

Contribution of Czech Construction Classification on West-European Construction Market

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Abstract

Czech Republic had centrally planned economy before 1989. During this period detailed classification system was created for industrial production. Structural classifications are still used, more than 14 years after transformation to free-market economy, mainly in the construction sector. In fact these classifications are huge databases containing various information about materials, prices, etc. Databases are currently actualized and ensure well transparent market and competition. They allow comparing prices of construction materials from various manufacturers; this eventuates in final price reduction. Czech system can inspire West European countries. Good example is Denmark, a country with a developed free-market economy. But construction market is controlled by oligopolistic markets structures or cartels even if it is against the law. Old market structures impede the development of the construction industry. An interesting use of these information can be in development of so-called product configuration systems which can be used in quotation of a new building. Establishing of analogical system could help to increase competition on construction market, to reduce prices and to ensure better orientation on market for customers in other countries. Consequence will be higher satisfaction on consumer's side as well as on the side of authorities. The objective of this study is to share advantages of Czech classification system.

Keywords

Classification, Competition, Cost, Database, Price.

1. Introduction

Czech Republic had centrally planned economy before 1989. During this period detailed classification system was created for industrial production. Structural classifications are still used, more than 14 years after transformation to free-market economy, mainly in the construction sector. Such system helps to increase competition on construction market, to reduce prices and to ensure better orientation on market for customers. The objective of this study is to share advantages of Czech classification system. Application of Czech classification in Denmark was chosen for demonstration purposes.

2. Development of Classifications

Private construction companies tried to use different classification systems during the transformation period (when economic system changed from centrally planned economy to free-market economy). Everything from “old times” was deemed as bad. But mostly all construction companies revert to old classifications. Classification system was modernized, adapted and harmonized with West-European classification systems.

2.1 Old Construction Classifications

All old classifications date from planned-market system. They are no longer obligatory, but still used in practice. Thanks transformation mechanism they are compatible with European classification system. Why are they still used? There are two main reasons. Firstly, work under these classifications is very quick and easy. Secondly, the new classifications are not as detailed as the previous ones. The classification system has a huge importance in the construction industry nowadays. The main old construction classifications are:

- **Unified Classification of Structures and Structural Works with Production Characters:** used for final structural production (completed buildings); has 7 codes. Simple example: 803 31 XX characterizes residential houses – common panel flat-houses, with 1-4 storey and without civil facilities, last 2 codes are used for more detailed specification (used materials etc.).
- **Classification of Structural Constructions and Works:** used for construction parts; has 5 codes. System is sorted into 9 classes according to construction process (1. Land Works, 2. Foundations, 3. Vertical Constructions, 4. Horizontal Constructions, 5. Communications, 6. Outside Adjustment, 7. Constructions and Construction Works of Subsidiary Manufacturing, 8. Installations, 9. Other Works and Demolitions). Simple example: 34123 characterizes vertical constructions (3xxxx), walls and partition walls (x4xxx), supporting walls (xx1xx), brick walls and block walls (xxx2x), walls from bricks and profilated bricks (xxxx3).
- **Construction Material Prices Catalogue:** catalogue with prices of construction materials. Contains basic prices, additional purchase costs, list of manufacturers and providers etc.

These classifications provide valuable information about prices, technical parameters, quality parameters, suppliers etc. Construction costs can be counted very quickly and exactly. It's possible to control prices of single materials, construction works or salaries of employees. Investors can see usual market price of material (to avoid the purchase of expensive one); can select the best products according to price / quality criterion, judge transport distance from manufacturer to construction site etc. These can help investors during tendering, also during construction to control costs. Prices invoiced by contractors have to correspond with market prices.

2.2 Classifications in Computers

Old structural classifications were updated. It was necessary to adapt them to pass new requirements (European standards, computer age). Classifications were harmonized to be compatible with European Union classification system. They were computerized, new budget programs were created on their basis. Nowadays several private companies currently update databases of materials and prices. Each construction company has some budget software, but all of them are based on identical software platform. So it's possible to transfer budget from one program into another one. This rules out problems when the investor is using a different budget program than the contractor.

3. Classification's Impact on the Market

Databases are currently actualized, twice a year. Prices reflect the real situation on the market. They allow price comparison of particular construction materials. This helps to reduce total price of construction. Budget program's users can select from various materials the best one according to their requirements (price, quality, technical parameters, and transport distance). This can be made without using internet, telephone or catalogues. Users will save time and money.

