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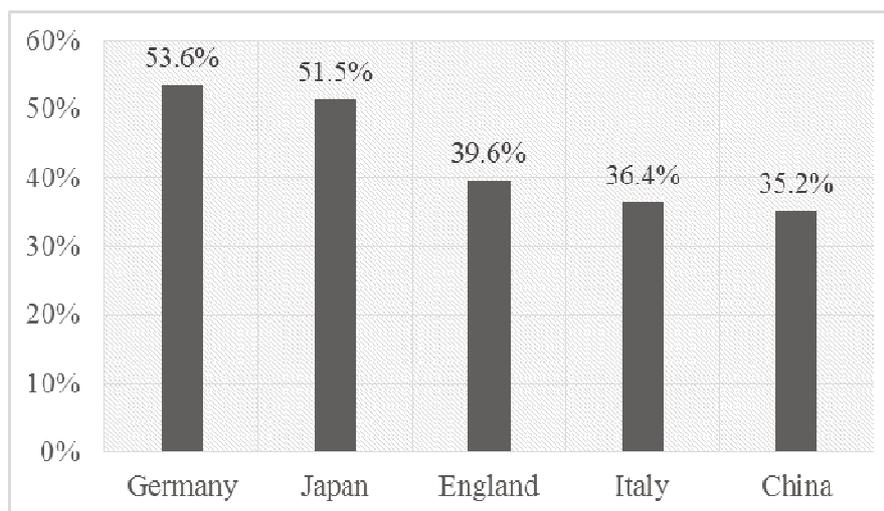
## THE CURRENT STATE ANALYSIS OF DEFENSE ENTERPRISES IN UKRAINE

The article is devoted to the analysis of the current state of the machine-building enterprises in defense sector. Based on the example of the machine-building enterprises on the East of Ukraine, the formation stages have been formed; enterprises' development directions have been allocated; the achieved results as the reform outcome have been presented. It has been shown that the short-term attitude of some local defense enterprises' administration has led to the decline in high-tech branches of mechanical engineering that, in turn, have replaced metal-containing production with a low percentage of added value of finished products. It ought to be noted that the economic situation of the largest enterprises at the military industrial sector and the civil sector is strongly influenced by small (micro) and medium-sized enterprises, which, by various methods, interfere with the tendering procedures conduct that in some cases is not significant but influences the technical re-equipment and innovative development pace at large enterprises.

**Keywords:** machine building, military industrial sector, production, industry, private companies, public administration.

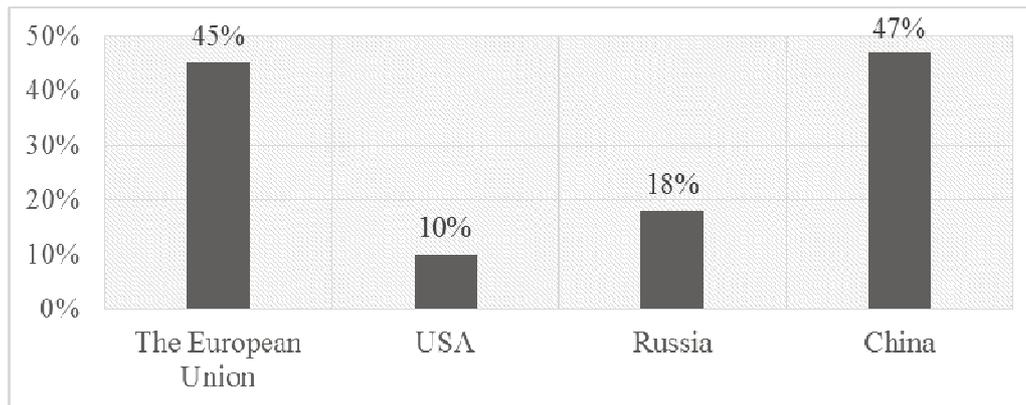
*Problem statement.* The determining factor in the products' competitiveness of modern production is the level of enterprise equipment condition, the professional staff availability, as well as the technological preparation level of production. Technological sides of the production is a set of interconnected processes that ensure the enterprise technological readiness to produce the commodities of the required quality in terms of time, production and costs. The content and volume of technological sides of the production depend on the production type, design and purpose of the product. Technological readiness presupposes the availability of a complete set of technological documentation and facilities for the technological equipment necessary for the new products' production.

