



World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium 2016,  
WMCAUS 2016

## Pricing in Construction Project Management Performed by the Self-employed

Martin Nový<sup>a,\*</sup>, Jana Nováková<sup>a</sup>, Miroslav Bartoš<sup>a</sup>

<sup>a</sup>*Brno University of Technology, Faculty of Civil Engineering, Institute of Structural Economics and Management,  
Veveří 331/95, 602 00 Brno, Czech Republic*

---

### Abstract

The price is the decisive parameter in evaluating the competition for the implementation of construction works. It's clear and correct determination is an important principle of project management and the basis for success of construction projects. The method of determining the price of the construction work with the aid of so-called 'calculation formula' has been for many decades commonly used in Czech construction industry as a basic tool for pricing. It is based on the situation when the person performing the construction work is an employee of the contractor (within the meaning of the Labour Code). All the items of the calculation formula of particular construction work can be derived from the standards used by a company, costs known in advance (contractual wages, statutory deductions from wages, machinery work, overhead costs) and the intended profit. The situation is different in case of a natural person who works on his/her own, within the meaning of The Trade Licensing Act. Apart from overall costs, part of his/her "wage" (remuneration) must cover the cost of living. In this article, the authors use the principle of retrograde calculation and propose a method whereby a self-employed person is also able to accurately calculate the cost of a construction work. Part of the calculation is also the determination of net income after subtracting all statutory deductions. In the future, the use of the suggested calculation with provability of sub-items can become a tool for increasing competitiveness of the self-employed.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of WMCAUS 2016

**Keywords:** price of construction works; self-employed; retrograde calculation;

---

---

\* Corresponding author. Tel.: +420 541 148 639; fax: +420 541 148 632

*E-mail address:* [novy.m@fce.vutbr.cz](mailto:novy.m@fce.vutbr.cz)

## 1. Introduction

"Pricing, according to some authors, is considered to be the most challenging part of the marketing mix, as it is very difficult to predict how customers and competitors will perceive the set price. Yet pricing decisions directly affect market performance of a company and its profitability. Properly set price is the most effective way a company can maximize its profits and ensure success of the enterprise. Optimal price may contribute to profit growth even more significantly than sales growth." [1]

In general, price is an amount of money for which we exchange required goods or services. There are two possible perspectives on prices –of a buyer (purchaser) or of a seller (supplier). Any supplier can set the price in two different ways. The most widely used method is to increase his/her costs of an additional charge that comprises seller's profit. Such pricing can be further adjusted (increased or decreased) according to market demand or with respect to other competitors. Purchasers evaluate the price (and their ability and willingness to buy) by the degree of satisfaction of their needs with regard to the no essentiality, availability and quality of purchased goods or services.

## 2. Pricing policy and price regulation options in the Czech Republic

In the Czech Republic, there are several legal regulations dealing with prices. The basic regulation is Act no. 526/1990 Coll. on Prices which came into force on 1st January 1991. It applies "to the application, regulation and control of product prices, outputs, works and services (hereinafter referred to as goods) for the domestic market, including prices of imported goods and the prices of goods destined for export" [2]. Ordinance No. 450/2009 Coll., implementing the Act on Prices, includes, inter alia, Appendix no.1 stating a minimum extent of the structure of prices calculation for goods that are subject to price regulation in relation to material conditions, i.e. one type of price regulation:

- „1. Direct material
2. Direct wages
3. Other direct costs
4. Indirect costs  
consisting of: a) Overhead costs  
b) Administrative expenses  
c) Amortisation; or rental for rented property
5. Other costs
6. Profit
7. Total Price" [3]

The decision on the method and scope of price regulation is issued by customs offices (e.g. fixed prices of cigarettes the end consumers), ministries (e.g. the Ministry of Health - on price regulation of health care services, the Ministry of Finance - a list of goods with regulated prices, maximum price of estate that is fully or partially funded from the state budget, etc.), regional authorities (e.g. the maximum price of public transport in a region). Prices of construction works have not been regulated since 1991.