Classifications, converted into computer programs, are helpful for many organizations and institutions. They are used by: statistical offices (statistical purposes); local authorities during tendering (control of bids and costs in effective and transparent way); construction companies (cost estimation and cost control), insurance companies (insurance events liquidation), expert's reports etc.

Generally, the biggest impact of classification systems on market is indirect promotion of competition. This promotion is caused by excellent availability of information (about prices, manufacturers etc.). The market is transparent for investors, authorities, construction companies and other participants on market. The problem is, whether institutions use all the advantages of budget programs (given there is willingness to use them, e.g. in public project) or not. It sounds like a great paradox: the classification system from a centrally planned economy is promoting competition on free market!

3.1 Contribution on West-European Construction Market

Czech system could inspire some West European countries. Application of Czech classification in Denmark was chosen for demonstration purposes. Denmark is a country with a developed free-market economy. But construction market is controlled by oligopolistic markets structures or cartels even if it is against the law. Old market structures impede the development of the construction industry. Construction is one of leading industries in country. Nearly one in four workers in the private sector is engaged in construction, production of construction materials, consulting and the operation and maintenance of houses and buildings.

3.1.1 Situation on Danish Construction Market

Although Denmark is a rich and developed country, there are serious problems in the construction sector. Firstly, competition on the construction market is not working. The strongest three companies (Skanska, MT Højgaard and NCC) control Danish construction sector. It is very difficult (almost impossible) to start an innovation process. Companies are held in their market positions due to strong relationships in oligopolistic hierarchy. The domestic construction market is relatively small and non-effective.

Secondly, prices in Danish construction sector are too high. That's a general problem of Denmark, where prices are amongst the highest in Europe. On the other hand, salaries and purchasing power are very high too. Danes pay too much for their houses. Costs in order to build a detached house in Denmark are about 25% higher than normal price in Sweden or Germany. There are more causes to this situation, especially high value added tax (25% in Denmark), high purchasing power or expensive building materials. [See: The Danish Construction Sector – from Tradition to Innovation].

There is absence of information about prices, quality and offer of construction materials on the market. Clients and companies are unable to forecast how much they can require / offer for certain price. The clients find that they do not get enough value for their money, and the contractors find that they have delivered more than required. The completed works should be of maximum value and satisfaction to the clients. The lack of transparency in the price-quality ratio is huge.

3.1.2 Consequences of such Unfavorable Situation in Figures

The negative factors mentioned above have a serious impact on the construction market. Some figures for illustration: Number of employees declined; total construction costs increased 63% from 1987 till 2002 (from this 76% workmanship and 60% building materials). Export is very low – only 2,5% of total production. Contractors cannot compete abroad. Construction products have lost export markets. There is often a wide gap between what the clients believe they can have and what can actually be delivered at a certain price.

3.2 How to Change the Construction Market?

How to motivate progress in the construction industry? Firstly, to set main goals, which have to be reached, as: increase productivity to the level of neighbouring countries; increase export to the level of neighbouring countries; reduce costs to the level of neighbouring countries; enhance transparency of the construction products market; enhance building and construction development and research. These goals can be reached by using the following package of instruments: establishing of public data bank; legislative changes (invite foreign companies on the market), governmental plan for research and development, PPP (Private Public Partnership) pilot projects etc.

Establishing public data bank of prices is one of the most important instruments. Strictly speaking, it is necessary to create a classification system for the construction sector. One big problem is to obtain data from the market (technical parameters, quality parameters, manufacturers, providers, prices and so on). As much as possible information must be included in the classification system. Only in this way the effect on the market will be as extensive as required. Establishing of a public price data bank has to be supported by law. Legal environment must allow easy forming of a public price data bank. All barriers have to be removed. People from Technical University of Denmark started to deal with classification systems for construction industry in 2004. They were interested in Czech system very much.