In economically developed countries, the share of machine-building industries accounts for 30-50% of the industrial production volume (Fig. 1), which, in its turn, provides guarantees for the technical re-equipment in the industry every 8-10 years (Fig. 2)<sup>1</sup>.



**Fig. 1. The share of machine-building industries in some countries**

<sup>1</sup> Машинобудування України: поточні тенденції. <<http://minprom.ua/page2/news755>> (2017, June, 05).



**Fig. 2. The share of machine-building products in the GDP of some countries**

Nowadays, the defense and civil engineering accounts for the main share of any country's economy which plays a decisive role in creating the material and technical base of the economy. Machine-building has an extremely important role in accelerating scientific and technological progress.

While producing means of production for various branches of the national economy, machine building provides comprehensive mechanization and automation of production. In addition, defense enterprises that are part of the whole defense industry sector, which is the economic sector, are intended for the development and production of defense-related products and, at the same time, are the foundation of the country's security. Therefore, maintaining the high level of these enterprises development through the regular updating of productive assets for developed countries is a foreground military-economic task of national policy.

It ought to be noted that the share of machine building in the gross domestic product (GDP) of Ukraine, according to the State Statistics Service, was about 12% in 2013, which suggests that any fluctuations in this area might seriously affect the financial well-being of the country<sup>1</sup>.

*Recent research and publications analysis.* There are many possible ways of developing the machine-building industry of Ukraine's military industrial sector. Some of them are supported by relevant scientific research. Thus, O. Golovach, the author of the article "Forming the strategy of upgrading to Ukrainian machine-building enterprises under the conditions of European integration"<sup>2</sup> points to the fact that the machine-building enterprises of Ukraine are currently at the lower level of the technological system compared to similar European companies and therefore cannot compete with the machine-builders of developed countries. The reason for this, according to the author, is the lag from western industries not only in the spheres of technological devices, but also in the field of managerial technologies.

N.Vetsepura and S. Prokofiev in the article "The issues of machine-building complex recovery of Ukraine under development of cooperative ties"<sup>3</sup> noted that in order to move to a new stage of the machine-building industry development in Ukraine, it is necessary to offer and implement innovative products on the domestic and international markets.

In the article "The state and development perspectives of the machine-building complex of Ukraine: administrative aspect"<sup>4</sup> the authors emphasize that the global economic crisis contributed to a decline in demand for Ukrainian machine-building products in 2008-2009 and, consequently, to a sharp decrease in production and sales volumes of most types of machine-building enterprises. According to the authors, the discrepancy of machine-building products to world standards significantly reduces the opportunities for domestic enterprises in the world market.

<sup>1</sup> Офіційний сайт Державної служби статистики України. <<http://www.ukrstat.gov.ua/>> (2017, June, 05).

<sup>2</sup> Головач, О.А. (2016). Формування стратегії розвитку машинобудівних підприємств в умовах євроінтеграції. *Економічний вісник Донбасу*, 2(44), 149–152.

<sup>3</sup> Вецепура, Н.В., Прокоф'єва, С.В. (2016). Питання відновлення машинобудівного комплексу України в умовах розвитку коопераційних зав'язків. *Економічний вісник Донбасу*, 3(45), 158–162.

