

БЕЛАРУСЬ НА МИРОВОМ РЫНКЕ ИНЖИНИРИНГОВЫХ УСЛУГ

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Уточняется понятие «инжиниринговые услуги», анализируются конкурентные позиции Республики Беларусь в указанной сфере в мире. Кроме того, автором статьи определяются направления для расширения сотрудничества с Китаем, который является мировым лидером с сфере инжиниринговых услуг.

Ключевые слова: инжиниринговые и строительные услуги; мировой рынок инжиниринговых услуг; сотрудничество с Китаем; концепция инжиниринговых услуг.

BELARUS IN THE GLOBAL MARKET OF ENGINEERING SERVICES

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In the article the concept of «engineering services» is specified, competitive positions of the Republic of Belarus in the above mentioned sphere in the world are analysed. Moreover the author of the article formulates the directions for increased cooperation in this area with China which is the world leader in the sphere of engineering services.

Keywords: engineering and construction services; global market of engineering services; cooperation with China; concept of engineering services.

At present there is an active development of the construction market and the market of engineering services in the Republic of Belarus and the People's Republic of China. International cooperation between Belarus and China in these spheres also has some development what turns the markets of construction and engineering services into potentially successful object of international cooperation of the Republic of Belarus and the People's Republic of China. Cooperation between these countries in the framework of construction and engineering received a certain development that is clearly represented in the China-Belarus Industrial Park «Great Stone».

The object of study in the article is the world market of construction and engineering services.

Specification of the concept of «engineering»

The analysis of literature sources [1–5] suggests that the concept of «engineering» is increasingly used in economic theory despite the fact that this kind of business is still quite new. Analysis of the scientists' views to the interpretation of the essence of this concept (table 1) makes it possible to conclude that there is no unambiguous definition of it.

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Table 1

Different approaches to the concept of «engineering»

Source	Definition
Balabanov I. T.	Providing technological knowledge necessary for the purchase, installation and use of purchased or rented machinery and equipment
Bereznoi A. V.	These are works and services that require scientific research and development works, preparation of project proposals and feasibility studies of the construction of industrial and other objects; execution of engineering-prospecting works for the construction of objects, design of engineering and technological processes
Kapustin P. A.	A complex of operations for the provision of industrial, commercial, scientific and technical services carried out by specialized engineering and consulting industrial, construction and other companies
Sokolova N. G.	Engineering and consulting services for creation of enterprises and other associations
Tax Code of the Republic of Belarus	These are engineering and consulting services for the preparation of the production process and the sale of goods (works, services), the preparation of the construction and operation of industrial, infrastructural, agricultural and other facilities, as well as pre-design and design services (feasibility studies, design and engineering design, technical tests and analysis of their results)
Matias K.	The kind of innovation activity providing the provision of research services, design and engineering, computational and analytical nature, related to the creation of objects, preparation of technical and economic justification of the project, the development of recommendations on the organization of production and management, as well as the provision of activity of the enterprises in a wide range of marketing activity goals
Tumanyan I. V.	Engineering and technical and advisory services on creation of industry objects, industrial and social infrastructures These services include the complex of works: predesign technical and economical researches and justifications, laboratory either experimental or modification of the technology or prototype model, development of detailed structures of the project from sketch variant to edition of the specification on equipment, technological tracking during development of the technology or equipment, consulting during project implementation, etc.
Lobanov A. A.	The set of design, consulting, engineering work on the creation (construction) and maintenance of the object through marketing research and their logistical support
Posadskii A. P.	Providing the technological knowledge necessary for the acquisition, installation and use of purchased or rented machinery and equipment
Sinita M. I.	This is the area of human intellectual activity, discipline, profession, it's task is to apply the achievements of science, technology, the use of laws and natural resources to solve specific problems, goals and objectives of humanity
Theory and Practice of Engineering	The range of services in the industrial, commercial, scientific and technical spheres
Dictionary on Academic	Field of activity on studying of questions of creation of objects industry, infrastructure, etc. first of all in the form of granting on commercial base of various consultation services
Chuprin A. V.	The process of interaction of market entities, aimed at creating additional consumer value by optimizing the client's investment costs
European Economic Community UN	Special activity related to the construction and operation of enterprises and infrastructure that includes consulting, construction, technological and integrated engineering (October 2009) The kind of intellectual activity that requires to describe, design, support the release and reproduction of the product (August 2011)
Wikipedia	Technical consulting services related to the development and preparation of the production process and ensuring the normal course of the production process and sales of products

Note. Developed by the author based on [1–5].