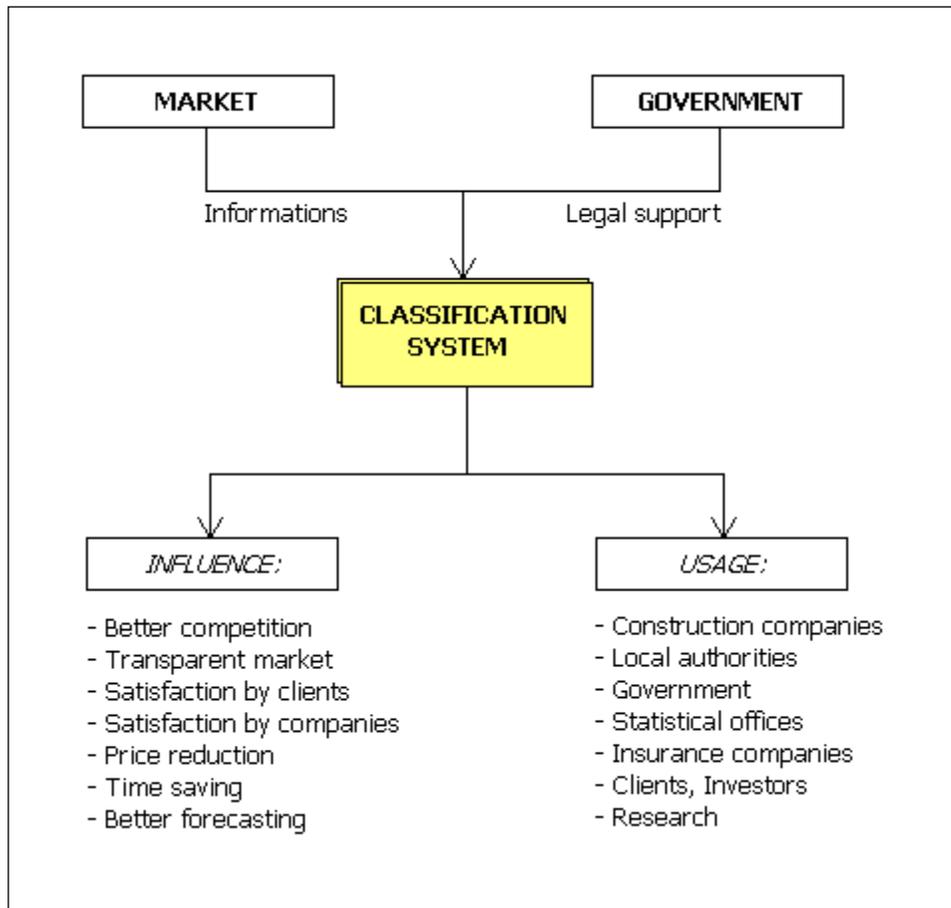


Figure 1: Classification System in Practice

4. Conclusion

The objective of this study was to share the advantages of the Czech classification system. Classification systems aren't saviour by themselves. But classification systems used jointly with other instruments can significantly improve the economic environment, mainly competition, in the construction sector. Such databases can enhance competition on the market, transparency, satisfaction of clients, manufacturers and providers. They will know how much they can require and offer for certain price in particular quality. This results in price reduction, time saving (easy and quick work with system), better investment decision-making, cost control etc. Market is "investigatable from the office" in few minutes.

Generally, the biggest impact of classification systems on the market is indirect promotion of competition. This promotion is caused by excellent availability of information (about prices, manufacturers etc.). Market is transparent for investors, authorities, construction companies and other participants on market.

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The Assessment of the Public Order Tender

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Abstract

The evaluation of economical expediency of the public order tender is in detail described by no legal norm. This paper presents methodology of economical expediency evaluation orders of public procurements by methods of value analysis and cumulative economic criterion.

Keywords

Public order tender, public contract, value analysis, cumulative economic criterion

1. Introduction

The issue of placing public orders and their assessment is carefully monitored by the public not only in the Czech Republic, but also in all the EU states. After the Czech Republic enters EU it will be obliged to respect European regulations, which are currently being created. In 2002 the European Parliament adopted the EU regulation named Common Procurement Vocabulary {CPV}, which the unit classification system is implemented in the sphere of placing public orders in EU with. United terminology exercises in placing public orders by government will contribute to easier determination of the public order subject. It will make possible automatic translation of statements about selection procedure into all EU official languages and transparency of placing public tenders in EU. This market has got the value over 1 000 milliard EUR per year in the whole EU. The use CPV terminology will be obligatory as soon as the EU directive about placing public orders comes into operation. It is supposed the EU directive will also contain the skeleton progress in placing public tenders, their evaluation and choosing. The most important duty of investor in placing public tenders is the decision in choosing the optimal tender. If the selection isn't done right, then every proceeding of competition will be only a waste of taxpayers' money.

