

## PRACE NAUKOWO-PRZEGLĄDOWE RESEARCH REVIEW PAPERS

---

Przegląd Naukowy – Inżynieria i Kształtowanie Środowiska nr 72, 2016: 206–219  
(Prz. Nauk. Inż. Kszt. Środ. 72, 2016)

Scientific Review – Engineering and Environmental Sciences No 72, 2016: 206–219  
(Sci. Rev. Eng. Env. Sci. 72, 2016)

**Edyta PLEBANKIEWICZ<sup>1</sup>, Agnieszka LEŚNIAK<sup>1</sup>, Vít HROMÁDKA<sup>2</sup>,  
Eva VÍTKOVÁ<sup>2</sup>, Gabriela KOCOURKOVÁ<sup>2</sup>**

<sup>1</sup>Instytut Zarządzania w Budownictwie i Transporcie, Politechnika Krakowska  
Institute of Construction and Transportation Engineering and Management, Cracow  
University of Technology

<sup>2</sup>Ústav stavební ekonomiky a řízení, Fakulta stavební, Vysoké učení technické v Brně  
Institute of Structural Economy and Management, Faculty of Civil Engineering, Brno  
University of Technology

### **Estimating the value of public construction works in Poland and the Czech Republic**

### **Wycena zamówień publicznych na roboty budowlane w Polsce i Republice Czeskiej**

**Key words:** cost estimation, the value of works,  
public procurement

**Słowa kluczowe:** kosztorys, wartość robót, za-  
mówienia publiczne

#### **Introduction**

Construction works can be delivered in two primary forms. The first one is the traditional system, where the client separates the execution of design works from construction works (the so-called Design-Bid-Build system). The second way is the Design and Build system, where one contractor is contracted both the execution of design works and construction works. In both cases the con-

struction owner is obligate to determine the estimated value of public order.

The article outlines the legislation concerning the methodology of estimating the value of works in Poland and the Czech Republic. It focuses particularly on cost calculation methods that public investors from these countries should follow when awarding a contract for works in the traditional system. This theoretical discussion is followed by a calculation example.

#### **Legal requirements for the rules of works value estimation in Poland**

The Public Procurement Law applicable on the public procurement market

in Poland (The Act of 29 January 2004 on public procurement), defines that the client can carry out public projects by means of two methods: Design-Bid-Build or Design and Build (Leśniak et al., 2012a; Czaczkowski, 2013). Detailed rules of preparation of these two cost studies are provided for in the Regulation of the Minister of Infrastructure dated 18 May 2004 on determining the method and basis of preparation of a client's cost estimate, calculation of expected costs of design and expected costs of construction specified in the functional and utility programme (called in this article the Regulation).

These studies play an important role in public procurement. They provide, among others:

- determination of the amount that would be spent by the client on financing the contract;
- classification of a contract to the appropriate threshold range, which enables the selection of an appropriate procedure for awarding contracts and compliance with the requirements of the Public Procurement Law, depending on the value of the contract (e.g. the content of Terms of reference, the amount of a tender bond, publication of notices, etc.);
- assessment of price offers submitted by contractors, applying for carrying out the works.

The method of document preparation is specified in the Regulation of the Minister of Infrastructure dated 18 May 2004, concerning the specification of methods and bases of drafting the investment cost estimate and calculating planned costs of design works and planned costs of building work specified in the functional-util-

ity program. The contract value may be calculated not earlier than six months prior to the date of the start of a contract award procedure (according to Article 35 of the Public Procurement Law).

### **Legal requirements concerning the principles of estimating the value of works in the Czech Republic**

Law 137/2006 Coll. on public procurement states that in the Czech Republic, in the case of the public works contracts awarding, the Design-Bid-Build approach is almost exclusively used. For pricing of works in public procurement it is necessary to distinguish the two views, the view of contracting authority and the view of the candidates. The process of selection of the best offer is solved e.g. in Hanák et al. (2015) or Schneiderová Heralová (2014).