Summarizing the information given in table 1, the views of theorists and practitioners regarding the interpretation of the concept of «engineering» can be combined into several groups:

- the first group includes authors who consider engineering as certain works and services (engineering consulting, design, consulting, etc.) (A. Bereznoi, N. G. Sokolova, A. A. Lobanov, etc.);
- the second group consists of scientists who interpret engineering as an activity or field of activity (K. Matias, Y. Sudaryanto, M. I. Sinitsa, etc).

The representatives of the first direction interpret the concept «engineering» as certain works or services, which corresponds to another concept an «engineering product», that is, the result of engineering activity. Representatives of the second direction interpret the concept of «engineering» as an activity or field of activity. It is more appropriate in this case to use the term «engineering work». This definition would emphasize that engineering is one of the types of entrepreneurial activity. Considering the above and other concepts, it is possible to draw the conclusion that the concept «engineering» should be considered as granting determined services or performances of works. Review and the integration of definitions of the concept «engineering» by the representatives of the third direction allows to assert about absence of unambiguous definition this concept. The main difference between such definitions lies in the different set of works or services provided by engineering enterprises. It is quite difficult to provide an accurate list of works and services that should be included in the «engineering package». It depends both on the customer and on the peculiarities of this or that economic sphere. It is necessary to consider the dynamic market environment, and therefore, can quickly generate new jobs and services that should be attributed to engineering. For this reason the fixation of an exclusive list of engineering works and services may lead to legal contradictions. A review and synthesis of the authors' positions on the formation of a list of engineering works and services allows combining them into two groups:

- works and services related to the preparation of production (preparation of technical assignments, design, development of design and estimate documentations, contracts for construction works, design works, etc.);
- works and services related to ensuring the normal course of the production process (production process monitoring, technical consulting, etc).

Thus, engineering is proposed to understand the implementation of various works and the provision of engineering, intelligence, consulting, architectural and design, research, analytical, and other services related to the preparation and provision of the normal course of production. This interpretation allows us to associate engineering with various types of economic activity: construction, urban planning, electrical engineering, mining or chemical industry, mechanical engineering, etc.

Engineering as a specific type of business has specific features:

- it is one of the forms of industrial purpose services, which is embodied not in the real form of a product, but in its beneficial effect. This effect can have a material carrier (project and technical documentation, graphics, etc.) or may not be tangible (training, control, etc.);
- it is ultimately associated with the preparation and provision of the process of production and sale of material goods and services designed for intermediate and final consumption;
- engineering is the object of purchase and sale, that is, has a commercial characteristic;
- unlike franchising and know-how, it deals with reproduced services, that is, with services, the cost of which is determined by the socially necessary time spent on their production, and therefore has many vendors for their implementation.

It should be noted that the main features of engineering as a type of economic activity are:

- availability of the range of types of engineering services;
- the supporting nature of most types of such services;
- availability of the science intensity of most types of engineering services, which places high demands on the level of qualification of the persons who provide them;
- the complexity of the organizational and methodological support of the process of providing engineering services, which is due, in particular, to the above-listed features inherent in this type of activity.

The task of engineering is to get customers the best result from the capital investments due to:

- systematic, interdisciplinary approach to project implementation;
- multivariate technical and economic developments, their financial assessment of the choice of the best option for the customer;
- development of projects taking into account the possibility of applying progressive construction and production technologies, equipment, structures and materials from various alternative sources that best suit the specific conditions and special requirements of customers;
- use of modern methods of organization and management at all stages of the project implementation.

International trade by engineering services

One of the components of the world market of services is engineering. International trade in engineering services consists in the provision by one state to another state engineering and accounting, consulting and engineering and construction services in the process of designing and building industrial and other objects abroad.

The essence of international trade in engineering services lies in the provision by a resident of one country to a resident of another on the basis of commercial contracts for engineering and settlement, consulting, engineering and construction services for:

- pre-production – pre-project services (socio-economic research, field research, topographical survey, mineral exploration, preparation of feasibility studies, etc., consultations and supervision over the conduct of these works);
- project services (drawing up master plans, schemes, working drawings, technical specifications, consultations, supervision, etc.);
- postproduction services (preparation of contract documentation, supervision of the implementation of works, construction management, commissioning works, etc.);
- ensuring the production process (services in the organization of the production process, enterprise management, personnel training);
- ensuring product sales;
- maintenance of the construction and operation of industrial, infrastructural, agricultural and other objects.

