

Performance Audit in Construction Organisations: Relevant Criteria and Analytical Procedures

Bibigul Amanzholova

Doctor of Science in Economics, Head of Department of Audit, Accounting and Finance

[ORCID](#)

E-mail: amanzholova@corp.nstu.ru

Novosibirsk State Technical University, Novosibirsk, Russia

Viktoriya Karakchieva

Candidate of Sciences in Philology, Associate Professor

[ORCID](#)

E-mail: karakchieva@corp.nstu.ru

Department of Foreign Languages, Novosibirsk State Technical University, Novosibirsk, Russia

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Abstract

Performance audit is becoming increasingly ubiquitous in commercial and business spheres internationally. Due to its important role in promoting efficient organisational and administrative practices, performance audit is becoming a subject more rigorously analysed in the academic sphere.

This study seeks to develop and test analytical tools of performance audit in Russian construction organisations. We place emphasis on the industry-specific dimensions of information disclosure. We intend to offer a solution to several crucial challenges in the field, which will allow for the development of a comprehensive method to implement analytical procedures. This is done with a view towards obtaining and collating sufficient and adequate audit evidence to help achieve business goals.

In order to devise a consistent methodology, first, a link is highlighted between construction industry constraints and performance audit criteria. Second, an algorithm is developed to carry out comparative integrated estimation of performance audit criteria in order to shortlist relevant indicators. Third, the algorithm is tested using financial reporting of selected construction companies, which makes it possible to build a consistent system of performance audit criteria and identify a reliable set of controlled parameters.

A profile of practical analytical procedures, performance audit criteria and measurement indicators is formed through financial and performance audit and imbedded statistical methods. Implementing this approach will be seen to close some information gaps commonly found in the reporting data of construction industry, as it links the subject area of performance audit and the objective criteria of effectiveness, efficiency and economy.

The findings are presented with reference to existing statistical surveys on construction industry constraints. While recent studies provide a broader picture across construction industry, they do not address its regional aspects. As such, within this study we have carried out estimates of performance indicators for construction companies operating in the Novosibirsk region. The estimates are based on the information available through Professional Market and Company Analysis System. As a result, a system of performance audit criteria is identified in relation to the dimensions of effectiveness, efficiency and economy and a framework of controlled parameters is shaped. The level of disclosure concerning these parameters presented in a company's reporting is supposed to determine the decisions of stakeholders and potential investors.

In consideration of further research, this study highlights that it is necessary to identify and validate performance criteria in view of the fact that only few construction companies are profitable. The mix of qualitative and quantitative analytical procedures demonstrated herein is an effective approach to address the challenges of information integrity assessment. We consider that the most promising aspect of this study is the analysis of how the quality and amount of information disclosed in the reporting of construction companies affects their public image and business activities. This can be seen to have widespread industry and academic applications. Additionally, our approach represents a suitable framework for possible adaptation towards not only other industries, but also further development of the methodological approach itself.

Keywords: performance audit, effectiveness, efficiency, economy, construction organisations, statistical methods, analytical procedures, tax burden, cost of goods, material returns

JEL classification: G32, M42, P17

Introduction

The role of auditing as an institutional mainstay and a business practice is evolving in line with economic, political and technological dynamics. Today, the idea of auditing is treated in a broad social context, at least in the context of social responsibility. Audit functions are no longer confined to only economic problems of a business. Rather, auditing is expected to ensure public confidence in the information presented in various types of reporting. A significant strand in the research literature emphasises that contemporary audit practices tend to go beyond the conventional framework of monitoring and analysis and focus on forecasting and developing recommendations.

We should take into consideration that current audit activities are carried against a business and socio-cultural backdrop which has been radically reshaped by technological development. In this technologically driven environment, traditional audit skills are no longer sufficient, and in this new context, the factors that influence audit effectiveness need consideration [1]. On the other hand, we can witness the growing availability of audit support systems [2] that may send erroneous signals that audit procedures are available to casual users. Researchers also point out that a pervasive feature of the current audit environment is multitasking, which they see as a cause of impaired performance in auditing [3]. In this context, it is particularly important to develop adequate methods of selecting from and interpreting massive amounts of information. These methods should be customised to concrete purposes in order to overcome the restrictions of standard audit support systems. Research literature provides examples of methods and analytical procedures developed to meet specific needs of audit entities [4]. Another prominent factor is technology integration in the auditing process. Since auditors tend to increasingly rely on restricting audit support systems, this adversely hinders the variety of thought in audit and leads to a stagnation in the evolution of better practices [2]. From this perspective, we consider any discussion around analytical procedures and methods in audit as a contribution towards resisting this negative tendency.

Performance audit is a system of controls that is carried out by regulators through analytical review activities to allow for reasonable conclusions as to whether the recipients of financial resources utilise them properly. Nevertheless, the question is still open as to which performance audit criteria should be selected as a reference against which the evidence is evaluated, classified and categorised.

Part of the problem lies in underdeveloped accounting information systems which restrict the implementation of performance audit procedures, as well as some industry-specific factors that influence criteria selection and evidence interpretation. The cases we have explored show that to provide a comprehensive assessment of company performance, researchers use both accounting (ROA, ROE) and market-based indicators, such as Tobins Q [5, 6].

However, in the case of the Russian construction industry this approach is unacceptable because of the limited information available.

This seems to be inconsistent with growing information transparency and easier access to information, which are considered as prominent features of the current technologically driven environment. We should note that digitalisation only provides opportunities, and does not guarantee a sufficient level of information disclosure. Researchers have shown that corporate disclosure behaviour depends on many contextual and institutional factors such as economic development, legislation, sophisticated financial markets, as well as firm-level variables such as corporate governance and ownership structure [7].

As our observations show, Russian construction companies tend to publish only accounting, tax and statistical reporting. These kinds of reporting include mostly quantitative data, which restricts the capacity of performance auditing. The reported data from construction companies provides only a minimum of mandatory information to be disclosed in accordance with the legislation. Moreover, this reporting is formed retrospectively. This leads to the scarcity of information needed for balanced decision-making, as well as its low relevance from the perspective of current economic, social and technological requirements and standards.

For any national economy, a construction industry is vitally important, as it raises funds from both governments and private investors, and, most importantly, it greatly contributes to the social and economic development of the country. This serves to emphasise the importance of performance audit procedures in the Russian construction industry. However, there is a gap in theoretical and applied research on performance audit tools adjusted to accounting and reporting practices in construction organisations.

A baseline study of the construction industry enables us to reveal the most prominent constraints that hold back the performance of construction entities and subsequently shortlist the factors that shape the parameters of performance audit tools implementation.

Today, we have to state that the Russian construction industry is descending into deeper crisis. This conclusion is in line with the findings of RABC (The Rating Agency of Building Complex, Russia) that highlights the following crisis indicators: reduction of government contracts, significant decline of the amount of real estate developed, increasing arrears periods, and bankruptcy. According to analysts, the core of this recession is to be found in customers' insolvency as well as their financial uncertainty from a mid-term perspective. This has a direct impact on the developers' results and financial sustainability.

We should emphasise here that the customers' uncertainty comes not only from their insolvency, but also, to larger extent, their distrust of real estate developers and other fund-raisers. Therefore, neither the investment attractiveness of construction projects nor government efforts to

promote mortgaging alone can combat the crisis. In this context, we appreciate the initiative of the Head of the Ministry of Construction to improve information transparency of developers and establish mandatory requirements to their information disclosures in terms of fairness and completeness. This puts the spotlight on performance audit, since, we strongly believe, this discipline is capable of providing a comprehensive solution to the problem of information quality with a view to providing an adequate evaluation of construction organisations' performance.

Construction industry trends

To gain a greater insight into Russian construction industry considerations, we now refer to official statistics [8]. For some time past, the industry has exhibited a marked slowdown. A slight growth of business in immediate post-crisis period (2010–2014) was followed by a steady decrease (Figure 1).

