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### **Development of mechanical engineering in Republic of Kazakhstan and growth prospects**

The article deals with the development of mechanical engineering in Republic of Kazakhstan and the activities of mechanical engineering during the years of Independence, as well as the problems of increasing the importance of this industry. For the successful development of mechanical engineering of Kazakhstan in the mustache of globalization required the production of products with higher added cost certified in accordance with the international requirements of quality. The main source for the consideration of issues related to the development of this sector of the economy is the industrial and innovative programs adopted in the country. As a result of the analysis were identified products of Kazakhstan engineering and the volume of production of engineering activities, a comparison of economic indicators of production and the solution of problems in the development of engineering in Kazakhstan and in the world. In conclusion, ways to improve and develop the machine building in Kazakhstan were proposed.

*Keywords:* economy, industry, mechanical engineering, production, sector, transport, import, export, factory, equipment, volume of labor productivity.

Mechanical engineering is one of the leading sectors of the national economy of any country, reflects the level of scientific and technological progress and the country's defense, determines the development of other sectors of the economy.

Mechanical engineering is the most important sector of the economy of any industrialized country. Producing all kinds of equipment, machinery, machines, devices, as well as goods for the population, mechanical engineering ensures the stability of the agro-industrial complex, energy and metallurgical sectors, transport and other key sectors of the economy. Currently, it is difficult to imagine life without the use of engineering products. Many people mistakenly believe that this industry is related only to the automotive industry [1]. However, mechanical engineering, having undergone fundamental changes in the products, is engaged in the production of various products, ranging from the manufacture of nails and ending with the production of aircraft. Sustainable development and reliable operation of mechanical engineering largely determine the energy and material intensity of the economy, labor productivity, the level of environmental safety of industrial production and, ultimately, the economic security of the country.

In the early XX century in Kazakhstan was the engineering industry. It worked only a small Metalworking companies. During the great Patriotic war, a number of machine-building plants were evacuated to Kazakhstan from the front-line territory of the USSR, which subsequently created the basis of the industry. During the Soviet period, the industry of Kazakhstan was formed mainly on the basis of the development of mining industries. Dozens of machine-building plants were built in the post-war period. In 70 years in the Republic there were completely new branches of mechanical engineering. This construction, road, municipal engineering, production of sanitary equipment, machinery for the food industry and household appliances. In the 1990s, the machine-building complex experienced a deep crisis associated with a sharp drop in demand for its products.

The current state of all branches of the machine-building complex of Kazakhstan reflects the decline in production and increased dependence on imports for many types of products.

Now in the economy of Kazakhstan engineering occupies an important place. This industry is the most complex and differentiated industry and has close production links with other inter-industry complexes. The share of machinery account for over a third of the volume of production in Kazakhstan, about 2/5 industrial personnel and almost production funds [2].

Many industrial centers of Kazakhstan have emerged historically, as a result of the influence of groups of conditions. The formation of the industry of Kazakhstan began with the creation of focal fragmented mines, mines, oil fields and other enterprises in places of concentration of huge deposits of minerals.

Currently, in Kazakhstan, the machine-building segment generates only 0.6 % of gross value added (GVA). The same indicator in Russia is 2.9 %. However, this is relatively small compared to the countries leading in the production of engineering products. Thus, in Germany it accounts for 8.1 % of GVA, in Japan — 7.2 %. It is noteworthy that in Belarus this figure is comparable to the German or Japanese and reaches 7.1 %. This state of Affairs is due to the fact that after the collapse of the Soviet Union, accompanied by a break in economic relations, there was a sharp decline in production in Kazakhstan. Mechanical engineering was in poor condition, with signs of recovery of the industry appeared only in the early 2000s. The dynamics of Kazakhstan's mechanical engineering GVA is characterized by high growth rates in 2006–2007, deterioration of indicators in 2008–2009 and the resumption of a positive trend in 2010. As a result, in 2010, the real value of GVA production of machinery and equipment exceeded that of 2006 by 55 %, electrical equipment, electronic and optical equipment by 24 %, and vehicles and equipment by 117 %. Mechanical engineering in Kazakhstan is represented not only by the automotive industry, although it occupies only 10 % of the total manufacturing industry [3]. Kazakhstan is actively developing oil and gas, mining and metallurgical, agricultural, electrical engineering and so on.