All these services are intellectual by nature and are aimed at optimizing investment projects at all stages of their implementation.

The main factors influencing the development of the world market of engineering services are:

- the acceleration of scientific and technological progress, which leads to significant shifts in the structure of international trade in the direction of increasing trade in related types of equipment. Requiring special knowledge to solve technological and organizational issues, ranging from the design of the enterprise to putting it into operation;
- growth in public and private investments, which allows to expand construction and introduce new facilities, which may require engineering services when designing;
- the availability of free capital, which is located in the market of engineering services;
- high demand for engineering services from countries that have embarked on the path of independent economic development and do not have the necessary experience and staff of specialists to explore and develop their natural resources, develop the fuel and energy base, create heavy industries and so on;
- the desire of big transnational corporations to foreign economic expansion, that is the expansion of spheres of influence. They use the provision of technical services as one of the means of penetration into the economies of other countries;
- an increase in the number of big engineering firms with big turnover and a wide range of activities, the creation of national international associations of engineering firms, which contribute to the development of engineering.

At the moment, the global market for engineering and construction is one of the fastest growing markets, represented by a significant number of companies, which creates a high level of competition.

The largest engineering companies in the world are presented in table 2 and the distribution of engineering companies by countries is presented in table 3.

Table 2

The largest engineering companies in the world (according to «Top 225 International Design Firms 2018»)

Rank 2018	Rank 2017	Firm	Location	Firm type
1	4	Jacobs	Dallas, Texas, USA	EAC
2	2	AECOM	Los Angeles, California, USA	EAC
3	20	SNC-Lavalin	Montreal, Quebec, Canada	EC
4	1	WSP	Montreal, Quebec, Canada	E
5	3	Arcadis NV	Amsterdam, the Netherlands	E
6	8	Fluor corporation	Irving, Texas, USA	EC
7	6	Dar Group	Dubai, UAE	EA
8	7	Stantec Inc.	Edmonton, Alberta, Canada	EAL
9	5	WorleyParsons Ltd.	North Sydney, NSW, Australia	EC
10	9	Fugro NV	Leidschendam, the Netherlands	GE

Note. A – architect, E – engineer, EC – engineer-contractor, AE – architect-engineer, EA – engineer-architect, ENV – environmental, EAC – engineer-architect-contractor, GE – geotechnical engineer, L – landscape architect, P – planner, O – other. Other combinations possible. Firms classified themselves.

Table 3

Distribution of engineering companies by countries

Country	Quantity of firms	Country	Quantity of firms	Country	Quantity of firms
USA	75	India	4	Austria	1
China	24	Jordan	4	Bahrain	1
Japan	12	the Netherlands	4	Finland	1
South Korea	11	UAE	4	Korea	1
Spain	9	UK	4	Kuwait	1
Italy	8	Greece	3	Luxembourg	1
Canada	7	Ireland	3	New Zealand	1
Australia	6	Belgium	2	Serbia	1
Egypt	6	Denmark	2	Singapore	1
France	6	Lebanon	2	South Africa	1
Germany	6	Portugal	2	Switzerland	1
Turkey	6	Sweden	2	Taiwan	1
				Tunisia	1

Consider in more detail the most representative of above mentioned companies.

AECOM manages projects in the following sectors:

- commercial and residential;
- education and healthcare;
- industrial (agriculture, food and beverages, automotive and heavy equipment and machinery, high tech, industrial real estate, logistics and retail, manufacturing, mining and metals, pharmaceutical and chemicals);
- leisure and hospitality;
- national governments;
- oil, gas and chemicals;
- power (alternative and renewable energies, emissions and combustion products control, energy efficiency, fossil fuel generation, nuclear generation, hydroelectric generation, transmission and distribution);
- sports and venues;
- transportation.

Within these sectors, AECOM carries out the following activities:

- archaeology, architecture and design;
- asset management, construction, cost management, decommissioning and closure, economics, engineering, environmental services, international development;
- IT and cyber security;
- operations and maintenance, planning and consulting, program, management/construction management, risk management and resilience and technical services;
- technical due diligence;
- lender's supervision, peer review;
- environmental impact assessment of projects, buildings and structures (by BREEAM International techniques, LEED and Estidama methodologies).

The company is represented in the markets of 150 countries. AECOM has approximately 87 000 employees among which there are architects, engineers, designers, gliders, scientists and construction project management specialists. The company has its offices in Russia and Ukraine.

