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State and Prospects of Engineering Development within Structural Economic Diversification of Kazakhstan

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Abstract

Background/Objectives: The article is devoted to problem connected with engineering development on innovative basis that is the most important condition of diversification and modernization implementation of national economy and restructuring assurance. Methods/Statistical analysis: Necessary conditions for achievement of rather high rates for a short period according to historical measures were created due to successful implementation of economic reform in transition market period and a number of state programs after 2000 provided transition of the country to qualitatively new stage of development focused on innovative character. Findings: Analysis to a current state of engineering and necessary justification of its advancing development for innovative updating of technical equipment production in branches of the economy as well as increase of their competitiveness is given in the article. Much attention is paid to implementation of restructuring of the operating machine-building enterprises for acceleration of innovative process in this branch. Priority directions of engineering development for improvement of its branch structure and possibility of cluster approach use and public-private partnership mechanism that opens wide prospects of production increase in machine-building production, including innovative production which replaces import one delivered to the country for ensuring its internal requirements are considered. Applications/Improvements: Efforts of the state hashould be aimed at providing needs in state investment into large infrastructure projects for the purpose of receiving benefit from innovation and effective state service management.

Keywords: Cluster, Diversification, Investment, Modernization, Restructuring, Versatility

1. Introduction

Nowadays the Republic of Kazakhstan is one of dynamically developing countries in the world. Thanks to successful implementation of basic state of the strategy "Kazakhstan – 2030" the country ahead of schedule was among the fifty competitive countries of the world, having made breakthrough in its development, peculiar to the Central Asian leopard. It is confirmed by steady annual growth of the economy of Kazakhstan for the 15-year period from the date of adopting this strategy which in separate years reached 10%. In 2013 production of Gross Domestic Product (GDP) per capita made more than 14,000 US, at the general growth of national economy by 6%1. As compared, this indicator in 1993 made only 700

USD, whereas national economy was in a phase of cyclic development recession.

Necessary conditions for achievement of rather high rates for a short period according to historical measures were created due to successful implementation of economic reform in transition market period and a number of state programs after 2000 provided transition of the country to qualitatively new stage of development focused on innovative character. But it should be noted that the economic growth reached by the country in that period is still based on the development of oil and gas branches which production in the structure of country's export is more than 70%. The head of the state in his Message to the people of Kazakhstan declared that in the short term prospects this branch would be a

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basis of economic development and its export potential would remain in the republic. But as it is known, mineral raw materials is a non-renewable resource. therefore Kazakhstan built a model of its balanced and sustainable development for ensuring further growth of the economy, taking the course for priority development of manufacturing industry including machine-building complex.

Use of economic growth of Kazakhstan as a mechanism founded on a stream of "cheap money" received from delivery of natural resources to foreign countries does not allow relying on stability of sustained economic development of the country in the short term prospects because it makes economy be dependent on a world market price situation on raw materials. Therefore the main and the only direction to create opportunities for accelerated economic growth of Kazakhstan is diversification of the economy so that its implementation assumes relative decrease in a share of the extracting branches in economic structure at advanced development of a processing sector. It allows the country to turn from the supplier of raw materials into the exporter of goods with a high value added share in the world markets and create Kazakhstan «niches» in the world economic system. Thus an important role is given to primary development of engineering which is the leading branch of the world industrial production where high level of science-intensive content branches in technological chain of added value still remains. The range and quality of products released by machine-building branch substantially define development of other branches of the economy on an innovative basis and it has important value on diversification and modernization implementation of the economy in the course of its restructuring. Thus, branches of a machine-building complex accumulating scientific and technical achievements will make essential contribution to the economy and increase share of nonoil sector in GDP of the country.

Materials and Methods

The present stage of economic development of Kazakhstan is connected with necessity of transition to the innovative way assuming intensive type of expanded reproduction and use of technological progress as the main source of economic growth. For activization of structural readjustment of the economy Kazakhstan carried out transition to the market economy in 2000 and took development on innovative way, so today it is the main keynote of economic development for industrially developed countries. To transfer into such way of development the country has sufficient potential resource and necessary legal base of innovative activities which basis is made by Laws of the Republic of Kazakhstan «Concerning State Support of Innovative Activities», "Concerning Science" and a number of state programs on industrial and innovative development adopted for the last decade.

