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Features of pricing in construction and estimated cost of construction objects

Capital construction involves a number of strategic important aspects, such as engineering, materials science, energetics, transport, etc. In this regard, the development and renewal of the construction process is an important step in the country's overall development and economy. Pricing in construction is based on general principles, but also bears a number of specific aspects due to the characteristics of the industry and its products. The use of various methods can reduce the cost of construction and installation works. The price in construction is a monetary expression of the unit cost of construction products and is determined by the amount of socially necessary labor spent on its creation. The pricing mechanism in construction has specific features. First of all, this is due to the individual nature of the buildings and structures under construction, especially manifested in hydraulic engineering, a significant dependence of the cost of specific, often non-repeating conditions of construction. Such circumstances do not allow to establish uniform selling prices for construction products, as it is done in other sectors of the economy. Therefore, the price of construction products in the vast majority of cases is determined on an individual basis, on the basis of estimates in accordance with the scope of work, methods of production technology and a single register for certain types of work. A special pricing system has been developed to assess the cost of construction products. The analysis of existing estimated standards allows to draw a conclusion that there is a problem of discrepancy of estimated and market cost of construction. In this way, the research allowing to analyze the current estimated standards from different positions, to identify the positive and negative parameters, as well as to offer a solution to the identified inconsistencies becomes relevant.

Keywords: major construction, construction, pricing, estimation, estimated cost, features of pricing, price in construction, cost, construction products, buildings and structures.

Construction is one of the leading industries in Kazakhstan which significantly impacts the development of a huge number of related sectors of the country's economy.

Reforms, carried out in Kazakhstan, have allowed the country to take firm position with a stable economic and social situation, to create favorable conditions for attracting capital and investment.

Construction is one of the actively developing economy sectors and has a significant impact on the socio-economic development of the country and regions. The share of construction in the gross domestic product (hereinafter referred to as GDP) of the Republic of Kazakhstan today is 6.2 %. Development of the housing sector, which accounts for 11 % of GDP in construction, is paid particular attention.

The relevance of the topic is determined by the fact that the effectiveness of the investment and construction project of repair and construction works significantly depends on the quality of design and estimate documentation and control of its execution.

The estimated cost is the basis for determining the amount of capital investments, construction financing, formation of contractual prices for construction products, calculations for the performed contract construction and installation works (hereinafter CIW), payment of costs for the acquisition of equipment and its delivery to the construction sites, as well as reimbursement of other costs at the expense of funds provided by

the summary estimate. On the basis of estimate documentation, accounting and reporting, economic calculation and evaluation of construction organizations and customers are carried out.

On the basis of the estimated cost of objects is determined by the carrying value of the put into effect fixed assets for built enterprises, buildings and structures. The estimated cost is the basis for the calculation of technical and economic indicators of the designed object, justification and decision on the implementation of its construction.

The entire amount of costs determined by the estimate for the construction of the object is called the total estimated cost, or capital investments. The total estimated cost is made up of costs:

– construction and installation work on the construction of buildings and structures;

– installation of technological equipment of process control automation systems;

– acquisition of main and auxiliary technological equipment;

– other expenses including design and survey and research works, preparation of the construction site, maintenance of the Directorate, training of operational personnel.

In international construction practice, as well as in recent years and in Kazakhstan, the contractor for the construction of the object is usually determined on a competitive basis by bidding. Under these conditions, the structure of the estimates generated by the customer with the breakdown of the consolidated budget calculation into separate parts with the selection of individual objects or types of construction, the performance of which the customer has the intention to invite private contractors. This portion of work is called a lot.

In accordance with the customer's task, the designer or the customer himself prepares the tender documentation, divides the project into separate parts — lots. The lot can be both the construction of individual structures and the performance of certain types of work (land-rock, concrete, etc.). The cost of each of the lots is determined either by a local estimate or object, or can be the sum of several object and local estimates. The amount of estimated costs for all lots forms a summary estimate.

The design and estimate documentation compiled by the designer is the property of the customer. Under these conditions, the cost of the construction project, defined in the project, is a trade secret of the customer. The contractor or contractors who intend to participate in the bidding, having bought the tender documentation for a small amount, themselves determine the cost of construction of the object for which they can build it.

The evaluation of tenders and the selection of the contractor are determined by a number of factors, the most important of which are usually:

– the price offered by it and guarantees of performance of works according to requirements of the customer;

– image of construction and installation company;

– technical and technological proposals;

– methods of technology of works;

– availability of infrastructure;

– financial conditions and financial guarantees.