As part of the design, AECOM uses the capabilities of geometric design in a Building Information Modeling (BIM) environment, which makes it possible to design a new generation of buildings of more complex shapes. Contractors use the advantages of 4D-design technologies (taking into account time parameters), which allows them to coordinate their construction schedules with the BIM-model developed by a group of designers, and makes it possible to consider various construction strategies in advance, thereby reducing construction risks and optimizing project implementation. In addition, BIM reduces the risk of cost overruns, as estimators are able to build more efficient calculations based on 5D technologies using predefined templates that include data on costs at previous facilities. AECOM's strengths and weaknesses are presented in accordance with table 4.

Table 4

Strength and weaknesses analysis of AECOM

Strengths	Weaknesses
1. Strong distribution network 2. Significant staff of highly qualified employees 3. Using local experience and knowledge of foreign markets 4. Sustainable development 5. High level of manufacturability, work in the BIM environment as a risk management tool	1. Dissatisfaction with the regional employees of the salary level (Russia, Ukraine) 2. Ineffective work of the HR departments in regional offices, that leads to high staff turnover 3. Problems in organizing the production design process in the regional representative offices of the corporation, that leads to uneven workload 4. Decrease in AECOM's reputation in the regional market (Russia, Ukraine) due to lower quality of ongoing projects

Note. Developed by the author based on [1].

Thus, analyzing the activities of AECOM Corporation it can be noted that it is a high-tech company which has a significant staff of highly qualified employees and a large-scale network of foreign companies, branches and representative offices. However, in the regional (in particular, in the Russian and Ukrainian market), the company's activities are less efficient, which is associated with problems in organizing the production design process and the inefficient work of HR departments. To improve the activities of AECOM in the regional market, it is necessary to strengthen the control of technological processes of designing work in regional corporation representative offices.

Another one of the strongest players in the international market of engineering services is Arcadis NV (the Netherlands), which is a part of a consortium of eight Dutch companies. The following directions can be highlighted as the main activities of the company:

- engineering (the development of architectural projects, master planning and sustainable urban development);
- consulting (project management, cost management, development of contract solutions);
- engineering and consulting (business consultations, solutions in the field of environmental protection, solutions in the field of water resources).

The analysis of the strengths and weaknesses of Arcadis NV is presented in table 5.

Table 5

Strengths and weaknesses analysis of Arcadis NV

Strengths	Weaknesses
1. Participation in a consortium of eight Dutch companies, which ensures the stability and competitiveness of the company due to the peculiarities of the relationship between the companies within the consortium 2. Sustainable growth of the company (in terms of revenue, infrastructure and buildings, implementation of technologies in the field of environmental protection and water resources) 3. Balance sheet and cash flow indicators are stable 4. Geographically balanced project portfolio (UK/Europe, North America) 5. A diversified base of international clients and key national clients 6. A diverse and experienced team of workers	1. Decrease in income in North America due to the competition impact in the environmental projects market 2. Brand awareness remains low

Note. Developed by the author based on [2].

Thus, we can conclude that a positive factor affecting the activities of Arcadis NV is its participation in the consortium, which ensures its sustainable development and competitiveness both in the Netherlands market and in the world market. This is reflected in the growth of the company's revenue, created infrastructure, constructed buildings and implementation of projects in other areas. As part of improving Arcadis NV's operations, it needs to increase brand awareness.

Engineering services in the Republic of Belarus

The engineering services market in the Republic of Belarus has growth potential, and this means that foreign contractors and subsidiaries have an opportunity to occupy a certain market share. For the Republic of Belarus import of engineering services is very important, as the country faces the challenge of updating its production capacity, the production structure changed to increase the output of high technology and the reduction of the release of energy and materials consumption. At the same time, Belarus has a modern construction industry, a wide network of design institutes. This makes it possible to fulfill export contract orders by the forces of Belarusian organizations, that is, to

develop export engineering. One of the real way to expand the export of engineering services is the participation of Belarusian firms as subcontractors in the implementation of contracts carried out by foreign organizations.

According to the UN International Standard Industrial Classification, engineering services are part of the section «Architectural and Engineering Activities and Related Technical Consulting», code 7421, similarly to the United Nations Guide to World Trade Statistics, engineering services are part of «Architectural, Engineering and Other Technical Services». This section includes four subsections:

- 1) engineering services;
- 2) integrated engineering services;
- 3) architectural services;
- 4) urban planning and architecture services.

