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05.23.00 Строительство и архитектура

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и городского хозяйства

05.23.22 Градостроительство, планировка сельских населенных пунктов

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При оформлении обложки использована работа фотохудожника Валентина Герцмана (Нью-Йорк)

**Уважаемые читатели!**

Жилищно-коммунальное хозяйство (ЖКХ) является одним из ключевых элементов социально-экономической деятельности государства. Жилищные права граждан, включая содержание и ремонт жилья, а также предоставление коммунальных услуг, должны соответствовать возможностям их реализации как за счет рыночных механизмов, так и за счет бюджетной поддержки.

Годовой оборот отрасли ЖКХ в 2020 г. оценивается в 6,4 трлн руб. (порядка 6 % ВВП Российской Федерации). В отрасли занято более 2 млн человек и работают около 41 тыс. организаций.

В региональные программы капремонта многоквартирных домов (МКД) включены 724 тыс. МКД площадью 2,6 млрд м², в которых проживает около 90 млн жителей (2/3 населения страны).

Сфера ЖКХ характеризуется неудовлетворительным состоянием активов, а также ускоренными темпами деградации основных средств, низкой экологической эффективностью.

Удельный вес сетей коммунальной инфраструктуры, нуждающихся в замене в общей протяженности сетей (по итогам 2020 г., по данным Росстата):

- тепловых сетей — 30,8 % от 167,4 тыс. км (заменено 2 % или 3,4 тыс. км), потери — 12,3 %;
- водопроводных сетей — 43,5 % от 584,1 тыс. км (заменено 1,1 % или 6,2 тыс. км), утечка и неучтенный расход воды — 22,9 %;
- канализационных сетей — 45,6 % от 200,8 тыс. км (заменено 0,4 % или 0,8 тыс. км).

«Недобор» выручки по всем коммунальным услугам по Российской Федерации (до прироста в 4 %) составил за 2020 г. порядка 30 млрд руб., за 2021 г. — порядка 20 млрд руб.

Для решения указанных проблем необходимо:

- увеличить объем привлекаемых средств Фонда национального благосостояния в два раза (до 300 млрд руб.);
- осуществить переход на долгосрочную модель ценообразования в коммунальной сфере, где основным методом отраслевого ценообразования будет являться метод сравнения аналогов с использованием значений эталонных затрат;
- провести изменение подходов поддержки социально незащищенных слоев населения путем снижения максимального размера платы за ЖКУ в совокупном доходе (с 22 до 15 % в течение 5 лет);
- продолжить модернизацию источников теплоснабжения в целях повышения их экологичности путем перехода на экологически чистые виды топлива и внедрения современных систем газоочистки (снижения «углеродного следа») и др.

Этим вопросам и другим проблемам ЖКХ посвящены статьи данного номера журнала.

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**Бутырин А.Ю.,
Ларионова Ю.В.,
Статива Е.Б.**

В Национальном исследовательском Московском государственном строительном университете 30 сентября – 1 октября 2021 г. состоялась национальная научно-практическая конференция «Судебная строительно-техническая и стоимостная экспертизы: проблемы и пути их решения»

**Грабовый П.Г.,
Ажимов Т.З.,
Волков Р.В.**

Создание нового международного коридора «Европа – Западный Китай» по маршруту «Санкт-Петербург – Казань – Оренбург – Актюбинск – Алматы – Хоргос» является оптимальным путем из Европы в Китай с минимальным количеством стран-участниц и границ

Яськова Н.Ю.

Выставка Expo 2020, открывшаяся в октябре 2021 г. в Дубае (ОАЭ), стала не только крупнейшей за 150-летнюю историю выставок, но и привнесла много нового в механизмы ивент-девелопмента, активно используемые в настоящее время для проведения имеющих важное международное значение событий

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**Дмитриев А.Н.,
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В статье рассматривается состояние и качество работы пассажирского транспорта на территории г. Барнаула, проведен анализ работы пассажироперевозящих организаций, оплата транспортных услуг населением

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**Стерник С.Г.,
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Наиболее значительный интерес к российскому рынку среди всех зарубежных стран проявляют китайские инвесторы

**Буриев Х.Т.,
Усманов И.А.**

Программным документом развития строительства в Узбекистане на среднесрочный период является «Стратегия модернизации, ускоренного и инновационного развития строительной отрасли Республики Узбекистан на 2021–2025 гг.», принятая 27 ноября 2020 г.

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05.23.19 Environmental safety of construction and municipal economy

05.23.22 Urban planning and planning of rural settlements

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**Grabov P.G.,
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Creation of a new international corridor “Europe – the Western China” along a route St. Petersburg – Kazan – Orenburg – Aktyubinsk – Almaty – Khorgos is an optimum way from Europe to China, with a minimum number of countries participants and borders to cross

Yaskova N.Yu.

Expo 2020, which opened in October 2021 in Dubai (UAE), became not only the largest in the 150-year history of Exhibitions, but also brought a lot of new aspects to the mechanisms of event development, which are currently actively used for holding events of international importance

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Butyrin A.Yu.
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Stativa E.B.



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Forensic structural engineering and construction cost examination: current problems and solutions

On September 30 – October 1, 2021, National Science and Practical Conference “Forensic Structural Engineering and Construction Cost Examination: Current Problems and Solutions” was held at the National Research Moscow State University of Civil Engineering. In the plenary reports, speakers presented the results of in-depth and detailed studies on the appointment and performance of forensic structural engineering/construction cost examinations in the course of criminal, civil, arbitration and administrative litigations, as well as the practice of using special civil engineering knowledge and knowledge in the field of pre-trial real estate valuation. The speakers identified and analyzed new trends in the development of these areas of forensic expertise. The speakers drew attention to the growing need for professional knowledge in the field of pre-design surveys, construction, operation, renovation and reconstruction of buildings and structures in operation, as well as the regularities governing the generation and transformation of market and other real estate values. The speakers drew attention to the increasing variety of forensic examinations currently conducted by employees of both public and non-public forensic institutions. The speakers also focused on the professional training of forensic experts, various forms of their training and professional advancement, the required level of teaching theoretical, procedural, organizational and methodological fundamentals of forensic examination, development of practical examination skills and demonstrating their consistency and results in expert opinions.

The conference speakers addressed the most relevant issues of construction cost examinations which are essential when the cadastral value of real estate facilities is contested in court and when causes, conditions, circumstances and the mechanism of accidents, failures, and casualties in the course of construction and operation of construction facilities are identified. Hence, the most relevant problems of forensic structural engineering and construction cost examinations were considered, and the most effective solutions were developed.

Keywords: forensic structural engineering examination, forensic cost examination, forensic civil engineering expert, conference, forensic institutions, examination methodology, criminal case, civil case, investigator, judge

INTRODUCTION

The conference “Forensic structural engineering and construction cost examination: current problems and solutions”, held at the National Research Moscow State University of Civil Engineering (NRU MGSU) on September 30 – October 1, 2021 began with a plenary session, opened by A.R. Tusnin, Vice-Rector for Research, Scientific and Technology Activities of NRU MGSU, Chairman of the Conference Organizing Committee.

K.Yu. Kulakov, Vice-rector for financial policy, NRU MGSU, A.K. Orlov, Director of the Institute of economics, management and communications in the field of construction and real estate, NRU MGSU, and P.G. Grabovy, Head of Department of construction organization and real estate management, NRU MGSU greeted the audience.

Relevant and informative plenary presentations on debatable issues of forensic structural engineering examinations (FSEE) were made by the following experts in the field of their theory and practice.

A.Yu. Butyrin, Head of the Laboratory of Construction Forensics of the RFCFS of the Russian Ministry of Justice, Doctor of Law, professor, Department of Construction Organization and Real Estate Management, NRU MGSU

In his report “The main trends in the development of forensic structural engineering examination”, professor Andrey Butyrin outlined the results of

studying the process of formation and development of FSEE as a whole and within the framework of examination-focused institutions of the Ministry of Justice of Russia.

According to the speaker, an essential feature of the process is the simplification of tasks solved by structural engineering experts. Professor Butyrin A.Yu. set the boundary between the notions of a “simple” and “complex” examination task, which are provisional to a certain extent [1].

Firstly, beyond the boundary of “simple” tasks are the research projects that determine the strength characteristics of load-bearing and enclosing constructions of buildings and structures. These studies are based on the provisions of such disciplines as theoretical and structural mechanics, resistance of materials, solid state physics, and others. Secondly, research-intensive research on construction and materials, requiring the use of advanced engineering facilities and equipment. Thirdly, this is the logic that is so much needed for the FSEE in criminal cases related to casualties on construction sites, accidents and failures in the construction industry.

The ratio of simple and complex tasks, tackled by experts, is determined as approximately ten to one.

As evidenced in practice, experts in structural engineering (coming from public and private institutions) undertake the resolution of “complex” problems extremely rarely. The research is conducted reluctantly and cursorily, although it takes a long

time which is a fairly clear sign of a decline in the overall professional level of structural engineering experts.

Given the fact that this trend has turned persistent, an attempt should be made to answer three main questions:

- 1) What is the reason for this phenomenon?
- 2) How should this phenomenon be treated?
- 3) What should be done in this regard?

We give the following answers to these questions:

1. The simplicity of the overwhelming amount of tasks, solved by forensic structural engineering experts, is explained by the needs of the investigative and judicial practice. At a given moment in time, an investigator and a judge need solutions for "simple" tasks, that do not require any reference to the foundations of fundamental and, therefore, presumably "complex" theoretical provisions. Hence, low cognitive demand tasks determine the low scientific level of research (it should be noted that a low scientific level does not mean a low-quality level).

2. This phenomenon should be treated without evaluation; that is, it is neither good nor bad – it's a given for today, and its understanding necessitates the formulation of rational proposals in this respect and making efforts to have them implemented.

3. The principal proposals, made in this respect, resolve themselves into this:

Firstly, it is necessary to redistribute the flows of commissioned examinations, and the "complex" ones (mind that their number is relatively small) shall be addressed to those scarce forensic examination organizations and institutions in which the professional training level of experts, as well as the equipment, instruments and methods allow to solve these tasks quickly and efficiently. Therefore, so-called "elite" expert organizations and institutions will stand out. Other (the overwhelming majority) "non-complex" examinations should be addressed to other forensic examination organizations, whose number is disproportionately larger. Investigators and judges, whose activities are related to the utilization of special structural engineering knowledge, should be informed about this proportion (which seems to be natural in any cognitive activity).

Secondly, it is necessary to change the idea of approaches to the professional training of professional structural engineering experts, with regard for the level and content of research highly demanded by practicing judges and investigators.

Thirdly, it is necessary to rationally approach the technological infrastructure of forensic organizations and institutions. At the same time, it is necessary to proceed from the fact that "complex" studies, requiring the use of modern expensive equipment should be conducted using the appropriate instruments at organizations and institutions that employ specialists who are constantly conducting certain applied research needed for particular examinations at the moment. This is the only way to ensure the guaranteed reliability of anticipated results of a forensic examination.

In the event that the trend, identified at the present stage, is correctly identified, the measures to be taken will allow for a more rational use of the cognitive potential of structural engineering experts in court proceedings.

K.Yu. Kulakov, Vice-Rector for Financial Policy, NRU MGSU, President of the Union of Financial and Economic Forensic Experts, Doctor of Economics, Professor

Professor Kirill Kulakov presented the report "New rules for contesting the cadastral value. State Cadastral Valuation – 2021 in Moscow:

what is to be expected and what's to be done?". The speaker cited and commented on amended provisions of these rules.

Cost studies are an integral part of the FSEE and other types of forensic examinations. They are also relevant when the cadastral value is contested. The cadastral value serves as the basis for taxation of natural persons and legal entities. The contesting of the cadastral value is based on the provisions of the Federal Law "On State Cadastral Valuation" dated 03.07.2016 No. 237-FZ. At the moment, the present-day procedure for contesting the cadastral value includes two options: according to the first one, the taxpayer can apply to a specialized commission in charge of contesting the cadastral value (if it is established in the subject of the Federation); the second option means resolving the issue in court [2]. In 2020, 20,746 disputes were initiated in courts about the cadastral value entered into the state cadastral register of real estate in respect of 37,932 real estate facilities. For the period from 01.01.2021 to 31.07.2021, 9,467 disputes were initiated in courts about the cadastral value entered into the Unified State Register of Real Estate in respect of 19,900 real estate facilities. Despite the fact that the legislation has several grounds for contesting procedures, 98 % of court disputes in 2020 and 99 % of court disputes in 2021 were focused on setting the cadastral value of a real estate facility equal to the market value. For other reasons, disputes are initiated very rarely. At the same time, 96 % of court decisions are positive, and they are issued in favour of applicants, which indicates a significant percentage of errors in determining the cadastral value.

As a result of the court resolutions issued in respect of the claims submitted from 01.01.2020 to 31.12.2020, there was a drop in the total cadastral value (approximately 228.6 billion rubles, or 52 %) of real estate facilities:

- the total cadastral value before the court proceedings was about 441.68 billion rubles;
- it was about 213.06 billion rubles after the court proceedings.

This value change is specified in the court resolutions on claims submitted from 01.01.2021 through 31.07.2021: there was a decline in the total cadastral value of the real estate by approximately 75.95 billion rubles (–50.29 %):

- the total cadastral value before the claim was about 151.03 billion rubles;
- the total cadastral value went down to about 75.08 billion rubles following the issuance of the court resolution.

The legislator has introduced an innovation for the cadastral value reconsideration; it is already in effect in 14 constituent subjects of the Russian Federation. A tougher procedure is back for taxpayers willing to contest the cadastral value in court: the innovation requires a mandatory pre-trial stage for individuals and legal entities. Contesting the cadastral value starts from interaction with the State Budgetary Institution for cadastral valuation. Significant and other nuances of the contesting procedure are also in place (Article 22.1 of the 237-FZ as amended. 269-FZ), namely [3]:

- an assessment report is attached to the application in the electronic format;
- an assessment report must contain an extract from the Unified State Register of Real Estate;
- an application can be submitted within 6 months as of the date of the market value assessment according to the assessment report.

In case of a decline issued by the State Budgetary Institution, its decision must be backed by the arguments identified in the course of the application consideration pursuant to paragraph 2, part 11, Article 22.1. They include the use of incomplete and (or)

► unreliable information, calculation or other errors that affect the final result of determining the market value of a real estate facility, violation of the regulatory requirements governing valuation activities when compiling a report on the assessment of the market value of a real estate facility.

A transitional period is established through January 1, 2023 in terms of the application of Articles 22 and 22.1 of Federal Law No. 237-FZ of July 3, 2016 "On State Cadastral Valuation", taking into account the following features:

1. During the transition period, the supreme executive authority of the subject of the Russian Federation may decide on the date of transition to the application of provisions of Article 22.1 of Federal Law No. 237-FZ dated July 3, 2016 "On State Cadastral Valuation" for the purposes of establishing the cadastral value of real estate facilities in the amount of their market value;

2. During the transition period before the day, specified in the resolution (in the absence of a resolution, before the end of the transition period):

- the provisions of Article 22.1 of Federal Law No. 237-FZ of July 3, 2016 "On State Cadastral Valuation" are not applied in the subject of the Russian Federation;
- the market value assessment report attached to the application in accordance with Part 9 of Article 22 of Federal Law No. 237-FZ of July 3, 2016 "On State Cadastral Valuation" is subject to preparation exclusively in the form of an electronic document.

Paragraph 5 of Article 6 of the Law 269-FZ establishes that in 2022, a state cadastral assessment of land plots should be carried out in all subjects of the Russian Federation, disregarding any restrictions on the frequency of state cadastral assessments.

According to paragraph 6, Article 6 of the Law 269-FZ, in 2023, any state cadastral assessment of buildings, premises, structures, facilities under construction, parking spaces must be conducted in all subjects of the Russian Federation, disregarding any restrictions on the frequency of state cadastral assessments.

The present-day frequency of the State Cadastral Valuation remains unchanged before these dates. According to paragraphs 2.2, paragraph 7 of Article 6, Law 269-FZ, the state cadastral assessment is not conducted if a decision to conduct it is made within a period smaller than six months before January 1 of the year of the state cadastral assessment required by such a decision.

The innovations, analyzed by Professor Kulakov, will require appraisers and the forensic expert community to review a number of approaches to cost studies in cases involving the contesting of cadastral value.

K.P. Grabovy, Head of the Laboratory of Forensic Construction and Technical Expertise and Claim Work, NRU MGSU, Doctor of Economics, Professor

Professor Kirill Grabovy made a report "Notarial expertise as a special way of conducting construction and technical research", in which he compared the main characteristics of a forensic structural engineering examination and an examination appointed by a notary.

The regulatory and legal justification of the notarial expertise includes the norms of Article 69 of the APC (Arbitration Procedure Code) of the Russian Federation "Grounds for exemption from proof"; Article 61 of the CPC of the Russian Federation "Grounds for exemption from proving"; Article 102-103 "Fundamentals of the legislation of the Russian Federation on Notaries".