## 3. Government procurements and prices of construction works

Specific indirect price regulation is introduced in Act no. 137/2006 Coll. on Government Procurement [4], processing respective EU regulations. The law regulates the procedures of awarding of contracts for public works. Based on the evaluation of tenders in the tender procedure where the main evaluation criterion is the economic advantageousness or the lowest bid price, the evaluation committee will determine the order of tenderers. Contracting authority concludes a contract with the most successful tenderer, including the offered price. In the Czech Republic, the method of price calculation is not (except for the above-mentioned exception) determined by any obligatory regulation. It is based on "habitual practice and the structure of price calculation always respects the requirements of the contracting authority.

The situation is identical in civil engineering. The result of construction activity - construction work - is always an original product with a high degree of complexity. Objective of construction projects is determined on three levels - specification (implementation), time (deadlines) and costs (price). The method and determination of the price of a construction work is in the market economy subject to the agreement of parties involved, i.e. the investor and the supplier. Price agreement is therefore an essential element of project management of construction projects.

The usual contractual tool in civil engineering is a contract for work defined by the Civil Code (Act No. 89/2012 Coll.). [5] Both parties must agree either on price or on the pricing method. Given that the construction can be quite extensive and expensive, the price of component construction works is set separately. These are set by word description, measuring unit, quantity - number of units, cost per unit (unit price) and the overall price for building construction or work. They are listed in the detailed budget and classified according to the used classification of construction work. Unit prices can be determined by the contractor based on actual costs or he/she can use the prices from the databases created by specialist firms or he/she can research the market. Furthermore, the price of functional buildings has to include the costs of engineering and assembly activities, technology costs, costs associated with the construction placement and other acquisition costs.

#### 4. Unit price of construction work

The unit price of construction work consists of the sum of supplier's entire costs (material, wages, statutory payments, machinery, energy, management and operational costs of the company) and a reasonable profit. To calculate the unit price, so-called "calculation formula" is used, which, in Czech building industry, does not have a unified or obligatory form. The most frequently used version is shown in Fig. 1.

Sample price calculation of construction work (without VAT) performed by an employee		
item	description	data or value
<b>Construction work</b>	type of construction work	
	measuring unit (m.u.)	
<b>Materials</b>	type of material	
	unit price (CZK/m.u. of material)	
	consumption norm (m.u. of material/ m.u. of work)	
	material costs (CZK/m.u. of construction work)	
<b>Profession</b>	type of profession	
	hourly rate (CZK/working hour) (incl. additional charges)	
	consumption norm (hour/m.u. of construction work)	
	labour costs (CZK/m.u. of construction work)	
<b>Salary deductions</b>	insurance rate (%)	
	deductions (CZK/m.u. of construction work)	
<b>Machinery</b>	type of machine	
	operational costs (CZK/hour)	
	consumption norm (hour/m.u. of construction work)	
<b>Other costs</b>	operational costs (CZK/m.u. of construction work)	
	type of the cost	
<b>Overhead</b>	total other costs (CZK/m.u. of construction work)	
	overhead base (CZK)	
	rate (%)	
<b>Profit</b>	total overhead (CZK/m.u. of construction work)	
	profit base (CZK)	
	rate (%)	
	total profit (CZK/m.u. of construction work)	
<b>End price</b>	calculated price (CZK/m.u. of construction work)	
	price coefficient	
	adjusted price	
	invoiced price (CZK/m.u. of construction work)	

Fig. 1: Calculation of the price of construction work (without VAT) performed by an employee.

Individual addends in the formula (rows in the table) represent the material costs, profession costs (worker's wages), statutory deductions from wages (social and health insurance), machinery (operational costs of construction machines and equipment), other costs (e.g. rentals, transportation, tests, licenses), overhead costs (associated with the construction and management of the company, proportionally divided among all items) and profit (surcharge to the costs). Material, profession and machine items and other costs can be repeated as needed. The base of overhead costs consists of the sum of wage costs, operational costs of machinery and other costs. The base of profit is the sum of the overhead base and overhead. The calculated price per measuring unit is the sum of all sub-items. The final (invoiced) price can be further adjusted (increased or decreased) by a coefficient that reflects the market situation. The price is always calculated without value added tax (VAT). The tax is eventually added to the total price in the invoice.

All the items in the calculation formula for particular construction work can be determined by the used norms (norms of consumption), costs known in advance (contractual wages, statutory deductions from wages, working machinery, overheads) and planned profit. The use of contractual wages and statutory deductions proceeds from the situation where the profession performing the construction work is an employee of the supplier (within the meaning of the Labour Code).