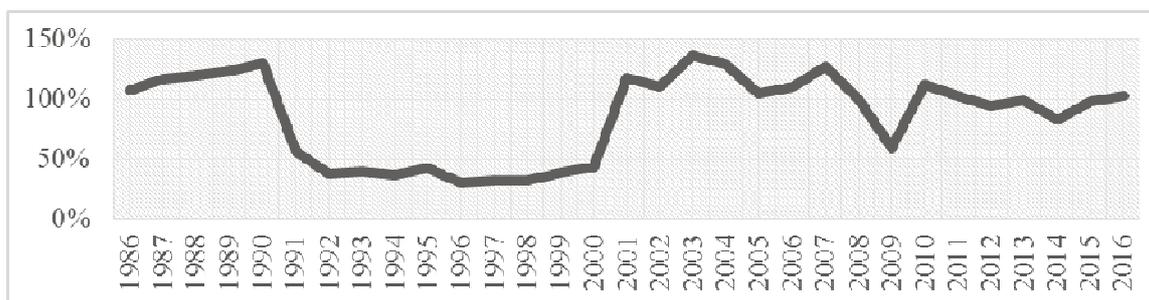
<sup>4</sup> Корнілова, І., Боклан, Н. (2012). Стан та перспективи розвитку машинобудівного комплексу України: управлінський аспект. *Вісник Київського національного університету імені Тараса Шевченка*, 137, 23–26.

However, there is no doubt that the existing situation among machine-building and other defense enterprises needs further in-depth research. Therefore, the *purpose of the article* is to analyze the state policy in the defense-industrial complex, its conditions and prospects for development on the example of several enterprises from the eastern Ukraine.

*Statement of basic materials.* During the USSR, virtually all enterprises were connected to one complex, the one closed-loop process; the enterprises of the machine-building industry and military industrial sector or other related industries did not constitute an exception. After the collapse of the USSR, closed-loop enterprises remained on different sides of the border; the system that had been established over the years was broken and it led to a collapse in a lot of sectors of the national economy of Ukraine, since each of the former republics received various fragments of a diversified machine-building complex. The result of such processes was a prolonged crisis, which led to bankruptcy and the closure of strategically important industries in the 90's. It ought to be noted that at that time, leaders and directors of enterprises had the lack of experience and a clear action plan to confront the crisis in the country which caused the above-mentioned collapse.

In the early 2000s, the enterprises of the machine-building and related industries of the military industrial sector began gradually to develop new contacts for the import / export of products. It was in 2001 when for the first time in the post-Soviet Ukraine's production revived (Fig. 3)<sup>1</sup>.

However, it ought to be highlighted that enterprises were characterized by chaotic development. In those years, some production directions were developing rapidly, while others were slowing down their development due to the lack of demand. Probably that was because of the fact that a lot of key enterprises, due to accelerated privatization, quickly changed the owner's status. The new owners had re-profiled the companies in such a way as to produce commodities that were currently in demand. In most cases, such enterprises' resettlement became compulsory. In order to prevent holding on the balance sheet the unprofitable manufactures that were out of action, the new owners divided large enterprises into several small ones. At the same time, the existing unique equipment was being sold, which at best was not sold as scrap metal.



**Fig. 3. Dynamics of the industrial production index in Ukraine since 1986 (incremental result)**

For example, most of the production and research and production associations were sold, which could partially provide innovation and production cycles. Dissemination was the main condition for various industrial and scientific giants' privatization. An example is the Kyiv Radio Plant Association, which employed about 20,000 people and was split into 24 independent entities. The leading enterprise of the USSR in the field of laser systems and torpedo control systems of the Kvant Institute was divided into 7 entities. Each of those once large enterprises could have become the core of the country's innovation development, which would have been in line with current trends in the management of innovation activities. However, fragmented enterprises ceased to influence technological progress in their industries<sup>2</sup>.

As a result of such transformations, unique production, technology, and personnel were lost forever. Instead, a simple, low-value and low-volume metal production emerged, which did not use sophisticated

<sup>1</sup> Чупир, О.М. (2013). Тенденції розвитку машинобудівного комплексу України: сучасни стан і перспективи. *Вісник економіки транспорту і промисловості*, 43, 99–103.

<sup>2</sup> Романенко, С.І. (2008). Подолання кризи в галузях машинобудування – умова економічного та інноваційного підйому країн СНД. *Інновації*, 2, 65–73.

technology and did not require highly skilled workers. Speaking about mechanical engineering, it usually means intelligent, technically complex products with a high share of added value. In modern realities this is far from being the case. The production of a technically simple, but material-intensive product for the raw material markets transforms Ukraine's economy into hostage to the global demand for certain products. In Ukraine it is customary to produce everything that is in demand, but the fact that the high proportion of technically simple products with low added value hinders development is not taken into account. It does not give the machine building and related industries the growth prospects, gradually turning the country into a raw material appendage of other "big players".