In fact, a new type of an extrajudicial procedure (a notarial expertise) is introduced. You can contest it in a court of general

jurisdiction by filing a separate application (that is, pursuant to the general procedure for contesting notarial actions). The court must accept a notarial expertise as evidence, that is, in certain situations, a notarial expertise can replace a court-appointed one.

A notarial expertise is a procedural action consisting of research and an expert opinion on issues whose resolution requires special knowledge in the field of science, technology, art or craft and which are to be addressed by an expert pursuant to a notary's decree in order to provide evidence necessary in the event of cases in courts or administrative authorities.

A notarial expertise is appointed not by a court, an investigator or a state authority, but by a notary in the absence of a court case (dispute); this is an out-of-court examination that has features typical for forensic examination.

In the vast majority of cases, the purpose of a notarial expertise is to provide evidence in a first-instance court case. However, it is noteworthy that a notarial expertise in the appellate instance is also possible.

The features of the notarial expertise are as follows. This type of proof is specified by the law, namely, Part 1 of Article 103 "Fundamentals of the legislation of the Russian Federation on notaries". Its scope and procedure are specified by the law (part 2 of Article 103 "Fundamentals of legislation on notaries"). The expertise is appointed by an authorized person, or a notary. Part 5 of Article 61 of the CPC (Civil Procedure Code) of the Russian Federation and Part 5 of Article 69 of the APC of the Russian Federation say that a notarial expertise can serve as the "grounds for exemption from proving". At the same time, the expert is warned about the criminal liability for issuing a deliberately false conclusion provided for in Article 307 of the Criminal Code of the Russian Federation (Part 6 of Article 103 of the "Fundamentals of legislation on notaries". The results of the notarial expertise can be used as evidence in further judicial proceedings, since this type of examination is specified by the norms of procedure codes.

In accordance with part 1, Article 102 of the "Fundamentals of the legislation of the Russian Federation on notaries", interested persons, such as an alleged plaintiff or an alleged defendant, who believe that the evidence, that could prove their rightness and refute the arguments of the other party in a future court case, will become unavailable for investigation (for example, consequences of a flood on the premises may be eliminated; traces of poor-quality repairs of the premises may disappear, etc.), are entitled to apply to the notary with an application for securing evidence.

Such an application is possible only on condition that the case for which the evidence is relevant does not exit and is not under consideration at a court or administrative authority.

It should be noted that the procedure for selecting an expert and the place of examination are not regulated by any law, expert candidates are proposed by the interested parties. If the notary does not notify all parties about the examination or notifies them, but they fail to arrive, he notary must be governed by the opinion of the party that is present.

A potential problem is when one of the parties receives the notification too late and does not have time to attend the examination; as a result, this party does not have time to submit his/her questions to the expert, while these questions determine the content of the examination and the court resolution, as the rights of late persons are not protected within the framework of notarial proceedings.

It remains unclear who, when and how chooses an institution for an examination. This is especially important in cases where one of the parties is not present during the examination for any reason.

It may happen that a person, knowing that in the future he/she will have to attend the court proceedings, addresses a notary and conducts an examination at the institution of his/her choice. As a result, the other party will have little chance to contest such evidence by the time the case is in court.

A notarial examination is aimed at obtaining sufficient evidence in a pre-trial procedure, which can later be evaluated by the court as the evidence correlated with the conclusion of a forensic expert.

An examination conducted in the order of notarization of evidence is the only way to obtain a full-fledged examination with the "signature" of an expert pursuant Article 307 of the Criminal Code of the Russian Federation in the extrajudicial process.

The significance of such an examination consists in the fact that the circumstances established by the notary are not subject to proving, which is enshrined in the legislation.

Hence, the studies under consideration are also of interest to a forensic structural engineering expert, who treats examinations as an everyday practice, because new prospects are opening up here, a relatively undeveloped area for the implementation of special structural engineering knowledge.

E.B. Stativa, Leading expert of the Laboratory of Forensic Construction and Technical Expertise of the Federal State Budgetary Institution of the Russian Federation under the Ministry of Justice of the Russian Federation, Candidate of Juridic Sciences, Associate Professor of the Department of Construction Organization and Real Estate Management, NRU MGSU

In the report on "Problems of formation and development of the methodological framework for the forensic structural engineering examination" Associate Professor Ekaterina Stativa noted that the process of generating the methodological framework for the majority of forensic structural engineering studies can be divided into three consecutive stages.

At the first stage, experts, having identified the issues that they have not solved in the absence of a special-purpose methodology, develop the method they need. If the situation repeats itself, this particular method is used as the principal one, although it must take account of the questions asked by the court and features of the item exposed to the expert examination [4].

The first stage can last for quite a long time, for years, and sometimes decades, until the accumulated empirical material converts into general methodological approaches to solving a certain type (class) of an expert problem.

The second stage encompasses the preparation and publication of research and methodology-focused articles, describing the new practice of solving expert problems that were not previously covered by the methodological literature. These articles consider certain aspects and patterns of similar forensic situations. The authors also try to identify the prerequisites and explain the reasons for the problematic issues in the judicial practice, whose resolution requires the knowledge of structural engineering.

The third stage of the methodology generation includes the preparation, approval, publication and introduction of methods (methodological recommendations) for solving standard forensic tasks.

This three-staged structure allows to systematize the methodology advancements, collected by structural engineering experts.

Some advancements are based on the existing methods, while others are based on the results of the generalized examination practice.

Surely, the development of methods, based on existing advancements, is a less laborious process, as it has a certain theoretical and methodological basis, and this process, in fact, is a logical continuation of a chain of judgments and indications of the need to perform certain cognitive actions.

Fundamentally new methods are developed "from scratch". The structure and algorithm of the future studies are designed, taking into account the essence of the issues to be tackled by the experts and specific features of the facilities to be examined.

The speaker believes that the principles that underly the development of new methods will allow to rationally and quickly design the relevant methodological material that meets the needs of forensic experts, investigative and judicial practice.

M.G. Nersesyan, Head of the Department of Forensic Economic Examinations of the Federal State Budgetary Institution of the Russian Federation under the Ministry of Justice of the Russian Federation, Candidate of Juridic Sciences

Medea Nersesyan made a report on "Complex forensic structural engineering and economic examinations". In the report, areas of interaction between a forensic structural engineering expert and a forensic economic expert were identified and clarified.

The issue of complexity in the theory of forensic examination is still considered complicated and debatable, to some extent. Integrated studies in the theory of forensic examination entail several methods of research, namely: several opinions are drafted by experts, having different specialties, and thus the examination is allegedly conducted independently; or one expert opinion is drafted according to the rules of an integrated examination. Therefore, it is necessary to distinguish integrated studies from an integrated examination. A common feature of these two cognitive actions is the impossibility of performing them without getting specialists in different areas of knowledge involved and applying the relevant special knowledge that they have.

The difference is that an integrated examination means that each subsequent study is based on the results of the previous one (performed by an expert having a different specialty), and when a set of studies is conducted, each is autonomous, and the results of the subsequent study are in no way related to the results of the previous studies.

An example of an integrated examination is the establishment of the cause of the building collapse on the basis of the results of a forensic examination of materials, that have proven the inadequate strength of the load-bearing structures. An example of an examination, based on a set of studies, is the determination by a forensic economic expert of the value of an enterprise, and by a structural engineering expert of the value of the building of this enterprise [5].

Forensic structural engineering experts and forensic economic experts often conduct both of these types of studies. This work contributes to obtaining comprehensive conclusions that allow investigation authorities or the court to have a better understanding of the main technological and economic characteristics of those organizations, enterprises and institutions that have become parties to the court proceedings.

At the same time, economic and structural engineering experts learn more about the specifics of these two areas of forensic examination, which certainly expands the range of their professional knowledge and develops their skills in conducting complex studies on several objects, which are now increasingly in demand both in criminal proceedings and cases considered by arbitration courts. ►

► This interaction is certainly fruitful and needs the attention from developers of training programs used in the training of forensic experts and their professional development, since the experience thus gained must be an integral part of the methodology used by forensic structural engineering and economic experts.

I.A. Danilkin, Head of the Forensic Centre of the Ministry of Internal Affairs of Russia in Moscow, Candidate of Juridic Sciences, associate professor

In his report *"Forensic structural engineering examination at Moscow interior authorities: inception, problems and development prospects"*, Igor Danilkin spoke about the forensic structural engineering examination at the Forensic Centre of the Ministry of Internal Affairs of Russia in Moscow. The speaker focused on the steady pace of its development. Mainly forensic examinations, conducted here, are aimed at identifying the types, amount, quality and cost of construction work conducted as part of the implementation of government-funded projects, which are financed from federal or regional budgets. A relatively young team of structural engineering experts tackles increasingly complex tasks, exploring large-scale, multi-object construction facilities. NRU MGSU graduates, who have been effectively trained in forensic structural engineering expertise, join the team. One of the main problems is the ever-decreasing number of criminal cases, the investigation of which requires the use of special structural engineering knowledge. Ongoing interaction between the Forensic Centre of the Ministry of Internal Affairs of Russia and NRU MGSU helps to solve this problem. There are plans to increase the number of forensic structural engineering experts, have them equipped with advanced devices and techniques that enable these specialists to perform high-level effective instrumental research that meets the requirements of contemporary court proceedings.

E.A. Safonova, Director of TRANS GEO LLC

Elena Safonova made a presentation *"Geophysical studies of construction facilities in the course of a forensic structural engineering examination and outside the scope of the court proceedings"* and described the technical capacity of the most recent version of the LOZA georadar. LOZA georadars belong to the class of geophysical instruments used to study the subsurface structure of the soil at depths of up to hundreds of meters, depending on the model of the instrument, the antenna used and the parameters of the sounding medium.

The principle of operation of radars is based on the emission of ultra-wideband electromagnetic pulses into the underlying environment and registration of their reflections from the boundaries of layers or objects.

A distinctive feature of the devices, in comparison with well-known foreign and domestic counterparts, is a large energy potential, which makes it possible to work in high conductivity environments, for example, in loam or wet clay, which is impossible for other georadars due to their low potential.

The operation of LOZA georadar has proven its effectiveness in solving the following tasks:

- engineering and geological surveys in the design of linear and areal structures;
- monitoring the state of soil below and near engineering structures during construction and operation (building foundations, railways and highways);
- identification of underground utilities;

- locating artificial and natural cavities in the ground and in building structures (karst cavities, voids and tectonic disturbances);
- determination of the thickness of filled and deformed soils, mapping the boundaries of bedrocks under loose sediments;
- search for sand and gravel deposits, mapping landslide bodies;
- checking the state of bridges, supports, tunnels;
- identification of landfills full of environmentally harmful waste;
- non-destructive surveying of buried tanks, hidden trenches, contaminated soil boundaries, and leakages.

To study the geological structure of the required section in the vertical direction, LOZA-V georadar, equipped with transceiver antennas, moves along the profile. The spatial step of measurements along the profile is selected depending on the required detail of the object study. When searching for small objects (pipes, cables and others), the step is 5–10 cm, and when examining geological objects (for example, sand pits), it is equal to 50–100 cm.

M.S. Rivanenko, Head of the Testing Laboratory Center of the State Budgetary Institution of Moscow "Center for Expertise, Research and Testing in Construction" (SBI "CEIIS")

In his report, *"Involvement of an expert organization within the framework of the state construction supervision"*, Maxim Rivanenko addressed the work, performed by the Moscow State Budgetary Institution "Centre for Examinations, Research and Testing in Construction", emphasizing that the mandatory element and, accordingly, the object of research is the project documentation, used as a benchmark to match the qualitative and quantitative characteristics of a building or a structure under construction. The main purpose of the work, performed by the staff of the Moscow State Budgetary Institution "Centre for Examinations, Research and Testing in Construction" is the instrumental control within the framework of the state construction supervision. The services, provided by this Institution are in great demand, and the amount of work, performed by the Institution, increases each year. The Institution represents an interconnected system that has two blocks: the main one (production) and auxiliary one (support). The production division focuses on seven areas: road construction control, control of load-bearing and enclosing structures; geodetic control; control of installation of engineering systems; sanitary and epidemiological control; fire control; quality control of sound insulation and facade structures. In turn, the support division has accounting, planning and economic departments, and the department of motor transport. The Institution maintains the necessary accreditation for this type of activity.

Since 2012, the Institution staff has implemented over 120,000 research projects and checked over 14,000 objects.

Presently, the Institution has the following problems.

In the course of the research, conducted within the framework of state supervision, it is impossible to compare the characteristics of an object under construction with regulatory requirements, the source of which is not specified in the project documentation for this object [6]. In other words, if a particular regulatory legal act is not listed in the project documentation, it is automatically excluded from the list of documents that can be considered by a construction supervision expert as the document that applies to this object.

The second problem is the lack of a unified approach to the structure of organizations involved in state construction supervision. The Institution employees have to conduct consultations with the regions where these organizations are being established.

These problems are being solved and everything is in place to eliminate their negative impact on the activities of expert

organizations involved in the state construction supervision in the Russian Federation.

L.I. Zaitseva, Associate Professor of the Department of Investment and Construction Business of the Russian Academy of National Economy and Public Administration under the President of the Russian Federation, Candidate of Juridic Sciences

Associate Professor Larisa Zaitseva presented a report entitled *"The assessment of the potential of structural engineering and cost examinations as alternative dispute resolution techniques"*.

The anti-crisis approach to bankruptcy encompasses rehabilitation and wellness procedures, the transformation of the role of arbitration managers, as well as the introduction of conciliation procedures aimed at reaching amicable agreements. At the early stages, an anti-crisis approach, including structural engineering examinations conducted within the framework of bankruptcy procedures, is used to restore the solvency of a legal entity, or the developer, which will allow the company to "survive". However, at the moment, only 2 % of companies remain stable and survive bankruptcy.

A wide range of out-of-court dispute resolution methods in investment and construction activities includes mediation, as the most popular type of settlement, and a number of other procedures, such as a "quasi-court", a dispute resolution and prevention commission, arbitration, as well as their combinations, such as mediation — arbitration and others. An early independent assessment of a dispute and multilateral negotiations are also employed. An examination is integrated into this process at any stage of dispute resolution.

The factors preventing the unlocking of the examination potential through the out-of-court resolution of construction-focused disputes include the following circumstances.

The first circumstance is the absence of industry-specific (targeted) regulation of the out-of-court examination, the abstract nature of its procedural norms, low court-related expenditures in the Russian Federation, which makes dispute resolution in the state court attractive; lack of friendly cooperation; formalized court work; abuse of procedural rights. It should also be noted that contractual constructions do not take into account the specific features of the construction industry in terms of applying alternative dispute resolution procedures and drafting clauses (including the "expert clause"). It is impossible not to mention the absence of a "reputational" criterion when choosing an examination institution, as well as the passive role of the state, acting as a customer in promoting alternative dispute resolution methods: 1.58 % of cases considered in arbitration courts end in a settlement agreement.

An examination, conducted in the context of alternative dispute resolution, has the following distinctive features.

The range of issues to be solved to effectively resolve the dispute, as well as their content are determined by experts (together with the parties to the dispute); examination costs are shared by the parties to the dispute; procedure (prompt interaction with the parties to the dispute, absence of procedural restrictions and others); selection of expert candidates is conducted by the parties themselves. The application of examination as an alternative method of dispute resolution is largely dependent on the lack of a project-oriented approach in the investment and construction sector. The issue of making an expert opinion binding also remains controversial. It can be quite difficult to find an expert having the necessary specialization.

This list of problems is not, of course, exhaustive; nevertheless, prerequisites are in place for the alternative methods of dispute resolution to become more widespread in Russia.

K.K. Maximov, Senior Expert of the Engineering and Technical Research Department of the Federal State Institution "Forensic Expert Center" of the Investigative Committee of the Russian Federation

Kirill Maximov presented the report *"Recommendations for the visual examination of the scene of an accident and examinations appointed in respect of criminal cases initiated on the basis of the facts of intoxication of people with carbon monoxide due to the operation of gas consuming equipment in housing accommodations"*, in which he briefly outlined the main provisions of the methodological recommendations for forensic structural engineering examinations in respect of the criminal cases related to the intoxication of people with carbon monoxide in housing accommodations. According to the speaker, these recommendations will allow to standardize these forensic examinations and reduce the time they take.