Figure 1. Trends for the volume of work performed by the economic activity “Construction” in Russia (percentage) in terms of price comparison to the previous year (2006–2015)

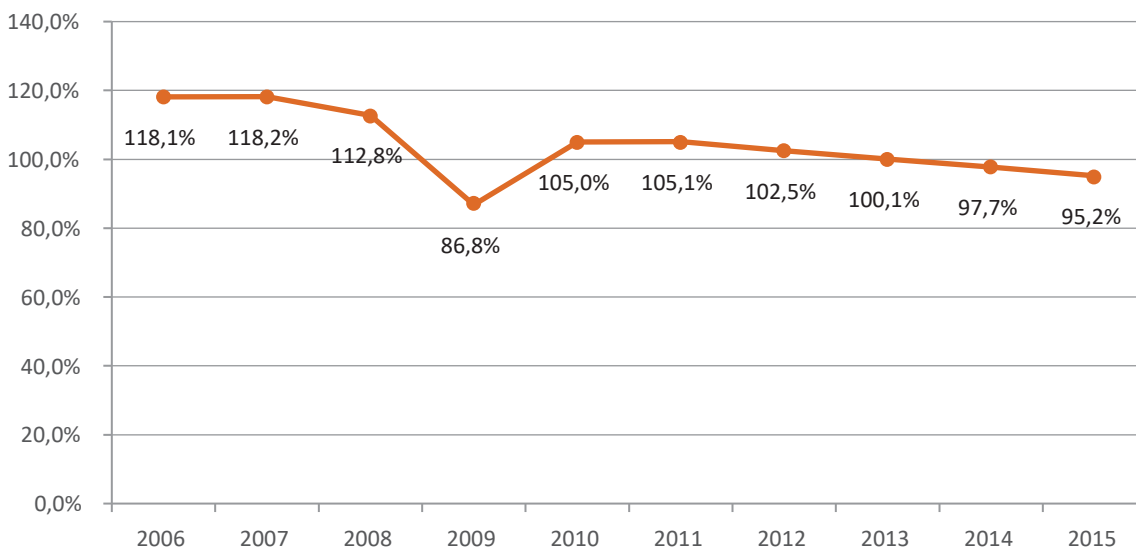
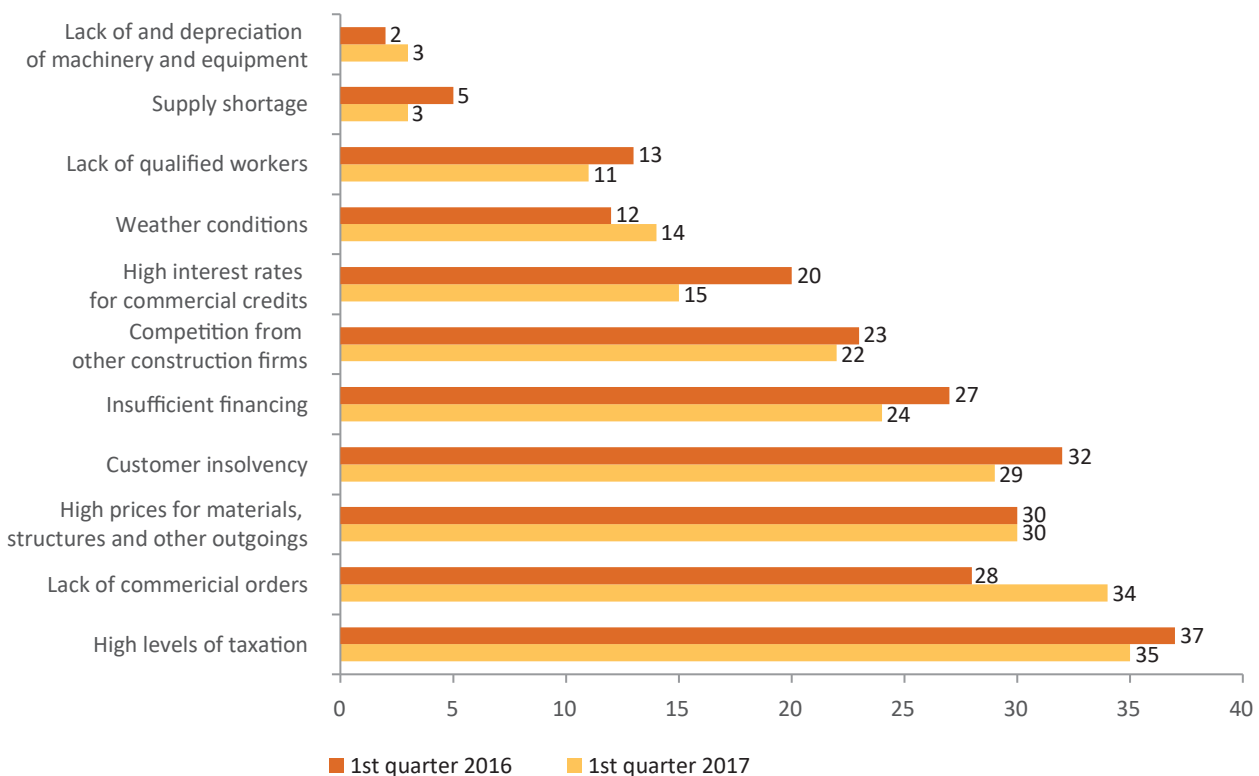


Figure 2. Construction industry constraints (response rate, %) [9]



A number of constraints that hamper the development of the construction industry. The Russian Federal State Statistics Service (Rosstat) conducts sampling monitoring of construction organisations, collecting quarterly feedback and expert estimates from people involved in the construction business. This allows for identifying key negative factors to stiffen construction industry from the perspective of the professional community (Figure 2).

The feedback from the respondents is in line with the data illustrating construction industry trends (Figure 3). Most prominent are such trends as the progressive growth of overdue accounts receivable, lengthy default periods, and the practically uninterrupted growth of fully depreciated manufacturing facilities. Other indicators in the 'red zone' concern the growing amount of bank loans in arrears. For example, at the end of 2013 overdue bank loans in construction industry totaled 7182 million roubles, in 2014 this increased six-fold and reached 49 936 million roubles. Statistics reveal that in 2015 the amount of overdue bank loans was as much as 54 434 million roubles.

The effect of industry development factors on individual enterprise performance

The pattern of factors listed above shaped the idea of implementing performance audit tools in the construction industry. The case is that the impact of these factors on the performance of construction companies seems evident as long as it is considered *per se*. However, if we

have a closer look at the performance criteria, the nature of their impact becomes far more ambiguous. Consider the factor 'Lack and depreciation of machines and equipment'. We cannot clearly categorise it as a negative factor influencing either effectiveness or economy.

Among the most relevant construction industry constraints, we can count the following:

- high level of taxation;
- high prices for materials, structures and articles;
- high interest for commercial credit;
- lack and depreciation of machines and equipment.

To provide a rationale for performance audit criteria patterns to be utilised in the construction industry, we have investigated how these criteria influence enterprise performance. The first significant factor is tax burden that shows the amount of resources a company has to divert to its taxation duties.

As we have mentioned above, construction business professionals see a high taxation rate as the most significant constraint. This means that the behaviour of high taxation factor needs further thorough consideration. Different ratios are used as indicators measuring tax burden, such as tax payable totals in relation to revenue, other earnings, and profit. Figure 4 shows the historical tax burden calculated by the method adopted by Federal Tax Statistics Service of Russia.

