticipated growth of foreign machine-building enterprises; ▪ Slow adjustment to the rapid changes of world market conditions may cause the recession in demand for domestic machine-building production; ▪ Labor migration; ▪ Lack of promotion strategy; ▪ Complicated access to public finance programs of industry development; ▪ Complex protection of intellectual property slows down implementing of inventions and patents.

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