

METHODOLOGICAL FOUNDATIONS FOR PRICING OF CONSTRUCTION PROJECTS

Yuliia Bibyk*, the Head of the Department of Economic Research
and Determination of the Road Work Cost,
Belska Olena, Researcher in the Department of Economic Research
and Determination of the Road Work Cost
M. P. Shulgin State Road Research Institute, State Enterprise (DerzhdorNDI SE)

*ORCID 0000-0002-7197-8909

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Introduction. In conjunction with the sustainable development of the road sector namely: record amounts of funding and record amounts of road works performed all parties of the investment process came to the same conclusion that the project implementation process is as important as project completion. Long-run objective of the project is its successful completion but the steps needed to achieve this aim are crucial to the profit and project life cycle. For this very reason choosing the right way to implement the project is an important first step before starting construction works.

Searching for the optimal mechanism for the implementation of the construction project, which would provide both the flexibility of the process and the maximum interaction of all stakeholders (investor/customer, designer, contractor), compliance with the budget and construction deadlines resulted to elaboration of a large number of alternative schemes for contract implementation, for example Design-Build (DB), Integrated Project Delivery (IPD), Construction Management at Risk (CMR) and the others.

Overview of recent researches and publications. The issue of implementation and use of Design-Build contracts (hereinafter – DB contracts) in Ukraine is new and therefore, until an insufficient amount of research has been carried out and scientific papers have been written on this topic. Consequently, the works by foreign scientists were mainly analyzed, such as: M. Konchar, V. Sandvino, K. Molenaar, A. Songer, A. Akintoe, G. Franks, B. Hancock, D. F. Turner, D. A. Langford, S. Rowlinson and the works by other scientists, which were based on the achievements of already mentioned researchers and new practical experience with up-to-date statistics. Furthermore, due to the lack of a sufficient dataset on the implemented construction DB contracts in Ukraine and to compare their effectiveness with traditional contracts, data was taken on Design-Build Institute of America (DBIA) and United States Department of Transportation (DOT) sites [1, 8].

This article is devoted to highlighting the features of one of the above mechanisms aimed at reducing financial costs and reducing the time to develop construction projects ensuring the maintaining or improving the quality of the project – DB contracts. This article was based on the scientific research of international practices which were aimed at studying the essence of such contracts and finding opportunities for their full implementation in the road sector of Ukraine.

The purpose of the article is the disclosure of the main characteristics of one of the most effective methods of procurement of road construction works – procurement according to the Design-Build scheme, determining their difference from traditional contracts, determining the upsides and downsides of the implementation of these contracts and the procedure for the formation of the contracts cost.

Basic material and results. The issue of improving cooperation and integration between the customer, designer and contractor during the construction project has long been of interest to researchers. The separation of design and construction phases was identified as a problem in 1962, and at the same time some contractors have offered to conclude package agreements for the entire complex of works. From then onwards many studies have focused on evaluating the effectiveness of the traditional method of project implementation compared to non-traditional methods. In recent years, more and more research has confirmed

that large and complex projects with a higher risk element achieve better results when using non-traditional methods of project implementation. [2].

In accordance with [1, 3] DB contracts – it is a contracting system through which one organization performs both design and construction under one single contract. Under the frame of DB contracts project developers (contractors) are the key parties to the projects and play an important role in the process of implementation of the project as they take more responsibility for the project and the progress and take control of the project management process. The principal difference between traditional contracts and DB contracts is that the contractor is engaged in design and construction, which reduces the time of work and reduces the expenditures of the contractor.

According to the DBIA progress report from 2018 to 2021, the share of contracts executed with usage the design-construction scheme increased by 18% and now accounts for 44% of all construction contracts in the United States (fig. 1). As the popularity of DB contracts has grown, the educational process associated with this method of implementing construction projects has also expanded. The continuing emphasis on educating customers/investors and project stakeholders regarding the implementation process and its benefits, as well as strengthening the legislative framework, contributed to adoption further implementation and widespread use throughout the industry. Generally, customer choosing DB contracts for unique and complex projects that require innovative approaches and require close cooperation.