Public tenders are one of the main financial sources for most subjects operating on the construction market. Financing sources flow from state, regional and local budgets and also from various funds of international organisations.

In case the investor of public tender is the state the contractor can be almost sure, that the negotiated price will be paid to full extent. Therefore the rules of placing public orders and their evaluation are in the centre of public interest.

In the Czech Republic these rules are given by the Act No. 40/2004 Coll., on Public Contracts since 1st May 2004. It is supposed the evaluation of tenders according to the lowest tender price doesn't concern the expediency of the tender to the full scope.

Economical expediency of the tenders can be judged with methods of the value analysis or the cumulative economic criterion.

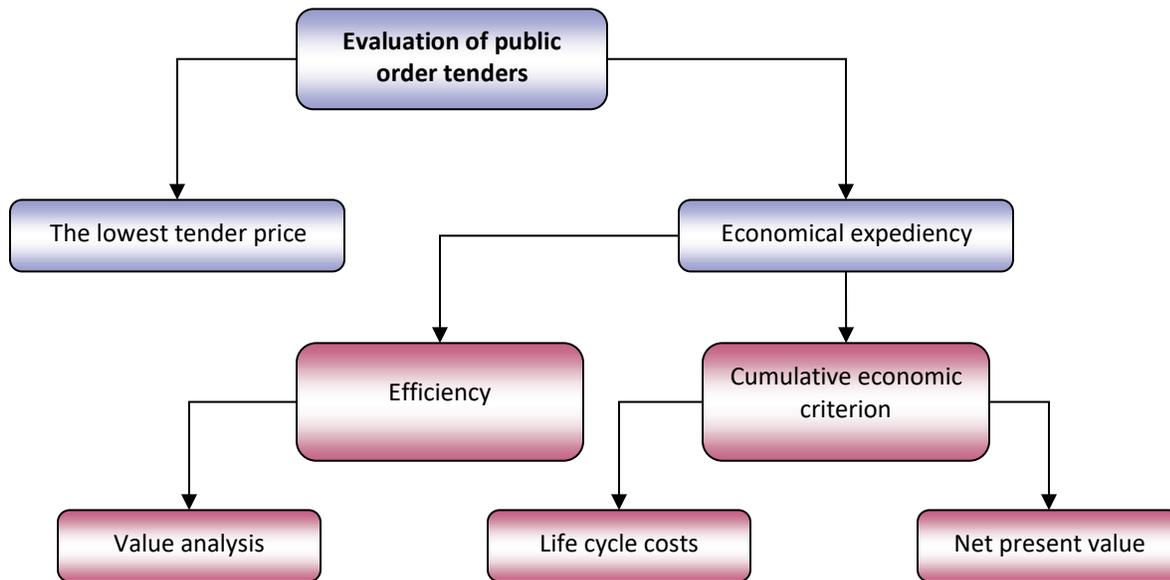


Figure 1: The evaluation of public order tender

2. The determination of tender economical expediency with methods of value analysis

The value analysis describes the subject of the evaluation by criterions, whose values give the possibility to express the total utility of evaluated subject. The efficiency ratio represents utility/tender price ratio.

$$E = \frac{U}{P} \quad (1.)$$

where

E... efficiency
 U... total tender utility
 P... tender price

For each submitted tender it is necessary to set its efficiency and compare with others. The tender with the highest efficiency is considered to be the most profitable. If it's possible to express U in monetary units as P then it's useful to judge each public tender according to the cumulative economic criterion representing both investment and operating costs. If it isn't possible to express U in monetary units then it's suitable to judge each public tender according to the economical expediency and tender utility express with methods of value analysis. From the whole spectrum of methods of value analysis were chosen these, which appear from sight of the evaluation of public tenders as the most suitable. At first it is the Delphi method, which can be applied to choosing and evaluating of each tender criterion. Secondly it is the method of

discriminatory analysis for determination of total tender utility, which corresponds to the demand on the complex evaluation.