In 2011, Kazakhstan's mechanical engineering continued to increase production. Thus, the physical volume of production of machine-building activities, compared with 2010, increased by 17 %. The leaders here were the production of vehicles, trailers and semi-trailers increase in physical volume of output by 63 % and other vehicles growth by 29 %. In 2011, the output of mechanical engineering (excluding indicators of the activity «repair and installation of vehicles») in monetary terms amounted to 278.2 billion tenge (\$1.9 billion) or 1.7 % of industrial production. At the same time, the production of machinery and equipment accounted for 27.8 % of the total machine-building production, electrical equipment, electronic and optical equipment 31.3 %, and vehicles and equipment 40.9 %.

In 2011, Kazakhstan produced 8.2 thousand cars and 0.9 thousand trucks, 330 thousand TVs, and 66 thousand washing machines. If we talk about the structure of engineering in Kazakhstan as a whole, today it is dominated by production for the mining, metallurgical and oil and gas sectors, which provides domestic demand for these industries.

Today, Kazakhstan is characterized by the presence of not only rich natural resources, but also a fairly developed industry. At the end of 2012, the share of industry in the GDP of the Republic was 32.2 %, including 18.5 % accounted for mining and 11.5 % for manufacturing. At the same time, the historically formed structure of the economy with the predominance of the raw materials sector has made Kazakhstan dependent on imports of high value added products, in particular from engineering, the need for which is growing every year.

Over the years of implementation of industrialization of the domestic machine-building became the core of industrialization came in one of the fastest growing industries: the production volume increased 2.3 times — of 376.2 billion tenge in 2010 to 869,9 billion tenge in 2014 m. the Share of the domestic engineering industry in manufacturing output rose from 9 % in 2010 to 14.8 % in 2014 [4; 450].

The mechanical engineering of Kazakhstan in 2015–2016, after going through the difficult phase of development starting in 2017, beginning to show positive growth. In General, over the years of the program of industrialization of the engineering industry implemented more than 100 projects, created about 11 thousand jobs, but the factor of further development of engineering is its digitalization and technological modernization.

The main source of growth is the manufacturing industry. Production figures in January 2018 compared to January 2017 increased by 6.2 %.

The largest growth for the year was shown by representatives of mechanical engineering: among the main growing industries are manufacturers of vehicles (242.7 % compared to January of the previous year), electrical equipment (165.6 %), as well as computers, electronic and optical products (151.4 %).

Today, the situation in the engineering industry of Kazakhstan is a reflection of the development of the country's economy. The productivity of the industry, the degree of its technological equipment is the secret of the success of all sectors of the country. Speaking about the profitability of mechanical engineering, it is necessary to note the segment «Production of electrical equipment». The number of products for 2018 increased twice compared to last year. The volume of production in the engineering industry for the first half of this year amounted to 470 billion tenge, which is 14.6 % more than in 2017. Oil, mining, metallurgical, transport directions are promising and need further development and support of the state. Last year, Kazakhstan produced 19.5 thousand cars, and in four months — already 9 thousand. In total, domestic manufacturers plan to collect this year 35 thousand cars.

In 2017, Kazakhstan exported 1,548 cars, most of them to China. We are now discussing the issues of increasing the export potential of cars, we are working on export markets and export promotion measures.

And in recent years, the engineering industry of Kazakhstan does not reduce the dynamics of growth. Thus, in five months of 2018, the volume of production increased by 12.2 % compared to the same period of 2017 and amounted to 384.6 billion tenge. The reason for the sharp increase in production is the restoration of demand in the market, the opening of export markets, as well as the program of preferential car loans from the state. Last year, every third car sold domestic Assembly.

The most stable dynamics of production and more in-depth localization of production in comparison with other sectors is characterized by electrical engineering: transformers, batteries, cable and wire products. Thus, according to the results of 2017, the production of transformers doubled, cable and wire products by 95 %, electric batteries by 14.6 %. The increase in exports to the CIS market, mainly to Russia, contributed to the growth. At the same time, according to his assessment, taking into account the gradual increase in oil prices and the development of new oil and gas fields, as well as the expansion of production of LLP «Tengizchevroil» is expected to increase production of equipment for the oil and gas industry. By the way, the volume of mechanical engineering production in 2017 increased by 5.6 % and amounted to 913.6 billion tenge. «The sector has seen an increase in volumes.» Tested in the country and the first electric vehicles.

In the long term, as the demand and the necessary infrastructure are formed, domestic producers are ready to establish their serial production on the existing ones.