Among state programs the most important and integrated one is the Program on Development of Innovation and Assistance of Technological Modernization in the Republic of Kazakhstan for 2010-2014. This program is a logical continuation of the policy on diversification of economic structure held in the country to deviate from its raw direction. It integrated the main approaches of the Strategy of Industrial and Innovative Development for 2003-2015 and the most important provisions of the State Program of Forced Industrial and Innovative Development (SPFIID) of the Republic of Kazakhstan for 2010-2014 for implementation of breakthrough innovative, industrial and infrastructure projects which allow creating strong base for further sustainable development of national economy².

The head of the state N. A. Nazarbayev within his speech at the forum "Innovative Kazakhstan-2020" held in summer 2011 in Almaty declared that by 2020 Kazakhstan wouldhave had all the signs and attributes of the working state on innovative type as a result of implementing these projects and using KZ T120 billion allocated for them.

Along with the above mentioned state programs a new program of industrial and innovative development of the Republic of Kazakhstan for 2015-2019 with new strengthened measures on the second five-year period for innovative industrialization of the country was adopted³. Priority directions of innovative development in such key industries of economy as chemical, metallurgical, machine-building, power, infrastructures, etc. are specified in this program. Considerable attention is paid to problems of modernization of the existing enterprises, creation of new high productive enterprises, attraction of foreign investments into non-oil sectors of the economy and promotion of domestic producers' goods on foreign markets.

For successful solution of program tasks on industrial and innovative development of the country there is an urgent need in accelerated development of a machinebuilding complex for carrying out modernization of the existing enterprises and creating new high productive enterprises that is the most important condition for implementation of innovative industrialization of the country. The main objective of the machine-building complex consists in increasing the technological level of production, ensuring mechanization and automation of all stages of production, creating cars and mechanisms of new generation capable of providing a repeated growth of labor productivity, introducing progressive power and resource-saving technologies, etc. This task concerns demand of priority development of engineering for implementation of economic modernization and realization of its major purpose on formation through interactions with innovative sphere of technical and economic potential for perspective growth of branches of the national economy and their future competitiveness⁴.

Proceeding from such purpose, engineering branches have to take the leading place in development of the national economy and improvement of its branch structure on diversification basis. Machine-building branches create necessary conditions for development of other branches of the economy on an innovative basis by creating new and advanced production. Therefore, in the Republic of Kazakhstan the priority significance is attached to the above mentioned state programs of innovative industrialization of the country on development of engineering along with branches of metallurgy and metal working . New samples of finished metal products are created at innovative development of these branches, and on their basis - a new equipment and technology, that are subsequently introduced into production and increase competitiveness of manufacturing capacities of enterprises as well as production released by them.

The existing technologies at these enterprises can constantly be improved by improving innovations on the basis of innovative production released by engineering branches. Gradually accumulating these innovations promote emerging of new types of technologies which lead to relative and sometimes absolute replacement of traditional technologies of production. On the basis of innovations and occurring technological changes new branches and types of production fitting into the process of reorganization of economic structure can be

created under its influence. It confirms the necessity of innovative development of engineering to carry out largescale modernization in branches of the economy and give them a boost to another level of technological trends of the present time.

3. Results and Discussion

Engineering among processing industries is distinguished by inherent typical structure of the made final product thanks to which it is considered a key industry of the economy of Kazakhstan creating necessary conditions for its development. In the republic this branch has a difficult connection system of both production, and financial character, its enterprises differ in versatility and spatial remoteness from the consumers, and various production potential. It is in technological chain of extracting and processing industries which in varying degree participate in production of equipment and machinery released by machine-building enterprises. Therefore these enterprises depend on cooperating enterprises delivering raw materials, energy, materials, completing knots and mechanisms, and summarize all advantages and ddisadvantages of their production activities.

Owing to this circumstance capacities of machinebuilding complex grow slowly and they are used insufficiently. Thus, the factors clogging stabilization of machine-building production still remain. Among them are lack of financing means and limitation of their sources, unattractiveness of engineering for commercial and foreign capital, the existing infrastructure which doesn't correspond to international practice yet. High tariffs for rail transportation and prices on component items led to the fact that many engineering enterprises changed over the development of aggregative production and became versatile ones, departing from paid off cooperation and specialization. Production concentration indicators of engineering products are not high either.

According to the statistical reporting for 2013 less than 5% of Industrial and Production Fixed Assets (further IPFA) fall to the share of a machine-building complex and only 1,4% of investment volume into fixed capital of production purpose, about 1% of annually invested IPFA cost, 6,5% of total number of industrial and production personnel, and degree of depreciation reached 50%, including their active part - 70-80%. At the majority of enterprises the rate of fixed updating assets makes 5,6%, and the rate of their retirement reaches 7%⁵. Thereof IPFA cost in the last few years is annually reduced by 7-8%, the share of products of Kazakhstan production in domestic market of machine-building production taking into account delivery of this production part to export makes about 20%. In developed countries more than 1/3 of total amounts of industrial output comes to the share of a machine-building complex, in Kazakhstan it is 4,8%.