After summarizing and determining the contractor between the customer and the contractor is a contract or contract for the performance of a certain tender or individual lots of work at a price announced in the application of the contractor.

The most important article of the contract for both the customer and the contractor is the contract price, which is determined on the basis of mutually acceptable financial and economic conditions. By the beginning of the contract price discussion, the customer has an estimate drawn up by the designer during the development of the project. The contractor in the tender package presents to the customer its estimate of the cost of construction, which shows the estimated cost of production and the planned profit. In extremely rare cases, the customer and the contractor immediately find a mutually acceptable solution. In the vast majority of cases, a compromise solution appears as a result of rather intense negotiations and the contractor's justification of pricing issues and the formation of the estimated cost [1].

When studying the process of the ratio of the construction and installation works estimated cost to the actual cost of construction, many parameters that vary in structure and quantity are revealed. A comparison of processes and results of determining the estimated cost of construction and installation works with the actual working conditions, the work of the new state information system, problem areas eliminated with the use of this system, and areas that remain imperfect in the implementation of this system is presented. The con-

cept of a modern determination of the estimated cost of construction and installation works is defined. It is established that in the current state information system of pricing, by managing the cost of resources in relation to each subject, the resource prices will draw near the market ones. However, the labor costs inherent in the current rates of the estimated regulatory framework for the most part do not reflect the actual time spent on the construction site. Having identified this problem, it should be noted that today we need mechanisms that would bring labor costs closer to real costs, which means that the wages of workers included in the prices will get closer to the market value.

Also, major construction involves a number of strategically important aspects such as engineering, materials science, energetics, transport, etc. In this regard, development and renewal of the construction process is an important step in the overall development of the country and its economy. Construction itself is a special, technically complete branch of material production, the task of which is to create new, and reconstruction and repair of existing production and non-production facilities (entities, houses, schools, hospitals, railways, highways, aqueducts, etc.).

The construction process includes the following stages:

1) preparation of construction;

2) construction;

3) sale of construction products.

At the initial stages, it is necessary to calculate the estimated cost that would be the basis for the calculation of technical and economic indicators of the project.

You can see the basic principles of determining the estimated cost of construction in the figure below.

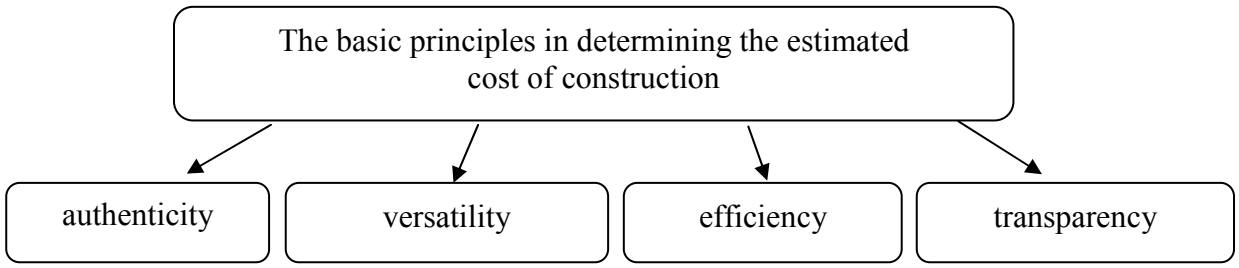

Figure. Method of determining the estimated cost of construction products in the Republic of Kazakhstan [2]

Pricing in construction is based on common principles, but it has a number of specific aspects, due to the peculiarities of the industry and its products.

1. Construction objects vary in size, area, number of floors, materials of structural elements. This also applies to objects built on standard projects since each of them depends on local conditions to which they are anchored, not to mention the objects being built on individual projects. Consequently, almost every building and structure has its own individual price.

2. In construction (unlike industry), as a rule, prices are set not for a finished object or a separate structure, but mainly for individual types of construction and installation works or for finished structural elements. This is due to the fact that a large number of highly specialized contracting and subcontracting entities, the products of which are not a ready-to-sell facility, but certain types of construction and installation work performed by them can take part in the construction process of the facility. The price for a completed object consisting of the value of the work performed or the value of individual structures is mainly important for the customer, investor or developer.

3. Applied building technologies and equipment significantly influence the price of construction or installation works. Therefore, the price of the same type of construction and installation work may be different for different construction companies. At the initial stages of the object design, when determining its value, the averaged (most often normative) prices are included considering the prevailing price level for building materials, the current wage level and the most common construction technologies.