The country is actively developing mining and metallurgical, agricultural, defense and many other areas. Kazakh manufacturers are confident that heavy engineering can meet the demand today. At the end of last year, the volume of production in the industry reached 998 billion tenge. This year, domestic machine builders intend to step over the bar of a trillion tenge. It is planned to increase this figure by three times by 2024.

For example, Kazakhstan has recently developed the production of vehicles (rail, road), including joint ventures with Belarusian and Russian companies that supply products to the common market. So, since 2003, JSC «Asia Auto» produces in Ust-Kamenogorsk Russian cars VAZ. JSC «KAMAZ-Engineering» Kokshetau is a joint Kazakh-Russian project for the production of automotive equipment of KAMAZ model range. JSC «AgromashHolding» based in Kostanay jointly with Russian companies produces engines and various agricultural machinery [5; 55].

In 2012 in Astana Industrial Park was launched electric locomotive plant of LLP «Locomotive wasuretakute» (COPIES). In accordance with the loan agreement, the Bank opened a credit line for 10 years in the amount of 10 billion tenge (over \$66 million). EKZ is a joint venture between JSC NC «Kazakstantemirzholy», the French Corporation AlstomHoldings (one of the world leaders in the production of machinery and equipment for railway transport) and CJSC «Transmashholding» (the largest Russian company in the field of transport engineering). The EKZ will produce four -, six-and eight-axle electric locomotives with asynchronous traction engines, designed for both freight and passenger rail transport. Components for their production will be supplied by Alstom and Transmashholding. The annual capacity of the plant will be about 100 sections of electric locomotives. Although they are primarily intended for the growing needs of Kazakhstan's Railways, it is expected that up to 40 % of the production of the EZ WILL be exported to the CIS countries.

Currently, Kazakhstan produces only 5–8 % of the necessary types of agricultural machinery, such as tractors, plows, harrows, rippers, seeders, mowers, harvesters, trailers, tractors, sprayers, machines for the preparation of animal feed, machines for poultry, etc. it is Planned to produce combines and tractors in Kostanay and Uralsk.

Plants for the production of agricultural machinery are located mainly in grain areas. In Astana plants «Kazahselmash and Zelenogradskaya» produce a set of agricultural tools, machinery for mechanization in agriculture and animal husbandry.

Pavlodar tractor plant JSC «Pavlodar tractor» is located in Pavlodar. He admits powerful advanced tracked tractors «DT-75T», adapted to perform many operations.

Much attention is paid to the development of the automotive industry. The Republic has also established the production of trucks and buses. In Kokshetau since 2005. works factory Assembly of popular cars «KAMAZ». In Almaty, established in 1996, the enterprise «Isker-GAZ» are assembled 30 modifications of vehicles «GAZel». The most important event for the automotive industry of Kazakhstan as a whole was the creation of the consortium «Kazakhstan — KAMAZ», which intends to organize the Assembly production of cars and special equipment «KAMAZ» in Kazakhstan. On the production capacities of JSC «Asia Auto» in Ust-Kamenogorsk mastered the Assembly of cars «Niva» and «Skoda». In Semipalatinsk on the basis of SemAZ plant Assembly production of the South Korean buses Daewoo is organized.

In the field of railway engineering car building is organized in close cooperation with the conversion enterprises of Northern Kazakhstan, Uralsk and Almaty. As well as specialized plants in the cities of Almaty, Astana and Taraz.

Electrical industry of Kazakhstan is represented by four directions: manufacture of electrical machinery, equipment and apparatus; manufacture of cable products; manufacture of electrical insulation products; production of battery and components production.

The plant in Pavlodar region is the only enterprise in the CIS that produces insulated power wire for European specialization. Production of high-voltage equipment is improving in South Kazakhstan region. In Almaty, there are factories of low-voltage equipment and electrical equipment. In Karaganda, there is an electric motor plant; in Ust-Kamenogorsk plant «Polimermash»; in Pavlodar and Taldykorgan there are condenser plants that provide the largest power plants of the Republic; in Kentau power transformers are produced; in Petropavlovsk plant of small-capacity engines; in Almaty, the foundry and mechanical plant, which produces cars and tractors and other spare parts.

In the field of electronic industry at the enterprises of Almaty, including the joint venture with the South Korean company LG, the Assembly of TVs, video and sound recording equipment, computers is carried out. Production of automatic machines, automatic production lines, machine tools with software control, work equipment is closely connected with the centers of research and development work. In Almaty there is a machine-Tool plant and Almaty heavy engineering plant, which produce various types of glasses. In Shymkent works plant for the production of giant press machines.