In IPFA structure of enterprise complexes buildings and construction make 47,8%, among them: buildings -42,1%, constructions - 5,6%, transfer devices - 3,9%. Cars and equipment - 47,8%, among them: power machines and equipment - 2,9%, working cars and equipment -43,8%, measuring and regulating devices and facilities, laboratory equipment - 1,9%, vehicles - 2,5% and other means - 1,1%. This structure of IPFA machine-building enterprises complex cannot be considered optimal, it needs improvement by increasing and updating an active part of fixed assets. The share of physical and moral depreciation of equipment is very big at these enterprises. The age structure of equipment park at the remained enterprises from the Soviet period is getting older, 1/3 of equipment has more than 20 years service life. Condition of the equipment park at many enterprises also prevents the phase down of the outdated production and establishing manufacturing of new types of products by using the most advanced technological processes. Therefore the range of manufactured engineering production especially its final types that are necessary for the republic are very limited.

Now a days needs of the country in engineering production are satisfied for 80% due to import delivery. Kazakhstan annually imports cars and equipment, transport vehicles, devices and automatic machines, exports forge-press equipment, metal-cutting machines, accumulators, centrifugal pumps, x-ray equipment. In connection with operating new enterprises a range of delivery to export of machine-building production by locomotive, motor transport, light plane, passenger and cargo cars increased in recent years with transition of machine-building branch within the state program of modernization development on innovative way.

The modern machine-building complex of Kazakhstan includes more than twenty branches and sub-branches: power, hoisting-transport, railway, electrotechnical, chemical and oil engineering, light and food industry engineering; instrument making; tractor and agricultural engineering; livestock breeding and forage production

engineering; machine-tool and device, automobile, electronic, aviation industry and some others. This complex defines a strategic condition of production capacity of the state, provides activities of the following branches of the economy: fuel and energy, mining-metallurgical and agro-industrial complexes, transport and communication, light and food industries.

To develop branches of machine-building complex on an innovative basis new horizons are open in connection with realization of the adopted new strategy "Kazakhstan-2050". The President of the Republic of Kazakhstan N. A. Nazarbayev in his Message to the people of Kazakhstan of December 17, 2014 "The Kazakhstan Way-2050: Common Purpose, Common Interests, Common Future" specified that "It is important to increase development of rare-earth metals, considering their importance for science-intensive branches electronics, laser technology, communication and medical equipment". The head of the state also specified in this Message that "within the second and subsequent fiveyear periods untill 2050 it is necessary to create branches of mobile and multimedia, nanospace technologies, robotics, genetic engineering, search and discovery of the energy of future". According to instructions of the Head of the state not only enterprises with high technology production providing creation of industrial economy with perfect structure will be built in Kazakhstan but at the same time work on its transformation in post-industrial system with essentially other values of development will be conducted. It is necessary to note that the specialized exhibition "EXPO-2017", which will be held in the capital of Kazakhstan Astana, will give a new impulse to development of the republic in the forthcoming prospect by means of staged transition of energy sector of the country to an alternative basis.

In this regard branches of machine-building complex face with a serious problem which consists in increasing of technological level of production, ensuring complex mechanization and automation of all production stages, creation of cars and mechanisms of new generation capable of providing a repeated growth of labor productivity, introduction of progressive power and resource-saving technologies, etc. For the solution of this task it is necessary to direct most part of resource capacity of the country at development of machine-building complex branches, releasing new equipment and machinery, increasing the level of scientific and technical security of production at existing and newly created machine-building enterprises.

In this regard it should be noted that for the recent five years, i.e. for the first five years of industrial and innovative development of Kazakhstan a great work on development of national economy, improvement of its branch structure due to primary development of manufacturing industry, including engineering has been performed. Within the program of the first five years 780 new enterprises have been put into operation in the country, 130 more enterprises are expected to be launched in 2014. As a result, production of more than 250 types of new products will be established in Kazakhstan, so that considerable part will represent a specific type of product innovation. As a part of these new enterprises there are a lot of newly created machine-building enterprises developed on the basis of 56 innovative projects determined by branch program on engineering development in the Republic of Kazakhstan for 2010-2014.