From the perspective of the contracting authority according to the mentioned law to determine in particular the estimated value of public contracts is necessary. Method for determining of the estimated value of public order is defined in § 13 (general requirements) and § 16 (the estimated value of public works contracts) of the law. Paragraph 13 state the obligation of the contracting authority this value to determine a key value is without VAT. The contracting authority provides this value on the basis of data and information on the contracts of the same or similar project. If this information is not available, the contracting authority sets out the estimated value of public contracts on the basis of data and information achieved from the research of the market with the desired filling, or on the basis of data and information obtained by other appropriate means.

However, the specific method of determining of the estimated value of construction contracts in the form of methodology and costing the law does not define.

The second view is the view of the applicant in determining of the offer price. According to § 44, point 4, of Public Procurement Law contracting authority is obliged to provide to candidates within the tender documentation the relevant documentation prepared in detail that specifies the subject of the public contract to the extent necessary for the processing of tenders. This documentation in accordance with the implementing Decree 230/2012 Coll. must include the documentation defining the construction of the technical, economic and architectural details that clearly defines the subject of the public contract, its value, materials, construction, technical, operational and dispositional characteristics, outward and quality. The list of works following the above-mentioned documentation and providing a detailed description of all the works, supplies or services necessary for the implementation of the public contract is also included. Items and structure of the list of works are described in the aforementioned implementing Decree 230/2012 Coll.

Pricing carried out by the applicants in the Public Procurement Law is not directly defined, the applicant must respect the terms of reference defined by the contracting authority. In this regard, the contracting authority may require delivery of the tender budget processed in the specified form and structure, and using the desired price database. The tenderer must also respect the list of works which is included in the tender documentation.

## Material and Methodology

### Principles of drafting the investment cost estimate in Poland

Pursuant to the Regulation of the Minister of Infrastructure dated 18 May 2004, the client's cost estimate is developed by means of a simplified calculation method, consisting in the calculation of the estimate value of works included in the bill of quantities (BQ) as the sum of products of the numbers of BQ items of basic works and their unit prices less value added tax.

The investment cost estimate calculates the works cost-estimate value ( $W_k$ ) as a sum of products of BQ units of works and their unit prices according to the following formula:

$$W_k = \sum_{j=1}^n L_j \cdot C_j \quad (1)$$

where:

$W_k$  – works cost-estimate value [EUR],  
 $L_j$  – number of BQ units of works [m<sup>2</sup>, m<sup>3</sup>, etc.],

$C_j$  – unit price of a basic work [EUR].

The calculation of the cost-estimate value excludes the value added tax.

In determining the unit prices of works (according to Art. 2 § 3 point 2 of the Regulation), the following should be used in order:

- unit prices of works determined on the basis of commercial data, including data from the previously concluded agreements or widely used up-to-date publication,
- detailed calculations.

In practice the orderers most often use current price publications. Table 1

TABLE 1. Sample publications containing unit prices of construction works

TABELA 1. Przykład publikacji z informacjami o cenach jednostkowych robót budowlanych

Publishing Wydawca	Catalogues for unit prices – simplified calculation Katalogi cen jednostkowych – kalkulacja prosta	Catalogues for prices of production factors – detailed calculation Katalogi cen czynników produkcji budowlanej – kalkulacja szczegółowa
OWEOB Promotion – Sekocenbud	bulletin with prices of: – earth and engineering works (BRZ) – building-investment works (BRB) – installation works (BRI) – electrical works (BRE) – repair and construction works and historical works (BRR)	– information about prices of construction materials (IMB) – information about rates of the estimate labour and prices of the functioning of the construction equipment (IRS)
Orgbud-Service	prices of the project construction works prices of the project installation works prices of renovation construction works prices of investment works: – ICRB – construction works – ICRI – installation works – ICRE – electrical works – ICRS – network works	construction input prices (ICCP)
Bistyp-Consulting	– catalogue of the PROJECT unit prices of works and structures – catalogue of works unit prices, prices of investment projects, road objects or renovations	information price list of construction materials and prices of the lease of construction equipment (and of installation or electrical materials) (ICMB)

shows examples of publications where one can find unit prices of construction works (Leśniak et al., 2012b, c).