Figure 3. Trends for business indicators of Russian construction organisations (2007–2015) – authors' calculations

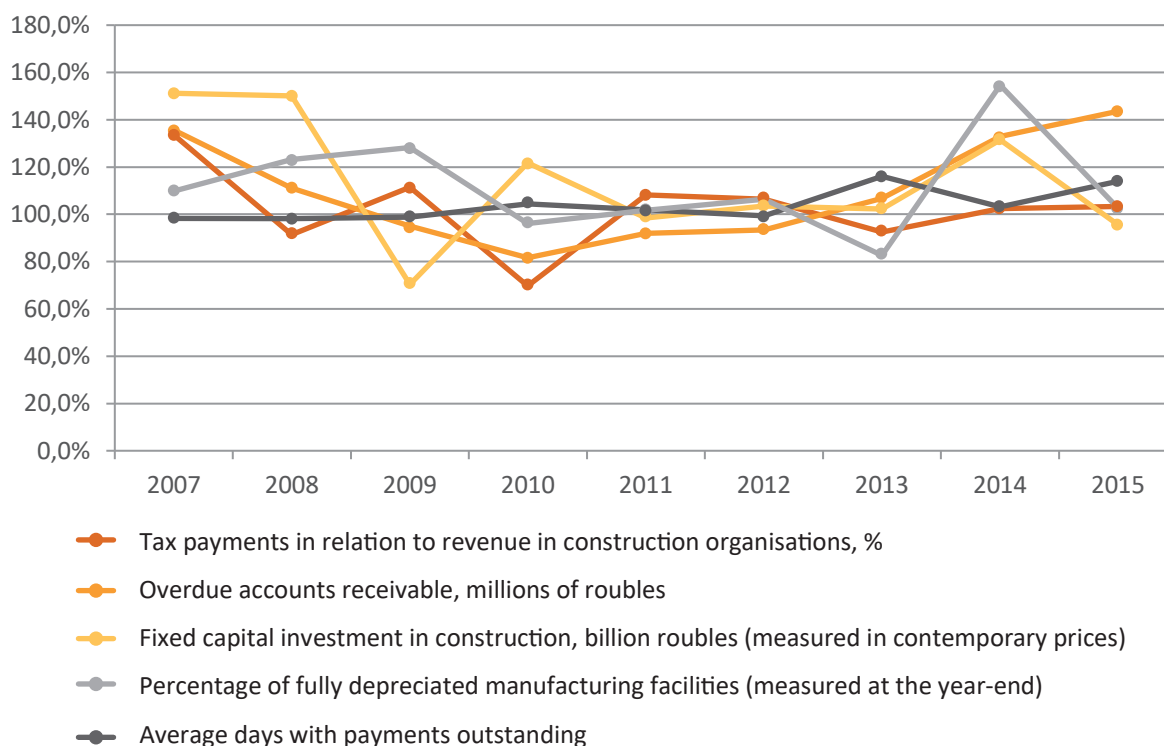


Figure 4. Tax burden in Russian construction industry, 2015–2016, percentage [10]

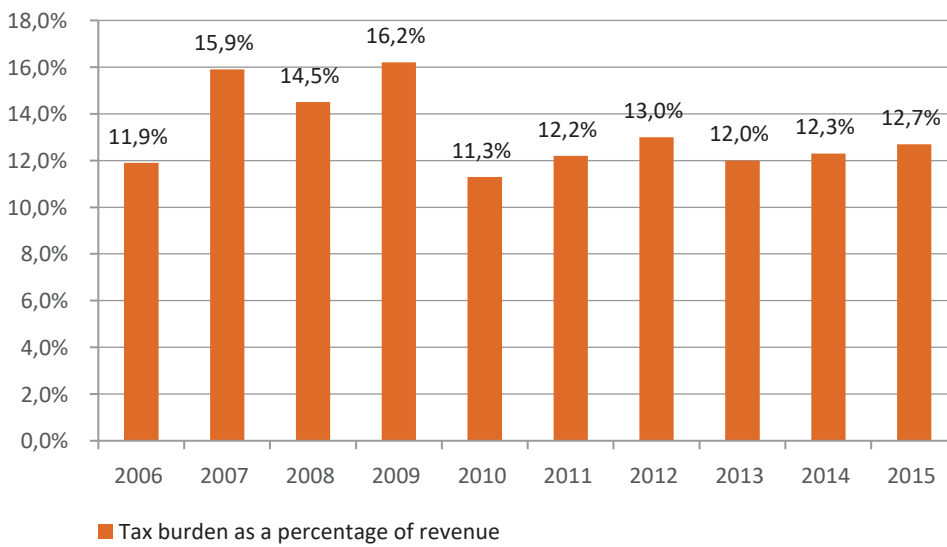
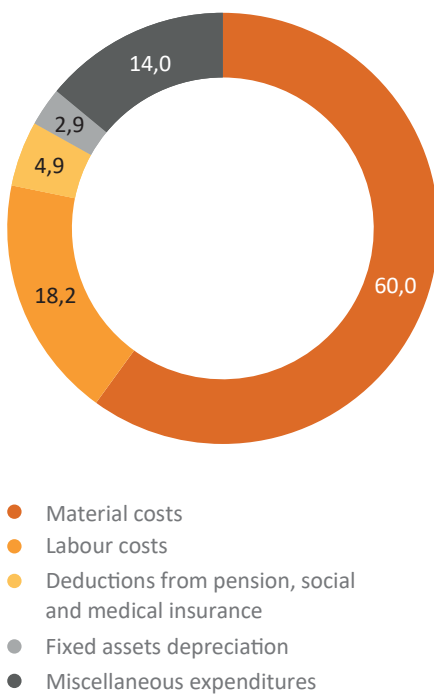


Figure 5. Construction works cost pattern in the Russian Federation, for 2015 (valued at actual costs) [11]



Thus, the pattern of controlled parameters enabling us to identify performance audit criteria should include profit, sales revenue, other earnings, and tax payable total.

Another constraint is high prices for materials, structures and articles. The power of this factor stems from the fact that construction industry is labour and material intensive. Figure 5 shows construction works cost pattern. Material costs account for more than 50% of estimated construction budget. This emphasises the importance of thorough monitoring of the procurement and depreciation of construction materials that should take into account their specific characteristics and feasibility.

To measure the impact of material costs on the performance of construction organisations, we suggest using the

ratios of material returns and costing to sales revenue as the elements of performance audit criteria.

Construction investment is decreasing. The first quarter of 2014 saw a slowdown of business activities within the industry. The demand for construction contracts shrank and the financial standing of developers deteriorated, not least due to the inflation. One obstacle to investment activity in the industry is high interest for commercial credits. Its significance is proven by the increasing amount of unsettled bank loans and other borrowings of companies in construction industry. The two indicators to measure this factor’s impact are borrowed funds turnover and returns on debt. Every year Rosstat summarises the condition of the country’s construction machinery fleet, where it repeatedly states that construction organisations face a reduction of their current machinery fleet and a growth of machinery with an expired service life [12]. It is important to note that the proportion of foreign manufactured machinery is substantial.

To measure the impact of ‘Lack and depreciation of machines and equipment’ on company performance, it makes sense to use such indicators as fixed assets turnover and returns on fixed assets.

To provide an overall assessment of business processes in the construction industry in terms of economy, we introduce elasticity coefficients where the numerator shows the changing value of costs (resources), and the denominator indicates the change in revenue within comparison periods. Given the economy criteria are met, the growth rate of the nominator will be smaller than that of the denominator. Economy is measured in terms of savings or overruns of resources utilised against actual outcome. Audit practices measure economy using ‘performance to plan’ indicators that consider changes in different resources (factors) against outcomes. So overrun/saving measuring methods involve the information provided by plans, budgets and estimates. We think that this information can be expanded to include effectiveness and efficiency

assessment as well. Our approach is aimed at establishing the comparability of performance assessment for different construction companies over time. That is why our approach involves the relations of changing factors and revenue.

To measure the performance of construction companies and lay the grounds for their development, we need a comprehensive approach that would enable us to evaluate the contribution of the key factors under consideration. A comprehensive solution is provided by performance audit procedures, as they provide relevant accounting and analytical information that enables users (including the public) to determine how well a company is performing by comparing its results to priority objectives in compliance with the costs and quality of resources consumed. However, prior investigations into fundamental and practical issues of auditing performance confined it only to the public sector of the economy. In today's resource-constraint environment, it is necessary to broaden its applicability and expand it to account for the private sector, including private enterprises in construction industry.

As we mentioned above, an advantage of performance auditing is a comprehensive evaluation in terms of *effectiveness*, *efficiency* and *economy*. The glossary of basic terms compiled by Accounts Chamber of the Russian Federation defines these terms as follows:

- 1) The efficiency of public spending is a relation between the outcomes (product, services and other) produced by public funds recipient and the input of material, financial, and labour resources used to deliver those outcomes.
- 2) The effectiveness of public spending – the extent to which actual outcomes delivered by a public funds recipient match the planned objectives.
- 3) The economy of public spending attains the recipient's planned objectives at minimum costs or achieving best results within the planned budget [13].