2.1 Definition, selection and classification of criterions for the tender evaluation

In the way of the elaboration and evaluation Delphi method proves competent for the phase of criterions' selection of the evaluated public order subject. The own realisation of Delphi method runs by the form of sending round and follow – up evaluation of question blanks filled by experts. The using of Delphi method can have following steps:

1. The evaluated subject determination.
2. The selection of experts.
3. In the first round experts are called upon to the enumeration of partial asked criterions for analysed subject (e.g. architectural, technical, etc.).
4. The work group of value analysis evaluates the data from experts and sorts them under the occurrence frequency of criterions. The work group limits number of these criterions to default number. Selected criterions are sent to same experts in the second round without mentioning the occurrence frequency of individual criterions.
5. In the second round experts are called upon to the order of priority's determination of individual criterions.
6. The work group of value analysis sets with the aid of occurrence frequency the order of priority for the calculation of total utility again.
7. The work group of value analysis creates the matrix of enter data for another decision making and put it to the investor. Enter data are partly exact measurable criterions or criterions, whose value is set with the subjective methods usage.

2.2 The determination of individual tender utility

The discriminatory analysis for the determination of individual tender utility of the public order is especially suitable. In principle it's the determination of deviation between evaluated tenders. For tenders evaluation is necessary to create the basic comparative tender or fictive tender. This one can be set with the worst values of individual criterions so that it's the minimum fictive tender V- or with the best values of individual criterions then it's the maximum fictive tender V+. The differences between comparative tenders represent total discriminatory effects. The deviation of exploring tender from the basic comparative tender we calculate with the mathematic statistical operations usage. It's Ivanovich's deviation (D), which is due to this formula:

$$D = \sum_{i=1}^n \frac{|d_i|}{s_i} \times \prod_{j=1}^{i-1} (1 - c_{ij}) \quad (2.)$$

where

- di... the difference expressive the filling of individual criterions
- si... standard deviation
- cij... correlation coefficient
- n ... number of criterions
- i ... number of matrix rows (number of criterions)
- j ... number of matrix columns (number of tenders)

The calculation of Ivanovich's deviation is practically achieved by sequential matrix series solution, which flow from formula (2). Ivanovich's deviation represents the total tender utility, i.e. $D = U$. Pursuant to

margin of efficiency E of individual tenders it is specified their order. The tender with the highest efficiency is evaluated as the best.

3. The determination of economic efficiency with the total economic criterion usage

3.1 The determination of tender life cycle costs

The calculation method of life cycle costs (LCC) is based upon the present and future costs assessment at the moment of tender evaluation. If costs are judged at the moment of tender evaluation all future costs linked to it must be recalculated for their present value. For recalculating of future costs is used the discount method that is based upon this calculation:

$$PV = \sum_{i=0}^n \frac{C_i}{(1+r)^i} \quad (3.)$$

where

PV... present value of operating costs linked to the tender in CZK
 C... operating costs in each year in CZK
 i... number of years from 0 to n
 r... discount rate

Costs life cycle of the tender are calculated with the formula usage:

$$LCC = PV + P \quad (4.)$$

where

LCC... life cycle costs of the tender in CZK
 P... tender price in CZK

Steps to using of the calculating method of life cycle costs:

- a) costs identification during all life cycle
- b) assessment of costs amount in single years in CZK
- c) calculation of discount costs in CZK
- d) tender life cycle costs calculation

Tenders order is specified on the basis of the lowest life cycle costs.

3.2 The determination of tender net present value

Net present value method (NPV) is used in the case of the evaluating of tenders of incomes. It's based upon the setting the difference between the value of future incomes and the tender price. If tender incomes are judged at the moment of tender evaluation all future incomes linked to it must be recalculated for their present value. For recalculating of future incomes is used the discount method that is based upon this calculation:

$$PV = \sum_{i=0}^n \frac{I_i}{(1+r)^i} \quad (5.)$$

where

PV... present value of future incomes linked to the tender in CZK
 I ... incomes after subtraction of operating costs in each year in CZK
 i ... number of years from 0 to n

r ... discount rate

Net present value is calculated with the formula usage:

$$NPV = PV - P \quad (6.)$$

where

NPV... net present value in CZK

P ... tender price in CZK

Tenders order is specified on the basis of the highest net present value.

4. Conclusion

At present scoring and classification methods are used for the evaluation of public order tenders. The selection of the tender is often based upon the lowest price. The practice of public tenders evaluation shows more complex evaluation methods must be used. In this context the methods of value analysis – Delphi method and discriminatory analysis – for calculation of the utility and methods for total economic criterion assessment are introduced in this paper.

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