Analysis of the dynamics of the development of the market of construction services and in the field of architecture, engineering and other technical services

Dynamics of foreign trade in goods and services for the analyzed period 2005–2012 in the Republic of Belarus has a positive trend (table 6). The volume of foreign trade in construction services for the analysed period 2005–2014 has a positive trend and a negative trend for the period 2015–2016. The indicator of the volume of foreign trade in services in the field of architecture, engineering and other technical services for the analysed period 2005–2013 has a positive trend and a negative trend for the period 2014–2018.

Table 6

Exports and imports of construction services and services in the field of architecture, engineering and other technical services in the overall structure of the foreign trade turnover of the Republic of Belarus for 2005–2018, million US dollars

Indicator	2005	2010	2011	2012	2013	2014	2015	2016	2017	2018
The volume of foreign trade in goods and services	34 730.9	66 103.5	94 283.1	100 938	90 433.1	87 094.7	65 494.9	59 885.8	72 976.0	83 246.6
Export	17 536.2	29 301.7	46 537.1	51 886.0	44 046.1	43 302.9	32 797.8	29 926.9	36 529.5	41 970.2
Import	17 194.7	36 801.8	47 746.0	49 052.0	46 387.0	43 791.8	32 697.1	29 958.9	36 446.5	41 276.4
The volume of foreign trade in services	3 488.2	7 802.6	8 961.1	10 354.8	12 759.5	13 612.7	11 023.8	11 244.9	12 616.8	14 096.5
Export	2 342.2	4 795.6	5 609.5	6 311.7	7 506.0	7 879.6	6 633.5	6 897.1	7 839.3	8 720.8
Import	1 146.0	3 007.0	3 351.6	4 043.1	5 253.5	5 733.1	4 390.3	4 347.8	4 777.5	5 375.7
The volume of foreign trade in construction services	80.0	314.3	545.8	1 106.7	2 323.7	2 744.4	2 017.1	1 929.1	1 788.0	1 842.7
Export of construction	60.1	151.1	226.3	469.7	1 065.5	1 220.4	995.5	1 029.1	897.1	820.5
Import of construction	19.9	163.2	319.5	637.0	1 258.2	1 524.0	1 021.6	900.0	890.9	1 022.2
The volume of foreign trade in services in the field of architecture, engineering and other technical services	61	146.5	171.5	223.5	419.5	282.1	211.3	249.8	—	—
Export of services in the field of architecture, engineering and other technical services	18	56.2	68.7	93.4	121.5	119.2	76.3	97.2	—	—
Import of services in the field of architecture, engineering and other technical services	43	90.3	102.8	130.1	298	162.9	135	152.6	—	—

Source: developed by the author based on payments of the National Bank of the Republic of Belarus and the Ministry of Statistics of the Republic of Belarus.

The negative dynamics of the analyzed indicators for the period under review is related to:

- imperfection of the regulatory legal framework governing the construction activities in the territory of the Republic of Belarus and the limited possibilities of state incentives for the development of the construction industry;
- lack of mechanisms for coordinating the development of subjects of the construction industry;
- non-optimal price-quality ratio of construction services;
- insufficiently effective use of information technology in the development and regulation of the construction industry;
- poor focus on the achievement of the final result in the implementation of marketing planning for the promotion of construction services;
- not enough high level of orientation to the needs of consumers of construction services, the lack of effective communication with the subjects of the construction industry and direct consumers.

The main directions of activation of trade in the field of international import of engineering services in the Republic of Belarus should be:

- modernization of the market of engineering services based on the implementation of international standards and active transfer of advanced technologies;
- building the capacity of companies in the field of engineering through the activation of innovative processes, the introduction of new technologies;
- improving the qualification and technological competitiveness of engineering companies;
- formation of innovative infrastructure of the market of engineering services.

Directions of cooperation of the Republic of Belarus and the People's Republic China in the field of international engineering

At this stage, the goal of engineering development in the Republic of Belarus is the formation of a modern engineering services market, within which equal competitive conditions will be created in order to carry out vigorous activities in the field of engineering, as well as project management in various areas of the economy. To enhance the competitiveness of this sector of the economy and its further development, the following directions can be identified for cooperation between Belarus and China (fig. 1).