For performance criteria, auditors may take numerous quality and quantity metrics that characterise the subject matter of audit in terms of its organisation, processes, results and/or business activities to provide evidence that enables to assess how reasonably public funds are utilised.

In the practice of performance audit, criteria patterns may vary in compliance with the audit subject matter and the nature of business under consideration. The main requirement is that the criteria pattern be sufficient for making reasonable conclusions, in line with the objectives of auditing procedures utilised [14].

Therefore, it is possible to make a connection between performance audit criteria and the industry-specific constraints in the construction industry as described above (Table 1).

Table 1. Linkage between performance audit criteria and construction industry constraints

Constraints	Performance audit criteria		
	efficiency	effectiveness	economy
High level of taxation	Tax burden in relation to revenue	Tax burden in relation to profit	Tax elasticity in relation to revenue
High prices for materials, structures, articles	Cost to sales revenue	Material returns	Elasticity of price of goods in relation to revenue
High interest for commercial credits	Borrowed funds turnover	Returns on debts	Elasticity of borrowed capital in relation to revenue
Lack and depreciation of machines and equipment	Fixed assets turnover; Capital / output ratio	Returns on fixed assets	Elasticity of equity in relation to revenue

This system is directed towards the overall goal of improving the relevant performance indicators selected as audit criteria. It will allow for comprehensive control over performance factors, and thus foster excellence of management and workforce performance in construction organisations. To fulfil this task, we suggest a comprehensive analysis using the integral estimation method.

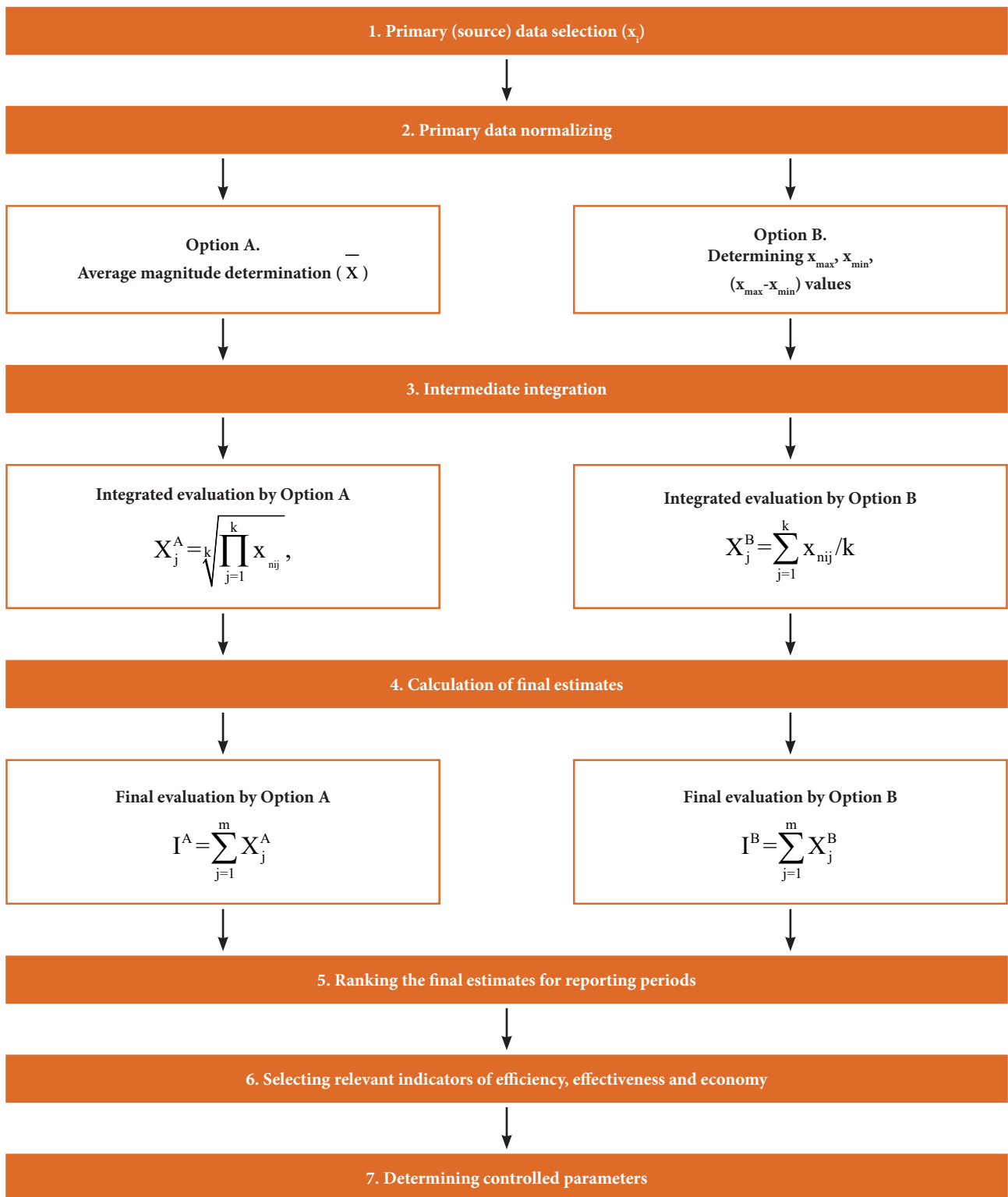
Applying integral estimation method to audit criteria

The integral estimation method is based on an approach to integrated indicators that is commonly used with complex and multidimensional social and economic phenomena. The baseline indicators are first converted and then convolved to form an aggregate multivariable estimate.

A similar approach involves using integrated indicators developed by a number of international organisations, for example, the Human Development Index suggested in UN Development Program [15]. Generally, the algorithms of obtaining integrated indices are very similar in all methods and follow the same sequence:

- selection of baseline indices (x_i) – primary data describing the phenomenon under study;
- primary data normalising – reducing to one value by the method of average, relative difference and other methods;
- integration of normalised data (x_n) by convolving interim metrics calculated through either multiplicative or additive methods.

Figure 6. Algorithm of comparative integrated evaluation of performance audit criteria



These steps may involve a wide range of normalising and integration procedures. We used the most appropriate procedures individually, as well as a mix of several procedures.

For example, for primary data normalising the following procedures were used:

1. *Normalising by the method of average.* A working method of data unification (x_n) is the comparison of individual values of every index (x_i) against the actual total average.

$$x_n = \frac{x_i}{x} \quad (1)$$

The exceedance of an index being assessed as a negative trend, normalising is calculated in reverse:

$$x_n = \frac{\bar{x}}{x_i} \quad (2)$$

2. *Normalising by range of actual values deviation.* Baseline data (x_i) are unified by comparison against the minimum (x_{\min}) and maximum (x_{\max}) values of the indicator.

$$x_n = \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \quad (3)$$

This integrated assessment procedure is known as the method of relevance difference [10]. For the indices describing negative trends, the normalising formula will be constructed as follows:

$$x_n = 1 - \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \quad (4)$$

The existing methods may differ in their ways of data harmonising to a single integrated magnitude, i.e. obtaining finite or intermediate values of an integrated indicator. For this purpose, power mean formulae are widely used. Some methods encapsulate the stage of weight indicators rating with follow-up procedures such as assessment of various experts' opinions. These methods utilise the weighted arithmetical mean that will average out the values of standardised indicators.

To form a list of integral indicators for construction industry constraints, we can use two options: (A) and (B) to investigate their comparability.

Option A involves normalising indicators' values by comparing them against the average magnitude, with the geometrical mean being used in intermediate integrating procedures:

$$X_j = \sqrt[k]{\prod_{i=1}^k x_{mi}}, \quad (5)$$

where X_j is the intermediate integrated indicator for a separate set of conditions j ;

k is the number of indicators describing the set of conditions j .

Option B involves normalising individual indicators by the relative difference method. Intermediate integrating is completed with the arithmetical mean.

The option selected for indicators normalisation will also influence further procedures of data integrating. In case that the normalised values are presented as relative deviations from the mean or minimum value and then further averaged (Options A and B), the finite aggregate can be calculated as an average magnitude.