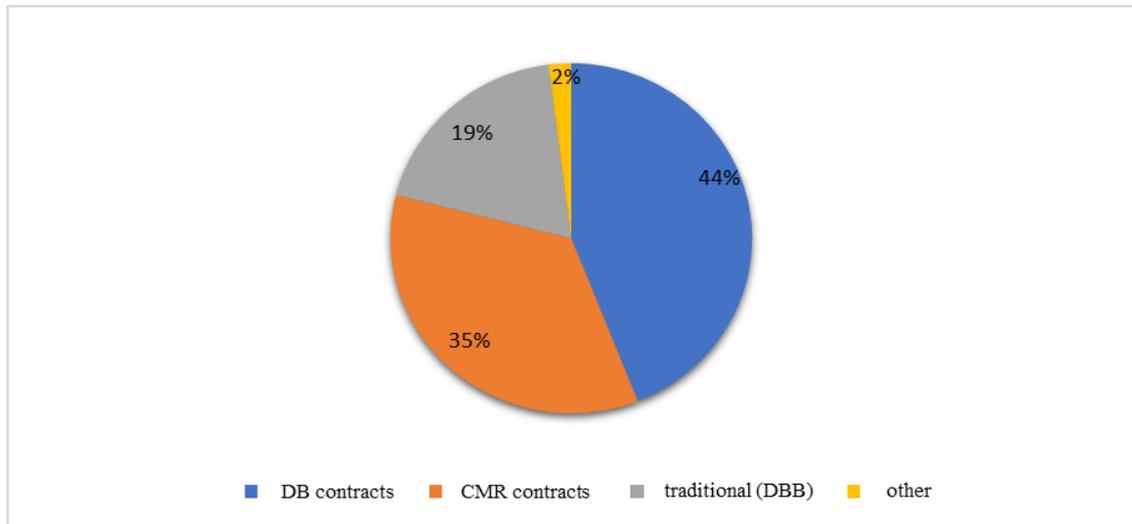


Fig. 1. Relative share of various types of contracts in construction [4]

Research of University of Texas at Austin [5] which concerned the increase of costs and time in the implementation of traditional contracts and DB contracts in construction had shown effectiveness of DB contracts. 38 DB contracts and 39 traditional contracts were selected for comparison, and the effectiveness of DB contracts is shown below (fig. 2).

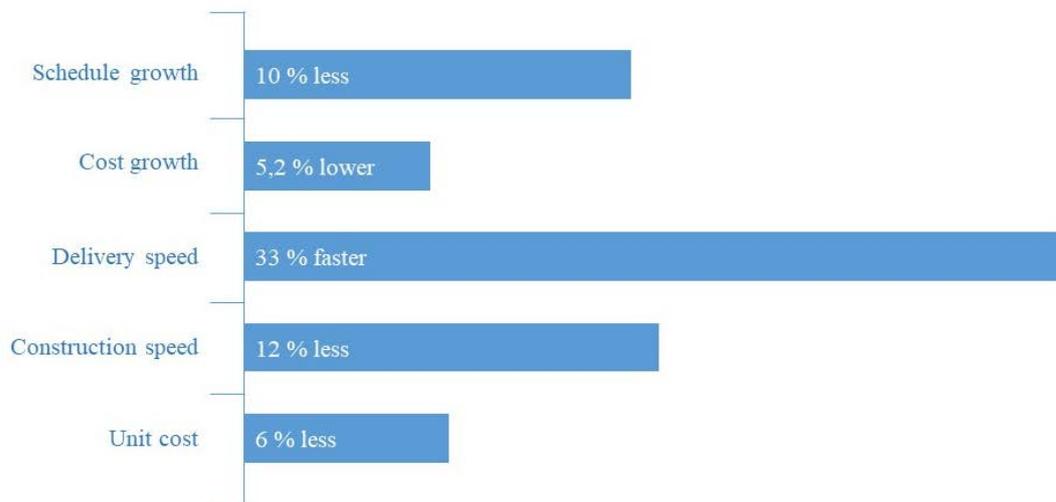


Fig.2. Key performance differences between traditional and DB contracts [5]

Taking into consideration monitoring of the international practices in the implementation of Design-Build projects as well as domestic experience in implementing construction projects under Design-Build scheme it is necessary to develop a certain model of cost formation for the possibility of implementing such projects.