REFERENCES

1. Butyrin A.Yu., Stativa E.B. *Judicial construction and technical expertise in the arbitration process*. Moscow, Yurлитinform Publ., 2019; 200. (rus.).
2. *Survey: organization, expertise, management. Part 2. Expertise of the investment project. Risk management : tutorial*. P.G. Grabovy (ed.). 2nd ed., rev. and enl. Moscow, ASV Publ., Prosveditel' Publ., 2021; 448. (rus.).
3. *Economics and property management : in 2 parts*. P.G. Grabovy (ed.). Moscow, ASV Publ., Prosveditel' Publ., 2019; 512 p. (rus.).
4. Butyrin A.Yu., Stativa E.B. *Judicial construction and technical expertise in the arbitration process*. Moscow, Yurлитinform Publ., 2019; 68. (rus.).
5. *Economics and management of housing and communal services*. P.G. Grabovy, A.N. Kirillova (ed.). Moscow, ASV Publ., Prosveditel' Publ., 2019; 672. (rus.).
6. *Reconstruction and renovation of the existing buildings in the city : in 2 parts*. P.G. Grabovy, V.F. Kas'yanova (ed.). Moscow, ASV Publ., Prosveditel' Publ., 2020; 672. (rus.).

Актуальные проблемы судебных строительно-технической и стоимостной экспертиз и пути их решения

В Национальном исследовательском Московском государственном строительном университете 30 сентября – 1 октября 2021 г. состоялась национальная научно-практическая конференция «Судебная строительно-техническая и стоимостная экспертизы: проблемы и пути их решения». В своих пленарных докладах выступающие представили резуль-

таты глубокого и детального изучения вопросов назначения и производства судебных строительно-технических и стоимостных экспертиз в уголовном, гражданском, арбитражном и административном процессах, а также практику использования специальных строительно-технических знаний и знаний в области оценки недвижимости в досудебном порядке. Были выявлены и проанализированы складывающиеся тенденции в развитии этих направлений судебно-экспертной деятельности. Спикеры отметили рост потребности современного судопроизводства в использовании профессиональных знаний в области предпроектных изысканий, возведения, эксплуатации, ремонта и реконструкции эксплуатируемых

зданий и сооружений, а также знаний закономерностей формирования и трансформации рыночной и иной стоимости объектов недвижимости. Выступающие отметили возрастающее разнообразие видов судебно-экспертных исследований, проводимых в настоящее время сотрудниками как государственных, так и негосударственных судебно-экспертных учреждений. Особое внимание докладчиками было уделено профессиональной подготовке судебных экспертов, различным формам их обучения и повышения квалификации, способам обеспечения необходимого для работы уровня преподавания теоретических, процессуальных, организационных и методических основ судебной экспертизы, приобретение ими практических навыков проведения исследований и отражения их последовательности и результатов в заключениях экспертов.

Ключевые слова: судебная строительно-техническая экспертиза, судебная стоимостная экспертиза, судебный эксперт-строитель, конференция, судебно-экспертные учреждения, экспертная методика, уголовное дело, гражданское дело, следователь, судья

СПИСОК ИСТОЧНИКОВ

1. Бутырин А.Ю., Статива Е.Б. Судебная строительно-техническая экспертиза в арбитражном процессе. М. : Изд-во Юрлитинформ, 2019. 200 с.
2. Сервейинг: организация, экспертиза, управление. Часть 2. Экспертиза инвестиционного проекта. Управление рисками : учебник / под общ. науч. ред. П.Г. Грабового. 2-е изд., перераб. и доп. М. : Изд-во АСВ, Просветитель, 2021. 448 с.
3. Экономика и управление недвижимостью : в 2-х ч. / под ред. П.Г. Грабового. М. : Изд-во АСВ, Просветитель, 2019. 512 с.
4. Бутырин А.Ю., Статива Е.Б. Судебная строительно-техническая экспертиза в арбитражном процессе. М. : Изд-во Юрлитинформ, 2019. С. 68.
5. Экономика и управление жилищно-коммунальным хозяйством / под ред. П.Г. Грабового, А.Н. Кирилловой. М. : Изд-во АСВ, Просветитель, 2019. 672 с.
6. Реконструкция и обновление сложившейся застройки города : в 2-х ч. / под ред. П.Г. Грабового, В.Ф. Касьянова. М. : Изд-во АСВ, Просветитель, 2020. 672 с.

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The economic feasibility analysis of innovative megaprojects for the benefit of construction enterprises: the case of the Republic of Tatarstan

The strategic development of the Republic of Tatarstan determines its development prospects for the coming 10–20 years. Its land zoning has shown that Kazan, Kama and Almetyevsk are the three fastest developing agglomerations in the republic. Nonetheless, many areas cannot benefit from the flow of goods and resources. A research on logistics allows to assume that the development of a road transportation network, including the construction of bridges, tunnels and the use of the river transport (as the cheapest means of transport) is a must. Along with the development of transport arteries, the republic needs advanced development points, the construction industry growth triggers, modernization and reconstruction of construction industry enterprises.

In the article, the co-authors analyze the natural resources, available in Tatarstan and the prospects for the establishment of enterprises for the production of construction materials in Tatarstan. The co-authors consider alternative cement delivery routes, key products needed for the development of housing and industrial construction to ensure the economic prosperity of Tatarstan.

The co-authors have also analyzed the economic efficiency of investment projects to be implemented in Tatarstan Republic, including the launch of a cement production facility that will take advantage of the mineral resources in the Ulyanovsk region minerals and the imported clinker to be delivered from Iran by water. The co-authors have also considered the potential construction of the toll highway "Shali (M-7) – Bavly (M-5)".

Keywords: construction enterprises, cement, air hardened binding materials, toll highway, total investment costs

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INTRODUCTION

In May, 2011, within the framework of the cooperation plan, the Cooperation Agreement was signed between the Ministry of Transport and Road Facilities of the Republic of Tatarstan and the State Committee of the Republic of Tatarstan on transport and road economy. This agreement entailed the construction of the category 1A highway as a part of the Europe – Western China transport artery, passing through the territories of both republics (Fig. 1). The new international road, titled the Europe – Western China international transport corridor, to be constructed along the St. Petersburg – Kazan – Orenburg – Aktyubinsk – Almaty – Khorgos route, is an optimum way to connect Europe and China; it passes through the minimum number of countries and crosses the minimum number of borders (Fig. 2)^{1, 2, 3, 4, 5}.

1 On the adoption of Strategy of socio-economic development of the Republic of Tatarstan till 2030 : Law of the Republic of Tatarstan dated June 17, 2015 No. 40-ZRT with changes for December 25, 2019 (in an edition. Laws RT of 05.04.2019 No. 31-ZRT, of 25.12.2019 No. 112-ZRT) it is accepted by the State Council of the Republic of Tatarstan on June 10, 2015.

2 The development strategy in the field of architecture, urban planning, construction, building materials industry, in the housing and communal services of Tatarstan for the period of 2016–2021 and on prospect till 2030. Order No. 256/0 of 30.12.2016. Ministry of construction, architecture and housing and communal services of the Republic of Tatarstan.

3 "On approval of the long-term target program "Development of housing construction in the Republic of Tatarstan for the period of 11–2015" : The resolution of the Cabinet of the Republic of Tatarstan dated June 20, 2011 No. 492 (as amended on August 31, 2012).

4 On approval of the State program "Transport system of Tatarstan development for the period 2014–2024" : The resolution dated December 20, 2013 No. 1012 (as amended on July 30, 2021).

5 On approval of the concept of import substitution in the construction industry for the period 2015–2016 in the Republic of Tatarstan : The instruction dated September 19, 2015 No. 2091-r.

As part of the Europe – Western China international transport corridor project, Tatarstan is implementing the investment project "Construction of the toll highway "Shali (M-7) – Bavly (M-5)" as part of new artery of the federal highway "Kazan – Orenburg", within the framework of the project "Sviyazhsk interregional multimodal Logistics Centre (SMMLC)", needed to accelerate the development of construction enterprises in Tatarstan. The total cost of the project is 18.3 billion rubles. The centre is located at the intersection of key primary railways, waterways, and highways, which can minimize transportation and intra-warehouse costs^{3, 4, 5, 6, 7, 8, 9}.

GENERAL PART

Cement is the most widely used resource on Earth after water, as its annual consumption equals to about one ton per person.

The Russian cement industry is gradually recovering from the crisis caused by COVID-19. A decline in

6 On approval of the Concept of creating an industrial zone on the territory of the prospective development of the Sviyazhsk interregional multimodal logistics Center : Resolution of the Cabinet of the Republic of Tatarstan of July 18, 2012 No. 613.

7 On approval of Transport complex of Tatarstan development Strategy for the period 2016–2021 with prospect till 2030 : The order dated July 24, 2017 No. 253 (amended as of February 27, 2020) (in an edition. Order of the Ministry of Transport and Road Facilities of RT of 27.02.2020 No. 72).

8 Methodology for calculating the fee amount for toll roads and road facilities. The procedure for its collection and revision. Assessment of consumer demand. Approved by Order of the Ministry of Transport of the Russian Federation dated 19.05.2003 No. OS-435-r: industry road methodological document

9 Industry Road Methodological document (ODM) 218.11.006-2021. Methodological recommendations for assessing the efficiency of the use of innovations and achievements of scientific and technological progress in the road sector: industry road methodological document.



Fig. 1. Europe – Western China international corridor

demand was caused by the construction activity decrease in the country due to shutdowns of many infrastructure projects.

Cement is manufactured in 156 countries of the world. The major producers of cement are China, Russia, Japan and India.

The cement industry is of key importance for the economic development as it is main type of building materials for the construction of residential, industrial and infrastructure facilities. The rate of the cement industry development is 1.5–2 times higher than the global GDP growth rate [1].

In many regions of the Russian Federation, including Tatarstan, soil is composed of rock of sedimentary origin, including carbonate rock, like limestone and dolomites. Due to the features of the geological composition of the Earth crust, the territory of Tatarstan is not rich in carbonate raw materials, and their quality varies [1–3].

Carbonate raw materials are unevenly distributed over the territory of 43 districts of Tatarstan.

A consolidated analysis of mineral resources of the Tatarstan Republic has shown that the republic has 340 deposits of carbonate rock, 66 of them can be used for construction purposes. They include the saw stone, raw materials for the production of lime, magnesia binders and limestone flour. The amounts of raw materials usable for the production of non-combustible materials and hydraulic binders have not been determined.

According to the “Strategic concept for the capital construction development of the Tatarstan Republic until 2030”, today the republic has the following reserves of carbonate mineral raw materials: crushed stone — 178,137.6 thousand m³; saw stone — 15,039 thousand m³; decorative and finishing stone — 823.5 thousand m³; limestone binders — 68,532.5 thousand tons; magnesia binders — 3,647.5 thousand tons; ameliorants — 101,882.8 thousand tons [1].

The analysis of their application has shown that the republic does not produce raw materials used to make facing stone, dolomite lime and dolomite cement, hydraulic binders (Portland cement, hydraulic lime, roman cement), refractories and other materials not considered in this paper [4, 5].

In Tatarstan, there is practically no production of air binders made of local carbonate raw materials.

In the republic, limestones and dolomites, sandstones, are used in construction. In total, about 80 deposits of the building stone, widely used to produce crushed stone of the “200” brand, were taken into account.

There is one saw stone deposit within the republic, that is, the Karkalinskoye deposit, located in the Leninogorsk district. This saw stone is used in the construction of walls, ceilings and partitions.

Sand and gravel mixes (SGM) are the most popular mineral construction raw materials, widely used as concrete, reinforced concrete, and asphalt concrete fillers. They are also used to make plaster and masonry mortars and the ballast for foundations of highways. Tatarstan has about 60 SGM deposits. Building sand is concentrated in the water area of the Nizhnekamsk water reservoir near Kazan.

There are very few pure limestones in Tatarstan.

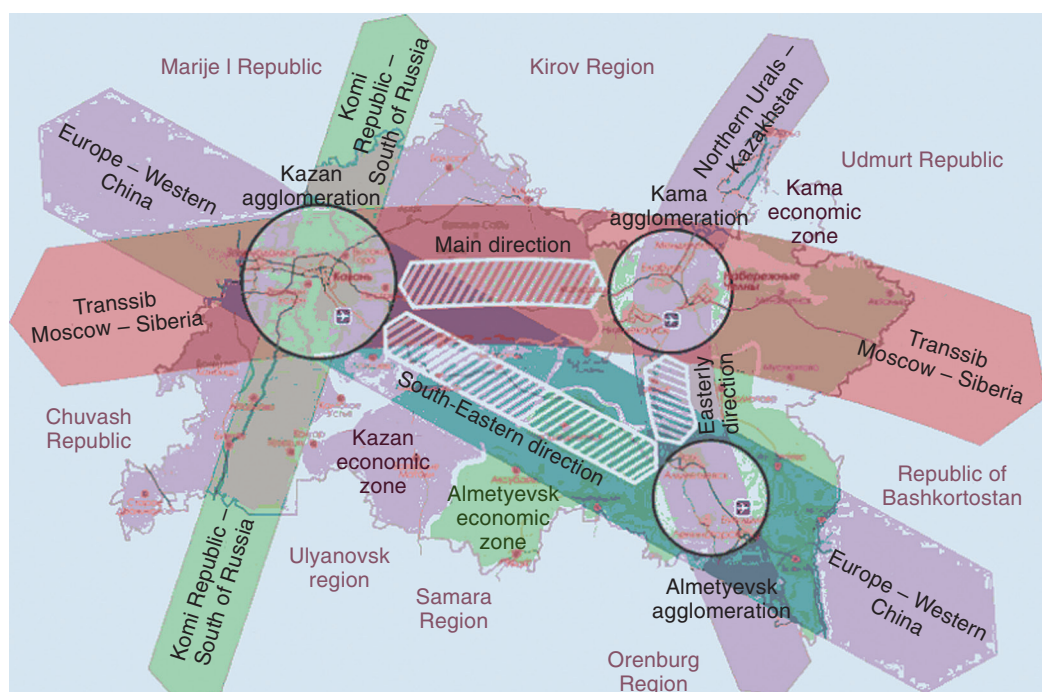


Fig. 2. The Republic of Tatarstan in the context of federal and cross-regional transport corridors

The development and application of resource- and energy-saving technologies for the production of building materials are feasible if local mineral raw materials are used. Their use must be based on the selective approach to raw materials; increasing the suitability of raw materials (for example, by switching to carbonate raw materials), the use of multi-level technologies to increase waste-free production; reducing energy consumption (reducing the temperature of heat treatment, duration of technological processes, etc.); using additives to expand the range of functional properties; optimizing properties and expanding the range of products.

However, the project of own cement production in the Republic of Tatarstan has a significant natural barrier. The point is that there are only three relatively large deposits of cement raw materials in the republic: Zelenodolskoye, Drozhzhanovskoye and Mendelevskoye, and none of them are suitable for the organization of industrial production in terms of required volumes and quality [6–8].

Thus, at the moment, it is impossible to build a full-cycle cement plant with a capacity of more than 1 million tons of cement per year. To launch a plant of such capacity, deposits of low magnesium limestone having reserves of more than 50 million tons are needed, which are not available in the republic.

Therefore, the most competitive are the following options of providing the Republic of Tatarstan with cement:

- the purchase of finished cement from the Saratov region (OAO "Volskement plant");
- the purchase of finished cement from the Mordovia region (OAO "Mordovcement");
- the purchase of finished cement from the Ulyanovsk region (OAO "Ulyanovskcement");
- a joint venture to be set up for the production of cement on the basis of the Ulyanovsk region deposits;
- logistics chains to ensure the purchase of the cement clinker from Iran to launch the manufacturing process [6].

If finished cement is to be purchased, the following suppliers can be considered:

Volsky sulphate-resistant cements are ideal for the manufacture of concretes that withstand the influence of corrosive media containing sulphates (when the concentration of sulfate ions exceeds 3000 mg-eq/l). A distinctive feature of Volsky sulphate-resistant cements is its lower heat release during hardening (2–3 times), which allows them to be successfully used in the construction of large cast-in-place structures (dams, port berths, etc.). Volsky cements are recommended for use in conditions of multiple freezing and thawing, moistening and drying of the cement stone (50–70 cycles).

Mordovian cement was used to make the dams of hydroelectric power plants on the Volga and Kama, hydraulic structures of the irrigation systems of Central Asian republics, ports in Murmansk, Tallinn, Nakhodka, Arkhangelsk; Nizhny Novgorod and St. Petersburg subways, Volga and Kama car factories, Cherepovets smelter, Cheboksary plant of industrial tractors, sports facilities of the 27th World Summer Universiade 2013 in Kazan, 22nd Winter Olympic Games 2014 in Sochi [6].

The raw materials supplied by JSC "Ulyanovsk Cement" allow for the early setting strength due to the high content of aluminum oxides. The plant is a smoothly operating facility; quality control is carried out at every stage of production from the supply of raw materials to the shipping of products to end consumers.

THE ECONOMIC FEASIBILITY ANALYSIS OF INNOVATIONS

A. The economic feasibility analysis of launching cement production

The per-ton cost of cement delivery to construction industry enterprises, with transportation charges included, is presented in Table 1.

Potential investors are willing to launch cement production and use imported clinker. The capacity of the cement production facility will reach 1 million tons per year.