It is then feasible to rank the consolidated aggregates on an annual basis, and select the most significant effectiveness and efficiency indicators. This is achieved by choosing the best year for each organisation and comparing effectiveness and efficiency indicators obtained by both methods.

The step-by-step sequence of the comparative integrated assessment method is summarised in the flow-chart (Figure 6).

Thus, the comparative assessment method of performance audit criteria allows for a serious improvement of the auditor's analytical tools. Firstly, it suggests reasonable selection procedures for efficiency, effectiveness and economic indicators, which provides representative evidence for the auditor's findings. Secondly, the method can be used to rate the industry players and so it provides the basis on which to compare performance criteria of the auditee against those of its competitors. Thirdly, relevant indicators allow for the building up of a consolidated framework of controlled parameters whose behaviour can be described by means of factor analysis to work out relevant recommendations.

Using the comparative integral assessment method to review the performance criteria of construction organisations in Novosibirsk region

To identify the relevant performance criteria which provide a fair view of construction organisations' performance in terms of their effectiveness, efficiency and economy, we used available information on financial and operational activities of sixteen construction organisations operating in the Novosibirsk region. To calculate performance indicators, we used accounting (financial) reporting from the same sample. The estimates were calculated with reference to the information provided by Professional Market and Company Analysis System (SPARK).

The examined data showed that ten companies under consideration were in the red zone (suffering net losses) throughout several years, so only six organisations could be shortlisted. Their profit trends are illustrated below (Figure 7).

As the graph shows, the companies numbered as 1 and 14 earned the highest net profit, the best year for both of them being 2013.

Consider the revenue trends shown in Figure 8.

Figure 7. Net profit trends for six construction organisations operating in Novosibirsk Region selected from the sample of 2010–2014

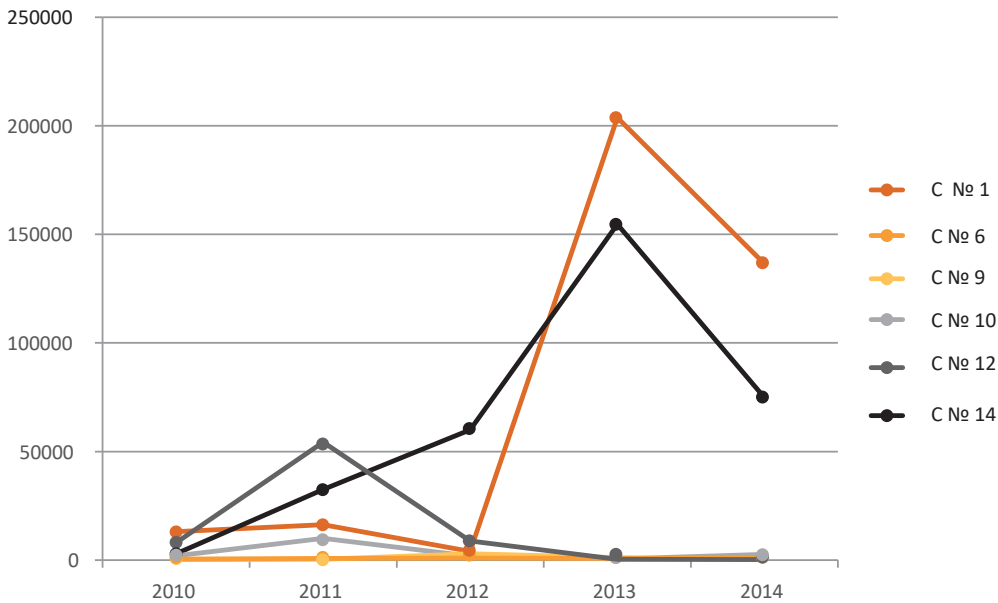
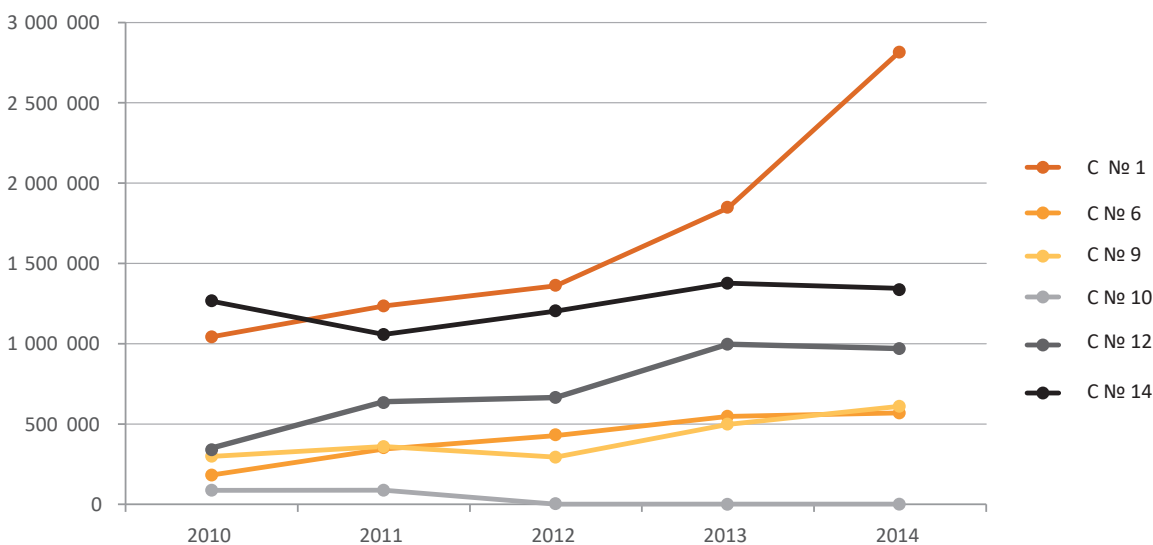


Figure 8. Revenue trends for six construction organisations operating in Novosibirsk Region selected from the sample of 2010–2014



The revenue figures show the same trend. Company 1 and Company 14 have the highest rates. To continue with the analytical procedures, we have chosen Company 14 since it is the only company in our sample that has its accounting reports regularly published, which should ensure the quality of its reporting. Analysis of the data from construction companies in the Novosibirsk region confirms the findings of Russian researchers. In this vein, E. Senatorova [16] points out that the Russian construction industry tends to provide only mandatory accounting and tax reporting. As for non-financial reporting, construction ranks highest among the industries that are unlikely to disclose that kind of information. Herewith we will examine the sequence summarised in Figure 6.

To complete basic data sets, performance audit criteria should be calculated (the results are summarised in Table 2). Consider some of the following factors. For “High level of taxation”, the following indicators are assigned: tax burden to sales revenue, current corporate income tax, tax to profit ratio. For “High prices for materials, structures and articles”, the relevant indicators are cost to sales revenue, price of goods, and material returns. For “High interest for commercial credits” – borrowed funds turnover, average annual cost of debt, and returns on debt. For “Lack and depreciation of machines and equipment”, the appropriate indicators are fixed asset turnover ratio, average annual value of fixed assets and returns on fixed assets.