The anticipated cost of the following components of the object total cost should be determined by the customer of realization of road-building projects according to the Design-Build scheme:

- elaboration of design documents (including it's appraisal);
- execution of road construction works.

The anticipated construction cost of elaboration of design documents can be calculated by the customer on the basis of the provisions of [6] using the following methods (fig. 3):

a) on the basis of applying to the calculation base the average percentage indicators of the cost of design works:

- cost of the equivalent projects (object-analogies data base);
- cost determined on the basis of consolidated average indicators of the construction cost;

b) calculation method based on [7];

c) direct calculation of labor costs and economically justified elements of costs in the form 3-P «Statement of estimates for the works execution».

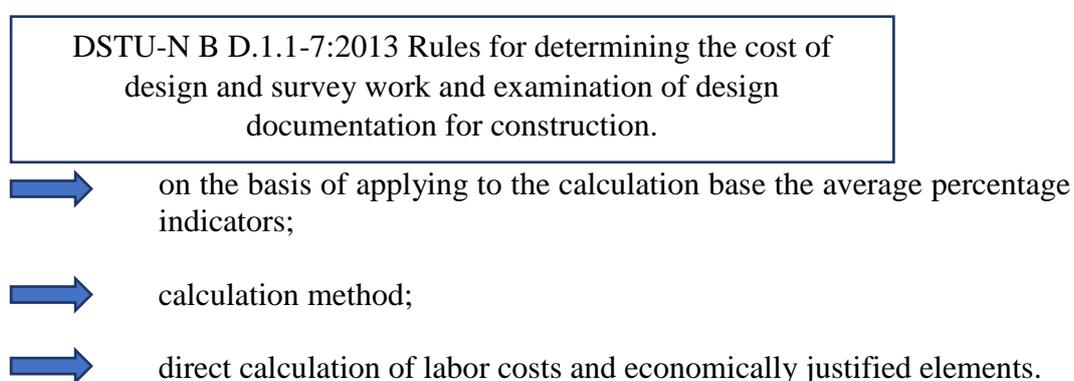


Fig.3. Methods of formation of the anticipated cost of design works

The anticipated cost of road construction works (fig. 4) can be calculated on the basis of architectural and technological solutions which are reflected in the developed and approved feasibility by applying:

- data on the cost of the object-analogies;
- consolidated estimated prices and standards.

In determining anticipated cost of road construction works using information on the cost of similar objects re-costing the current price level (or using inflation index).

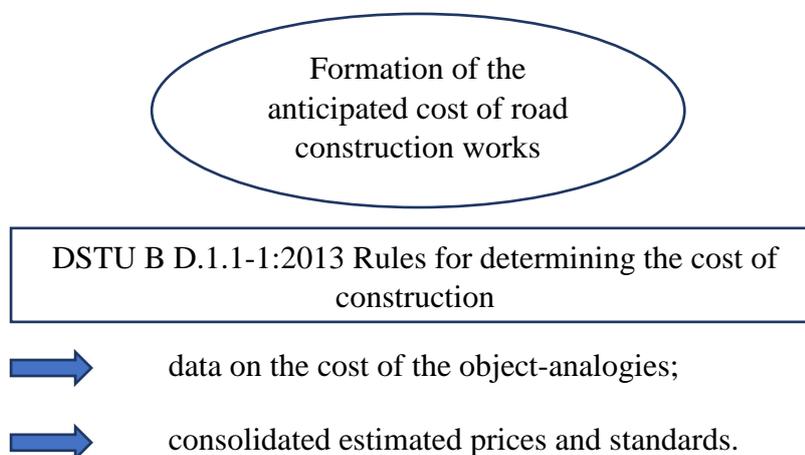


Fig.4. Methods of formation of the anticipated cost of road construction works

When determining the anticipated cost of road construction works using the consolidated estimated prices and standards, the following is possible:

- 1) applying consolidated estimated norms;
- 2) applying consolidated indicators of construction costs or consolidated estimated prices.