The principles for such behavior can be observed on the example of PJSC "Azovmash", which was not working for several years after the declaration of Ukraine's independence. When in 2000 the company changed its board of directors, one of the first orders was the steel complex restoration. Thus, two 25-ton furnaces were restored and two 5-tonne ovens were built, later they were increased to 10 tons. Then the cast moulding production was expanded. After practically complete re-engineering of production "Azovmash" started to work. However, the method via which the plant revived had hidden threats. All materials and human resources were involved in the production of irrational, from a scientific point of view, products<sup>1</sup>.

The fact was that the new plant management, in order to get the most profit in the shortest possible time, chose the path of least resistance. At that time, the scales of the world market tended to upgrade the rolling stock of railways, and that was especially noticeable in the CIS countries. At the same time, the main importer was Russia which was a country with an export-raw material model of the economy and suffered an acute shortage of cars, open wagon and tanks. Domestic enterprises could not handle large order volumes from both the state and private sectors. In that regard, at the state level, it was allowed to let Ukrainian car manufacturers to enter the Russian market.

It ought to be emphasized that "Azovmash", both in the Soviet years and after the collapse of the USSR, was the leading enterprise in the production of mining, crane and metallurgical equipment, rocket technology, while not losing its influence in the above-mentioned directions, even in the stagnant nineties. However, when new administration was appointed, those areas lost their priority, the company ceased the amount of orders. The fact that the aforementioned high-tech products had a long manufacturing process, from the production of semimanufactured articles to the final assembly and the finished product testing, which ensured the production areas and enterprise capacities with long-time loading that could lead to a production decrease of, at that time, strategic product.

Simultaneously, company's own steel complex encouraged to set records in carriage-building, which provided production of some railroad casting, but the others were imported.

2001 was the year of free economic zones creation in the Donetsk region, which allowed the company to have started the first molding line for a large carriage cast by the year 2004. Thus, having received manufacturing facilities for the cast parts of any complexity and orientation production, the company's managers turned their attention to science-intensive products again.

Another product type was components for the tanks and armored personnel carriers manufacturing. The company first declared itself in that field in 1995, when Ukraine signed a contract with Pakistan to supply 320 T-80UD tanks. Due to "Azovmash" plant, Ukraine managed to execute that order in due time because the direct producer experienced some delays by reason of the cast towers and buildings lack. However, the professional personnel availability at "Azovmash" plant allowed to execute that order.

The enterprise revival was greatly facilitated by close cooperation with European machine giants such as Kunkel-Wagner, STG Group, Danieli, Siemens, Mannesmann Demag, Voestalpine and others. This cooperation led to a deep modernization of production, but exceptionally in carriage construction.

In 2008, the world crisis influenced the "Azovmash" performance. The decline in production volumes was catastrophic in all directions, but it was particularly badly damaged by wagon construction. In that area, the decline in manufacturing was about 60%.

As it was noted above, Russia was the main importer of freight cars and tanks manufactured by the "Azovmash" plant with an import share of about 85%, and that market was unpredictable. Management of this market had always been carried out artificially. While Russian cargo operators were changing actively the fleet, and, according to estimates of various experts, there were about 1.06 million items, Russian plants were unable to cope with orders, and in those conditions the Ukrainian manufacturers'

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<sup>1</sup> Офіційний сайт ПАТ «Азовмаш». <<http://www.azovmash.com>> (2017, June, 05).

involvement was a necessary alternative. In times of crisis, the rearmament was slowed down; it turned out that there were not enough orders for Russian factories, so Ukrainians ones were expelled. However, since freight operators in Russia were private, a lot of them were accustomed to working with Ukrainian enterprises, and that did not suit the Russian car manufacturers, who had general approval in government circles aimed at import substitution in machine building. As a result, the authorities used force measures to support their car manufacturers<sup>1</sup>. In the struggle for the share non-market methods were commonly used. In particular, in the fourth quarter of 2013, wagon imports of all major wagon-handling enterprises of Ukraine were completely prohibited. The reason was the poor quality of carriage castings used in production, resulting in the largest number of accidents on Russian railways due to Ukrainian railcars. It ought to be noted that the reason was also referred to earlier when attempts had been made to restrict the cars' export from Ukraine. Those difficulties were not new, but they arose in most cases only in "Azovmash" plants, which used most of the casting of its own production.