Table 2. Calculation of performance audit criteria for a sample Joint Venture (2011–2015)

Con- straints	Indicators	2011	2012	2013	2014	2015	
1	2	3	4	5	6	7	
Level of taxation	<i>Efficiency</i>						
	Tax payment (TP) , thousands of roubles.	3029	15 671	25 722	33 913	29 281	
	Revenue (R), thousand roubles	1 265 615	1 057 643	1 203 466	1 376 886	1 345 318	
	Tax burden to Revenue (TB_R) , TP/R	0.24	1.481	2.14	2.46	2.18	
	<i>Effectiveness</i>						
	Net profit (P)	2908	32 562	59 942	154 647	74 897	
	Tax burden to Profit (TB_P) , TP/P	104.16	48.13	42.91	21.93	39.09	
	<i>Economy</i>						
	Elasticity coefficient of taxes to revenue (E _{TP/P}) (TP ₁ - TP ₀)/(R ₁ - R ₀)	0.957	-0.061	0.069	0.047	0.147	
	Costs of raw materials, components, articles	<i>Efficiency</i>					
Cost of goods (CG), thousands of roubles		1 066 089	742 053	775 189	936 102	909 110	
Cost of revenue C/R		0.84	0.70	0.64	0.68	0.67	
<i>Effectiveness</i>							
Material costs (MC), thousands of roubles		586 349	408 129	426 354	514 856	500 011	
Material returns (MR) MC/R		2.15	2.59	2.82	2.67	2.69	
<i>Economy</i>							
Elasticity coefficient of the cost of goods to revenue (E _{CG/R}) (CG ₁ - CG ₀)/(R ₁ - R ₀)		-5.68	1.56	0.23	0.93	0.86	
Interest on commercial loans		<i>Efficiency</i>					
		Average annual amount of debt (DC) , thousands of roubles	748 909	734 374	650 277	589 952	627 999
	Debt turnover (T_D) R/DC	1.69	1.44	1.85	2.33	2.14	
	<i>Effectiveness</i>						
	Returns on debt (R_D) P/DC	0.00	0.04	0.09	0.26	0.12	
	<i>Economy</i>						
	Elasticity coefficient of debt capital to revenue (E _{D/R}) (DC ₁ - DC ₀)/(R ₁ - R ₀)	-0.76	0.24	-0.81	-0.02	-2.50	

Machinery shortage and deterioration	<i>Efficiency</i>					
	Average annual value of fixed assets (FA), thousands of roubles	720 372	671 384	668 643	708 279	721 756
	Fixed assets turnover (T_{FA}) R/FA	1.76	1.58	1.79	1.94	1.86
	Capital intensity ratio (CI) FA/R	0.57	0.63	0.56	0.51	0.54
	<i>Effectiveness</i>					
	Returns on fixed assets (R_{FA}) P/FA	0.42	5.05	8.65	21.37	10.40
	<i>Economy</i>					
	Elasticity coefficient of fixed assets to revenue (EFA/R) $(FA_1 - FA_0)/(R_1 - R_0)$	1.57	0.26	0.33	0.18	0.12

Following the algorithm, the next step is to calculate the average value, normalise baseline data, and make an intermediate integral assessment by the two methods (Options A and B) for the six sample organisations. The findings for one of the organisations under consideration (below referred to as a Joint Venture) calculated by Option A are presented in Table 3 and 4. Table 3 summarises the factors of “High tax rate” and “High price for materials, structures and articles”, and Table 4 summarises

those of “High interest for commercial credits” and “Lack and depreciation of machines and equipment”. The evidence herein brings us to the conclusion that reference periods for the high taxation factor is the year of 2011, for “High price for materials, structures and articles” – 2013, and for “High interest for commercial credits” and “Lack and depreciation of machines and equipment” the reference periods are 2013 and 2014 respectively.

Table 3. Intermediate integrated estimates for High tax rate and High price of materials, components, and equipment for the reporting period of 2011–2015, Option A

High level of taxation								
Year	Tax burden to revenue	Normalised tax burden to revenue	Tax paid, thousands of roubles	Normalised tax paid, thousands of roubles	Tax burden to profit	Normalised tax burden to profit	Product of normalised values	Intermediate integrated estimate
2011	0.24	7.101	3029	7.105	104.16	0.491	24.825	2.917
2012	1.48	1.147	15 671	1.3731	48.13	1.064	1.677	1.188
2013	2.13	0.795	25 722	0.836	42.91	1.194	0.794	0.926
2014	2.46	0.690	33 913	0.634	21.92	2.336	1.023	1.007
2015	2.18	0.780	29 281	0.735	39.09	1.310	0.752	0.909
\bar{x}	1.69	x	21 523	x	51.24	x	x	x

High price of materials, structures, articles

Year	Cost to sales revenue	Cost to sales revenue, normalised values	Price of goods, thousands of roubles	Price of goods, normalised values	Material returns (MR)	Material returns, normalised values	Product of normalised values	Intermediate integrated estimate
2011	0.84	0.841	1 066 089	0.830	2.16	0.834	0.583	0.835
2012	0.70	1.010	742 053	1.193	2.59	1.001	1.207	1.064
2013	0.64	1.100	775 189	1.142	2.82	1.090	1.371	1.111
2014	0.68	1.042	936 102	0.946	2.67	1.033	1.019	1.006
2015	0.67	1.048	909 110	0.974	2.69	1.039	1.062	1.020
\bar{x}	0.71	x	885 708	x	2.59	x	x	x

Table 4. Intermediate integrated estimates for high interest on commercial loan and machinery shortage and deterioration for the reporting period of 2011–2015, Option A

High interest on commercial loan

Year	Debt turnover	Normalised debt turnover	Average annual debt capital, thousands of roubles	Average annual debt capital, normalised values	Returns on debt	Returns on debt, normalised values	Product of the normalised values	Intermediate integrated estimate
2011	1.69	0.893	748 909	0.895	0.004	0.037	0.029	0.309
2012	1.44	0.761	734 374	0.913	0.04	0.425	0.295	0.666
2013	1.85	0.978	650 277	1.031	0.09	0.883	0.891	0.962
2014	2.33	1.234	589 952	1.136	0.26	2.512	3.522	1.521
2015	2.14	1.133	627 999	1.067	0.12	1.143	1.382	1.114
\bar{x}	1.89	x	670 302	x	0.10	x	x	x

Machinery shortage and deterioration

Year	Fixed assets turnover	Normalised fixed assets turnover	Average annual value of fixed assets, thousands of roubles	Normalised average annual value of fixed assets	Returns on fixed assets	Normalised returns on fixed assets	Product of the normalised values	Intermediate integrated estimate
2011	1.76	0.983	720 372	1.032	0.42	0.045	0,046	0.358
2012	1.58	0.881	671 384	0.962	5.05	0.551	0.466	0.776
2013	1.80	1.007	668 642	0.98	8.65	0.942	0.909	0.969
2014	1.94	1.087	708 279	1.015	21.37	2.328	2.568	1.369
2015	1.86	1.042	721 756	1.034	10.40	1.134	1.222	1.069
\bar{x}	1.82	x	698 086	x	9.27	x	x	x

The same procedure was performed using Option B. The findings for “High tax rate” and “High price of materials, components and articles” are shown in Table 5. The intermediate integral estimates are similar to those obtained by Option 1. For example, the factor of “High tax rate” has the reference year of 2011, “High price of materials, components and articles” – 2013; for “High interest for commercial credits” and “Machinery shortage and deterioration” the reference year is 2014.

Table 5. Intermediate integrated estimates for High tax rate and High price of materials, components, and articles for the reporting period of 2011–2015, Option B

High tax rate

Year	Tax burden to revenue	Tax burden to revenue, normalised values	Tax payments, thousands of roubles	Tax payments, normalised values	Tax burden to profit	Tax burden to profit, normalised values	Normalised values total	Intermediate integrated evaluation
2011	0.24	1	3029	0.591	104.16	0	2	0.667
2012	1.48	0.441	15 671	0.265	48.13	0.681	1.713	0.571
2013	2.13	0.146	25 722	0	42.91	0.749	1.156	0.385
2014	2.46	0	33 913	0.149	21.92	1	1	0.333
2015	2.18	0.129	29 281	0.591	39.09	0.791	1.070	0.357
\bar{x}	1.69	x	21 523	x	51.24	x	x	x

Year	Cost of revenue	Cost of revenue, normalised values	Cost of goods, thousands of roubles	Cost of goods, normalised values	Material returns	Material returns, normalised values	Normalised values total	Intermediate integrated evaluation
x_{max}	2.46	x	33 913	x	104.16	x	x	x
x_{min}	0.24	x	3029	x	21.92	x	x	x
$\frac{x_{max} - x_{min}}{x_{min}}$	2.22	x	30 884	x	82.24	x	x	x
High price of materials, components and articles								
2011	0.84	0	1 066 089	0	2.16	0	0	0
2012	0.70	0.710	742 053	1	2.59	0.652	2.362	0.787
2013	0.64	1	775 189	0.897	2.82	1	2.898	0.966
2014	0.68	0.819	936 102	0.401	2.67	0.777	1.997	0.666
2015	0.67	0.840	909 110	0.484	2.69	0.801	2.126	0.709
\bar{x}	0.71	x	885 708	x	2.59	x	x	x
x_{max}	0.84	x	1 066 089	x	2.82	x	x	x
x_{min}	0.64	x	742 053	x	2.15	x	x	x
$\frac{x_{max} - x_{min}}{x_{min}}$	0.20	x	324 036	x	0.67	x	x	x

