

# Public Technological and Price Audit, Design and Survey Work as Part of the Price of Construction Products

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**Abstract—** The article deals with Chapter XII of the Consolidated Estimate of Construction Costs. The analysis of costs for technical and price audit, design and survey works as a part of the price of construction products on objects-representatives on the basis of which the scheme of formation of Chapter XII of the consolidated estimate at the pre-investment stage is offered is made. The cost analysis is aimed at determining the dependence of the cost of the twelfth Chapter of the Consolidated estimated calculation on the total amount of capital investments in the construction of the object. The obtained indicators for the objects of housing and civil construction will allow to generate with sufficient accuracy the costs of public technological and price audit, design and survey work at the stage of initial formation of the total amount of investment required for the project implementation. The authors consider the methods of formation of the cost of design and survey works, the cost of examination of project documentation, identified the main disadvantages of the methods used and the directions of optimization of the obtained indicators. Based on the analysis of methods, the costs included in Chapter 12 of the Consolidated estimated calculation of the cost of construction for housing and civil facilities were determined and optimized.

**Keywords—** *Consolidated estimate, cost of design, examination of project documentation.*

## I. INTRODUCTION

When designing construction projects, price optimizations are crucial and certainly affect the return on investments. However, accurate estimate of the investment requirements might be quite difficult at the onset of the investment process. This applies to associated construction costs, while the cost of construction and installation work can be calculated per various procedures with varying accuracy depending on the investor's decision [1, 14]. All the associated costs are accounted for in the summary estimate of construction costs in twelve chapters; Chapter One "Site Development" and Chapter Twelve "Public Technological and Pricing Audit, Design and Survey Work" deserve special attention.

## II. RELEVANCE

The limit on assets required for estimating the costs of carrying out design and survey work, public and pricing audits is calculated in Chapter XII of the summary estimate [2]. The

scope of work and its costs are pertaining to the following classification.

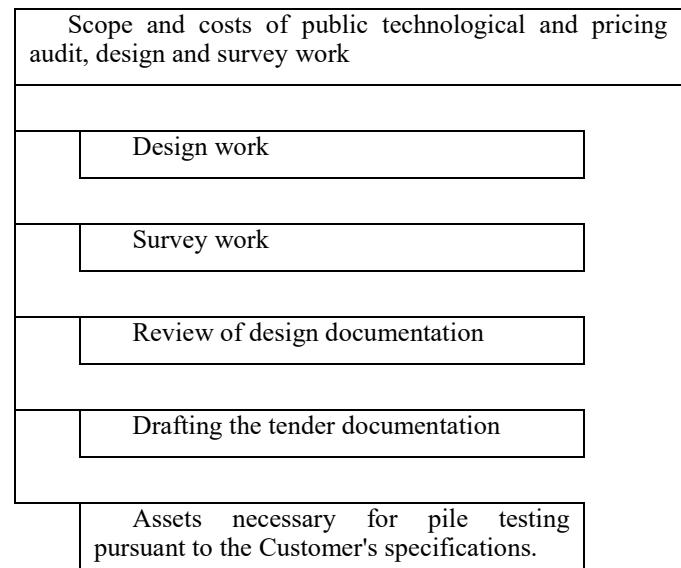


Figure 1. Scope of work and costs per Chapter XII of the summary estimate.

When writing Chapter XII of the summary estimate at a pre-investment step, a number of difficulties arise including the appraisal of design costs [12, 13] design-documentation review costs. These costs are not yet final, as there are no design and survey contracts in place. In fact, these costs are not accounted for in the initial estimates of investment requirements, which distorts the perceived project efficiency.

Due to this, such costs have to be roughly estimated at the pre-investment stage to improve the accuracy of business plans.

## III. STATEMENT OF PROBLEM

The today's regulatory framework used in design appraisals (СБЦ-01) is based on obsolete and unsubstantiated design deadlines that neglect the innovativeness of design

products [3]. Analysis of the results we have obtained shows that IT developments in construction; the emergence of innovative, versatile, cost-efficient and technically advantageous construction materials, products, and structures; architectural improvements in residential construction; and the emergence of software of computer-aided design have led to a situation where the use of regulatory frameworks for basic pricing is not indicative of the real design costs [4, 5, 6, 7, 8, 9].

Design-documentation review costs are estimated on the basis of the Russian Governmental Decree dd. March 5th, 2007 No. 145 (rev. dd. December 10, 2014) State Expert Reviewing of Design Documentation and Engineering Survey Results. Calculations require precise land area size within the building line as well as within the residential building's total area. However, some of these variables may not be accurate or even known at all at the pre-investment stage.