A detailed calculation of the unit price is allowed in the second place. It involves the specification of the value of individual unit prices (costs of labour, materials and equipment use), adding indirect costs and profit according to the following formula:

$$C_j = \sum_{k=1}^m n_k \cdot c_k + Kp_j + Z_j \quad (2)$$

where:

$C_j$  – unit price of a specified position in the bill of quantities [EUR],

$n_k$  – unit pricing: labour, materials, equipment,

$c_k$  – production factors price,

$Kp_j$  – indirect costs per bill of quantities item,

$Z_j$  – profit calculation per bill of quantities item.

Determining the rates and production factors prices, according to Art. 2 § 5 of the Regulation, involves the following order: own analysis, market data or commonly used up-to-date publications. Determining unit pricing, according to Art. 2 § 5 of the Regulation, involves the following order: individual analysis, cost estimation standards of unit pricing as specified in relevant catalogues and the interpolation and extrapolation method using the values specified in catalogues. All the available catalogues with pricing standards can be used.

Indirect costs in the investment cost estimate are calculated on the basis of the ratio method, in accordance with the following formula:

$$K_{pj} = \frac{W_{Kp} \cdot (R_j + S_j)}{100\%} \quad (3)$$

where:

$K_{pj}$  – indirect costs per bill of quantities item [EUR],

$W_{Kp}$  – indirect costs ratio [%],

$R_j$  – labour costs per bill of quantities item [EUR],

$S_j$  – costs of equipment use per bill of quantities item [EUR].

Profit is calculated as the product of the profit mark-up ratio and the basis of profit calculation (Plebankiewicz and Leśniak, 2013). Thus two bases of profit calculation are in use:

- production costs:  $Z_1 = R_j + M_j + S_j + K_{pj}$ ;
- processing costs:  $Z_2 = R_j + S_j + K_{pj}$ .

The elements of the basis, that is  $R_j$ ,  $M_j$ ,  $S_j$ ,  $K_{pj}$ , indicate costs per bill of quantities item.

The indirect costs and profit ratio is established in the starting assumptions for cost estimation. The values are assumed in accordance with § 5.4 of the Regulation in relation to market data, including the data from previous contracts or commonly used recent publications, or – when such data is not available – in relation to an individual analysis (Juszczuk and Leśniak, 2012).

### **Principles of drafting the investment cost estimate in the Czech Republic**

The principle of determining of the investment cost is highly dependent on the details of the available project docu-

mentation. In the case that the project is only on the level of the study, and being evaluated from the viewpoint of economic efficiency and technical feasibility, information is not sufficient to create the detailed item budget. In this case it is possible to use the technical-economic indicators indicating the price per unit ( $m^3$  enclosed space,  $m^2$  of built area), or to compare with the already implemented similar buildings. In the case of major constructions, however, there may be special rules and guidance that the principle of calculating of the estimated value of the construction defines. In the case of constructions of road infrastructure the Ministry of Transport issues Pricing norms that allow the determination of the preliminary price including respect for the risks associated with inaccurate estimation.

Pricing norms assess the basic price (which consists from the construction object type like roads, bridges and their reconstruction, tunnels), which includes the real costs of implementation of these objects.

Calculation of the total price is made in the following steps (Hromádka et al., 2015):

- determining the “basic price” according to the price norms (main construction objects of type A);
- recalculation of prices of other objects by percentage rate (other objects of type B);
- expert correction of “basic price” according to “attributes”;
- determination of the risk premium for all constructions (types A and B);
- conversion of the total price to the current price level (total cost of ob-

jects of type A + type B including the expert correction and the risk component (recalculated according to the CZSO / STIF)

- calculation of prices including VAT.

In the case of the calculation of the offer price by the applicant in case the procurement procedure it is possible to determine the value of the construction on the basis of more detailed project documentation. The most common method in this case is drawing up the item budget. Item budget is structured on the basis of the Classification of building structures and works.

In the frame of individual groups of building components the sub-components, and in the context of building components particular individual works are listed. The price of one construction work by multiplying of the amount of the construction work expressed in the defined measure units and unit prices of construction work is calculated. In the case, when costs for the main material are not included in the price of construction work, the cost of this material must be separately evaluated in the specification. Part of the items in the budget by items reflecting the transfer of materials on site is created. The item budget for construction work is then completed by the assembling items or the cost for operating set.