### 5. Calculation of construction work performed by self-employed person

The situation is different in case of a natural person who works on his/her own, within the meaning of The Trade Licensing Act. Apart from the overall costs, part of his/her "wage" (remuneration) must cover the cost of living. In this case, it is appropriate to use the principle of retrograde calculation (Fig. 2). Clearly identifiable costs (materials, equipment, and other costs) are step by step subtracted from the end price (e.g. formed by competitive environment); the rest represents proper contribution of profession performance. This contribution is further analysed to determine whether its amount is acceptable and the performance can be realized. Natural person doing business as a self-employed person (hereinafter referred to as SE) therefore can, based on legal requirements and personal preference, model a structure of work costs to determine his/her net cash income.

Sample price calculation of construction work (without VAT) performed by the self-employed		
item	description	data or value
<b>Construction work</b>	type of construction work	
	measuring unit (m.u.)	
<b>End price</b>	invoiced price (CZK/m.u. of construction work)	
	price coefficient	
	calculated price (CZK/m.u. of construction work)	
<b>Material</b>	type of material	
	unit price (CZK/m.u. of material)	
	consumption norm (m.u. of material/ m.u. of work)	
	material cost (CZK/m.u. of construction work)	
<b>Machinery</b>	type of machine	
	operational costs (CZK/hour)	
	consumption norm (hour/m.u. of construction work)	
<b>Other costs</b>	operational costs (CZK/m.u. of construction work)	
	type of cost	
<b>Profession</b>	total other costs (CZK/m.u. of construction work)	
	type of profession	
	hourly rate (CZK/working hour) (incl. additional charges)	
	consumption norm (hour/m.u. of construction work)	
	labour costs (CZK/m.u. of construction work)	

\*) see calculation of hourly rate, insurance and benefits of the self-employed

Fig. 2: Calculation of price of construction work (without VAT) performed by the self-employed.

Fig. 3 shows the procedure of calculating the hourly rate of the self-employed accompanied by a numerical example. The example is based on the status of legislation in force in 2016. A list of incomes and expenses of the self-employed (hereinafter referred to as LIE) is a form issued by the Czech Social Security Administration which every SE has to complete for the previous calendar year, hand in and cover the difference between insurance and total advances reported last year. [6] The list of incomes and expenditures for Health Insurance Company is another form issued by the respective health insurance company. [7] This form also has to be completed, handed in and the balance payment for the last year has to be made. A calculation of new advances for the current year is also part of the forms.

Calculation of hourly rate, insurance and benefits of the self-employed		
<i>(assumptions: self-employment, 12 months in a year, ongoing)</i>		
item	description	value
Primary input data	tax base from the previous year (line 26 LIE) (CZK)	500 000,00
	assessment base from the previous year (line 34 LIE) (CZK)	250 000,00
	estimated tax base for the current year (CZK)	550 000,00
	estimated assessment base for the current year (CZK)	275 000,00
	indirect costs rate (% of estimated tax base for the current year)	10,00
	indirect costs for the current year (CZK)	55 000,00
	sum of the estimated tax base and indirect costs for the current year (CZK)	605 000,00
	estimated working hours per the current year (hour)	2 024,00
Income	estimated working hours per the current month (hour)	169,00
	income per working month (CZK)	50 416,67
Pension insurance	income per working hour = hourly rate (CZK/working hour)	298,91
	monthly advance (line 42 LIE) (CZK) - estimation	6 692,00
Sickness insurance	advance per working hour (CZK/working hour)	39,60
	voluntary monthly insurance (line 43 LIE) (CZK)	480,00
Health insurance	advance per working hour (CZK/working hour)	2,84
	annual health insurance assessment base (line 16 in LIE for health insurance company) - estimation (CZK)	18 562,50
Contribution	advance per working hour (CZK/working hour)	9,17
	before taxation per working hour (hourly rate - all insurances) (CZK/working hour)	247,30
	after taxation 15 % per working hour (CZK/working hour)	210,21
	after taxation 15 % per month (CZK) (excluding tax credits, deductible items and tax benefits)	35 525,00

LIE - list of incomes and expenses

input value

Fig. 3: Calculation of hourly rate and income of the self-employed.