For the participation of China in the implementation of the presented directions, a number of activities must be carried out, among which can be singled out:

- improvement of the legislative, regulatory and technical conditions for attracting engineering and construction companies from China to the Belarusian market;
- organization of the professional community in the field of engineering activity, which includes both resident companies of the Republic of Belarus, Belarusian-Chinese companies, and foreign engineering and construction companies operating in the Belarusian market: creation of associations and engineering clusters, development of self-regulatory organizations, formation of specialist communities, implementation of the guarantee system;
- the creation of modern scientific and technical engineering centers operating in various industries and with different geographic markets;
- formation of large research and project consortia with the participation of the organizations of the National Academies of Sciences of Belarus and China in order to solve complex engineering problems;
- coordination at the republican and regional levels of engineering industry support mechanisms;
- tax stimulation of demand for services of engineering companies;
- creation of a system for monitoring the market of engineering services;
- the introduction of modern training programs, retraining and advanced training of specialists in the field of engineering;
- development of cooperation and collaboration with foreign engineering companies;

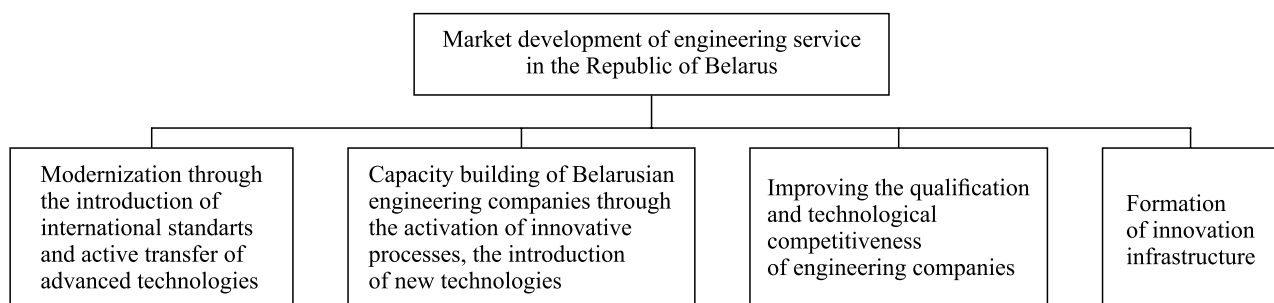


Fig. 1. Market development of engineering services in the Republic of Belarus
(developed by the author based on [4])

- improvement of legislation in the field of science, technology and innovation in the Republic of Belarus, the legal protection of the commercial use of intellectual property;
- creation of a regulatory legal base in the field of combining research and business activities for employees of state scientific organizations with the aim of motivation for innovation activities;
- development of a regulatory legal framework and the creation of institutions that promote the use of the capabilities of the Union State and the Eurasian Economic Union in the scientific and technological field, including engineering;
- development of professional standards of engineering activity.

In the framework of the development of cooperation between the Republic of Belarus and the People's Republic of China, it is advisable to develop the interaction of Chinese engineering companies with Belarusian design organizations.

As of 2018, in the Republic of Belarus there were over 650 design organizations of various profiles, areas and specialization of work, various scale of activity. Chinese engineering companies, including China CAMC Engineering Co., Ltd. (CAMCE), can engage Belarusian design institutes, design organizations, as well as design specialists in order to establish long-term and promising mutually beneficial relations based on the exchange of experience of the work of Belarusian design organizations, by connecting production capabilities, intellectual and information resources.

Strengthening and development of cooperation between Chinese and Belarusian companies in the engineering and construction services market can be achieved through the creation of joint Chinese and Belarusian companies in such forms as holdings and consortia, groups of companies, strategic alliances and unions. The formation and development of these forms of cooperation is necessary in order to increase the sustainability of companies, the competitiveness of the participating companies of these forms of cooperation, stimulate economic growth in the market of engineering and construction services, increase employment and export of services. The cooperation of the Belarusian-Chinese engineering firms can be expanded through the following measures:

- strengthening the relationship between the Belarusian-Chinese engineering companies in order to simplify access to new technologies;
- optimal distribution of risks, both general and specific, inherent in this industry;
- joint entry of companies into the international market of engineering services;
- organization of joint research and development;
- sharing of scientific knowledge and fixed assets;
- reduction of transaction costs of interaction.

An important component of successful Belarusian-Chinese cooperation in the market of engineering and construction services is the prompt and high-quality exchange of information on projects within the framework of joint strategic alliances, consortia and holdings. Based on an analysis of the problems of CAMCE's production and economic activities in the Republic of Belarus, to facilitate the cooperation between Belarus and China, such an action is proposed as the development of a unified information and consulting system for Belarusian-Chinese cooperation and partnership. This system will provide informational, consulting and legal support on the specifics of activities in the field of engineering and construction in the market of the Republic of Belarus (fig. 2).