An important part of the construction price assessment is a calculation of unit prices of construction works. In the Czech Republic there is a database of indicative prices of construction works, which are created and managed by private commercial companies, but often serve as the indicative prices for the public sector. Databases are part of the soft-

ware designed for budgeting commonly used in the Czech Republic. The most used ones include KROS plus (URS Praha), BUILDpower (RTS) or euroCALC (Callida). However, the mentioned databases are based on average prices and therefore calculated prices versus the reality are slightly exaggerated for the purpose of tendering procedures. Therefore, these prices are adjusted to ensure competitiveness in the tender.

Method of determining of the unit prices of works is based on the structure of costing formula. Calculation formula tends to have different forms, the most common is form based on the sum of direct costs, indirect (overhead) costs and profit. Detailed calculation formula is as follows:

- direct costs (direct material; direct wages; machines; other direct costs);
- indirect costs (production overhead costs – it is usually a percentage of the direct processing costs: direct wages, equipment and other direct costs; administrative overhead costs – it is usually a percentage of the direct processing costs: direct wages, equipment and other direct costs).

Profit (usually a percentage proportion of the sum of the direct processing costs and indirect costs). Detailed information about the work measurement see in (Tichá and Kocourková, 2014).

## **Finding and discussion**

To illustrate similarities and differences in the methodologies of preparing an investment cost estimate building insulation works were chosen as an example.

The scope of works:

1. Windows covers with foil – 178.97 m<sup>2</sup>.
2. Preparation of the surface – 768.50 m<sup>2</sup>.
3. Thermal insulation system (the underside of the balcony) – 76.80 m<sup>2</sup>.
4. Thermal insulation system of the walls of bricks with polystyrene slabs – 503.30 m<sup>2</sup>.
5. Thermal insulation system of the jambs of width of 15 cm with polystyrene slabs – 48.80 m<sup>2</sup>.
6. Thermal insulation system of the walls of concrete with polystyrene slabs – 139.60 m<sup>2</sup>.
7. Double-painting with oil paint grilles and balustrade with straight bars – 68.64 m<sup>2</sup>.

### Investment cost estimate in Poland

The first step is the quantity calculation with the catalogue base. The simplified method of calculation is applied for cost calculation. Total cost of construction works is calculated as the sum of the products of the basic construction works quantities and their unit prices according to formula 1 (Table 2). The base of unit price of basic construction works are Catalogues for unit prices OWEOB Promotion – Sekocenbud II/2015. The base of unit price for position 7 is detailed calculation (Table 3).

### Investment cost estimate in the Czech Republic

The method for the cost calculation is similar as in the case of the Polish approach, the main difference is that in the case of the Czech approach the cost for construction work and costs for main material are sometimes calculated sepa-

rately in individual items (in the calculation in Table 4 highlighted by *Italic*).

The following calculation was processed according to the “Catalogues and descriptions of indicative prices of construction works” by ÚRS Praha, a.s., in software Kros Plus.

The calculation (Table 4) also includes parts related with this type of construction (font underlined), but not displayed in the calculation of Polish variant. The reason is in less aggregation of items of construction works valued in the Czech Republic, where to use more partial items including construction works and materials is necessary (Table 5).

### Conclusion

Investment cost estimate is the first type of cost estimate to be prepared when construction works are planned. Its purpose is to establish the probable cost which an investor must take into account before subcontracting works. This information is for the use of the investor and this document is not submitted to the other party, that is, the potential contractor.

In Poland, in the case of private investors to have such a document is completely voluntary and not required by law, yet the public ones must obligatorily determine the estimated value of the planned construction works contract.

In the Czech Republic is in the case of private investors the same situation as in Poland. In the case of public investor it is necessary to respect law about public orders, which defines the structure of compulsory documents needed for the tender documentation, but not directly