Over the past two years, 12 enterprises for the Assembly of Belarusian equipment have been organized in Kazakhstan. Today in the Republic the equipment and equipment ON «BelAZ», RUE «MTZ», ON «Gomselmash», JSC «Minsk motor plant», JSC «Minsk automobile plant», RUE «plant «Mogilevliftmash», JSC «Bobruiskagromash» and JSC «BelCard» gathers.

Domestic demand for machine-building products in Kazakhstan is largely dependent on imports, which account for 92.1 % of its total consumption. For example, in 2011, the trade balance of engineering products was negative and amounted to \$13.2 billion in Kazakhstan is a net importer of the product in all the considered economic activities. At the same time, the export of machine-building products of the Republic was equal to only \$0.7 billion, of which \$0.35 billion was for equipment, \$0.29 billion for electrical equipment, \$0.06 billion for vehicles. In turn, the largest items of Kazakhstan's imports in 2011 were electronic components, equipment for radio, television and communications \$1.8 billion, electric machines and electrical equipment, as well as railway rolling stock of \$1.5 billion, respectively [6; 50].

Exports of Kazakh engineering products are small: in 2011 it was equal to 0.4 % of GDP (the lowest figure among the CES countries) and is focused primarily on the Russian market. Although it is difficult to expect a multiple increase, some product groups (bearings, electrical equipment), taking into account the creation of a Single economic space, can predict a certain increase in export flows. A distinctive feature of this industry is the predominance of Assembly plants in the automotive, railway and agricultural engineering. One of the most important and real opportunities for the development of engineering in modern conditions is cooperation between the CIS countries. This will help to increase production and exports, expand sources of investment and introduce new technologies.

Analysis of exports and imports of the industry showed that in the short and medium term it is unlikely to take a strong place in the world market. Kazakhstan should also expect an increase in imports of some types of engineering products. Nevertheless, the elimination of major development problems could increase its export potential and reduce its dependence on imports, and because of the rapidly growing domestic demand for machine-building products, it would be advisable for enterprises to focus on the domestic market.

Meanwhile, there are systemic problems in the industry, which, in our opinion, cannot be fully resolved even in the medium term. The most acute of them is the lack of capacity for the production of the component base, adequate to the lines of equipment assembled in the country. For example, only one national operator of the railway industry — JSC «NC «Kazakstantemirzholy» requires spare parts for 2800 positions, of which only 500 are covered by local manufacturers.

The second most important problem is the lack of capacity in the key for all segments of the machine tool industry. At the same time, it should be noted that the degradation of the machine Park and difficulties with the supply of components for Assembly plants are inherent in the engineering of all CIS countries.

Another key problem in the development of the industry is the lack of available funding. As a result, machine-building enterprises are often unable to invest in expansion or modernization of production, leading to technological backwardness and low productivity. Therefore, improving the system of financing engineering, including through development institutions, can dramatically improve the state of the industry.

High transport costs and energy intensity of production also have a negative impact on the activities of enterprises of the complex, which lead to a low level of profitability and price competitiveness of their products. High depreciation of fixed assets, outdated equipment and technologies do not allow to ensure the profitability of production.

The accession of the largest economies of the region of Russia and Kazakhstan to the WTO will lead to increased competition in the market between local and foreign producers. In itself, such competition can have positive consequences, however, given the problems described above, the situation of some sub-sectors of the machine-building complex can seriously deteriorate. Moreover, problems may arise even in foreign engineering companies that have enterprises in the CIS countries for industrial Assembly, production of individual components and components. In the context of high import duties on the import of finished products, the launch of these enterprises was economically justified. If such duties are inevitably reduced, the rate of deployment of industrial Assembly plants and further localization of production in the countries of the region may decrease dramatically. On the other hand, the accession to the WTO provides for transition periods to change the customs tariffs for engineering products, which will allow to implement the measures necessary to limit the negative consequences of this step.

Returning to the realities of Kazakhstan, it should be noted that the growth of welfare of the population, coupled with its relatively low security of cars and durable goods will «warm up» the demand for the products of those sub-sectors of engineering that are focused on the consumer market (this process has been going on for several years). At the same time, the need to upgrade the capacities of various sectors of the national economy will stimulate demand for investment engineering products.