The implementation of this model will allow to receive timely and accurate information regarding the specifics of the design, engineering and construction activities in the Republic of Belarus. Within the framework of the planned model of the information-consulting system of the Belarusian-Chinese cooperation and partnership, it is necessary to create a number of interconnected blocks such as:

- unit for administration access rights of engineering companies to system resources;
- an information block that contains the regulations, laws, standards and other special and specific information needed in the field of engineering for the organization of joint Belarusian-Chinese projects;
- means for organizing communication of specialists of engineering companies that are part of a holding or consortium through a corporate network.

One more basic direction of the development of cooperation between Belarus and China in the market of engineering services is creating of high-quality staff for this kind of economic activity. The formation of human resources in the field of engineering is necessary to meet current and future needs for specialists and skilled workers, considering the technological renewal of organizations and the transition of the Republic of Belarus to a post-industrial employment model.

Cooperation between Belarus and China in the field of the formation of qualified engineering personnel can be carried out in the form of mutual learning and exchange of experience, which can be carried out even at the stage of higher education through the organization of student exchange. For the formation of highly qualified personnel in the framework of the Belarusian-Chinese cooperation, the following activities are possible:

- development of forecasts of the professional qualifications of workers to adjust the volume and structure of training, retraining and advanced training of personnel taking into account the needs of the engineering services market;

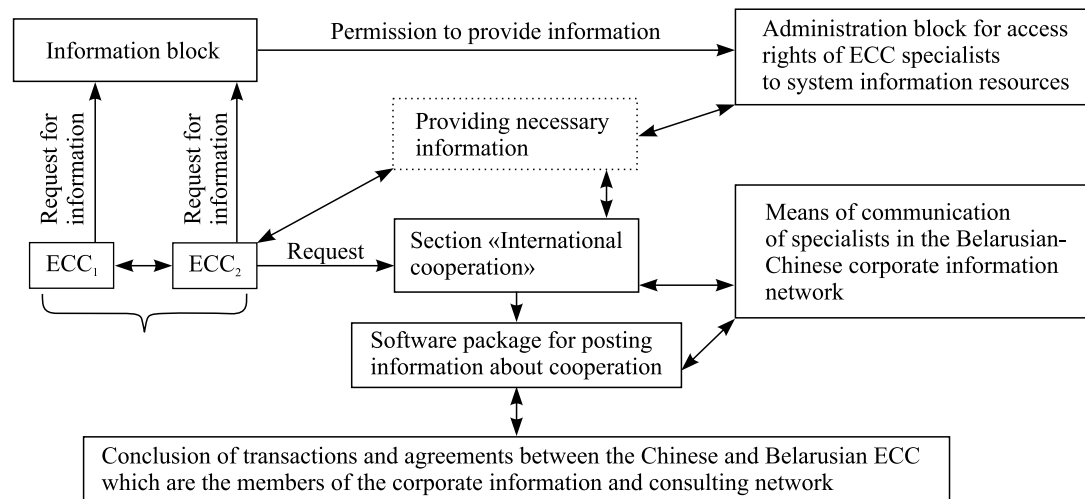


Fig. 2. Model of information and consulting system of the Belarusian-Chinese cooperation and partnership.

Note. ECC – engineering and construction companies

- development of a social partnership mechanism in the field of providing qualified personnel in the field of engineering services, aimed at implementing multilateral partnership agreements in the field of training of specialists and skilled workers;
- development of programs to provide qualified personnel for the engineering services market, including on the basis of the contract form of professional training.

Within the framework of providing a market for the development of active cooperation between Belarus and China in the field of the formation of qualified engineering personnel, one of the measures may be the development of the practice of hiring expatriate specialists – highly qualified senior and middle management workers from China to work both in joint companies and in units of large Chinese companies located in Belarus. Attracting this category of workers can significantly facilitate the cooperation of Belarusian and Chinese engineering and construction companies. However, this measure also has its drawbacks, the main of which is the significant amount of remuneration of expatriate specialists. An important element in the development of the engineering services market, including at the international level, is to increase the share of investments in construction and installation works both by the state (from the volume of investments in fixed assets) and by attracting private investments, including from abroad. This is necessary, in particular, due to the negative dynamics in 2014–2018 and the constructed trend (fig. 3).

The following factors may increase investment in engineering companies of the Republic of Belarus:

- growth of budgetary investment resources;
- increasing the interest of commercial organizations in expanding investments in the field of engineering services;
- attraction of foreign investments as well as Chinese investments;
- development of new forms of investment (including housing leasing), etc.