Since the delivery of clinker by water transport is considered the cheapest alternative, it is assumed that two manufacturing facilities with the total capacity of about 2 million tons of cement per year will be launched in Kazan and Naberezhnye Chelny. Subsequently, it is

Table 1. Per-ton cement cost with transportation charges included

Breakdown of expenses	Total rubles per ton
Transportation by rail from Volsk (593 km)	
Per-ton price of cement	3,800
Transportation charges	1,323.61
Total cost with the transportation charges included	5,123.61
Transportation by rail from Mordovia Republic Railway station Nuya (593 km)	
Per-ton price of cement	3,600
Transportation charges	921.29
Total cost with the transportation charges included	4,521.29
Transportation by rail from Ulyanovsk (246 km)	
Per-ton price of cement	3,900
Transportation charges	820.67
Total cost with the transportation charges included	4,720.67

► advisable to replace part of the imported semi-finished product with clinker made of local raw materials.

The final cost of clinker imported from Iran consists of the manufacturer's price and transportation charges and totals at 2,320 rubles per ton (Table 2).

Table 2. The per-ton cost of clinker transported by water from Iran with transportation charges included

Types of costs	Total rubles per ton/for 1,791 km
Per-ton price of clinker from Iran	1,980
Transportation charges	340
Total costs with transportation charges included	2,320 rub/ton

Hence, due to the favourable geographical position, it is possible to launch a joint venture in the Tatarstan Republic to be engaged in the manufacturing of cement based on Ulyanovsk region's minerals. The research calculations made using Alt-Invest-Construction software shows that the total amount of investments required for the construction of a joint venture equals to 20,008,774 thousand rubles, and the major part of the amount will be invested into buildings and structures.

Besides, it is economically feasible to produce cement from clinker imported by water from Iran.

The purchase of cement clinker from the Islamic Republic of Iran is designated for the production of cement from imported clinker on the territory of the Sviyazhsk Centre in the Republic of Tatarstan. Located at the crossroads of the international transport corridors "North-South" and "West-East", with access to the Federal railroad, water, and motor highways, Sviyazhsk logistics terminal can become the nucleus of the transportation and logistics system of the Volga region in the future [1].

Table 3. Total investment cost efficiency

Indicators	Values	Measurement unit
A cement producing joint venture that will consume minerals from the Ulyanovsk region		
Required investment amount	20,008,774	thousand rubles
Cement price per ton	4,450.37	rub
Simple payback period	5.14	years
Net present value (NPV)	688,179	thousand rubles
Discounted payback period (DPP)	7.65	years
Internal rate of return (IRR)	27.6	%
Cement production from clinker imported by water from Iran		
Required investment amount	575,146	thousand rubles
Cement price per ton	3,800, 00	rub.
Simple payback period	3.57	years
Net present value (NPV)	8,987,319	thousand rubles
Discounted payback period (DPP)	3.61	years
Internal rate of return (IRR)	192.3	%

The terminal is capable of becoming a major imported and exported cargo handling point that will serve all Volga regions, as well as a key river port for cargo transportation using international transport corridors.

The project implementation term is up to 4 years. The term is determined based on reaching the enterprise's full capacity, the term of repayment of borrowed funds. The total amount of investments to be made is 575,146 thousand rubles, the major portion of this amount will be invested in the construction of buildings and structures (Table 3).

The main research findings are presented in Fig. 3.

B. Economic justification of the toll highway construction megaproject

Highway parameters: length — 299 km; 1A technical category; 4 lanes with a median strip; no intersections at the same level; maximum speed — 150 km/h.

The construction of highway "Shali (M-7) – Bavly (M-5)" is conditionally divided into four sections: "Sorochy Gory – Shali (M-7)" — 40 km; "Bridge crossing over the Kama River at Sorochy Gory village" — 14 km; "Alekseevskoe – Almetevsk" — 145 km; "Almetevsk – Bavly (M-5)" — 100 km [6].

Let's consider the methodology used for calculating the fee charged for toll roads and road facilities in relation to the analyzed facility.

The fee must correspond to the number and quality of services provided to the user of a toll highway or a road facility, and take into account the need to fully or partially cover the costs of construction (reconstruction) of a highway or a road facility and the cost of their operation [8–10].

The benefits of toll roads and road facilities are:

- savings in operating costs (transportation costs) in the form lower fuel and lubricant consumption, tire wear, repair and other costs;
- shorter goods/passengers delivery time; higher comfort and traffic safety.

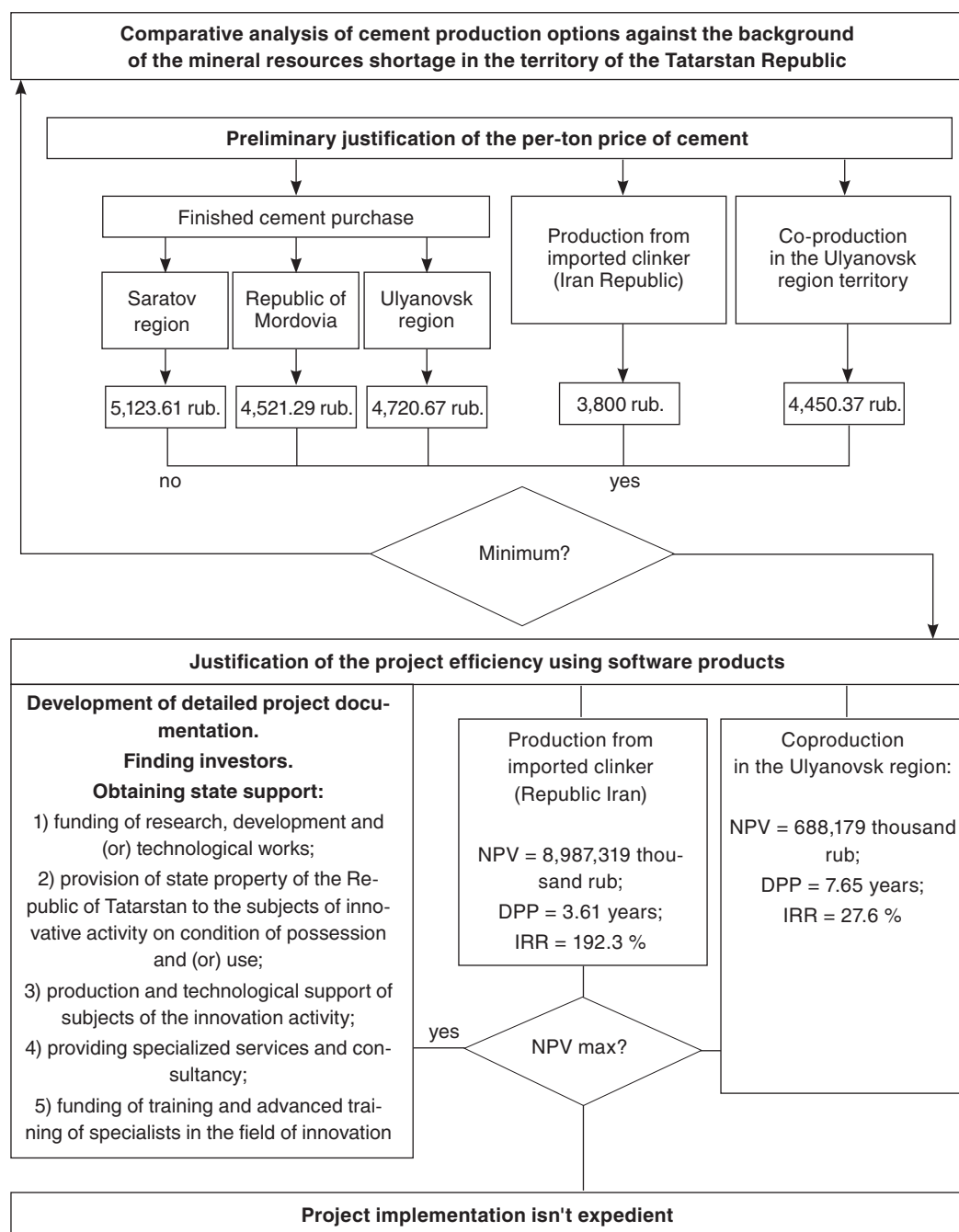


Fig. 3. Comparative analysis of cement production options against the background of mineral resources shortage in the Tatarstan Republic

The maximum toll amount must not exceed the ultimate (maximum) value of savings made by users of toll highways and roads.

Today, cargoes are delivered from Europe to Asia and back by sea through the Suez Canal. The delivery time via this route with a length of 21 thousand km is 30–40 days. An alternative option is the delivery by road using the Europe – Western China route, here, the delivery time is 14–18 days. The advantage of the road transport corridor Europe – Western China for cargo owners is its low cost and delivery time.

As part of the international project on building the transport corridor Europe – Western China, the Republic of Tatarstan is implementing an investment mega-project on construction of the toll

highway "Shali (M-7) – Bavlly (M-5)" as part of a new route for the Federal highway Kazan – Orenburg (Fig. 4) [6].

The Tatarstan Republic is one of the most developed regions of Russia in terms of the transportation infrastructure. In the coming years, promising megaprojects will be implemented in the region, attracting additional cargo flows to its territory and revenues to be generated by transit operations not only in Tatarstan, but also in Russia as a whole.

About 20 million tons of cargo is currently transported through the territory of the Russian Federation from Asia to Europe, and over a third of it passes through the territory of the Volga Federal District. The annual cargo flow across the border of the Republic of Kazakhstan and the Orenburg region is about 7 million tons. According to



Fig. 4. Situational plan of highway “Shali – Bavly”

the experts’ forecasts, cargo transportation across Russia in the Asia–Europe direction may increase significantly in the next 15–20 years, reaching about 100–150 million tons a year [8, 9].

The toll charge is differentiated depending on the type and carrying capacity of vehicles. The classification of vehicles is presented in Table 4. [17, 18].

Each of these four groups has a characteristic vehicle: Vaz-2170 LADA Priora, GAZ-3310 Valdai, KamAZ-5520, Nefaz 3297. Amounts saved by these vehicles, if they take the toll route, are calculated and compared with the same vehicles taking alternative routes, and the resulting values are applied to the entire group.

The process of calculating the toll charge and compiling the toll charges list has the following stages: initial data collection and list drafting; calculating amounts saved by users of toll roads in comparison with alternative free routes; assessing the consumer demand for travel services on toll roads; determination of optimal toll charges; compiling the toll charges list.

The economic evaluation S_{Σ} of total savings (effect) made by the user of the toll road includes (Fig. 5):

$$S_{\Sigma} = S_{op} + S_d + S_t + S_a, \tag{1}$$

where S_{op} — costs saved due to the vehicle operation on a toll road facility compared to an alternative road; S_d — savings from

Table 4. Vehicle classification

Groups and types of vehicles	Identification	Classification	
		Weight, <i>t</i>	Axis number
Group I Motorcycles with and without a trailer (sidecar) Passenger cars with and without a trailer Vans, minibuses with up to 11 seats, trucks	G1	Below 3.5	Two
Group II Trucks Trailers Buses with 11 to 29 seats	G2	From 3.5 to 8.0	Less than three
Group III Trucks Trailers	G3	More than 8.0	More than three
Group IV Buses with 30 + seats Special large-sized vehicles	G4	More than 8.0	Is not used

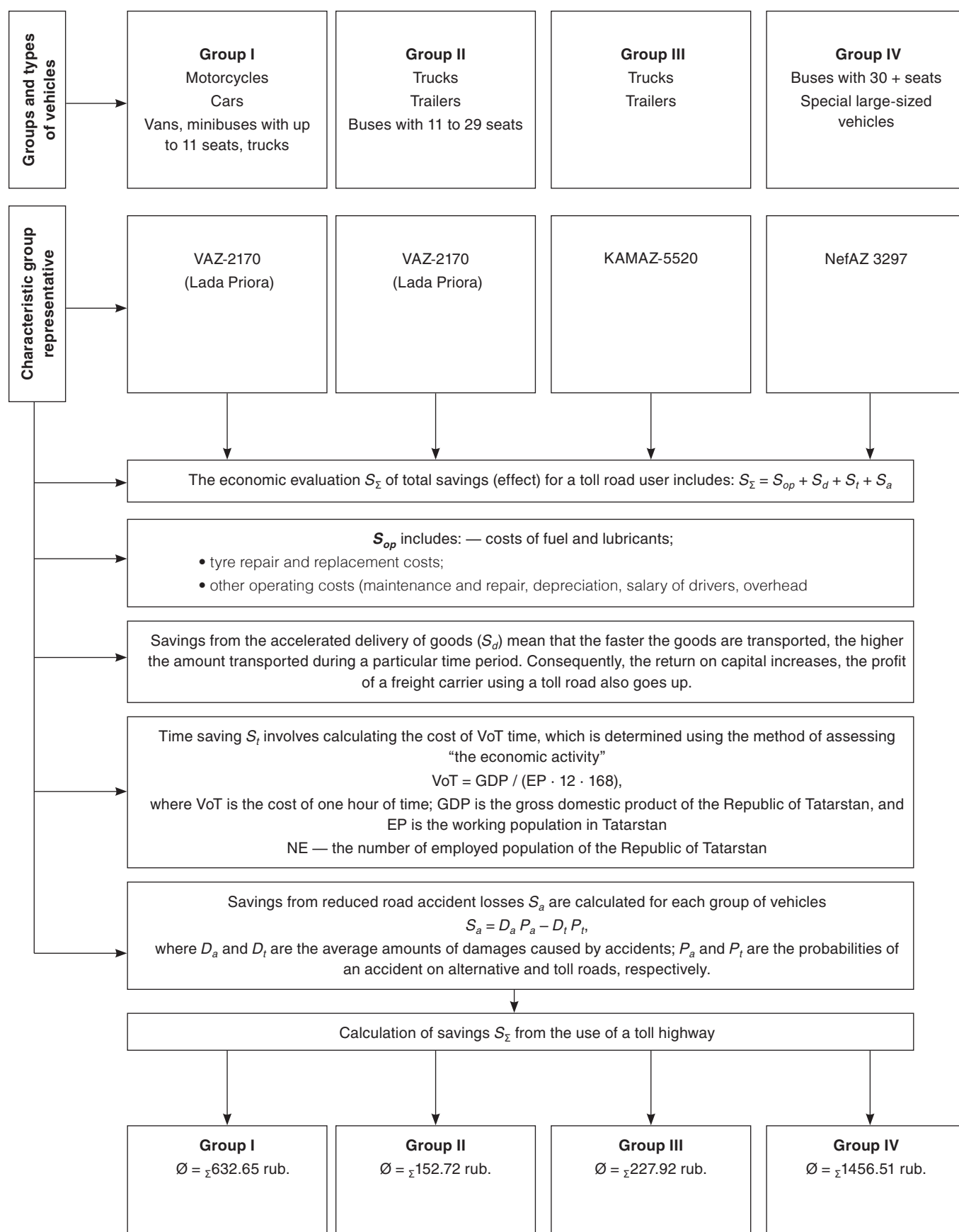


Fig. 5. Economic evaluation of total benefits (effect) obtained by the user of the toll road

► speeding up the cargo delivery; S_t — savings from the reduced travel time; S_a — savings from reducing the risk of accidents.

The efficiency of the total investment costs in respect of the project on the construction of a toll highway is calculated using the Alt-Invest-Construction software (Table 5).

The discounted payback period (PP) is the minimum period required to achieve zero NPV. It is 6.66 years (see Fig. 6), given that the service life of the highway without major repairs is 15–19 years.

When calculating the performance indicators, project risks were taken into account at various project stages, including preparation, construction and operation (Table 6) [11, 12].

The discount rate, taking into account the risks of the project, is calculated according to formula (2):

$$d = d_i + \frac{R}{100\%}, \quad (2)$$

where d_i is a risk-free rate, is determined using formula (3); R — risk adjustment.

$$d_i = \frac{1 + \frac{r}{100\%}}{1 + \frac{i}{100\%}} - 1, \quad (3)$$

where r is the refinancing rate of the Central Bank of the Russian Federation; i is the officially announced rate of inflation for the current year.