TABLE 2. The simplified method of cost calculation in Poland

TABELA 2. Kalkulacji kosztu robót budowlanych metodą uproszczoną

No Nr	Catalogue number Numer katalogu	Work description Opis roboty	Mea- sure- ment unit cw* Jed- nostka miary cw	Unit prices of cw Cena jednost- kowa cw [EUR]	Quan- tity of cw Ilość cw	Cost of cw Koszt cw [EUR]
1	KNR 2-02 0925-01	polyethylene window shields, 0.2 mm thick	m <sup>2</sup>	2.19	178.97	391.94
2	KNR 0-23 2611-01	preparation of the ground for insula- tion by the light-wet method, by mechanical clearance and washing	m <sup>2</sup>	1.75	768.50	1 344.88
3	KNR 0-23 2614-03	insulation of concrete walls with the ATLAS STOPTER system Styrofoam panels using ready-to-use dry set mortar, with preparation of the ground and manual application of ready-to- use thin-wall elevation plasters – at the bottom of the balcony	m <sup>2</sup>	29.07	76.80	2 232.58
4	KNR 0-23 2614-02	insulation of building brick walls with the ATLAS STOPTER system Styro- foam panels using ready-to-use dry set mortar, with preparation of the ground and manual application of ready-to- use thin-wall elevation plasters	m <sup>2</sup>	28.64	503.30	14 414.51
5	KNR 0-23 2614-05	insulation of 15 cm wide reveal with the ATLAS STOPTER system Styro- foam panels using ready-to-use dry set mortar, with preparation of the ground and manual application of ready-to- use thin-wall elevation plasters	m <sup>2</sup>	46.43	48.80	2 265.78
6	KNR 0-23 2614-03	insulation of concrete buildings with the ATLAS STOPTER system Styro- foam panels using ready-to-use dry set mortar, with preparation of the ground and manual application of ready-to- use thin-wall elevation plasters	m <sup>2</sup>	29.07	139.60	4 058.17
7	KNR 4-01 1212-05	double painting with oil colour of grates and railings made of straight bars	m <sup>2</sup>	7.09	68.64	486.66
Total/Suma			25 194.52			

\*cw – construction work/robota budowlana.



TABLE 3. Cost calculation of unit price of position 7 in cost estimation  
 TABELA 3. Kalkulacja ceny jednostkowej pozycji 7 w kosztorysie

Catalogue number Numer katalogu	Works description, lists of resources and overheads Opis roboty, wykaz surowców, lista narzędzi	Measurement unit cw* Jednostka miary cw	Norms Ilość jednostek	Unit prices Cena jednostkowa [EUR]	Compounds of unit prices Składniki ceny jednostkowej	Unit price of cw Cena jednostkowa [EUR]
KNR 4-01 1212-05	double painting with oil colour of grates and railings made of straight bars – labour – materials: • oil-based topcoat • oil-based primer • white spirit • sheets of sandpaper – auxiliary materials 2% (M) • Kp = 65% (R + S) • Z = 12% (R + S + Kp)	w-h/m <sup>2</sup> dm <sup>3</sup> /m <sup>2</sup> dm <sup>3</sup> /m <sup>2</sup> dm <sup>3</sup> /m <sup>2</sup> ark./m <sup>2</sup> % % %	0.94 0.077 0.077 0.034 0.56 2 65 12	3.50 6.32 4.03 1.73 0.24 0.99 3.29 5.43	3.29 0.49 0.31 0.06 0.13 0.02 2.14 0.65	7.09

\* cw – construction work/robota budowlana.

TABLE 4. The simplified method of cost calculation  
 TABELA 4. Kalkulacja kosztu robót budowlanych metodą uproszczoną

No Nr	Catalogue number Numer kata- logu	Work description Opis roboty	Measurement unit cw* Jednostka mia- ry cw	Unit prices of cw Cena jednost- kowa cw [EUR]	Quantity of cw Ilość cw	Cost of cw Koszt cw [EUR]
1	2	3	4	5	6	7
1	629991011	covering fillings and vertical surfaces with foil adhesive tape	m <sup>2</sup>	1.08	178.97	192.75
2	985131111	cleaning surfaces of walls, floors and arches reverse with pressurized water	m <sup>2</sup>	5.29	768.50	4 067.19