The President of the Republic of Kazakhstan N. A. Nazarbayev in his new Message to the people of Kazakhstan for 2015 "Nurly zhol - Way to the future" paid attention to necessity of implementing projects among other branches in engineering, having indicated the sums allocated for these purposes. Along with it the Head of the state specified that in the forthcoming year different types of infrastructure would gain development by quite high rates that will stimulate growth of the national economy⁷. Nowadays such important elements of infrastructure as technopolises, science and technology parks, innovative clusters which are successfully functioning have already been created, and in the nearest future agglomerations in four large cities of the country will be created in order to provide forming up a real sector of the economy according to the world trends based on science-intensive innovative model. Thus, an important attention is paid to branches of machine-building complex as activization of innovative processes in sectors and spheres of the economy depend on their development extent. In this regard it is necessary to provide priority development of engineering, improve its branch structure along with improvement of production structure of the operating machine-building enterprises, extend sizes of these enterprises, use a corporate type of management by funding forces of science, education and practice representatives. It is necessary to strengthen co-operated relations of engineering enterprises with enterprises of metallurgical branch where it is required to carry out a number of measures, so that scientific and technical security of their production didn't lag behind

modern requirements and inquiries on their production from consumers' side. The share of the most advanced technological processes in this branch is still small.

At the present time there is practically no industrial production of science-intensive, high technology, special materials and alloys for development of modern machine-building production at metallurgy and metal working enterprises of the republic. In this branch demanded assortment of rolled products and hardware for releasing innovative production of engineering by domestic producers has not yet been made. Industrial production of materials and hardware on the basis of the latest technologies such as powder metallurgy, electrometallurgy, galvanotechnics, new foundry and chemical technologies hasn't yet been established. Production made by means of such technologies would find broad application in such priority directions of machine-building complex, as:

- tractor and agricultural engineering, including production of equipment and spare parts for the branches engaged in processing of agricultural production;
- transport engineering, including production of tanks, cars, machinery for carrying out road works, containers, details of upper structure track, equipment and spare parts for railway transport;
- engineering for oil and gas extraction and oil and gas processing industries;
- production of equipment for mining and metallurgical complex;
- automobile industry;
- electronic and household engineering.

In recent years in Kazakhstan much attention is paid to creation of conditions for advanced development of specified priority engineering branches, so that dynamics growth depend on the degree of self-reliance of the country's machine-building production including innovative production replaced by the import one. Thus, great importance is paid to implementation of restructuring the operating machine-building enterprises, aimed at equipping their production by high productive facilities and machinery providing decrease of both power and material-output consumption of production and increase of its qualitative characteristics. In this regard, production of machine-building production at the enterprises is gradually transferring to new resourcesaving, high technological and ecologically reasonable model of development, which allows making innovative production along with advanced equipment and machinery. There are necessary resources for this purpose in Kazakhstan. For example, there is thin sheet steel and qualitative copper that allows organizing production of electric motors. Processing of hydrocarbon raw materials in the republic is limited in connection with operation of oil and gas without further effective use of petrochemical raw materials. If deep processing of these raw materials were organized, it would be possible to create production of plastic details for machine equipment. Kazakhstan also has an opportunity to organize production of cars for nuclear power by creating joint ventures with foreign partners using their technologies.

Another important problem of engineering development and improvement of its branch structure in conditions of transfer to innovative way of development is increase in sizes of machine-building enterprises and integration of their production to be large corporations in the long term. Creation of some large corporate associations in this branch as, for example, in extraction industry (KazMunaiGas, Kazakhmys, Kaztsink, TNC Kazchrome) by structure of their management promote development of machine-building branches on an innovative basis and increase of their competitiveness. Use of cluster approach would make high-quality changes in reproductive process, providing integration of science, business and education that finally leads to creation of industrial associations called clusters8.

It is known that cluster represents a network of industrial groups of affiliated, geographically interconnected companies and organizations cooperating with them in common, certain type of business (production) and characterized by common activities and relationship with each other. For the first time cluster was introduced by M. Porter with definition into a scientific and practical turn as "a group of geographically adjoining and cooperating companies and organizations operating in a certain sphere characterized by common activities and inter-supplementing each other"8.