The situation deteriorated considerably as a result of the almost complete breakdown of relations with Russian importers in 2014. Then there was a complete stop of all production. As a result, a lot of departments were abandoned, and all steelmaking furnaces of the steel complex were stopped. There were numerous prerequisites and reasons for that, but the main mistake was to reorient the enterprise to release one type of product. As a result of unilateral modernization, the "Azovmash" plant lost its existing technology, industrial potential and specialists that affected negatively and put the company at the risk of survival.

Another large machine-building enterprise in the East of Ukraine is the Novokramatorsky Machine-Building Plant (NKMZ). This enterprise, like the "Azovmash" plant, has undergone all the stages of the crisis that have taken place in Ukraine, but has not lost its industrial potential, and vice versa have increased the manufacturing capacity. Nowadays, NKMZ is a powerful engineering and manufacturing complex that traditionally specializes in the design, manufacturing and complete supply of high-tech equipment<sup>2</sup>.

The situation of NKMZ after the collapse of the USSR was the same as with the vast majority of Ukrainian industrial enterprises. The economic crisis of the first years of the unplanned economy hurtfully affected everyone, and NKMZ was no exception in that process. In the late 1980s, the plant produced up to 180,000 tons of equipment per year, with a total sales value of 350 million Soviet rubles; in the early 1990's NKMZ survived due to the production of spare parts, like all post-Soviet enterprises.

The fight against the effects of the crisis on each of the machine-building enterprises was based on own rules. Some "flowed" in the hope of assistance from the state, others tried to establish a chaotic business in the market of industrial equipment. NKMZ made the decision to learn to work in a market environment, yielding the enterprise's profit at the first stages. The bet was correct: today, the plant has a status of solid player in the heavy machinery market, unlike a number of post-Soviet machine-building enterprises that had the best start-up opportunities in the early 1990's.

The process started in 1995, when, after several years of spare parts manufacturing, NKMZ won a tender for the equipment supply. Then two German companies contacted the company, together with which the rolling mill for Germany had to be manufactured. The delivery volume amounted to approximately 2.5 thousand tons<sup>3</sup>.

After the equipment was delivered to Germany, the profitability level of NKMZ increased up to 20%. On the one hand, the company showed that it was capable of performing serious foreign orders, on the other hand, the management concluded that while maintaining current trends in the system of management and material equipment the enterprise would simply have no future because in the middle of 1990 the degree of depreciation of fixed productive assets was about 70%.

In the following years, the company's management began to pursue a policy of investment attraction, production assets modernization and personnel training. The enterprise created various centers, which educated both ordinary company employees as well as graduates of vocational and higher educational institutions.

As for the technical re-equipment of the enterprise, by the year 2008, 139 machine tool equipment units had been put into operation in the amount of 537.4 million UAH. New equipment in combination with the modern tool, which was mainly produced by NKMZ itself, ensured high accuracy and processing quality and increased the productivity of metal cutting operations.

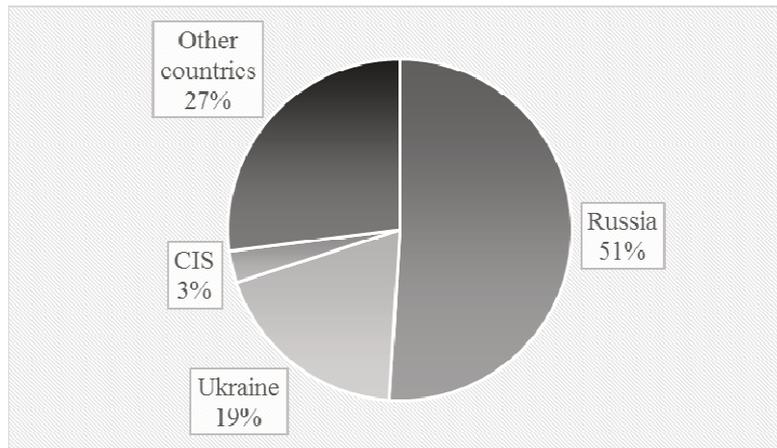
<sup>1</sup> Офіційний сайт ПАТ «НКМЗ». <<http://www.nkmz.com>> (2017, June, 05).