Hence, the calculated value of the discount rate equals to:

$$d = 0.04 + \frac{8\%}{100\%} = 0.12(12\%).$$

Table 5. Total investment efficiency

Indicators	Values	Measurement unit
Construction of toll highway "Shali-Bavly" having improved fast-track pavement		
Investment amount required	19,067,455	thousand rubles
Toll charge amount	1,062	rub.
Simple payback period	4.89	years
Net present value (NPV)	14,120,323	thousand rubles
Discounted payback period (DPP)	6.66	years
Internal rate of return (IRR)	25.1	%

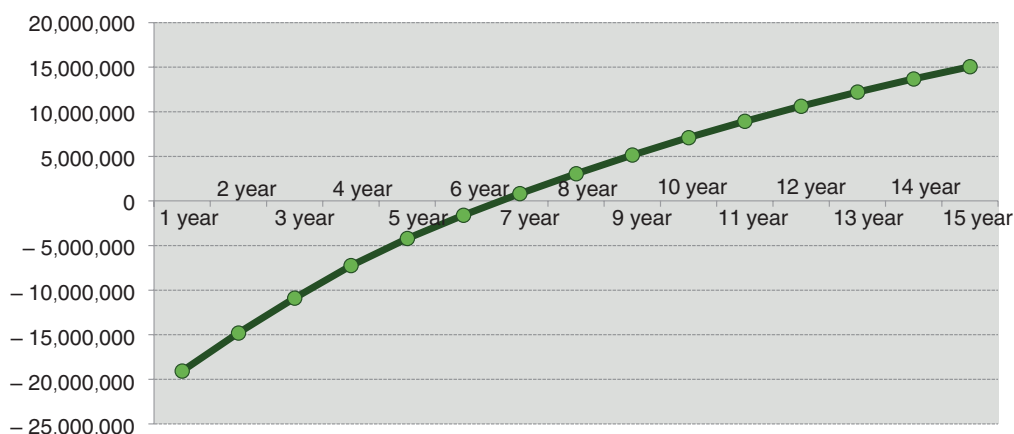


Fig. 6. Projected payback period for total investments

Table 6. Expert evaluation of project risks

No.	Simple risks	Wi (weight)	Pi (value of risk)
1	Preparatory stage (preparation)	0.12	1.00
2	Construction	0.2	2.00
3	Operation:	0.68	5
3.1	a) financial and economic	0.30	4.00
3.2	b) social	0.15	1.00
3.3	c) technical	0.15	0.00
3.4	d) ecological	0.08	0.00
Total project risk		$R = 8.00$	

We will simulate project risks on the basis of various initial indicators: the sale price, current (operating) costs, the discount rate, the required investment amount. The resulting value is the net present value of the project, or NPV (Fig. 7) [11].

Risk modeling has shown that NPV is most sensitive to the growth of project risks: an increase in the discount rate by 18 % will make the project will become ineffective. The safety margin is 40 %, since a 50 % reduction in the sale price makes the project ineffective. Performance indicators show little sensitivity to an increase in the investment amount and current costs.

CONCLUSION

Therefore, the toll highway project is financially feasible, cost-effective, and socially significant for the development of the Tatarstan Republic and the Russian Federation as a whole.

The following areas of development are set in the current "Strategy of the socio-economic development of the Republic of Tatarstan until 2030":

- renewal of transport and engineering systems, their intensive restoration and replication based on the development and implementation of effective social, scientific and technical programmes, federal and regional projects;
- increasing the investment attractiveness and innovative activity of industrial and construction enterprises, importation substitution and other actions.

These and many other tasks can be solved through the construction of transport arteries connecting the territories of advanced development, points of growth with all other municipalities, that need to boost their population and employment.

Sensitivity analysis		Adjust...	
Variable parameter			
Implementation cost			
Within the range			
	From:	100%	From the
	In increments:	-10%	planned one
Total indicator			
NPV for total investments			
Table of calculated values		Value	Result
Recalculate...		100%	14120 323
		90%	10902 936
		80%	7677 825
		70%	4436 252
		60%	1178 603
		50%	-2103 477
		40%	-5422 348

Sensitivity analysis		Adjust...	
Variable parameter			
Discount rate			
Within the range			
	From:	12%	From the
	In increments:	6%	planned one
Total indicator			
NPV for total investments			
Table of calculated values		Value	Result
Recalculate...		12%	14120 323
		18%	5603 251
		24%	209 555
		30%	-3402 549
		36%	-5941 616
		42%	-7801 848
		48%	-9213 327

Sensitivity analysis		Adjust...	
Variable parameter			
Operating expenses			
Within the range			
	From:	100%	From the
	In increments:	15%	planned one
Total indicator			
NPV for total investments			
Table of calculated values		Value	Result
Recalculate...		100%	14120 323
		115%	13938 443
		130%	13756 564
		145%	13574 685
		160%	13392 805
		175%	13210 926
		190%	13029 047

Sensitivity analysis		Adjust...	
Variable parameter			
Total investment amount			
Within the range			
	From:	100%	From the
	In increments:	12%	planned one
Total indicator			
NPV for total investments			
Table of calculated values		Value	Result
Recalculate...		100%	14120 323
		112%	11967 334
		124%	9806 756
		136%	7629 649
		148%	5452 542
		160%	3260 909
		172%	1062 021

Fig. 7. Analysis of NPV sensitivity to changes in initial parameters

REFERENCES

1. Safin L.R. "Corridor" of the development of the transport infrastructure of the Republic of Tatarstan. *Industrial and environmental safety: scientific and technical journal*. 2011; 10(60):18-19. URL: <https://prominf.ru/article/koridor-razvitiya-transportnoy-infrastruktury-respubliki-tatarstan> (rus.).
2. Usmanov A.N. The Sviyazhsk interregional multimodal logistic center. Ministry of transport and roads of the Republic of Tatarstan, 2021. URL: <https://mindortrans.tatarstan.ru/investproekt/annotaciya.htm> (rus.).

3. Rozhko O.N., Homenko V.V. Cooperative communications of the republic of Tatarstan in the international system of transport corridors. *The Review of Economy, the Law and Sociology*. 2016; 1:65-73. URL: <https://www.elibrary.ru/item.asp?id=25778622> (rus.).
4. Kamalova Z.A., Smirnov D.S. Some possibilities of production of portland cement in the Republic of Tatarstan. *News of the Kazan State University of Architecture and Engineering*. 2009; 2(12):246-249. URL: <https://www.elibrary.ru/item.asp?id=13036581> (rus.).
5. Medvedev V.R., Tagirov G.F. Integration of Russia into the system of the international transport corridors. *Bulletin of the Kazan Scientific*

- Research Technological University. 2014; 23:475-479. URL: <https://www.elibrary.ru/item.asp?id=22671113> (rus.).
6. Implementation of the investment project "Construction of the toll highway "Shaly (M7) – Bavy (M5)". 2021. URL: https://mindortrans.tatarstan.ru/investproekt/annotaciya_Shali.htm (rus.).
7. Krupnov A.G. Transport infrastructure of the Republic of Tatarstan as factor of sustainable development of the region. Current trends of science and technology development. 2015; 6-6:64-67. URL: <https://www.elibrary.ru/item.asp?id=24285015> (rus.).
8. Bushansky S.P. Efficiency of toll roads issues. Economic analysis: theory and practice. 2012; 42(297):2-8. URL: <https://www.elibrary.ru/item.asp?id=18062892> (rus.).

9. Bushansky S.P. Socio-economic risks of toll roads. Economic analysis: theory and practice. 2015; 10(409):36-46. URL: <https://www.elibrary.ru/item.asp?id=23034509> (rus.).
10. Kleshcheva O.A. Development of highway construction in the Republic of Tatarstan. Bulletin of Economics, Law and Sociology. 2015; 3:49-52. URL: <https://www.elibrary.ru/item.asp?id=24295214> (rus.).
11. Koryakin A.S. Sensitivity analysis of the investment project. Science Symbol: international scientific journal. 2016; 6-1(18):205-208. URL: <https://www.elibrary.ru/item.asp?id=26287891> (rus.).
12. Grabovy P.G. Environmental aspects of the substantiation of production solutions for the extraction and processing of rock for construction industry enterprises. Real estate: economics, management: journal. 2020; 1:15-19. URL: <https://www.elibrary.ru/item.asp?id=42669869> (rus.).

Обоснование экономической эффективности реализации инновационных мегапроектов для нужд предприятий стройиндустрии (на примере Республики Татарстан)

Вектор стратегического развития Республики Татарстан (РТ) необходимо определить, чтобы сделать вывод: какой будет республика через 10–20 лет. Как показывает территориальное зонирование республики, основное развитие затрагивает три крупные агломерации: Казанскую, Камскую и Альметьевскую. При этом многие районы остаются в стороне от движения товаро- и ресурсопотоков. Рассмотрение логистики позволяет предположить, что необходимо развитие дорожной транспортной сети, в том числе строительство необходимых мостов, туннелей и использование возможностей речного транспорта (как самого дешевого). Одновременно с развитием транспортных артерий необходимо создание точек опережающего развития, точек роста строительной отрасли, проведение модернизации и реконструкции предприятий стройиндустрии и, как следствие, сопутствующих отраслей.

В данной статье проведен анализ состояния минерально-сырьевой базы РТ и перспективы создания на территории РТ предприятий по производству строительных материалов. Рассмотрены различные варианты обеспечения РТ цементом, имеющим ключевое значение для развития жилищного и промышленного строительства и в целом для экономического развития РТ.

Выполнено обоснование экономической эффективности реализации на территории РТ инвестиционных проектов по созданию предприятий по производству цемента на базе полезных ископаемых Ульяновской области и из привозного клинкера, доставляемого водным путем из Ирана, а также по строительству платной автомагистрали «Шали (М-7) – Бавлы (М-5)».

Ключевые слова: предприятия стройиндустрии, цемент, воздушные вяжущие материалы, платная автомагистраль, полные инвестиционные затраты

СПИСОК ИСТОЧНИКОВ

1. Сафин Л.Р. «Коридор» развития транспортной инфраструктуры Республики Татарстан // Промышленная и экологическая безопасность: научно-технический журнал. 2011. № 10 (60). С. 18–19. URL: <https://prominf.ru/article/koridor-razvitiya-transportnoy-infrastruktury-respubliki-tatarstan> (rus.).
2. Усманов А.Н. Свяжский межрегиональный мультимодальный логистический центр // Министерство транспорта и дорожного хозяйства Республики Татарстан, 2021. URL: <https://mindortrans.tatarstan.ru/investproekt/annotaciya.htm>
3. Рожко О.Н., Хоменко В.В. Кооперационные связи Республики Татарстан в международной системе транспортных коридоров // Вестник экономики, права и социологии. 2016. № 1. С. 65–73. URL: <https://www.elibrary.ru/item.asp?id=25778622>
4. Камалова З.А., Смирнов Д.С. О некоторых возможностях производства портландцемента в Республике Татарстан // Известия Казанского государственного архитектурно-строительного университета. 2009. № 2 (12). С. 246–249. URL: <https://www.elibrary.ru/item.asp?id=13036581>
5. Медведева В.Р., Тагирова Г.Ф. Интеграция России в систему международных транспортных коридоров // Вестник Казанского

- технологического университета. 2014. № 23, с. 475–479. URL: <https://www.elibrary.ru/item.asp?id=22671113>
6. Реализация инвестиционного проекта «Строительство платной автомагистрали «Шали (М7) – Бавлы (М5)». 2021. URL: https://mindortrans.tatarstan.ru/investproekt/annotaciya_Shali.htm
7. Крупнов А.Г. Транспортная инфраструктура республики Татарстан как фактор устойчивого развития региона // Современные тенденции развития науки и технологий. 2015. № 6-6. С. 64–67. URL: <https://www.elibrary.ru/item.asp?id=24285015>
8. Бушанский С.П. Вопросы эффективности платных дорог // Экономический анализ: теория и практика. 2012. № 42 (297). С. 2–8. URL: <https://www.elibrary.ru/item.asp?id=18062892>
9. Бушанский С.П. Социально-экономические риски платных дорог // Экономический анализ: теория и практика. 2015. № 10 (409). С. 36–46. URL: <https://www.elibrary.ru/item.asp?id=23034509>
10. Клещева О.А. Развитие автодорожного строительства в Республике Татарстан // Вестник экономики, права и социологии. 2015. № 3. С. 49–52. URL: <https://www.elibrary.ru/item.asp?id=24295214>
11. Корякин А.С. Анализ чувствительности инвестиционного проекта // Символ науки: международный научный журнал. 2016. 6-1 (18), с. 205–208. URL: <https://www.elibrary.ru/item.asp?id=26287891>
12. Грабовый П.Г. Экологические аспекты обоснования производственных решений по добыче и переработке пород для предприятий стройиндустрии. Национальный исследовательский Московский государственный строительный университет // Недвижимость: экономика, управление: журнал. 2020. № 1, с. 15. 19. URL: <https://www.elibrary.ru/item.asp?id=42669869>

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УДК 06+338.48

ИВЕНТ-ДЕВЕЛОПМЕНТ: УРОКИ БУДУЩЕГО (по материалам Всемирной выставки Экспо 2020 в Дубае)

В условиях пандемии, осложнившей обмен идеями и диалоговые режимы обсуждения концепций развития, повышается актуальность мировых выставок как эффективных площадок поиска вариантов развития и создания общего будущего на основе учета подходов различных стран. Выставка Экспо 2020, открывшаяся в октябре 2021 г. в Дубае (ОАЭ), стала не только крупнейшей за 150-летнюю историю выставок, но и привнесла много нового в механизмы ивент-девелопмента, активно используемые в настоящее время для проведения имеющих важное международное значение событий. Во-первых, пространство Экспо было структурировано в трех основных направлениях: «Устойчивое развитие», «Мобильность», «Возможности». Во-вторых, все участники имели возможность продемонстрировать их видение общего будущего. В-третьих, ивент-проект Экспо 2020 стал крупнейшим в новейшей истории архитектурным аттракционом, объединившим концептуально и стилистически новейшие подходы к структурированию среды жизнедеятельности. В-четвертых, креативность стала основой всех павильонов, а искусственный интеллект, смарт-технологии и когнитивные подходы были визуализированы во всех сферах и элементах системы «Природа – Общество – Человек». В-пятых, фактически все павильоны были сегментированы на возможности в обеспечении устойчивого развития. Российский павильон, расположенный в сегменте «Мобильность», объединил видеоряд прикладных проектов структуризации пространств жизнедеятельности, идеи развития сознания и интеллекта, подчеркнув значение крупнейших отечественных компаний в интерактивном мультимедийном формате захватывающего шоу. Будущее, создаваемое общими усилиями, невозможно без синтеза идей в поисковом режиме познания. Мобильный формат российской экспозиции дополнил особенности ивент-проекта Экспо 2020. Его дальнейшее развитие и капитализация в формате инновационной экосистемы станет очередным шагом существенного повышения экономической эффективности ивент-девелопмента.

Ключевые слова: среда жизнедеятельности, мировая выставка, ивент-девелопмент, креативная экономика, устойчивое развитие, структурированное пространство

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ОБЩАЯ ПРОБЛЕМАТИКА

Организация Объединенных Наций объявила 2021 г. годом креативной экономики. Ее целевой фокус сосредоточен на создании креативной среды жизнедеятельности не только в крупных городах, но и в регионах. Региональные креативные кластеры повсеместно становятся центрами развития национальных экономик, а их возникновение все чаще в новейшей истории представляет собой следствие реализации масштабных мегапроектов, приуроченных к событиям, имеющим мировое значение. Именно масштабные публичные мероприятия, будучи капиталоемкими и требующими не только особой пространственной локализации, но и специальных организационных механизмов, стали предметом ивент-девелопмента. Последний представляет собой организационно-экономический механизм управления ивент-проектами на всех стадиях их жизненного цикла, а обеспечение экономической эффективности инвестиций в этот тип проектов становится системной задачей новой постковидной реальности. И если Олимпиада в Токио прошла без зрителей, то стартовавшая в Дубае выставка Экспо 2020 объединила экспертное сообщество, потоки посетителей и туристических групп, специализированных мероприятий, шоу, конференций и др. Это позволило представить

практически все форматы креативных подходов к созданию общего будущего [1].

Среди традиционных ивент-проектов саммитов, чемпионатов, спартакиад, олимпиад и многих других событийных мероприятий, имеющих международное значение, всемирные выставки занимают особое место. Они аккумулируют все сферы жизнедеятельности общества, особенности национальных подходов к решению проблем развития и безопасности, позволяют переформатировать глобальные ценности, определяя будущее системы «Природа – Общество – Человек».

ЭВОЛЮЦИЯ ИВЕНТ-ДЕВЕЛОПМЕНТА В ВЫСТАВОЧНОМ СЕГМЕНТЕ

Цели, задачи, а главное, функционал и механизмы ивент-девелопмента за 150-летнюю историю мировых выставок претерпели существенные изменения. Они коснулись не только целевых фокусов, но и механизмов реализации — от демонстрации достижений науки и техники и поиска сфер применения фундаментальных открытий до формирования общепланетарных целей развития: восстановления экологического равновесия, создания комфортной городской среды, оптимизации ресурсопотребления и др. Касательно функционального наполнения ивент-проектов, их расширение коснулось использования

▶ новых форм развлечений в диапазоне от представления уникальных светомузыкальных шоу до интерактивных игр, в равной мере доступных взрослым и детям, инвалидам и здоровым людям, пожилым и молодым. Информационное обеспечение, навигация, клиентоориентированность дополнились дегустационными и ознакомительными мероприятиями. Пространственная локализация расширилась, а архитектурное разнообразие и концептуальные подходы стали структурироваться, подчиняясь общей идее поиска гармоничного будущего.