The first clusters of oil and gas engineering in the republic were created in the territory of the West Kazakhstan and Atyrau areas under the name "Metallurgy and Metal Working" in mining and metallurgical branch of Karaganda region which are successfully functioning, confirming advantages of these branches' development on a cluster basis. Such clusters have positive impact not only on activities of the enterprises included in them, but also on economy of the region and country in general as cluster provides close interaction of enterprise structures, higher educational institutions and scientific centers, public organizations, administrative establishments etc. As practice of cluster works show, association of structural division efforts create necessary conditions for development of innovative activities, increase of flexibility and mobility of companies, growth of competitiveness and their market stability. Thus, it is necessary to pay attention to a cluster core not to allow formation of a gap in connection chain between its structural divisions. Undoubtedly, a core of the cluster must be a large company or a group of large companies whose technological chains of interconnected with them below and above concentrated enterprises are to be formed vertically.

Co-ordinating actions from the state's side with the system of supporting measures of innovative process carried out according to the Industrialization Map of Kazakhstan for 2010-2020 are necessary for creating a branch of high technology engineering on the basis of its developing priority directions. On the basis of the Industrialization Map 294 projects with a total amount of investment for KZ T 8,1billion are planned in the country. As it was noted, from the beginning of developing this sum, growth of processing equipment renewing of machine-building enterprises along with creation of new types of production was outlined in national economy. In this regard it is necessary to establish and develop publicprivate partnership as the form of state and business interaction forming prerequisites of interrelations of all key elements of innovative system. Now a days, when domestic engineering began to revive intensively it is required to strengthen the state role which co-ordinates at the state level of public-private partnership interaction and provides coherence of national, branch, regional priorities of development and concentration of resources on priority directions of this branch.

However, public-private partnership mechanism, namely, transfer of state ownership objects with application of project financing principles, concession, operation and contents in trust management of property is used insufficiently in national innovative system. The current legislation doesn't allow applying different types of contracts used in the world practice yet. It is one of the reasons that constrains attraction of foreign and domestic investments for developing priority branches of the economy including engineering.

4. Conclusion

Machine building is the leading branch of the economy defining development of its other branches. It plays a great role in realization of the State program of industrial and innovative program development of Kazakhstan that provides complex solution of reproduction process problems, i.e. reequipment of production on a new technical basis, creation of progressive organizational and legal forms of management and various types of market infrastructure through development of financial, investment, insurance, information institutions and formation of branch clusters, as well as safety and quality of production according to international standard requirements. In this regard the demand on engineering development considerably increased. Emergence of its new branches in the republic are caused by acceleration of the carried-out process of economic restructuring both its modernization and necessity of using major application of this branch connected with formation of technical and technological potential for innovative industrialization of the country through its interactions with innovative sphere.

Nowadays for transition of engineering branches to innovative way of development it is very important to adopt experience of new equipment and technology created in foreign countries which import is cheaper to the country than their development and creation in the republic. It is a benefit to our republic as it saves time and money given to diversification and modernization of engineering production. Use of the advanced foreign equipment and technology, and experience in restructuring process of the operating machine-building enterprises will be the most rational way until developed infrastructure and own model of engineering development, effective pricequality criterion, costs of service and maintainability in conditions of Kazakhstan are not created.

Development of engineering on the basis of its priority directions has to be based on optimization of interindustry effects initiated by innovative and technological reequipment. Development and implementation methods of innovative programs within interindustry complexes will be focused on coordinated and balanced development of production device and release on

the basis of innovative technologies of competitive production within all the technological chain. Thus, it should be noted that programs devoted to development of any industry, agriculture, construction, transport and communication industries have to contain engineering section for showing their necessity in innovative machinebuilding production.

To increase positive achievements in engineering development in recent years it is necessary to create and develop cluster in this branch. From 2015 the country will pass to practical realization of the second stage of the State program on forced industrial innovative development through 2019. Among the 14 branch priorities of this program 6 refer to machine-building branch. In this regard for implementation of this innovative project and ensuring competitiveness of the operating machinebuilding enterprises it is expedient to create of a number of machine-building clusters in Kazakhstan. As a territory for clusters placement those administrative territorial units whose production and personnel potential are the most acceptable from scientific and technical point of view are to be chosen. Thus, efforts of the state hashould be aimed at providing needs in state investment into large infrastructure projects for the purpose of receiving benefit from innovation and effective state service management which will be rendered by different types of infrastructure.

In the forthcoming years as it is specified in the new Message of the President of the Republic of Kazakhstan N. A. Nazarbayev to the people of Kazakhstan "A pivot of new economic policy will become the plan of infrastructure development". This plan is intended for 5 years, KZ T 6 billion are allocated for its implementation, share of the state will be 15%. During implementation of investment projects according to the plan of infrastructure development public-private partnership in the country will gain more development at promoting clustering in priority branches of the economy, including engineering.

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