The input data for the calculation:

- The tax base from the previous year out of row 26 of LIE
- The assessment base from the previous year out of row 34 of LIE (50 % out of row 26 of LIE)
- The anticipated tax base for the current year (increased or decreased value out of row 26 of LIE)
- The estimated assessment base for the current year (50 % of the previous row)
- Indirect costs rate (estimated tax base for the current year in percent's)
- Indirect costs for the current year (e.g. personal transport, communication expenses, bookkeeping)
- The estimated working hours per the current year
- The estimated working hours per the current month (value from the last row divided by 12)

Other calculations based on the input data:

- Income per working month (the sum of the expected tax base and indirect costs for the current year divided by 12)
- Income per working hour = hourly rate (the value out of the previous row divided by the anticipated number of working hours of the current month); input data for the table in Fig. 2, profession - hourly rate

SE has to, or rather can use their income to pay pension, sickness and health insurance:

- Monthly advance on pension insurance out of row 42 of LIE (i.e. 29.2 % of the estimated assessment base for the current year)
- Advance on pension per working hour (the value from the previous row divided by the anticipated number of working hours per the current month)
- Monthly voluntary sickness insurance out of row 43 of LIE (not obligatory payment; if needed, the minimum is 2.3 % from 5 000 CZK, i.e. 115 CZK, the maximum is 2.3 % of the assessment base determined for the previous year divided by 12); the amount of paid sickness insurance yields the benefits paid during illness
- Annual assessment base for health insurance out of row 16 in the LIE (13.5 % from half of the expected assessment base for the current year)
- Monthly advance payment for health insurance per working hour (the value from the previous row divided by the anticipated number of working hours of the current month)

Calculated hourly rate (income per working hour) is after rounding used in the price calculation of construction work performed by the self-employed in Fig. 2. SE can use this rate in any subsequent calculation of work that he/she performs until the input conditions change. Therefore, the retrograde calculation becomes, for indeterminate time, a classic aggregate calculation where the total price is a sum of all sub-items.

From the table in Fig. 3, SE can calculate his/her estimated monthly contribution after payment of all insurances and deduction of income tax. It is similar to the net salary of the employee (to cover his/her living expenses) and concurrently the company's profit (to maintain or further develop the business):

- Profit before taxation (hourly rate after the deduction of insurance)
- Contribution after taxation (85 % of the value of the previous row for working hour)
- Contribution after taxation for the working month (the value of the previous row multiplied by the anticipated working hours of the current month); the tax credits, possible deductible items and tax benefits are not included; rounded to the integer

## 6. Conclusion

This article describes the usual price calculation of a construction work used by companies with employees. For the self-employed, a new method is proposed, using the principle of retrograde calculation. A natural person working on his/her own can now calculate the price for the construction work in advance, with respect to all input conditions. Part of the calculation is also the determination of net income after subtracting all statutory deductions, which corresponds to net wage of an employee. In the future, the use of the suggested calculation with provability of well-founded sub-items can become a tool to increase competitiveness of the self-employed in civil engineering.

## References

- [1] Wikipedia. Pricing strategies. 2016. Available at: [https://cs.wikipedia.org/wiki/Tvorba\\_cen](https://cs.wikipedia.org/wiki/Tvorba_cen) (accessed 6 April 2016).
- [2] Collection of Law. Czech Republic. Vol. 86. 1990. 526. Pricing Act. pp. 1946-1951. ISSN 1211-1244.
- [3] Collection of Law. Czech Republic. Vol. 144. 2009. 450. Decree of implementing the pricing act. pp. 7423-7424. ISSN 1211-1244.
- [4] Collection of Law. Czech Republic. Vol. 47. 2006. 137. Public Procurement Act. pp. 1650-1720. ISSN 1211-1244.
- [5] Collection of Law. Czech Republic. Vol. 33. 2012. 89. Civil Code. pp. 1026-1368. ISSN 1211-1244.
- [6] Czech Social Security Administration. Payers. Form. Income and expenditure for 2015, the self-employed. 2016. Available at: <https://portal.cssz.cz/web/portal/tiskopisy-osvc-2015> (accessed 6 April 2016).
- [7] General Health Insurance Company of Czech Republic. Overview self-employed for 2015. 2016. Available at: <https://webevzp.blob.core.windows.net/media/Default/dokumenty/formulare/platci/prehled-osvc-2015.pdf>. (accessed 6 April 2016).