Table 6. Intermediate integrated estimates for high interest for commercial credits and machinery shortage and deterioration for the reporting period of 2011–2015, Option B

Year	Debt turnover	Normalised debt turnover	Average annual debt capital, thousands of roubles	Average annual debt capital, normalised values	Returns on debt	Returns on debt, normalised values	Normalised values total	Intermediate integrated evaluation
2011	1.69	0,279	748 909	0	0.004	0	0.279	0.093
2012	1.44	0	734 374	0.091	0.04	0.157	0.248	0.083
2013	1.85	0,459	650 277	0.620	0.09	0.342	1.422	0.474
2014	2.33	1	589 952	1	0.26	1	3	1

2015	2.14	0,786	627 999	0.761	0.12	0.447	1.993	0.664
\bar{X}	1.89	x	670 302	x	0.10	x	x	x
x_{max}	2.33	x	748 909	x	0.104	x	x	x
x_{min}	1.44	x	589 952	x	0.26	x	x	x
$x_{max} - x_{min}$	0.89	x	158 957	x	0.004	x	x	x

Machinery shortage and deterioration

Year	Fixed assets turnover	Normalised fixed assets turnover	Average annual value of fixed assets, thousands of roubles	Normalised average annual value of fixed assets	Returns on fixed assets	Normalised returns on fixed assets	Normalised values total	Intermediate integrated evaluation
2011	1.76	0.492	720 372	0.974	0.42	0	1.466	0.489
2012	1.58	0	671 384	0.052	5.05	0.221	0.23	0.091
2013	1.80	0.609	668 642	0	8.65	0.393	1.002	0.334
2014	1.94	1	708 279	0.746	21.37	1	2.746	0.915
2015	1.86	0.783	721 756	1	10.40	0.477	2.259	0.753
\bar{X}	1.82	x	698 086	x	9.27	x	x	x
x_{max}	1.94	x	721 756	x	21.37	x	x	x
x_{min}	1.58	x	668 642	x	0.42	x	x	x
$x_{max} - x_{min}$	0.36	x	53 114	x	20.95	x	x	x

The next step is to make overall integrated assessments separately as per the procedures described in Option A and Option B and then average them to produce a single overall estimate. The findings are summarised in Table 7.

Table 7. Derivation of Integrated estimates by Option A and Option B and total integrated evaluation for the reporting period of 2011–2015

Option A						
Year	High tax rate	High price of materials, components and articles	High interest for commercial credits	Machinery shortage and deterioration	Integrated evaluation, Option A	Ranking
2011	2.917	0.835	0.310	0.358	4.421	2
2012	1.188	1.065	0.666	0.776	3.695	5
2013	0.926	1.111	0.962	0.969	3.968	4

2014	1.008	1.006	1.521	1.369	4.905	1
2015	0.910	1.020	1.114	1.069	4.113	3

Option B

Year	High tax rate	High price of materials, components and articles	High interest for commercial credits	Machinery shortage and deterioration	Integrated evaluation, Option B	Ranking
2011	0.667	0.000	0.093	0.489	1.249	5
2012	0.571	0.787	0.083	0.091	1.532	4
2013	0.386	0.966	0.474	0.334	2.159	3
2014	0.333	0.666	1.000	0.915	2.915	1
2015	0.357	0.709	0.664	0.753	2.483	2

Option A and Option B averaging

Year	High tax rate	High price of materials, components and articles	High interest for commercial credits	Machinery shortage and deterioration	Total Integrated evaluation	Ranking
2011	1.792	0.418	0.202	0.424	0.709	4
2012	0.880	0.926	0.374	0.433	0.653	5
2013	0.656	1.038	0.718	0.651	0.766	3
2014	0.671	0.836	1.261	1.142	0.977	1
2015	0.633	0.865	0.889	0.911	0.824	2

It is feasible to rank the integral estimates of Option A and Option B by reporting periods. Rank one is assessed as a target (reporting) magnitude. For the Joint Venture under consideration, the target periods obtained by Option A and Option B fall in the same period of 2014.

To obtain overall integral estimate, we need to average out Option A and Option B estimates (see Table 7). Similarly, rank the overall integral estimates by periods. Then, choose the best period for every selected organisation and compare the normalised values of Options A and B for every factor. The results are in Table 8.

The calculations show that for the construction companies under consideration, the fundamental indicators

include tax burden to profit, cost to sales revenue, returns on debt, fixed assets turnover and economy indicators for each factor. These metrics are capable of providing sufficient feedback about the performance of the construction companies in the sample throughout the reporting period in terms of their effectiveness, efficiency and economy. Besides, the indicators are intended to reveal the accountancy, managerial and taxation items that call for detailed auditing procedures to be implemented in order to evaluate the reliability of the reporting efforts and their compliance with the current legislation. Table 9 shows a relevant indicator framework for performance audit procedures.

Table 8. Framework of relevant efficiency and effectiveness indicators

High tax rate		
Organisation	Tax burden to revenue	Tax burden to profit
1	2	3
№ 1	–	+
№ 6	+	–
№ 9	–	+
№ 10	–	+
№ 12	+	+
№ 14	–	+
Total	2	5
High costs of raw materials, compounds, articles		
Organisation	Cost to sales revenue	Material returns
№ 1	+	+
№ 6	+	–
№ 9	+	–
№ 10	+	–
№ 12	+	–
№ 14	+	–
Total	6	1
High interest for commercial credits		
Organisation	Borrowed funds turnover	Returns on debt
№ 1	+	+
№ 6	+	+
№ 9	–	+
№ 10	–	+
№ 12	+	+
№ 14	+	+
Total	4	6
Machinery shortage and deterioration		
Organisation	Fixed assets turnover	Returns on fixed assets
№ 1	+	+
№ 6	+	–

№ 9	+	-
№ 10	+	-
№ 12	-	+
№ 14	+	+
Total	5	3

Table 9. Performance audit criteria framework for construction organisations

Efficiency			
Cost to sales revenue		Fixed assets turnover	
Effectiveness			
Tax burden (to profit)		Returns on debt	
Economy			
Elasticity of taxes to revenue	Elasticity of cost of goods to revenue	Elasticity of debt capital to revenue	Elasticity of fixed assets to revenue

In view of this, the most relevant efficiency criteria for construction companies are seen to be fixed assets turnover and cost to sales revenue. Therefore, we can suggest that the most essential criteria among the construction industry constraints are the condition of property, plant and equipment and production costs structure. Thus from the perspective of efficiency assessment, we should emphasise the audit procedures that allow for a detailed analysis of prime costs, depreciation, asset acquisitions, and disposals. With regard to effectiveness, the values that

deserve thorough analysis are debt financing, tax burden and its impact on performance.

Therefore, the most salient feature of our approach to the proposed performance audit criteria system is that it reveals industry-specific controlled parameters and baseline information available for auditing procedures to be conducted in construction organisations. Having identified significant performance audit indicators, we can now distinguish the controlled parameters that are presented in Table 10.

Table 10. Performance audit criteria framework developed for construction organisations with monitoring parameters

Criteria category	Criteria	Controlled parameters
1	2	3
Efficiency	Cost to revenue	Cost of goods
		Revenue
Effectiveness	Fixed assets turnover	Revenue
		Fixed assets average annual
Effectiveness	Tax burden (to profit)	Tax payment
		Net profit (loss)
Effectiveness	Returns on debt	Net profit (loss)
		Debt capital annual average

Criteria category	Criteria	Controlled parameters
Economy	Elasticity of taxes to revenue	Tax payment
		Revenue
	Elasticity of cost of goods to revenue	Cost of goods
		Revenue
	Elasticity of debt capital to revenue	Debt capital
		Revenue
Elasticity of fixed assets to revenue	Fixed assets	
	Revenue	

To provide further performance estimation, consider the controlled parameters summarised in Table 11.