	621211021	installation of contact heat insulation of exterior soffits with polystyrene boards thickness up to 120 mm	m <sup>2</sup>	21.28	76.80	1 634.34
	283759390	<i>board facade polystyrene EPS 70 F 1 000 × 500 × 120 mm</i>	m <sup>2</sup>	9.62	78.34	753.79
	621531021	thin silicone grained plaster thickness of 2.0 mm including penetration of exterior soffits	m <sup>2</sup>	10.88	76.80	835.65
3	622252001	installation of founding skirting of the contact insulation	m	3.07	0.00	0.00
	<u>590516490</u>	<i>skirting Al with clapboard, foundation U 12 cm, 0.95/ 200 cm</i>	m	3.02	0.00	0.00
	622143003	mounting of plaster plastic or galvanized corner profiles with fabric	m	1.05	0.00	0.00
	<u>590514800</u>	<i>Al corner trim 10 × 10 cm with fabric pack. 2.5 m</i>	m	0.67	0.00	0.00
	622143004	mounting adhesive of plaster lawn profiles (APU rails)	m	0.91	0.00	0.00
	<u>590514760</u>	<i>profile window cleaning cloth – Thermospoj 9 mm / 2.4 m</i>	m	1.31	0.00	0.00
	622211021	installation of the contact heat insulation of external walls of polystyrene boards thickness up to 120 mm	m <sup>2</sup>	17.43	642.90	11 206.73
	283759390	<i>board facade polystyrene EPS 70 F 1 000 × 500 × 120 mm</i>	m <sup>2</sup>	9.62	655.76	6 310.03
	622531021	thin silicone grained plaster thickness of 2.0 mm including penetration of the outer walls	m <sup>2</sup>	10.40	642.90	6 685.97
4 + 6	622252001	installation founding skirting of the contact insulation	m	3.07	0.00	0.00
	<u>590516490</u>	<i>skirting Al with clapboard, foundation U 12 cm, 0.95/ 200 cm</i>	m	3.02	0.00	0.00
	622143003	mounting of plaster plastic or galvanized corner profiles with fabric	m	1.05	0.00	0.00
	<u>590514800</u>	<i>Al corner rail 10 × 10 cm with fabric pack. 2.5 m</i>	m	0.67	0.00	0.00
	622143004	mounting of adhesive of plaster lawn profiles (APU rails)	m	0.91	0.00	0.00
	<u>590514760</u>	<i>profile window cleaning cloth – Thermospoj 9 mm / 2.4 m</i>	m	1.31	0.00	0.00

Table 4 cont.

1	2	3	4	5	6	7
	621211001	installation of the contact heat insulation of exterior soffits polystyrene boards thickness up to 40 mm	m <sup>2</sup>	20.13	48.80	982.50
	<u>283763610</u>	<u>extruded polystyrene URSA XPS III – (S. G. NF) – 1.250 × 600 × 30 mm</u>	m <sup>2</sup>	5.70	49.78	283.70
	621531021	thin silicone grained plaster thickness. 2.0 mm including penetration exterior soffits	m <sup>2</sup>	10.88	48.80	530.98
5	622252001	installation of founding skirting of the contact insulation	m	3.07	0.00	0.00
	<u>590516490</u>	<u>skirting Al with clapboard, foundation U 12 cm, 0.95/200 cm</u>	m	<u>3.02</u>	<u>0.00</u>	<u>0.00</u>
	<u>622143003</u>	<u>mounting of plaster plastic or galvanized corner profiles with fabric</u>	m	1.05	0.00	0.00
	<u>590514800</u>	<u>Al corner rail 10 × 10 cm with fabric Pack. 2.5 m</u>	m	<u>0.67</u>	<u>0.00</u>	<u>0.00</u>
	622143004	mounting of adhesive of plaster lawn profiles (APU rails)	m	0.91	0.00	0.00
	<u>590514760</u>	<u>profile window cleaning cloth – Thermospoj 9 mm / 2.4 m</u>	m	<u>1.31</u>	<u>0.00</u>	<u>0.00</u>
7	783113520	oil paints medium steel construction B double and 1 enamel	m <sup>2</sup>	4.33	68.64	297.22
Total/Suma				26 433.33		

\* cw – construction work/robota budowlana.