Всемирная выставка в Дубае стала важнейшим и крупнейшим международным событием, с одной стороны, впитавшим и развившим опыт предшественников, с другой — открывшим возможность посещения и прямых контактов с начала пандемии. Экспо 2020 стартовала 1 октября 2021 г. и продлится до марта 2022 г. Более 25 млн чел. (70 % из-за рубежа) готовы принять организаторы. 192 страны-участницы представили не только проекты лучших архитекторов и архитектурных бюро, но и собственные концепции поиска путей «Объединения умов и создания будущего» в трех заданных организаторами тематических зонах: «Устойчивость», «Мобильность» и «Возможности», образно названных «трилистником» [2]. Именно эти три направления по замыслу организаторов невозможно реализовывать без синергии общих усилий в русле идентичного понимания гуманитарных, научно-технических, национальных и глобальных целей. Сложность целевой фокусировки Экспо 2020 заключалась в том, что ОАЭ выиграли право проведения всемирной выставки в 2013 г. Динамичность мирохозяйственных процессов оказалась настолько велика, что общие ценности обеспечения устойчивого развития оказались подвержены сильному влиянию труднопредсказуемых геополитических факторов, реструктуризации общественных потребностей и динамике вызовов развития. Следует отдать должное организаторам — идеи их «трилистника» устояли и перед ковидными вызовами. Стресс-фактор пандемии скорректировал сегмент «Возможности» и изменил режим безопасности.

Масштаб задач создания и презентации будущего определил размах дубайской выставки. Она оказалась крупнейшей за все 150 лет проведения Экспо. Первая Всемирная выставка состоялась в Лондоне в 1851 г. Нынешняя выставка, 37-я по счету, стала первой на Ближнем Востоке. В процесс подготовки было вложено более 8 млрд долл. и обустроено 438 га земли, выделенных на окраине Дубая [3]. Для сравнения с этой огромной по общепринятым меркам территорией (примерно 600 футбольных полей) скажем, что предшествующая выставка в Милане приняла 145 стран-участниц, а по площади была в 3 раза меньше Дубайской. В отличие от предшествующих проектов ивент-девелопмента все без исключения объекты Экспо 2020 были построены заново. В целом выставочный комплекс включал в себя 275 сооружений, в том числе ветку и станцию наземного метро Dubai Exhibition Centre, специально построенный комплекс апартamentов, гостиниц и объектов городской инфраструктуры [4]. Из уникальных сооружений Экспо 2020 отметим площадь Аль Васл с самым большим в мире несущим куполом, возведенным по проекту чикагского бюро Adrian Smith + Goraon Gill Architecture (рис. 1). В монтаже этого сложнейшего сооружения участвовало более 800 высококлассных технических специалистов, обеспечивших пространство, затененное в дневное время и освещаемое в формате светомузыкального шоу в вечернее и ночное время, что позволило использовать площадь не только во всех основных церемониях Экспо 2020, но и в грандиозных тематических шоу.

Обратим внимание, что каждый ивент-проект мировых выставок — это, в первую очередь, проект создания недвижимости в форме павильонов каждой страны, а также инфраструктурной недвижимости, обеспечивающей функционирование выставочного комплекса. Именно поэтому всемирные выставки эксперты и специалисты считают главным архитектурным аттракционом пятилетия. Они позволяют увидеть локализованные в едином пространстве лучшие образцы структурированной недвижимости, зачастую бросающей вызов традиционным формам и стилям.



Рис. 1. Площадь Аль Васл с самым большим в мире несущим куполом, возведенным по проекту чикагского бюро Adrian Smith + Goraon Gill Architecture

На практике представленная на предыдущих выставках недвижимость по большей части сохраняется в городах проведения. И это не только ставшая символом Парижа Эйфелева башня, но и брюссельский «Атомиум», жилой комплекс Habitat-67 в Монреале, башня Спейс-Нидл в Сиэтле. Некоторые объекты были разобраны и увезены странами-участницами. Так поступил СССР с проектом павильона для монреальской выставки. В настоящее время он находится на ВДНХ. Но чаще всего по замыслу инициаторов ивент-девелопмента выставочная застройка получает вторую жизнь, капитализируясь на каждом витке развития. Во всех случаях судьбу выставочной недвижимости предопределяет степень ее соответствия развивающимся технологическим трендам и доминирующим моделям жизнедеятельности. Так, после завершения Экспо 2020 выставочная территория и расположенная на ней недвижимость будут использованы в качестве District 2020 — инновационной экосистемы развития Дубая.

Предусмотренная в ивент-проектах структуризация выставочного пространства подчинена, с одной стороны, основной идее Экспо, с другой — желанию участников продемонстрировать свои научно-технические достижения и позицию по достижению общих целей. В свое время именно на выставках были продемонстрированы первый телефон, искусственный спутник Земли, лифт и не только! Попкорн, кетчуп, мороженое в вафельном стаканчике, словом, великое множество предметов, запахов, форм и вкусов, которые составляют нашу привычную реальность, — выходцы из проектов выставочного сегмента.

В то же время новинки потребительского сектора в дубайском ивент-проекте были существенно потеснены поиском места каждой из стран в обеспечении устойчивого развития. Так, Великобритания, демонстрируя на фасаде своего павильона стихи нейросетевого происхождения, продвигала идею расширения Smart-пространств. Автор британского павильона Эс Девлин предложил миру «коллективную поэму, которая приобрела архитектурную форму». Стихи генерировал алгоритм машинного обучения GPT-2. Нейросеть полгода тренировали на 15 тыс. произведений британских поэтов [5]. Но не только технологические прорывы были характерны для дубайского проекта. Невозможно обойти еще один важнейший контекст современных ивент-проектов — политический. Так, впервые в арабском мире участвовал Израиль. Всего год назад между странами были установлены дипломатические отношения. Следом Судан и Марокко также объявили о нормализации отношений. Официальный представитель павильона Израиля Менехем Ганц отметил, что неслучайно павильон находится в сегменте «Возможности», открывая перспективы мирного разрешения всевозможных конфликтов [6]. Основная идея израильского ивент-проекта — создать пространство для общения. Пока павильон пуст внутри, но все чаще вечером в нем проходят театрализованные представления, звучит музыка, собирая собеседников, создавая диалоговые режимы и рождая общие замыслы. Их воплощение и наполнит вакантное пока пространство. Словом, многообразие представленных аспектов, подходов, предлагаемых механизмов и средств визуализации огромно. Остановимся на лучших, по нашему мнению, ивент-проектах Экспо 2020.

ШЕДЕВРЫ ЕХРО 2020

Работа выставки только началась, но уже была выявлена лидирующая по посещению группа павильонов. За них «голосуют» посетители, увеличивая количество и формируя очереди,

лучшие ивент-проекты комментируют эксперты, в СМИ сравниваются и непрерывно соревнуются заложенные в павильонах смыслы и идеи... И если первая неделя выставки собирала 6-часовые очереди у павильонов Японии и Южной Кореи, огромный интерес вызывали грибы на стенах павильона Нидерландов и непознанный фантастически успешный Китай, то ноябрь фокусировал интерес к павильонам ОАЭ, России, Великобритании, Бахрейна и Австрии.

Системообразующие выставочные комплексы «Устойчивость», «Мобильность» и «Возможности» стали центрами притяжения, неизменно пользующимися успехом у посетителей. Три лепестка («трилистник») создаваемого будущего без границ объединили основные планетарные ценности в диапазоне от природных (можно любоваться Андами, проходить сквозь пески Сахары, стоять под ливнем в Нидерландах, встречать восход в Австралии, гладить скакунов в Туркмении или наслаждаться тайской кухней), до мега-проектных контекстов. Так, современное понимание устойчивого развития существенно расширило границы. Поверхность планеты исследуется на уровне корневой системы с уходом вглубь Земли, захватывая также и морские глубины. Общественное устройство касается преодоления языковых и культурных барьеров, а устойчивое развитие человека связывается с творчеством, нестандартным мышлением, изобретательностью и ... непредсказуемостью.

По-новому видится и мобильность современного мира. Ивент-проект «Мобильность» включил не только ретроспективный анализ преодоления пространственных вызовов, но и интеллектуальный экскурс к великим философам прошлого: Абу Убайд аль-Бакри, Ибн Баттута и др. [7] (рис. 2). Проницательность их суждений не только подтвердила история человечества, но и фактически все основные вызовы развития были предвосхищены ими. Устремленность в космос, освоение микромира, социальные лифты и всеобщая толерантность — вот новые современные контексты мобильности. Во внутренних сегментах павильона демонстрируются исторические ракурсы перехода от колесниц к современным космическим станциям и новым городам.

Третий лист «Возможности» объединил большинство развивающихся стран, представивших свои концепции использования природного, экономического и научно-технического потенциалов.



Рис. 2. Великие философы прошлого

Из своего рода сенсаций Экспо 2020 отметим, в первую очередь, бионические формы павильона ОАЭ. Ивент-проект здания был разработан всемирно известным испанским архитектором Сантьяго Калатравой. Его замысел отразил национальную символику — сокола. Павильон похож на птицу, оживающую несколько раз в день и поднимающую 28 «крыльев» из углеродного волокна. Конструкции двигаются плавно за счет гидравлических приводов. Крылья имеют не только эстетическое и зрелищное назначение, но и защищают солнечные панели на кровле от песка во время бури [8].

Реализуя комплексные возможности устойчивого развития, архитектурное бюро V8 Architects создало голландский павильон как грандиозный экологический аттракцион! В здании производятся вода, еда и энергия. Разноцветные солнечные батареи дают энергию, достаточную для выращивания грибов-вешенок и 3,5 тыс. съедобных растений. Полы павильона покрыты материалом на основе мицелия. Вода для орошения добывается установкой Rainmaker, выкачивающей из сухого воздуха Дубая до 800 л воды в день! Аттракцион добычи воды из воздуха дополнен зонтиками с видеоинсталляцией путешествия водных капель в голландский павильон. Апофеозом интерактива является дождь — чудо для здешних условий пустыни.

Наряду с невероятными и технологическими новинками уютно размещены павильоны с обычными человеческими радостями. Чего стоит гостеприимство Африки или комфорт Бразилии. Как нам объяснил директор Бразильского павильона Рафаэль Насименто, главная идея — не перегружать людей информацией, а дать возможность «весело провести время». Следуя опыту Экспо 2015, бразильский павильон представлял собой огромную веревочную сетку, на которой можно было лежать и прыгать, дубайский вариант бразильского павильона представляет собой зону, где можно погулять босиком по щиколотку в прохладной воде и покачаться в гамаках.

В павильоне Люксембурга посетителей в финале ожидает горка, на которой можно прокатиться, а сам павильон при внешней невесомости является сложным каркасом из тысячи элементов, представленных фирмой ArcelorMittal, которая отвечала за поставку и монтаж металлических конструкций самого высокого здания планеты Бурж-Халифа.

Австрийские архитекторы (венское бюро Querkraft Architekten) создали лабиринт из 38 усеченных конусов-ветроловов, замещающих кондиционеры. А цюрихские архитекторы OOS спроектировали здание по образцу бедуинских жилищ с той лишь разницей, что внутри можно совершить восхождение на Альпы с инсталляцией горной панорамы. В целом, фактически все всемирно известные архитекторы и девелоперские компании участвовали в выставке. Не исключением стал и павильон России.

РОССИЙСКИЙ ПАВИЛЬОН — ПЛАНЕТА И МЕХАНИКА ЧУДА

Лейтмотивом ивент-проекта России стало проникновение в «творческий разум, творящий будущее». Креативность — важнейшее свойство человеческого мозга, ставшего главным фокусом экспозиции. Авторам удалось представить устройство и принципы работы мозга, рождение сознания в невероятно захватывающей форме мультимедийного шоу. В его эпицентре использовалась огромная кинетическая скульптура мозга, оживающая с помощью проекционных технологий нейросетевой модели. Прикладные области последней представлены

в презентациях крупнейших российских корпораций. Так, креативные проекты Росатома погружают посетителей в историю исследования и покорения атомной энергии, знакомят с перспективами ее использования в освоении космического пространства.

Прикладные проекты Экспо 2020 российского павильона представлены в масштабном видеоряде на первом этаже павильона. Крайне интересующие мир акваториальные комплексы (АТК), позволяющие осваивать и обустраивать разномасштабные пространства (земля-море), панорамно демонстрируются на примере освоения Дальнего Востока. И если три года назад проектный подход в сфере АТК формировался [9], то к концу 2021 г. мы можем наблюдать их реализацию в онлайн режиме.

Архитектура российского павильона в Дубае (рис. 3) стала результатом деятельности проектного бюро «СПИЧ» под руководством С. Чобана [9]. В основе авангардистские идеи метода эксприматикки, позволившего найти форму посредством окружностей и дуг разных цветов и радиусов. В результате — купольный объем, опутанный множеством колец из алюминия и трубками, покрытыми разноцветным полимерным составом. Купол не нуждается в промежуточных опорах, позволяет создать помещение большой высоты, в котором пульсирует разноцветными огнями семиметровая скульптура гигантского мозга — «самого сложного феномена Вселенной».

Мультимедийное шоу создано компанией Simpateka Entertainment Group, оно демонстрирует, как творческий разум может создавать будущее (рис. 4). Российским организаторам удалось совместить лазерные технологии, навесные сценические системы, звук, свет, видео, акваториальное шоу в единой видеоинсталляции смыслового пространства макро и микро-миров. Автором идеи и дизайна выступил К. Петров (Simpateka), научным куратором — академик К. Анохин, художественным куратором — Д. Ликин (первый канал ТВ).

Успех российского участия во всемирной выставке не нов. Чуть более 100 лет назад в Париже весь мир смотрел на Россию, как на носителя всего самого нового, актуального, передового и влиятельного. Конец XIX в. ознаменовал бурное развитие в Российской империи агротехнической, строительной и фундаментальной науки. Производство росло несопоставимо более высокими, чем мировые, темпами. И это касалось всех сфер национальной экономики — сырьевой, машиностроительной,



Рис. 3. Российский павильон на выставке Экспо 2020

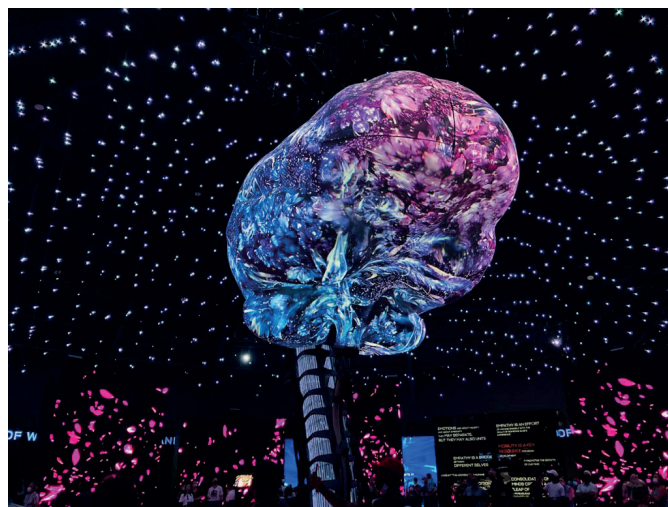


Рис. 4. Мультимедийное шоу, демонстрирующее, как творческий разум может создавать будущее (создано компанией Simpatеka Entertainment Group)

финансовой, промышленной, ремесленной, социальной, производства продуктов питания и др. Высокое значение и результативность развития были отмечены на всемирной выставке в Париже. Максимальное количество наград получили российские участники Парижской выставки 1900 г.: 212 Гран-при, 370 золотых медалей, 436 серебряных медалей, 347 бронзовых. Предметом особой гордости стал проект рабочего городка (Санкт-Петербург). Комплекс из пяти зданий (архитектор Н. Дмитриев) с уютными зелеными дворами, благоустроенными квартирами с кухнями, туалетами и ванными комнатами, расположенными на первых этажах магазинами, яслями, четырехклассным училищем, рекреационным залом, амбулаторией, прачечной, наличием общественного центра, состоящего из столовой, библиотеки, зала для собраний с эстрадой и киноаппаратурой. Российский проект был принят международным сообществом с восторгом. Тем более, что впервые по тем временам Товарищество по борьбе с жилищной нуждой использовало механизм комбинированного финансирования, а именно: пожертвования, сбор от проведения выигрышных лотерей, акции (паевые) и ссуды. Последние брались у Министерства внутренних дел. К слову сказать, нашумевший проект был полностью реализован в 1906 г. А представленный Россией социальный эксперимент положил начало включения социальных новаций в программы всемирных выставок.