In order to full-fledged implementing of Design-Build contracts in Ukraine the possible upsides and downsides of such contracts were investigated and identified. With a foundation of theoretical insights and application results of executed projects the conclusion on the possible positive and negative aspects of the analyzed contracts was made [8].

Upsides:

- single-responsibility principle;
- reduction of the project cost;
- the cost is clearly defined;
- reduction of project implementation time
- opportunity to get better profit.

Downsides:

- limited involvement of the customer;
- strict procurement conditions.

Conclusion. It's an obvious point that DB contracts promote an integrated approach to construction and solve some problems faced by the construction industry today, for example, when the contractor is not responsible for design documentation developed by the design organization and often finds defects in design documentation that require additional time and considerable resources for correction.

Decision to provide preference to DB contracts in contrast to the traditional ones could be made after a full analysis of the customer's needs, design requirements and the need for innovative solutions as there is a significant compromise between construction time and uncertainty regarding the cost aspect of each project.

In order to determinate anticipated cost of purchasing new construction, reconstruction, overhaul and current repairs under the Design-Build scheme it is necessary to use the provisions of the current estimate and regulatory documents and compulsorily have a developed of object-analogies database. Additionally, to determine the cost of work by the applicant, the customer must provide information on all necessary technical, qualitative and quantitative characteristics of the subject of procurement in accordance with the developed and approved feasibility study.

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Бібік Юлія Миколаївна, завідувач відділу економічних досліджень та визначення вартості дорожніх робіт. **Бельська Олена**, науковий співробітник відділу економічних досліджень та визначення вартості дорожніх робіт. Державне підприємство «Державний дорожній науково-

дослідний інститут імені М.П. Шульгіна» (ДП «ДерждорНДІ»). **Модель формування очікуваної вартості будівельних проектів за схемою «проектування - будівництво».** Традиційний метод будівництва відокремлює інтереси проєктувальників від інтересів підрядників, проте зважаючи на метод за схемою Design-Build (DB) «проектування-будівництво», повна відповідальність покладається на одну організацію з метою мінімізації потенційних ризиків і загальних витрат, крім того, при запровадженні схеми Design-Build (DB) термін від планування будівництва об'єкта до кінцевого результату значно зменшуватиметься. Виконане дослідження характеризує основні принципи, відмінності, переваги та недоліки концепції інтегрованої реалізації будівельних проектів для її реалізації в дорожньому господарстві України.

Реалізація інфраструктурного проекту — комплексний процес, що включає планування, проєктування та будівництво. Вибір способу реалізації проекту — одне з основних рішень, які приймають власники під час розроблення стратегії закупівлі. На сьогодні дорожня галузь України розвивається швидкими темпами, тому потребує ефективного механізму реалізації дорожньо-будівельних проектів як для інвестора/замовника, так і для підрядника. Зі свого боку виконання дорожніх робіт за такими контрактами мінімізують ризики для інвестора/замовника, скорочують строки будівництва та досить часто забезпечують економію коштів. Останнє може бути досягнуте в тому випадку, коли вимоги інвестора/замовника максимально деталізовані й не виникне непорозумінь чи зміни проєктних рішень, що призведе до додаткових витрат.

Ключові слова: закупівлі, схема «проектування-будівництво», традиційні контракти, закордонний досвід, реалізовані проєкти.

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Bibyk Yuliia, Head of the Department of Economic Research and Determination of the Road Work Cost. **Belska Olena**, Researcher in the Department of Economic Research and Determination of the Road Work Cost. **M. P. Shulgin State Road Research Institute, State Enterprise (DerzhdorNDI SE).** **Methodological Foundations for Pricing of Construction Projects.** Searching for the optimal mechanism for the implementation of the construction project, which would provide both – the flexibility of the process and the maximum interaction of all stakeholders (investor/customer, designer, contractor), compliance with the budget and construction deadlines resulted to elaboration of a large number of alternative schemes for contract implementation and this article dedicated Design-Build scheme. DB contracts promote an integrated approach to construction and solve some problems faced by the construction industry today, for example, when the contractor is not responsible for design documentation developed by the design organization and often finds defects in design documentation that require additional time and considerable resources for correction.

Key words: procurements, design-build, traditional contracts, international practices, completed projects.