The authors hereof propose estimating the design-documentation review costs as a function of the construction estimate, which in its turn can be based on the reference construction costs [10].

#### IV. THEORY

We have reviewed design product appraisal methods [3,4,5,10] to propose a flow chart for design appraisal, see Figure 2.

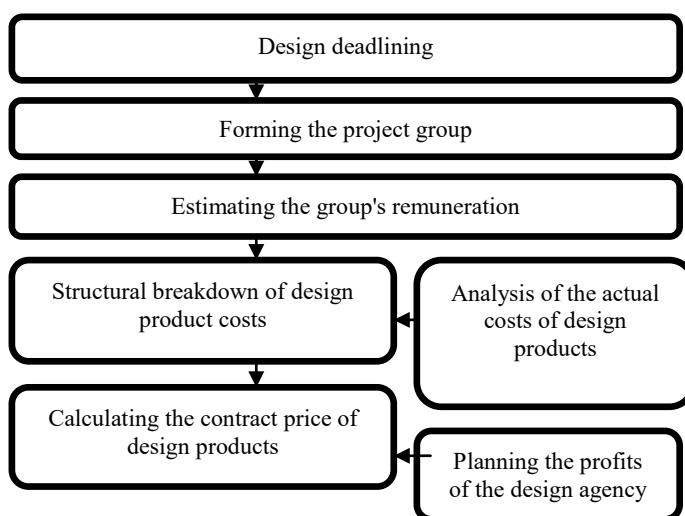


Figure 2. Flow-chart for design-product appraisal

This appraisal is based on analyzing the design-product costs breakdown. The authors have analyzed the actual costs of products (services) of Irkutsk-based design agencies over 2015–2017. To that end, the city's design agencies were classified into four groups: large, medium-sized, small, and micro-enterprises (in terms of revenue). Table 1 presents the review results.

Table 1. Average remuneration as percentage of costs

Representing companies	Remuneration costs, %			Average, %
	2015	2016	2017	
Large enterprises	56.9	52.7	43.0	50.86
Medium-sized enterprises	48.6	54.9	55.6	53.0
Small businesses	53.1	55.8	50.6	53.16
Microenterprises	55.9	56.5	56.0	56.13

Pursuant to the Russian Governmental Decree dd. March 5th, 2007 No. 145 (rev. dd. December 10, 2014), design documentation and survey work products are reviewed in two stages. Survey work is reviewed first, and design documentation is reviewed thereafter. The authors have made stage-specific appraisals for sites in Irkutsk.

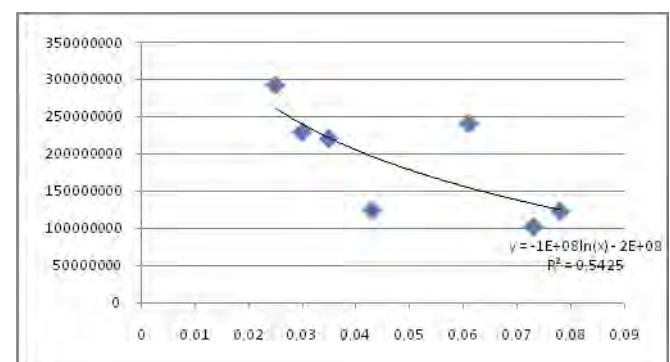


Figure 3. Survey-work review costs as percentage of the estimated construction costs.

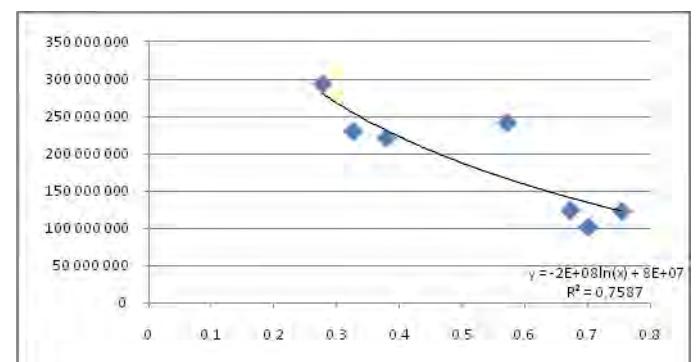


Figure 4. Design-documentation review costs as percentage of the estimated construction costs.

## V. CONCLUSIONS

The authors have used their research efforts to propose a method for generating the costs for Chapter XII of the Consolidate Estimate at the pre-investment stage; this Chapter mentions design and survey work costs as well as design reviewing costs. For design-work appraisal, we herein propose a flow chart based on the design costs breakdown as shown above. Design review is appraised in percent of the main site costs. To calculate such percentage, we use polynomial approximation.

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