ВМЕСТО ЗАКЛЮЧЕНИЯ

Дубайская выставка показала, что российский креатив продолжает вдохновлять весь мир и сейчас, а главный девиз Expo 2020 «Объединяем умы и создаем будущее» в полной мере развернут и структурирован в сегменте «Мобильность» на территории павильона нашей страны. «Мир стал слишком сложен. Космическую станцию или вакцину от болезни нельзя сделать в одиночку. Чтобы развиваться дальше, нам надо объединять свои идеи и мысли, вместе творить», — говорят создатели российской презентации. По словам замминистра промышленности и торговли РФ и генерального комиссара российского павильона на Expo 2020 Алексея Груздева, разноцветные нити, соединенные вместе, символизируют то, какие разные люди живут в России. Они представляют разные народы, которые говорят на разных языках, но вместе строят

будущее [10]. Удобный конференц-зал (второй этаж российского павильона) позволяет проводить множество мероприятий культурной и деловой программы всемирной выставки.

Главным уроком Expo 2020 было «ощущение многоточия». Особенностью российской экспозиции, развивающей суть ивент-девелопмента, стал ее мобильный характер. Она изменяется на протяжении полугодия работы выставки. Будут представлены не только различные регионы, мегапроекты, но и сферы деятельности: образование, культура, экономика, космос.

Первыми гостями павильона России стали госминистр по международному сотрудничеству, гендиректор Expo 2020 Рим аль-Хашими и госминистр торговли ОАЭ Тани аз-Зеуди, а также генсек Международного бюро выставок Дмитрий Керкенцес, который отметил неизменно яркое участие России во всемирных выставках. «Возможно, этот павильон станет первым шагом к победе заявки Москвы на организацию Expo 2030», — предположил он.

СПИСОК ИСТОЧНИКОВ

1. Официальный сайт Expo2020Dubai. URL: <https://www.expo2020dubai.com/en> (дата обращения: 06.11.2021).
2. A World Class World Expo. URL: <https://www.nytimes.com/2021/10/24/world/world-expo-dubai.html> (дата обращения: 12.11.2021).
3. Dubai to host Expo 2020: The Anticipated Economic Boost. URL: <https://www.jonesday.com/en/insights/2014/05/dubai-to-host-expo-2020-the-anticipated-economic-boost> (дата обращения: 15.11.2021).
4. Expo 2020 Dubai: Pavilions and Architecture. URL: <https://www.archdaily.com/tag/expo-2020-dubai> (дата обращения: 13.11.2021).
5. Dubai Expo 2020: Coronavirus-delayed world fair opens. URL: <https://www.bbc.com/news/world-middle-east-58745890> (дата обращения: 13.11.2021).
6. Israel opens its pavilion with big bash at Dubai's Expo 2020. URL: <https://www.timesofisrael.com/israel-opens-its-pavilion-with-big-bash-at-dubais-expo-2020/> (дата обращения: 10.11.2021).
7. «Алиф» — павильон «Мобильность». URL: <https://www.expo2020dubai.com/ru/understanding-expo/participants/special-pavilions/mobility> (дата обращения: 15.11.2021).
8. Explore some of the best pavilions at the expo 2020 Dubai. URL: <https://www.designboom.com/architecture/expo-2020-dubai-pavilions-roundup-10-13-2021> (дата обращения: 08.11.2021).
9. Yas'kova N.Yu., Kolosova T.N. The investment and construction activities transformation at the modern development stage of

► Russia // IOP Conference Series: Materials Science and Engineering. 2020. Vol. 869. Issue 6. P. 062050. DOI: 10.1088/1757-899X/869/6/062050

EVENT DEVELOPMENT: LESSONS OF THE FUTURE (a case study of Dubai EXPO 2020)

In the context of the pandemic, that has hampered idea sharing and development concept dialogues, World EXPOs are gaining relevance as effective search engines focused on development options and creation of the common Future consistent with the approaches chosen by different countries. EXPO 2020, that opened in Dubai (UAE) in October 2021, is not only the largest event held in the 150-year history of world fairs, it has also contributed many novelties to event development mechanisms, applied to events of international significance. First, the EXPO space has three principal districts: Sustainability, Mobility, and Opportunity. Second, all participants have the opportunity to demonstrate their vision of the common future. Third, the EXPO 2020 event project has become the largest architectural curiosity in the contemporary history. It has consolidated emergent approaches to structuring the living environment from the standpoint of concept and style. Fourth, creativity is the basic message of each pavilion, while artificial intelligence, smart technologies and cognitive approaches are visualized in all aspects and elements of the Nature – Society – Man system. Fifth, virtually all pavilions are segmented into public spaces, demonstration zones, giving an insight into the country's standing and capability in terms of sustainable development. The Russian pavilion, located in the Mobility district, offers a video series on the applied structurization of living spaces, as well as ideas focused on consciousness and intelligence, thus, emphasizing the impact of major Russian companies in the interactive multimedia format of a spectacular show. The future, created in a joint effort, is impossible without a synthesis of ideas in the search-focused cognition mode. The mobile format of the Russian exposition complement the features of the EXPO 2020 event project. Its further development and capitalization in the format of an innovative ecosystem is another step along the way towards a substantial rise in the economic efficiency of event development.

Keywords: *living environment, world exposition, event development, creative economy, sustainable development, structured space*

REFERENCES

1. Official site Expo2020Dubai. URL: <https://www.expo2020dubai.com/en> (date accessed: November 6, 2021).

10. Груздев А. Мы покажем миру креативную Россию. URL: <https://www.businesssemirates.ae/content/pr/430/13047> (дата обращения: 06.11.2021).

2. A world class world expo. URL: <https://www.nytimes.com/2021/10/24/world/world-expo-dubai.html> (date accessed: November 12, 2021).

3. Dubai to host Expo 2020: The Anticipated Economic Boost. URL: <https://www.jonesday.com/en/insights/2014/05/dubai-to-host-expo-2020-the-anticipated-economic-boost> (date accessed: November 15, 2021).

4. Expo 2020 Dubai: Pavilions and Architecture. URL: <https://www.archdaily.com/tag/expo-2020-dubai> (date of access: November 13, 2021).

5. Dubai Expo 2020: Coronavirus-delayed world fair opens. URL: <https://www.bbc.com/news/world-middle-east-58745890> (date accessed: November 13, 2021).

6. Israel opens its pavilion with big bash at Dubai's Expo 2020. URL: <https://www.timesofisrael.com/israel-opens-its-pavilion-with-big-bash-at-dubais-expo-2020/> (date of access: November 10, 2021).

7. "Alif" — pavilion "Mobility". URL: <https://www.expo2020dubai.com/ru/understanding-expo/participants/special-pavilions/mobility> (date accessed: November 15, 2021). (rus.).

8. Explore some of the best pavilions at the expo 2020 Dubai. URL: <https://www.designboom.com/architecture/expo-2020-dubai-pavilions-roundup-10-13-2021> (date accessed: November 8, 2021).

9. Yas'kova N.Yu., Kolosova T.N. The investment and construction activities transformation at the modern development stage of Russia. IOP Conference Series: Materials Science and Engineering. 202; 869(6):062050. DOI: 10.1088/1757-899X/869/6/062050

10. Gruzdev A. We will show the world creative Russia. URL: <https://www.businesssemirates.ae/content/pr/430/13047> (date accessed: November 6, 2021).

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Project portfolio management as a tool for implementing an organization's strategy: development of a project selection and ranking system

At the current stage, development of economic relations is characterized by high competition in all sectors of economy with no exception. Requirements, applicable to the quality of products and services, resource conservation, environmental safety of products and technologies are increasing. Hence, these changes need investments and a balanced approach to the implementation of projects, having versatile foci and scale. In this regard, a portfolio management toolkit is increasingly used, since it allows for an optimal set of portfolio components and a clear focus on strategic changes in the company's activities. The portfolio management motivation is the ability to optimize investment resources and set disbursement priorities.

Given the strategic focus of the project portfolio, it is necessary to implement such processes as the assessment of each project from the standpoint of compliance with corporate strategic objectives, elimination of task duplication within the portfolio, cost and feasibility assessment, as well as project ranking and balancing. Many researchers believe that it is advisable to use expert analysis methods for the project selection and ranking, since experts are able to assess not only the quantitative, but also the qualitative characteristics of components, their strategic focus, and use extra data. The most acceptable methods are the analytic hierarchy process, the strategic buckets method.

Given that each project portfolio component has been examined and selected according to the commercial efficiency criteria, it is necessary to solve the task of assessing each component's impact on the targets of the portfolio as a whole. We believe that the problem of developing a system of target indicators, related to the company activities, requires further consideration. To generate the project portfolio objective, it is advisable to apply the SMART methodology, which is focused on such characteristics of objectives as being specific, measurable, achievable, relevant for the company, and time-bound. This approach is quite consistent with the strategic focus of the project portfolio. The dynamic nature of the project portfolio implementation, along with the permanency of the strategic objectives, requires balancing the portfolio not only at the verification stage, but also at each life cycle phase, which will allow to avoid risks.

This paper aims to review and summarize approaches, goals and principles of a strategic project portfolio management in an organization, develop suggestions for ranking projects in the portfolio taking into account the interdependence of projects, the ability to implement strategic changes. Having focused on the standard project classification, the co-authors propose a step-by-step approach to the formation of an optimal set of the project portfolio components, providing systemic synergy. The co-authors propose a system of targets for ranking the project portfolio components to be based on the provisions of the portfolio management methodology and the experience of its implementation in various spheres of economy, regulatory legal acts, and opinions of well-known economists. The proposed project portfolio criteria are consistent with the requirements of the SMART goal setting methodology and include the following positions: revenue increase; production costs decrease; market share growth; the company's market capitalization growth. The rating of the portfolio component is determined by the sum of the contribution points to the achievement of the above targets.

Keywords: *strategic project portfolio, portfolio components, portfolio component typology, expert and analytical methods, ranking of components, portfolio balancing, target portfolio indicators*

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RELEVANCE OF THE ISSUE

The project management methodology implementation allows for the maximum efficiency of investments in the company development. Projects serve as a driving force of change, contribute to the preservation or strengthening of the market standing. However, there is a need to look for balanced development tools, taking into account the interrelated development directions and new resource constraints. The use of the portfolio project management methodology facilitates the successful implementation of large-scale strategic changes in a company.

The studies show that the widespread implementation of portfolio management methods and its growing importance have the following drivers [1]:

- scarcity of investment resources;

- prioritization needed to distribute resources available to the company;
- difficulty in aligning each separate project to corporate strategic goals.

The project portfolio is considered as a set of components grouped for the sake of effective management and achievement of corporate strategic objectives¹. At the same time, portfolio components are the projects, programs, as well as related activities having specific distinctive features. To achieve the strategic objectives, that have a long-term planning horizon, both sequential and parallel methods of implementing portfolio components are possible. The implementation mechanism depends on the chosen scenario, with a synergetic effect in focus.

¹ GOST P ISO 21506–2016. Project, program and portfolio management. Guidance on portfolio management.

- To optimize the portfolio in terms of its content and interrelation between its components, it is necessary to develop management tools corresponding to the complexity, relevance and coherence of the tasks to be solved.

The implementation of national projects has resulted in a number of regulatory and methodological materials that can be successfully adapted and applied at the level of an organization. In particular, Methodological recommendations on the organization of project activities by federal executive authorities, approved by Resolution No. 1937p-P6, defines the process groups of the element "Strategic planning and project portfolio management". It encompasses the following processes²:

- identification, which means a list of project portfolio management activities, verification of compliance with strategic objectives, elimination of duplication (at the level of organization, possible synergy of interrelated projects should be taken into account after each project or programme has been assessed in terms of effectiveness);
- expertise, which envisages an assessment of the coherence of projects, cost examination, and feasibility checks sensitive to external and internal factors;
- the ranking and balancing of projects within the portfolio.

To develop a project portfolio management mechanism, each process is divided into sub-processes, which allows to create a management framework focused on specific organizational units and linking the current operational activities of a company with its project activity. Each of the above processes can be adapted to portfolio management at the level of organizations with regard for the existing organizational and management structure.

The concept of "a strategic project portfolio" is introduced, it envisages the achievement of strategic objectives as a priority relative to all possible evaluation criteria [2]. In fact, it is necessary to go beyond the traditionally applied criteria for evaluating separate projects, focus on the project portfolio as a whole and suggest criteria for its evaluation.

Project portfolio management is a complex management process, since programmes and projects as components of the portfolio have fundamental differences, despite the overall strategic focus. Each project portfolio component has a different degree of complexity and uncertainty in terms of the results to be achieved. It is necessary to consider the following ideas when applying methods of portfolio project management [2, 3]:

- the company production capacity should be used to the maximum and grow in the process of implementing the project portfolio;
- it is necessary to clearly define which strategic goals are relevant to the project portfolio and can be implemented;
- the components of the portfolio should provide a synergistic effect;
- realistic decision-making terms and their subsequent implementation should be considered;
- the applied methods of portfolio construction should ensure the optimal search for solutions;
- the decision verification simplicity is necessary as a focus on available information resources, and flexibility is needed to adapt to changes in the project implementation environment, both external and internal;

- the ability to formalize a solution, also a must for a multi-component portfolio.

Furthermore, attention should be paid to the fact that the implementation of the project portfolio is focused, as a rule, on fairly large-scale changes in the company's activities. This involves organizational changes and establishment of new organizational units (project teams, project offices).

Strategic objectives should be specified both in a separate project and in the project portfolio as a whole. At the same time, strategic goal-setting can be conditionally divided into three consecutive stages [4]:

- a strategic analysis of factors of the external and internal environment from the perspective of opportunities and threats; at this stage, an expert assessment of economic, political, technological, market, environmental and social factors that might influence the project deliverables and the process of its implementation is made;
- development of a strategy that is ultimately consistent with the results of strategic analysis; at this stage, it is essential to determine the competitive standing of the company itself;
- taking into account the first two stages and their results, an optimal business strategy is developed.

Regardless of the available studies on this problem, successful project portfolio management requires portfolio management tools, with account for the industry specifics, among other things. The issues of project portfolio management that require further research include:

- project portfolio goal setting;
- project portfolio component ranking and selection criteria;
- methods of strategic analysis of external and internal factors of the business environment adaptation to the tasks of the corporate portfolio management

The adjustment of the project portfolio to the strategic objectives of an organization should be considered as a continuous process. The project portfolio should be examined not only at the verification phase, but regularly, it is necessary to monitor both the process of implementing the project portfolio and achieving targets.

EXPERT ANALYSIS METHODS USED TO SELECT AND RANK PROJECT PORTFOLIO COMPONENTS

The interrelation between several components should be established while constructing a multi-component projects portfolio. The project classification according to different criteria is essential for the project management mechanism development. The analysis of the points of view, expressed by various authors on the issue of classification, shows no fundamental discrepancies. The most typical approach to the project classification is project ranking according to the following criteria [4–6]:

- project scale;
- implementation period;
- resource constraints;
- target task nature;
- grounds for a target task;
- predictability of results.

This classification allows to identify the features of projects that enable portfolio managers to add these projects to their portfolios and design an effective management mechanism.

The low predictability of project results makes uncertainty very significant, as it does not allow identifying risks at the stage of the

² Methodological recommendations on the organization of project activities in federal executive authorities. URL: https://admlip.ru/doc/app/adm/dep_ecn/metod_2.pdf

project feasibility study and forces to reserve funds. Given the goals and features of portfolio management, it is necessary to analyze the project classification from the standpoint of their coherence. One of the classification approaches provides for the following variants of project coherence [7]:

- incompatible or alternative projects, when one option accepted nullifies the profitability of the other one;
- complementary projects, when the profitability of one project is nullified if the other project is not implemented;
- independent in terms of benefits;
- complementary to each other in terms of results and implemented simultaneously to provide for a synergistic effect;
- substitutive, when their simultaneous implementation reduces the overall profitability.

If we address portfolio projects from the standpoint of the above classification, we believe that at the initial stage an excessive set of projects is built, which is quite logical and sets the stage for an optimal set of portfolio components. To achieve the final version, it is necessary to apply a step-by-step approach, which we see as follows:

Stage 1: contradictory projects are eliminated;

Stage 2: the set of substitutive and complementary projects is optimized;

Stage 3: projects that are interrelated in terms of costs are selected, allowing to optimize the overall cost of implementation of the project portfolio;

Stage 4: the projects, that are most independent in terms of benefits, are selected to support the corporate strategy;

Stage 5: the budget and the basic timeline of the project portfolio are developed, with account taken of each priority.

When the optimal composition of the project portfolio is defined, a basic calendar plan is needed, indicating not only the launch and completion dates for each project with regard for the pre-set priorities, but also the main checkup events to be accompanied by a logical connection between the portfolio components [2].

A comparative analysis of existing approaches to project portfolio management, selection of components, conducted by V.M. Anshin and V.D. Barkhatov, proved that the methods, corresponding to the following approaches, are used to select projects for a portfolio: expert analysis, economic and mathematical methods, graphs. Each of the approaches has both advantages and disadvantages. Expert analysis methods make it possible to evaluate not only the quantitative, but also the qualitative characteristics of projects, taking into account their strategic orientation [3].

Experts may also consider risks and uncertainties, attract additional data if the indicators of each project at the stage of their feasibility study do not provide a comprehensive idea of their impact on the achievement of strategic objectives, with regard for the market competition and the dynamics of the business environment.