<sup>2</sup> Офіційний сайт ПАТ «НКМЗ». <<http://www.nkmz.com>> (2017, June, 05).

<sup>3</sup> Індивідуали машинобудування. <<http://www.ukrrudprom.com/digest/nm230505.html?print>> (2017, June, 05).

This policy was expedient. After completing the first order for the equipment supply to Germany, NKMZ signed other contracts. Together with Voest Alpine, it supplied three rolling mills to Germany and Austria, three slab machines for continuous casting at the Metallurgical Plant EKOSTahl (Germany), one slag of continuous casting machine in the USA and another in Austria. Among other importers of the plant products were France, Holland, Slovakia, Romania, China, Italy, Poland, Bulgaria, India and Egypt.

Later orders were received from Ukraine, Russia, Kazakhstan and Belarus. Metallurgical and mining enterprises began to work at full capacity (Fig. 4). The trust in the plant arose after the delivery of equipment to Germany. Thus, the share of exports in the commodity products volume in 2009 amounted to over 89%, including the export share to countries outside the former Soviet Union that increased from 20% at the end of 2008 to 29%, which indicates the growing competitiveness of products in the world market.



**Fig. 4. Consumers countries of the NKMZ machine-building products**

The company management adopted a program to overcome the crisis phenomena in the company as part of the NKMZ development strategy. The main goal of the programme was to gain the trust and receive grants of individual machine building firms as Danieli, Fuchs, Voest Alpine, SMS Demag. The final programme had been scheduled for 2015, but in 2014, an anti-terrorist operation began in eastern Ukraine.

Kramatorsk city, where the NKMZ is located, has become known throughout the world, along with other cities of the Donetsk region of Ukraine. There is no stability in the city, which could not but affect the enterprise orders' portfolio. In order to change the situation for the better and keep the regular customers, the company's management has taken an unprecedented step: to manufacture products worth up to dozens, and sometimes hundreds of millions of hryvnias at their own expense, while receiving payment only upon delivery to the customer<sup>1</sup>.

However, by 2015, the situation had changed in a positive direction. That year NKMZ received a net profit of 952.42 million UAH, which is 2.7 times more than a year before.

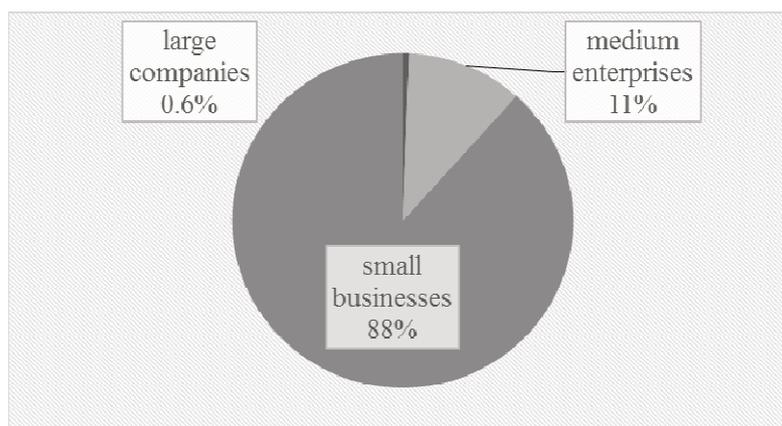
The export share of NKMZ's divisions has been steadily increasing, indicating the demand for the company's unique products abroad<sup>2</sup>.

Another factor that significantly affects the economic situation of most major machine-building enterprises in Ukraine ought to be noted. As it has been mentioned above, the product manufacturing in Ukraine during the 1990s and later was chaotic due to insufficient legislative regulation in that area. As a result, a large number of medium and small semi-tensile productions were formed. As of 2015, in Ukraine there were officially about 42.5 thousand industrial enterprises of all forms of ownership, and only 233 (0.6%) of them were large (Fig.5)<sup>3</sup>.