TABLE 5. Detailed cost calculation of position 7 in cost estimation  
TABELA 5. Kalkulacja szczegółowa pozycji 7 w kosztorysie

Catalogue number Numer katalogu	Works description, list of resources, list of overheads Opis roboty, wykaz surowców, lista narzutów	Measurement unit cw* Jednostka miary cw	Norms Ilość jednostek	Unit prices Cena jednostkowa cw [EUR]	Compounds of unit prices Składniki ceny jednostkowej	Unit price of cw Cena jednostkowa [EUR]
783113520	oil paints medium steel construction B double and 1 enamel – labour [M] = [P] + [O]: • direct wages [P] • craftsman • payments of social and health	w-h/m <sup>2</sup> %	0.191 34	3.62 0.69	0.69 0.24	4.33

	<ul style="list-style-type: none"> <li>• insurance [O] (34 % form [P])</li> <li>– materials [H] = [XC] + [D]: <ul style="list-style-type: none"> <li>• purchase price [NC] <ul style="list-style-type: none"> <li>○ boiled oil paint color on the basic 0840 design O 2004 (9 kg) 5.85</li> <li>○ boiled oil paint color white UNIBAL 1000 O2025 (4 kg) 6.29</li> <li>○ enamel internal oil COLIOL 1000 white about 2 116 (9 kg) 6.48</li> <li>○ thinner oil-synthetic brush to S 6006 1.91</li> <li>○ canvas grinding of artificial corundum type S150 835 mm grain size 150 0.77</li> </ul> </li> <li>• transport of material [D] <ul style="list-style-type: none"> <li>○ boiled oil paint color on the basic 0840 design O 2004 (9 kg) 0.16</li> <li>○ boiled oil paint color white UNIBAL 1000 O2025 (4 kg) 0.17</li> </ul> </li> </ul> </li> </ul>	kg	0.02500	5.85	0.14
		kg	0.22000	6.29	1.38
		kg	0.13000	6.48	0.84
		kg	0.02500	1.91	0.05
		m	0.02800	0.77	0.02
		kg	0.02500	0.16	0.004
		kg	0.22000	0.17	0.04
		kg	0.13000	0.17	0.02
		kg	0.02500	0.15	0.004
		m	0.02800	0.01	0.0004
	<ul style="list-style-type: none"> <li>– machines [S] – not included</li> <li>– other direct costs [T] – not included</li> <li>– overhead costs – production [R<sub>1</sub>] 53% from [P] + [O] + [S] + [T]</li> <li>– overhead costs – administration [R<sub>2</sub>] 30% from [P] + [O] + [S] + [T]</li> <li>– profit [Z] 12% from</li> <li>– [P] + [O] + [S] + [T] + [R<sub>1</sub>] + [R<sub>2</sub>]</li> </ul>	%	53	0.93	0.49
		%	30	0.93	0.28
		%	12	1.70	0.20

\* cw – construction work/robota budowlana.

the way, how to prepare it. This way depends on decision of public investor in the role of submitter or the applicant.

In both cases the investment cost estimate:

- allows to establish the price that the orderer is going to allocate to finance the contract;
- makes it possible to classify the order to an appropriate threshold range, which allows to select correctly the mode of the awarding a contract and to obey the requirements of the Public Procurement Law related to the value of the contract (for example, the significant terms and conditions of the tender, the amount of tendering security and publication of announcements);
- allows to evaluate the completeness and verify the technical basis of the cost estimate, namely, design documentation and specifications for work accomplishment and acceptance;
- facilitates the evaluation of price offers submitted by contractors applying for the contract in a tender procedure.

The differences are caused mainly by the variation in the model studies, which leads to, for example, a distinct viewpoint or a different rank consolidation degree in the cost estimate. Similarly, price calculation for each labour unit reveals the differences in the ways overheads are calculated.

## References

The Act of 29 January 2004 on public procurement (Journal of Laws of 2015, item 2164).

Czaczkowski, W. (2013). Standardization of contractual procedures in contracts for construction works. *Scientific Review – Engineering and Environmental Sciences*, 59, 98-104.

Hanák, T., Korytářová, J., Kozík, R. and Radziszewska-Zielina, E. (2015). *Exploration of Contractor Evaluation Process in the Management of Public Works Contracts*. In Project Management as a Spectrum of Scientific Problems in Engineering and Management. Wrocław, WSOWL, 55-65.

Hromádka, V., Korytářová, J., Vitková, E. and Hanák, T. (2015). *Efficiency and risks of megaprojects in the Czech Republic*. In Advances in Civil Engineering and Building Materials IV. Hong Kong, Taylor and Francis Group, London, UK, 237-241.