Analysis of the dynamics of production in mechanical engineering allows us to note the trend of constant increase and gives every reason to believe that this sector is actively developing and competitive. Mechanical engineering is the embodiment of the best technical solutions. In this way, many companies often need assistance at the state level. The Union of machine builders of Kazakhstan initiates measures for technological modernization and stimulation of import substitution of all domestic enterprises. A number of draft laws aimed at supporting Kazakhstan's machine-building industry were developed in the active assistance of the Union. And today, producing all kinds of equipment, machinery, machines, devices, as well as goods for the population, the Union of machine builders of Kazakhstan ensures the stability of the agro-industrial complex, energy and mining, transport and other key sectors of the economy.

According to forecasts, in the coming years, the economy of the Republic will develop dynamically and, consequently, the need for machine-building products will increase. However, the volume of production of Kazakhstan's machinery is now relatively small, and in any case it is not able to fully meet the demand of local consumers. Therefore, mass import substitution in the conditions of economic growth of Kazakhstan is unlikely, and moreover, in many positions it is impractical, since the creation of new engineering industries requires huge resources. At the same time, the locomotive of the future growth of the Kazakhstan machine-building complex is its transport segment. The number of new enterprises for the industrial Assembly of cars, electric and diesel locomotives, as well as aircraft is growing in the country. In the near future, the increasing capacity of railway engineering should solve the problem of filling and updating the fleet of rolling stock.

Today, the structure of machine-building production in Kazakhstan is dominated by mining and metallurgical, agricultural, oil and gas, military and transport industries. The share of machine-building complex in the total structure of the manufacturing industry of the Republic of Kazakhstan in 2011. it was 11.18 %, in the structure of industrial production — 3.4 %, in the structure of GDP-about 2 %. Engineering products also

account for 3.4 % of total exports and 40.6 % of imports. The share of Kazakhstani products in the domestic market of engineering products is about 13 %, the remaining 87 % of the country's needs are covered by foreign (mainly Russian) supplies. For the successful development of mechanical engineering of Kazakhstan in the mustache of globalization required the production of products with higher added worth certified in accordance with the international requirements of quality.

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### Қазақстан Республикасындағы машина жасау өнеркәсібінің дамуы және өсу перспективалары

Мақалада Қазақстан Республикасында машина жасау өнеркәсібін дамыту және Тәуелсіздік жылдарындағы машина жасау өнеркәсібінің дамуы және қазіргі кезеңдегі осы саланың экономикадағы маңыздылығын арттыру мәселелері қарастырылды. Жаһандану жағдайында Қазақстанның машина жасау өнеркәсібін табысты болуы үшін экономиканың осы секторын дамытуға байланысты мәселелерді қарау үшін халықаралық сапа талаптарына сәйкес сертификатталған анағұрлым жоғары сапалы қосымша тұрақтылығы бар өнім шығару қажет, елде қабылданатын индустриялық-инновациялық бағдарламалар осының негізі болып табылады. Жүргізілген талдау нәтижесінде қазақстандық машина жасау өнеркәсібі өнімдерімен, машина жасау салаларындағы өнім түрлері өндіру көлемі анықталды, өндірістің экономикалық көрсеткіштері салыстырылды және Қазақстан мен дүние жүзіндегі машина өнеркәсібі өнімдерін жасаудағы айырмашылықтар мен еліміздегі осы саланың дамуындағы проблемаларды шешу үдерістері қарастырылған. Қорытындысында Қазақстанда машина жасау өнеркәсібін жақсарту және дамыту жолдары ұсынылды.

*Кілт сөздер:* экономика, өнеркәсіп, машина жасау, өндіріс, сектор, көлік, импорт, экспорт, завод, құрал-жабдық, еңбек өнімділігінің көлемі.

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### Развитие машиностроения в Республике Казахстан и перспективы роста

В статье рассмотрены развитие машиностроения в Республике Казахстан и деятельность машиностроения за годы независимости, а также проблемы повышения значимости данной отрасли. Для успешного развития машиностроения Казахстана в условиях глобализации необходим выпуск продукции с более высокой добавленной стоимостью, сертифицированной в соответствии с международными требованиями качества. Основным источником для рассмотрения вопросов, связанных с развитием данного сектора экономики, являются принимаемые в стране индустриально-инновационные программы. В результате проведенного анализа была выявлена продукция казахстанского машиностроения и объемы продукции машиностроительных видов деятельности, проведено сравнение экономических показателей производства в машиностроении Казахстана и в мире. В заключение были предложены пути улучшения и решения проблем в машиностроении в Казахстане.

*Ключевые слова:* экономика, промышленность, машиностроение, производство, сектор, транспорт, импорт, экспорт, завод, оборудование, объем производительности труда.

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