4. Construction is characterized by a long production cycle. Consequently, the project price may not coincide with the actual one (especially in terms of inflation), which makes it necessary to consider the time factor in the formation of prices in construction.

5. Construction products are distinguished by high material consumption and considerable labor costs. Due to the fact that the price in construction is not formed from the actual cost, but from the estimated cost,

the constituent elements of the price may not reflect the actual level of costs for the purchase of materials and other resources. This makes it necessary to systematically monitor the prices of building materials and labor resources and to determine the way their changes affect the cost of construction products.

6. Price in construction is formed by the designer, customer and contractor, each of whom pursues his own commercial goals. Therefore, the final price for construction products is in fact a compromise price between all subjects of the construction.

In the construction, it is possible to say that it is not the prices themselves that are set, but mainly standards, on the basis of which the price of the construction object is determined. There are major factors that influence the cost of construction in Table 1 below [3].

Table 1

Factors affecting the construction cost [3]

Type	Factors		% per year
Objective	increase in prices for resources used in construction		10–20
	change of legislation		5–10
	construction start delay due to administrative barriers and late financing		5–10
Subjective	opportunities for making subjective decisions affecting the construction cost	redundant space planning solutions	10–40
		the use of inefficient design solutions	10–20
		irrational object placement	5–10
	inaccuracies and errors in calculations associated with misuse	inaccurate determination of volumes	10–20
		false use of estimated standards	10–30
		errors associated with the construction master plan	5–10
	low innovation activity in construction due to the lack of motivation to reduce costs		

In Kazakhstan, estimated cost of the object is determined, as a rule, in accordance with the «methodology for determining the cost of construction products in the Republic of Kazakhstan», developed in 2011.

This methodology establishes the procedure for determining the cost of construction products. It is put into effect instead of SN RK 8.02–02–2002 «The procedure for determining the estimated construction cost in the Republic of Kazakhstan».

The purpose of the methodology is to create a unified methodological basis for all entities involved in investment and construction process in determining the estimated cost of construction, the formation of contractual prices for construction products and settlements for the work performed.

According to the methodology, the estimated cost of construction is the funds necessary for the implementation of construction, the amount of which is determined on the basis of project materials and estimated standards in accordance with the current legislation of the Republic of Kazakhstan. Estimated cost is the basis for determining the amount of investment funds for the construction of pricing for construction products and serves as a guideline in the implementation of contractual construction services purchase by the customer and the conclusion of the contract, calculations for contract work performed according to the current legislation [2].

Thus, the cost of construction refers to the funds for the creation of building products. Calculations of this cost are made by drawing up special documents — the estimates, and the cash costs expressing the cost are called the estimated cost.

Based on the estimated cost, the amount of capital investments is determined; construction financing and settlements for the work performed are carried out. The estimate documentation is used in the process of accounting and reporting, as well as in carrying out an economic analysis of the activities of construction and installation entities.

The estimated cost of a construction object is divided into the following components: estimated cost of construction and installation works; estimated cost of equipment, appliances, tools and manufacturing equipment and other costs. The sum of these determines the estimated cost of the object or the amount of capital investments in the object:

$$CI = C_{c.w.} + C_{i.w.} + C_{purch.} + C_{other} \quad (1)$$

where CI — capital investments in the facility; $C_{c.w.}$ — the cost of construction works; $C_{i.w.}$ — the cost of installation works; $C_{purch.}$ — the cost of purchasing equipment, tools, furniture and appliances; C_{other} — other capital works and expenses.

In the estimates of the construction cost, funds are divided into the following chapters [2]:

– Costs of preparatory work for the construction site in terms of work performed by the contractor;

– Main construction objects;

– Objects for utility and service purposes;

– Power facilities;

– Objects of transport facilities and communication;

– External networks and facilities for water supply, sewage, heat and gas supply;

– Landscaping and gardening of the territory;

– Temporary buildings and facilities;

– Additional construction costs related to the contractor.

Table 2 below shows the technological structure of the estimated cost of construction of various facilities [4].