Juszczyk, M. and Leśniak, A. (2012). Artificial neural network applications review for cost management in construction projects. *Scientific Review – Engineering and Environmental Sciences*, 55, 55-64.

Law 137/2006 Coll. on public procurement.

Leśniak, A., Plebankiewicz, E. and Zima, K. (2012a). Design and Build Procurement System – Contractor Selection. *Archives of Civil Engineering*, 58 (4), 463-476.

Leśniak, A., Plebankiewicz, E. and Zima, K. (2012b). Cost calculation of building structures and building works in Polish conditions. *Engineering Management Research*, 1 (2), 72-81.

Leśniak, A., Plebankiewicz, E. and Zima, K. (2012c). Wpływ założeń kalkulacyjnych na wynik oszacowania kosztów robót budowlanych. *Czasopismo Techniczne*, 3-B, 75-87.

Plebankiewicz, E. and Leśniak A. (2013). Overhead costs and profit calculation by Polish contractors. *Technological and Economic Development of Economy*, 19 (1), 141-161.

Regulation of the Minister of Infrastructure dated 18 May 2004 on determining the method and basis of preparation of a client's cost estimate, calculation of expected costs of design and expected costs of construction specified in the functional and utility programme (Journal of Laws of 2004, No 130 item 1389).

Schneiderová Heralová, R. (2014). *Life cycle costing in the preparation of public works contracts*. In conference proceedings of

People, Buildings and Environment 2014, an international scientific conference, Kroměříž, Czech Republic, 394-404.

Tichá, A. and Kocourková G. (2014). *Innovative perspectives on the analysis of work in the construction industry*. In conference proceedings of People, Buildings and Environment 2014, an international scientific conference, Kroměříž, Czech Republic, 459-466.

## Summary

**Estimating the value of public construction works in Poland and the Czech Republic.** The article outlines the legislation concerning the methodology of estimating the value of works in Poland and the Czech Republic. In both countries it is necessary for the public investor to respect the law governing public procurement, which defines the structure of compulsory documents needed for the tender documentation, but not directly the way of their preparation. In both countries, though, there exist model proceeding schedules for the calculation of the value of a public procurement for construction works. To illustrate and compare the calculation methods a sample calculation of the procurement value is presented for a selected thermal efficiency improvement project.

## Streszczenie

**Wycena zamówień publicznych na roboty budowlane w Polsce i Republice Czeskiej.** Roboty budowlane są realizowane w dwóch podstawowych systemach. Pierw-

szy to system tradycyjny, gdzie zamawiający rozdziela projektowanie od wykonania (tzw. system Design-Bid-Build). Drugi system to Zaprojektuj i Buduj (Design & Build), gdzie wykonawca zarówno projektuje, jak i zgodnie z własnym projektem realizuje roboty budowlane. W obydwu przypadkach zamawiający publiczny jest zobligowany do wyznaczenia wartości zamówienia zgodnie z obowiązującymi przepisami prawnymi. W artykule przedstawiono porównanie przepisów prawnych dotyczących metodologii szacowania wartości zamówienia na roboty budowlane w Polsce i Czechach. Szczególną uwagę zwrócono na metody stosowane w przypadku zamówień realizowanych w systemie tradycyjnym. Zaprezentowany przykład obliczeniowy pozwala na określenie podobieństw i różnic w sposobach kalkulacji w obydwu krajach.

### Authors' addresses:

Edyta Plebankiewicz, Agnieszka Leśniak  
Politechnika Krakowska  
Instytut Zarządzania w Budownictwie  
i Transporcie  
31-155 Kraków, ul. Warszawska 24, Poland  
e-mail: eplebank@izwbit.pk.edu.pl  
alesniak@izwbit.pk.edu.pl

Vít Hromádka, Eva Vítková,  
Gabriela Kocourková  
Brno University of Technology  
Institute of Structural Economy and Management  
Veveří 331/95, 602 00 Brno, Czech Republic  
e-mail: hromadka.v@fce.vutbr.cz  
vitkova.e@fce.vutbr.cz  
kocourkova.g@fce.vutbr.cz