<sup>1</sup> Відіграти гривню: обвал національної валюти громить економіку України. <<http://nv.ua/publications/spasti-grivnu-obval-nacionalnoy-valyuty-gromit-ekonomiku-ukrainy-88.html>> (2017, June, 05).

<sup>2</sup> Новокраматорський машинобудівний завод майже втричі збільшив чистий прибуток в 2015 році. <[http://hi.dn.ua/index.php?option=com\\_content&task=view&id=63928&Itemid=147&view=article&month=3&year=2016](http://hi.dn.ua/index.php?option=com_content&task=view&id=63928&Itemid=147&view=article&month=3&year=2016)> (2017, June, 05)

<sup>3</sup> Офіційний сайт Державної служби статистики України. <<http://www.ukrstat.gov.ua/>> (2017, June, 05).



**Fig. 5. Distribution of industrial enterprises of Ukraine by size**

The formation of large number of small enterprises is expanding manufacturing industries, but this significantly impedes the development of large enterprises and the entire economy of Ukraine affecting the industrial production index. Thus, the unprofitable Ukrainian production can be observed annually, which also has a significant role in the investors' analysis of the Ukrainian market.

Small and medium-sized enterprises cannot compete with industry leaders on the products quality, as well as in the supplies' geography, but their impact remains high at the local level. Private owners of small and medium-sized enterprises, often using different corrupt schemes, sign profitable contracts with Ukrainian consumers. The attractiveness of such productions is not at the high quality, but at a much lower price. The final cost of manufactured goods at the enterprise in the aggregated form depends on the cost of the materials used, the wages of workers and depreciation, which makes the average and especially small production absolutely unconventional. In realities of Ukraine, a lot of these potential customers are satisfied with such cooperation with companies, thus, the spent money (it can be hundreds of millions in hryvnas) is not invested into the science-intensive areas, reducing the innovative development and deteriorating Ukraine's integration to European society. As a result, according to the State Statistics Service, in 2016, the machinery industry suffered losses of about UAH 1.5 billion. Moreover, even more significant damage was experienced by related industries (Table 1).

*Table 1*

**Financial results of large and medium-sized enterprises  
as of September 2016**

Industry	Financial result, UAH billions	Enterprises that have profits		Enterprises that have losses	
		in% to the total number of enterprises	financial result, billions, UAH	in% to the total number of enterprises	financial result billion UAH
Machine industry	-1.530	70.3	7.773	29.7	9.303
Computer products	0.499	74.2	0.745	25.8	0.245
Electrical equipment	-0.491	67.9	0.907	32.1	1.399
Machines and equipment not included in other groups	-0.450	70.9	2.705	29.1	3.156
Mechanical transport vehicle	-1.088	69.2	3.414	30.8	4.502

*Conclusions.* It has been shown that the single approach to modernizing machine-building enterprises that could be used everywhere has not been developed yet. It is revealed that the main danger for the machine-building industry in Ukraine is international competition. Competing with long-established international machine-building enterprises in technical and technological plans is almost impossible for any Ukrainian company because they do not have either time or money.

There is currently a completely different picture. The enterprise development is influenced by a lot of factors, both external and internal, which include the old and low equipment technical level, the skilled personnel shortage, especially in the field of management, corporate culture low level, enterprise inefficient capacity, slow, and in the majority cases, the complete absence of a reaction to changes in the world arena, lack of money resources, debt growth, catastrophic demand decline for products of machine-building enterprises, lack of domestic market development, national currency depreciation, investment resources insufficient amount, and so on. For the successful machine-building enterprises development of the defense and civil significance, the company needs equipment of the appropriate level and the availability of appropriately qualified specialists. Nowadays, when developing a new product, a lot of companies are trying to introduce the old technology as state-of-the-art ones, which has already been old-fashioned for several decades.

The above-mentioned influence of small and medium-sized enterprises is underestimated, which causes a defensive and civil disproportion in the Ukrainian machine-building complex, and only its elimination will increase the competitive advantages of national producers.

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