Table 2

Technological structure of the estimated cost of construction of various facilities [4]

No.	Cost groups	Civil engineering, %	Industrial engineering, %
1	The cost of construction and installation works	75–90	40–60
2	The cost of the purchase of equipment, tools	15–5	50–25
3	Other capital works and costs	10–5	10–15

The use of various methods can help achieve a reduction in the cost of construction and installation works, i.e. the improvement of used items and means of labor, technical and technological solutions to increase the degree of prefabricability of construction of facilities. This can make it possible to increase the performance of production workers, which ultimately will reduce the cost of construction and installation works [5]:

$$C_{t.w.} = S_{t.v.} * S_{w.}(1 - R_{l.c.})/100), \quad (2)$$

where $C_{t.w.}$ — estimated cost of temporary works; $S_{t.v.}$ — the share of construction and installation works at facilities with a higher degree of construction prefabricability in the total volume of construction and installation works in the planning period, %; $S_{w.}$ — the share of costs under the item «Basic wage» in the estimated cost of works, %; $R_{t.c.}$ — a specific reduction in labor costs at the expense of the increase in construction prefabricability as a result of the implementation of technical solutions that reduce the cost of construction agreed with the customer and the control bodies and institutions, unit shares.

Reduction of the cost of works as a result of reducing the construction duration in monetary terms is determined by the following formula [5]:

$$C_{c.d.} = C_{fixed}(1 - R_{c.d.}), \quad (3)$$

where $C_{c.d.}$ — estimated cost of construction duration; C_{fixed} — the amount of fixed costs in the composition of materials, the cost of operating construction machines and overhead costs, p.; $R_{c.d.}$ — a specific reduction in the duration of construction, fractions of a unit.

The content and essence of a comprehensive program to reduce production costs of construction and installation works depend on the specifics of a construction entity, current state, development prospects, etc. Each program should reflect the following activities:

– on the rational use of material resources (introduction of new machinery and waste-free technology allowing to save material resources of different types; development of the entity's regulatory framework; introduction of advanced technologies for construction and installation works and building materials, parts and structures; use of construction waste; improvement of the construction product quality, etc.);

– on defining and maintenance of the optimum size of the entity allowing to minimize the costs of construction and installation works;

– those related to effective management of fixed assets on the balance sheet of a construction company (exemption from unnecessary machinery and equipment; leasing the company's property; improving the quality of maintenance and repair of fixed assets; advance training of the personnel maintaining the machines and mechanisms, etc.);

– those related to personnel management (defining and maintaining the optimal number of personnel; raising advance training and retraining of personnel; applying progressive norms and standards; choosing the optimal system of labor motivation, etc.);

– on forming, functioning and development of the management system of a construction company (selection of forms for organizing construction production, forms of relations with participants in the production process, management structure, etc.) [5].

Currently, there are micro private decisions in the selection of a suitable composition of work rates and the choice of the most optimal value for constrained working conditions, but they are not sufficiently objective. Examples of micro private decisions in managing the amount of labor inherent in a price are such cases as: increasingly, when examining design estimates, there are disagreements between the customer and the contractor about the validity of the rates and factors application, causing different conditions of works, etc. Presence of inconsistencies in estimated norms of real costs that are present during the implementation of any construction object leads to the distance of the estimated cost from the market. As a result, the procedure for calculating the estimated cost of construction and installation works requires improved methods that are in direct correlation with modern work technologies and working conditions.

The problems of inconsistencies in the scope of work and current prices with modern technologies and, in connection with scientific and technical progress, the identification of new complexity factors are important for pricing in general, because they reflect actual labor costs in production, which means they affect the real wages of construction workers. This resource is not regulated by GIS, but it, just like the cost of materials, influences the mapping in the estimated market prices.

Conclusions

In the article, the current estimated standards were analyzed, where inconsistencies with the current costs of construction firms were revealed; the work of GIS pricing was described, namely the policy of changing the procedure for calculating the estimated cost of construction and installation works, the maximum control of the cost of construction resources by the state. But if the cost of construction resources is regulated by the state, while the time for performing specific work is regulated by the current estimated costs, with technology of work that is inconsistent with modern working processes. In this connection, modern methods of «estimating» objects of construction and installation works require the development of new subprocesses, the purpose of which will be to approximate labor costs in estimates to the actual hours of work at facilities and, as a result, approximation of estimated costs to market. Such methods can be an integrated assessment mechanism and the method of weighted coefficients. This solution, among other things, will allow not only large entities to demand up-to-date information, since they purchase services from development institutes and professional consulting agencies, but also small companies that simply cannot afford to spend significant funds on such kind of information for each and every project.