Table 11. Historical analysis of controlled parameters of the Joint Stock Company for the reporting period of 2015–2016

Controlled parameters, thousand roubles	Year		Growth rate, %	Increment, %	Absolute devi- ation, thou- sand roubles
	2015	2016			
1	2	3	4	5	6
Revenue	1 359 373	1 181 227	86.8	-13.2	-178 146
Net profit	35 118	128 276	365.2	265.2	93 158
Tax payment	38 269	35 701	93.2	-6.8	-2568
Debt capital annual average	459 443	430 395	93.6	-6.4	-29 048
Fixed assets average annual	703 439	693 165	98.5	-1.5	-10 274
Price of goods	894 988	696 656	77.8	-22.2	-198 332
Fixed assets	687 027	699 303	101.7	1.7	12 276
Debt capital	402 711	458 079	113.7	13.7	55 368

To evaluate efficiency, calculate the profitability ratios presented in Table 12.

Table 12. Joint Stock Company profitability ratios for the reporting period of 2015–2016

Company performance indicators	Formula	Year		Change (+,-)
		2015	2016	
1	2	3	4	5
Profit margin from core operations	Net income / (production cost + overheads + selling and marketing expenses)	0,163	0,204	0,041
Returns on assets	Net profit / Average total assets	0.025	0.089	0.064
Returns on equity	Net profit / Average equity capital	0.045	0.148	0.103
Returns on sales	Net income / Revenue	0.140	0.169	0.029
Returns on fixed assets	Net profit / Average fixed assets	0.051	0.183	0.132

As shown in the table, the efficiency indicators demonstrate a positive trend. Nevertheless, to understand what actually created this trend, factor analysis has been conducted for every efficiency indicator.

A factor analysis of operations was conducted by the method of chain substitute. Its results provide the evidence sufficient to assess the impact of monitoring parameters on company performance. Table 13 summarises the results obtained.

Table 13. The impact of controlled parameters on company performance obtained through factor analysis for the reporting period of 2011–2015: Summary Table

Profitability ratios	Controlled parameters	Absolute variation, thousand rubbles.	Positive / Negative impact	Materiality assessment, %
Profit margin from core operations	Price of goods	-198 332	+	28. 469
Returns on assets	Net profit (loss)	93 158	+	72.623
Returns on equity	Net profit (loss)	93 158	+	72.623
Returns on sales	Revenue	-178 146	+	15.081
Returns on fixed assets	Net profit (loss)	93 158	+	72.623
	Fixed assets	12 276	-	1.755

As is seen from the table, the assessment of deviation materiality on the controlled parameters emphasises a number of indicators that are to be found in financial statements. For the construction organisation under examination, those indicators are as follows: price of construction work, net profit (loss) and revenue. Therefore, to interpret these values, the auditor has to reach out to additional information that affects the behaviour of the controlled parameters. Such information includes accounting policies on the price of goods formation (assessment methods of inventory disposal, capital assets depreciation, reserve accumulation policy, etc.). Thus, when interpreting performance audit evidence, account-

ing policy is considered with reference to the indicators of effectiveness, efficiency and economy (by 'accounting policy' we mean the policies that are not restricted to merely accounting objectives but also concern the issues of corporate profit taxation). Another indicator to be specified is revenue. When examining a company's revenue, the auditor should understand its pattern and see how it fits the declared activities. He also should examine how well the audited entity maintains separate activity-based records of income and expenses. The revenue structure for the Joint Stock Company under consideration is provided in the notes to the Company's accounting statement (See Table 14).

Table 14. Revenue of the Joint Venture Company by type of activity for the reporting period of 2015–2016

N ^o п/п	Indicator	Revenue VAT exclusive, 2016, roubles	Revenue VAT exclusive, 2015, roubles
1	Selling own production (Foam concrete)	1 064 759 788	1 165 710 643
2	Construction and assembling operations, contractor's activities	3 192 367	50 449 400
3	Rental services	30 182 217	40 621 766
4	Providing services, work execution (including delivery)	56 139 530	65 885 422
5	Sales of real estates and land property	2 312 369	11 500 000
6	Sales of purchased goods	24 640 676	25 206 049
TOTAL		1 181 226 947	1 359 373 280

Thus, the method developed within the study has been tested using the reporting of construction companies operating in the Novosibirsk region. To yield and analyze performance audit criteria we initially selected sixteen construction companies throughout the Novosibirsk region. However, for the criteria to work well and adequately reflect the performance with reference to effectiveness, efficiency and economy, we had to reduce the sampling to six organisations. To obtain relevant indicators of effectiveness and efficiency for the six organisations, we identified their best period and compared the normalised values, estimated by Option A and Option B for each factor.

Conclusion and Further research

This paper sought to draw up a set of criteria and analytical procedures for performance auditing in construction companies. It identifies some significant results and opens opportunities for future research.

The demonstrated results have confirmed our hypothesis that performance audit tools can provide a comprehensive solution to the problem of information openness and fairness in relation to the assessment of construction organisation performance.

First, we used valid statistical methods to determine certain significant indicators describing performance audit criteria. These indicators have been validated by compelling evidence elicited from sixteen construction organisations, over a period of five years.

Second, to establish significant indicators regarding efficiency, effectiveness and economy, auditing procedures were identified. This range of performance audit procedures was selected due to its having the capacity to provide comprehensive analysis of relevant information to measure key performance indicators.

Third, all the profitability indicators were subjected to factorial analysis that enabled us to assess the impact of certain controlled parameters vis-a-vis the performance

results. The materiality of deviation for controlled parameters was estimated, and this allowed for the emphasising of some of the indicators gleaned from financial statements. Thus, it was identified as the information that is particularly important, meaning a strong emphasis should be put on this information's accuracy and fairness.

Fourth and lastly, we implemented performance audit procedures in order to systematise accounting policy information, which has implications for the applied parameters. This was to enable the identification of the most pertinent items to be disclosed through reporting.

The provided study of accounting policies of a Joint Stock Company has shown that the organisation utilises a weighted average cost method to compute the depreciation of goods sold, final products, financial assets and inventory. This method works well when purchasing prices tend to fluctuate sharply. In this case, prime costs averaging is shown to help avoid both unpredictable losses and unexpected revenue rates.

Therefore, the method demonstrated in this study provides guidelines to ensure accounting and analytical support of performance audit in construction organisations. This enables the creation of a system of performance audit criteria, the determination of their reference values, and the establishment of a set of controlled parameters. Being equipped with the controlled parameters, we can streamline accounting information, (including tax information and the information available through accounting statements) in terms of its materiality for stakeholders. Through this framework, stakeholders may evaluate a company's performance against the criteria of efficiency, effectiveness and economy. We should note that performance audit findings are especially important for internal users to validate their managerial decisions, as well as for external users making investment decisions.

It is necessary to expand and strengthen the results provided herein through further research. Firstly, we could see that statistical methods can fully validate the framework and reference values for performance audit criteria.

Nevertheless, to accomplish this task, we need to obtain information applicable to longer periods of at least several years. This will allow for the setting of benchmarks not against budget and forecast values, but using the information on the dynamics of effectiveness and efficiency of resources utilisation. Additionally, there is still a gap in the understanding of performance criteria with regard to many construction companies that continue to lose business. Secondly, using integrated estimates to rank relevant indicators of efficiency, effectiveness and economy enabled us to determine and specify controlled parameters. Controlled parameters create a reliable framework to present accounting and tax information in a systematic manner and assess the quality and reliability of its disclosure. This is a contribution to auditor sampling methodology and needs further development in the context of auditor review of material information disclosures. Thirdly, the research points out the need to supply stakeholders with information on effectiveness, efficiency and economy to provide them with comprehensive understanding of performance prospects in a broader socio-economic context. This means that construction companies need to disclose non-financial reporting, or expand their financial reporting with quality parameters. This creates an opportunity for further research on how the amount and quality of information disclosed in companies' reports impact business activities and the reputation of a construction company.

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