Cooperation of Belarusian and Chinese engineering companies can be developed in the framework of encouraging mutual investments, which can be implemented both in the activities of companies as a whole and in specific construction projects carried out by companies both in Belarus and in China. The result of investment and financial cooperation of Belarusian and Chinese engineering companies may be aimed at creating special investment and financial funds aimed at supporting engineering projects in the territory of the Republic of Belarus.

Thus, in order to increase the competitiveness of this sector of the economy and further develop this area in the context of cooperation between the Republic of Belarus and the People's Republic of China, can be highlighted the following main directions of development of the engineering market in the Republic of Belarus:

- development of interaction of Chinese engineering companies with Belarusian design organizations and involvement of Belarusian design organizations in cooperation in order to establish long-term and promising mutually beneficial relations based on the exchange of experience of the Belarusian design organizations in the market of the Republic of Belarus, on the combination of production capabilities, intellectual and information resources;
- creation of joint Chinese-Belarusian companies in such forms as holdings and consortia, groups of companies, strategic alliances and unions in order to increase their financial sustainability with the economic instability of the Belarusian economy in order to increase the competitiveness of companies participating in these forms of cooperation, stimulating economic growth in the market of engineering and construction services, increasing employment and export of services;

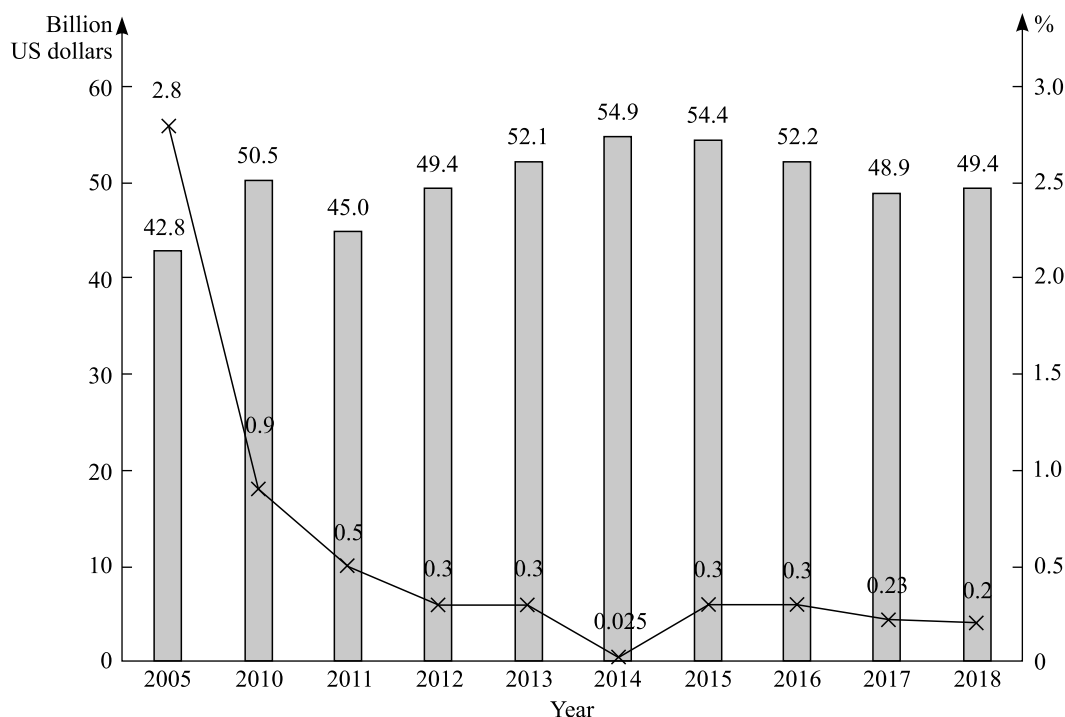


Fig. 3. Dynamics of the share of investments in investments in fixed capital in construction and installation works in the Republic of Belarus

- formation of qualified engineering personnel, which can be implemented in the form of organizing mutual learning and sharing experience at the stage of higher education through the organization of student exchange, as well as the development of expatriation practices;
- cooperation of Belarusian and Chinese engineering companies can be developed in the framework of encouraging mutual investments, which can be implemented both in the activities of companies as a whole and in specific construction projects implemented by companies both in the Republic of Belarus and in the People's Republic of China.

These measures will allow both Chinese and Belarusian companies to receive financial results from each other's activities.

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