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Л.В. Трункина, Э.Ж. Сыздыкова, С.С. Шакеев, Г.А. Шакенова

Құрылыстағы бағақалыптастырудың ерекшеліктері және құрылыс нысандарының сметалық құны

Күрделі құрылыс машинақұрау, материалтану, энергетика, көлік, тағы басқа стратегиялық маңызды аспектілерді қамтиды. Осыған байланысты құрылыс үрдісін дамыту және жаңарту — жалпы елдің және оның экономикасының дамуындағы маңызды қадам. Құрылыста бағақалыптастыру жалпы қағидаларға негізделген, бірақ оның бірқатар осы саламен және сала өнімдеріне байланысты ерекшеліктері бар. Құрылыста баға құрылыс өнімнің бірлігінің ақшалай құнын көрсетеді және оны құруға жұмсалатын, қажетті қоғамдық жұмыстар көлемімен анықталады. Құрылыста бағақалыптастыру механизмінің өзіндік ерекшелігі бар. Ең алдымен, бұл салынып жатқан ғимараттар мен құрылыс жайлардың ерекшелігімен, әсіресе гидротехникалық құрылыста байқалынатын, жиі нақты және қайталаусыз құрылыстың шарттарына құнның айтарлықтай тәуекелділігіне байланысты. Мұндай жағдайлар, басқа салалардағы халық шаруашылығында жасалатындай, құрылыс өніміне бірдей сату бағасын орнатуға мүмкіндік бермейді. Сондықтан құрылыс өнімнің бағасы, өте көп жағдайларда, жеке түрде сметалық құжаттар негізінде жұмыс ауқымына, жұмыс өндіру технологиясының әдістеріне сай және жеке жұмыс түрлеріне бірыңғай реестр бойынша анықталады. Құрылыс өнімнің құнын бағалау үшін бағақалыптастырудың арнайы жүйесі әзірленген. Әртүрлі әдістерді қолдану арқылы құрылыс-монтаждау жұмыстарының өзіндік құнын төмендетуге болады. Жүзеге асырылып жүрген заңнамаларды талдау қазіргі уақытта құрылыстың сметалық және нарықтық құны арасындағы сәйкессіздіктің болуы туралы қорытынды жасауға негіз бар. Осыған байланысты жүзеге асырылып жүрген сметалық заңнамаларды әртүрлі жақтардан талдаудың өзектілігі артады, оның оң және теріс параметрлерін анықтауға, сонымен қатар белгілі сәйкессіздіктерді шешудің нұсқаларын ұсынуға мүмкіндік береді.

Кілт сөздер: күрделі құрылыс, құрылыс, бағақалыптастыру, смета, сметалық құн, бағақалыптастыру ерекшеліктері, баға, өзіндік құн, құрылыс өнімі, ғимараттар мен құрылыс-жайлар.

Л.В. Трункина, Э.Ж. Сыздыкова, С.С. Шакеев, Г.А. Шакенова

Особенности ценообразования в строительстве и сметная стоимость объектов строительства

Капитальное строительство задействует ряд стратегических важных аспектов, таких как машиностроение, материаловедение, энергетика, транспорт и т.д. В связи с этим развитие и обновление процесса строительства является важной ступенью в общем развитии страны и его экономики. Ценообразование в строительстве базируется на общих принципах, однако оно имеет ряд специфических сторон, обусловленных особенностями данной отрасли и ее продукции. Применением различных методов можно добиться снижения себестоимости строительно-монтажных работ. Цена в строительстве представляет собой денежное выражение стоимости единицы строительной продукции и определяется количеством общественно необходимого труда, затрачиваемого на ее создание. Механизм ценообразования в строительстве имеет специфические особенности. Прежде всего это связано с индивидуальным характером строящихся зданий и сооружений, особенно проявляющимся в гидротехническом строительстве, существенной зависимостью стоимости от конкретных, часто неповторяющихся условий строительства. Подобные обстоятельства не позволяют установить единые отпускные цены на продукцию строительства, как это делается в других отраслях народного хозяйства. Поэтому цена на строительную продукцию в подавляющем большинстве случаев определяется в индивидуальном порядке на основе сметной документации в соответствии с объемами работ, методами технологии производства работ и единым реестром на отдельные виды работ. Для оценки стоимости строительной продукции разработана специальная система ценообразования. Анализ действующих сметных нормативов позволяет сделать вывод, что в настоящем существует проблема несоответствия сметной и рыночной стоимости строительства. В таком ключе актуальность приобретают исследования, позволяющие проанализировать с различных позиций действующие сметные нормативы, разобраться в работе гражданско-инженерного строительства, выявить положительные и отрицательные её параметры, а также предложить вариант решения выявленных несоответствий.

Ключевые слова: капитальное строительство, строительство, ценообразование, смета, сметная стоимость, особенности ценообразования, цена в строительстве, себестоимость, строительная продукция, зданий и сооружений.

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