Furthermore, expert methods allow to establish the interrelation between projects. In particular, these methods include the method of strategic buckets, sorting, and the analytic hierarchy process. The analytic hierarchy process allows to rank projects by establishing a hierarchy of selection criteria in line with the corporate strategy. The disadvantage of the method is its inability to consider the mutual influence of projects, both when ranking the selection criteria and choosing alternatives for each criterion. The model of strategic buckets is based on a clearly formulated corporate strategy and the set of strategic criteria. For each criterion, a bucket of projects is composed and ranking occurs within each bucket.

The interrelation of projects, if they are not independent in terms of benefits and costs, which is an extremely rare occasion in an organization, can be expressed through both direct and reverse synergies. It is recommended to take a closer look at the correlation between projects from the standpoint of production and marketing [3]. A production synergy is driven by the use of a common technology, the sharing of results, and staff training. A reverse synergy is expressed in the struggle for resources between the components of the portfolio. Marketing dependence will be expressed in the development of common sales channels, the use of a common brand, the formation of a product range.

Project ranking can be performed according to one of the criteria. As a rule, when projects are ranked, traditional indicators from the "Methodological Recommendations for Assessing the Effectiveness of Investment Projects" are used to assess the project commercial efficiency. They are NPV; IRR; BPB; and the ROI index³. We believe that a single-criterion approach is incapable of covering all the tasks of managing strategic changes.

Expert methods allow to validate a project portfolio with account taken of the pertaining uncertainty and risks, as well as the positive and negative mutual influence of projects. The advantages of expert analysis methods lie in the experts' ability to apply several methods if they want to consider the problem in more detail.

PROJECT SELECTION AND RANKING: APPROACHES, METHODS, CRITERIA

Project selection is the construction of a portfolio that will ensure the achievement of strategic goals. A well-balanced portfolio should be viewed from the two standpoints. At the stage of the project portfolio construction, balancing means an equilibrium between long-term and short-term components of the portfolio, risks and results, costs and results. In the process of monitoring the portfolio implementation, balancing should be considered as a dynamic process aimed at adjusting the portfolio implementation processes.

The most crucial process in portfolio project management is the verification of project ranking and selection criteria. At the same time, we take it for granted that each candidate project, that may enter the portfolio, is selected according to the criteria of commercial efficiency.

In particular, when prioritizing projects according to the opportunities they create for the implementation of the corporate strategy, D. Kendall and S. Rollins propose the following criteria, believing that the criteria system should be focused on the following positions [8]:

- the achievement of corporate business objectives (market share growth, entering new markets, revenue growth, cost reduction);
- an impact on the results for consumers, which is consistent with modern concepts of corporate social responsibility (applying for consumer opinions about the product quality, solving substantial problems, experienced by many consumers);
- an impact on the growth of the corporate strategic potential.

The latter criterion confirms the attainment of strategic objectives and is used to perform an expert assessment of the project according to the following system of points [8]:

a) an obvious opportunity to take a leading stand in the industry with a significant payback of investments in the organization development (5 points);

³ Methodical recommendations on investment projects efficiency assessment. URL: http://www.consultant.ru/document/cons_doc_LAW_28224

- b) potential opportunities for expanding the market share and improving competitiveness (4 points);
- c) creating significant strategic advantages in the future (3 points);
- d) compliance with the industry development trends (2 points);
- e) presents some interest for business development (1 point);
- f) most likely will not provide any strategic advantages (0 points).

The approach, proposed by D. Kendall and S. Rollins, is quite logical and can be successfully used to perform the expert assessments of project portfolios.

Since the project implementation periods differ, projects have versatile target tasks and expected results, a multi-criteria approach to their selection is needed to build a portfolio⁴[8].

The features of the project portfolio, analyzed from the standpoint of the portfolio component selection criteria, include the following [9]:

- the portfolio has a business content that may change along with the business strategy change;
- success should be defined in terms of generalized integral performance indicators of an organization.

The portfolio includes projects different in terms of investments and expected results, different implementation periods and foci. This requires a multi-criteria approach to their assessment and selection, since a single-criteria approach will be ineffective from the standpoint of the strategy compliance⁴. The value of the portfolio lies in boosting competitive advantages, although it is necessary to consider potential restrictions: access to production factors, sales markets, assessment of the scale of production. For high-tech industries, it is necessary to have access to products, technologies, marketing tools and other innovations.

In the model, offered by M. Dickinson, A. Thornton and S. Graves, the co-authors, considering approaches to balancing the portfolio of projects, propose the following selection criteria: project financing costs, the success probability, the share in the total project portfolio profitability, the cost of debt capital [10].

The Guide to the Project Management Body of Knowledge (PMBOK Guide) considers projects as a tool for creating business value presented as net quantifiable benefit for the company. At the same time, it is emphasized that the benefit can be tangible, intangible, or both. Tangible assets include cash, equity, fixed assets. Intangible assets are goodwill and trademark⁵. In total, an increase in value can be characterized by such an indicator as the company market value growth. Standard business valuation methods can be applied to analyze both tangible and intangible benefits of the project portfolio. This indicator is quantifiable and relevant within the framework of the modern concept of business management costs. An important advantage of this indicator is that it characterizes the investment attractiveness of the company.

As for the project portfolio management, many authors pinpoint the need to consider management as a dynamic process, which is quite logical due to the long-term periods of strategic changes implemented by the organization. This is due to the fact that at the stage of assessing the project efficiency, many factors potentially influencing the success of its implementation are not transparent

enough, and during the project processing they can be identified more clearly. Hence, factors, that are not taken into account during the feasibility check due to the information incompleteness or inaccuracy, will begin to actively manifest themselves. Therefore, it is recommended to highlight the static and dynamic characteristics of the project portfolio, assuming that not only input values, but also ongoing assessments of success of the implementation of the portfolio components are needed [11].

The need to consider the pace of portfolio management processes is also presented in R. Cooper's model for innovative projects, according to which the decision on the further implementation of a project included in the portfolio is taken discretely at each phase of its life cycle, from an idea to its commercialization. This allows to close the project at an early stage and avoid negative consequences, if its implementation terms change. Despite the fact that R. Cooper considered innovative projects, such an approach can be reasonably applied to any projects that have a long implementation period and splittable life cycles⁶ [12].

This approach is also consistent with the provisions of the "Methodological recommendations for assessing the efficiency of investment projects", that recommend to evaluate and compare the performance indicators of the company's participation in the project³. If it turns out that the performance indicators obtained during the initial calculation are not achieved, it is recommended to consider whether it is advisable to continue the project in the originally planned format, make adjustments or abandon the project.

At the stage of economic verification of projects, it is envisaged that they will be tested for sensitivity to possible economic changes during the project processing, which may boost costs, cut revenues, but in reality this is not sufficient, hence, it is necessary to monitor each phase of the project life cycle.

When ranking projects from the standpoint of the development of new products, the indicator of the expected commercial value of the project (ECV), introduced by R. Cooper and his co-authors can also be used, as it takes account of production and commercial risks of projects [12]. The indicator is calculated using the following formula:

$$ECV = (PV \cdot Pcs - C) \cdot Pts - D, \quad (1)$$

where C is the cost of implementing the project (capital expenditures on equipment and product promotion); D is product development costs; Pts is probability of product development success; Pcs is probability of commercial success of the project; PV is discounted income on the commercial implementation of the project.

Each project has its own objectives. Portfolio management assumes a single objective. SMART technology is considered as a modern approach to setting operating objectives, when all available information is summarized at the objective setting stage, acceptable deadlines for the implementation of the project portfolio are established, the need and sufficiency of resources are determined. This makes it possible to formulate specific tasks for all process participants.

SMART is an abbreviation, it encompasses the following goal setting criteria: Specific, Measurable, Achievable, Relevant, Time bound. Each letter of the abbreviation SMART stands for a criterion for the effectiveness of goals⁷. Our project portfolio criteria are

4 Evseeva M.V. Project and programs portfolio management: modern requirements. URL: <https://cyberleninka.ru/article/n/upravlenie-portfelem-proektov-i-programm-sovremennye-trebovaniya/viewer>

5 A guide to the project management body of knowledge (PMBOK guide) : [electronic resource]. URL: <https://www.litres.ru/raznoe-4340152/rukovodstvo-k-svodu-znaniy-po-upravleniu-proektami-rukovods>

6 Cooper R.G. Perspective: The Stage-Gate® Idea to Launch Process – Update, What's new and NexGen Systems: [electronic resource]. URL: https://www.stage-gate.net/downloads/wp/wp_30.pdf

7 The SMART targets: thorough review. URL: <http://powerbranding.ru/marketing-strategy/smart-celi>

The expert evaluation of the impact made by the project portfolio components on the achievement of corporate strategic objectives (for ranking purposes)

Project portfolio components	Impact on achievement of corporate strategic objectives				Consolidated rating, points
	Growth of sales revenue	Production costs reduction	Market share growth	Market capitalization growth	
Project 1	20	12	15	48	95
Project 2	70	40	20	32	162
Project 3	10	48	65	20	143
Total project portfolio target numbers	100	100	100	100	

consistent with the requirements of the SMART methodology and include the following items:

- sales revenue growth;
- production costs reduction;
- market share growth;
- market capitalization growth.

By using this system of indicators to assess the correlation between the components of the project portfolio and corporate strategic objectives, one can rank projects and eliminate projects lacking potential to influence the implementation of the corporate strategy. To assess the impact of projects on target numbers, it is proposed to apply the methodology of expert assessments provided in the "Methodological guidelines for the development of national projects (programmes)"⁸. The methodology is used when it is necessary to assess the contribution of a federal project to the national project target. The project rating represents the sum of the contribution points to the achievement of the targets. At the same time, one point corresponds to one percent of the contribution to the achievement of the objectives and target numbers of the national project. By applying the methodology to the corporate strategy management, one can assess the impact of a specific project portfolio component on the achievement of strategic objectives (Table).

It is understood though, that portfolio management does not exclude or replace the processes of the current operational activity. These are equivalent processes that make up the essence of project portfolio management. It is important to consider this link and create an effective consolidated organizational and economic mechanism.

CONCLUSION

Project management allows to focus management processes on achieving specific strategic objectives. Market transformations are quite dynamic, new products and new technologies are emerging, but along with this, new restrictions related to resource preservation, environmental and social responsibility of organizations appear. These processes strengthen the role of corporate strategic planning, intensify the search for new tools aimed at the balanced management of strategic changes allowing for long-term competitive advantages.

The methodology of project portfolio management has become quite widespread, both at the state level and at the level of organizations, but the complexity of economic processes sets new challenges and trends in the development of management tools. This

framework applies both to the project portfolio with regard to the different foci of its components, and to the management mechanism with account taken of the dynamics of environmental factors in the course of project implementation.

The project classification based on the portfolio components demonstrates their diversity in focus, duration, resource requirements, and interdependence from other portfolio projects, thus, outlining the problem of their optimal selection and ranking. The most widely used and effective methods include the expert analysis technique that makes it possible to assess not only the quantitative, but also the qualitative characteristics of projects, take into account their strategic focus, risks and uncertainties, as well as the market competition. This is important due to the fact that a project, having its own high indicators, may be rejected at the project portfolio selection phase.

According to many studies, a multi-criteria approach should be applied to the selection of projects at the portfolio construction stage, as it takes account of all aspects of the corporate strategy. The business content of the portfolio is focused on strategic changes and integral indicators of the corporate activity. These indicators become important at the goal-setting stage, when the application of the SMART approach allows to select specific, measurable, achievable, relevant, and time bound criteria. These criteria include the sales revenue growth, the production costs reduction, the market share growth and the company's market capitalization growth.

REFERENCES

1. Barteneva O.A. *Methods of managing the strategic portfolio of the company's projects : dissertation of the Candidate of Economic Sciences. Moscow, RANEP, 2012; 155. (rus.)*.
2. Barteneva O.A. *Basic principles of forming strategically oriented corporate-wide project portfolio of a large company. Russian entrepreneurship. 2010; 11:1(2):42-46. URL: <https://cyberleninka.ru/article/n/osnovnye-printipy-formirovaniya-strategicheskii-orientirovannogo-obshchekorporativnogo-portfelya-proektov-krupnoy-kompanii> (rus.)*.
3. Anshin V.M., Barkhatov V.D. *Project portfolio management: comparative analysis of approaches and recommendations on implementation. Project and programs management. 2012; 1(29):20-40. (rus.)*.
4. Masur I.I., Shapiro V.D., Olderogge N.G. *Project management : manual. The 2nd edition. Masur I.I. (ed.). Moscow, Omega-L Publ., 2004; 405. (rus.)*.
5. *Project management: fundamentals of project management : manual. M.L. Razu (ed.). Moscow, KNORUS Publ., 2006; 768. (rus.)*.
6. Kerzner H. *Strategic planning for projects management using a project management maturity model. New York, Wiley, 2001; 272.*
7. *Project management. Advanced rate. Manual. M.V. Gracheva (ed.). Moscow, Faculty of Economics, Moscow State University. 2017; 404. (rus.)*.
8. Kendall G.I., Rollins S.C. *Advanced project portfolio management and the PMO: Multiplying ROI at Warp Speed. 2003; 448.*

⁸ Methodical instructions on national projects (programs) development. URL: <http://static.government.ru/media/files/Pxh1N8ADDbq7ZvMMWcafEd3McQVTRj5.pdf>

- 9. Markov O.A. *The portfolio management of the construction projects on a strategic level*. Synergiya. 2016; 5:5-12. URL: <https://www.elibrary.ru/item.asp?id=27529406>
10. Dickinson M., Thornton A., Graves S. *Technology portfolio management: optimizing interdependent projects over multiple time periods*. IEEE Transactions on Engineering Management. 2001; 4(48):245-261. DOI: 10.1109/17.969428

11. Shutova D.A., Raut D.V. *Dynamic process of project portfolio management*. Innovations in management. 2018; 4(18):64-73. URL: <https://www.elibrary.ru/item.asp?id=36798832>
12. Cooper R.G., Edgett S.J., Kleinschmidt E.J. *Portfolio management in new product development: lessons from the leaders-I*. Research-Technology Management. 1997; 40(6):16-27. DOI: 10.1080/08956308.1997.11671170

Управление портфелем проектов как инструмент реализации стратегии организации: развитие системы отбора и ранжирования проектов

Современный этап развития экономических отношений характеризуется высокой конкуренцией во всех без исключения отраслях экономики. Возрастают требования к качеству продукции и услуг, ресурсосбережению, экологической безопасности продукции и технологий, что требует привлечения инвестиций и применения сбалансированного подхода к реализации проектов разной направленности и масштабов. В этой связи все более широкое применение находит инструментальный портфельного управления проектами, который позволяет обеспечить оптимальный набор компонентов портфеля и четкую ориентацию на стратегические изменения в деятельности компании. Мотивация портфельного управления проектами состоит в возможности оптимизировать инвестиционные ресурсы, установить приоритеты их расходования.

Учитывая стратегическую направленность портфеля проектов, необходимо реализовать такие процессы, как оценка каждого проекта с позиций соответствия стратегическим целям организации, исключение дублирования задач компонентов портфеля, экспертиза стоимости и реализуемости, а также ранжирование и балансировка проектов. Многие исследователи высказывают точку зрения, что для отбора и ранжирования проектов целесообразно применять экспертно-аналитические методы, поскольку эксперты способны оценить не только количественные, но и качественные характеристики компонентов, их стратегическую направленность, привлечь дополнительную информацию. Наиболее приемлемыми методами в этом случае являются метод анализа иерархий и метод стратегических корзин.

Принимая за основу, что каждый компонент портфеля проектов прошел экспертизу и отбор по критериям коммерческой эффективности, необходимо решить проблему оценки влияния каждого компонента на целевые показатели портфеля в целом. Полагаем, что проблема формирования системы целевых показателей применительно к деятельности компаний требует дальнейшего рассмотрения. Для формирования цели портфеля проектов целесообразно применить методологию SMART, которая ориентирована на такие характеристики целей, как конкретность, измеримость, достижимость, ценность для компании, ограниченность во времени. Такой подход вполне согласуется со стратегической направленностью портфеля проектов. Динамический характер реализации портфеля проектов при неизменности поставленных стратегических целей требует балансировки портфеля не только на этапе обоснования, но и на каждой фазе жизненного цикла, что позволит избежать рисков.

Целью статьи является рассмотрение и обобщение подходов, целей и принципов управления стратегическим портфелем проектов в организации, разработка предложений по ранжированию проектов при формировании портфеля с учетом их взаимозависимости, возможности обеспечения стратегических изменений. Ориентируясь на типичную классификацию проектов, авторами предложен поэтапный подход к формированию оптимального набора компонентов портфеля проектов, обеспечивающий системную синергию. Базируясь на положениях методологии портфельного управления и накопленном опыте применения в различных сферах экономики, нормативно-правовых актах, точках зрения известных экономистов, авторы предлагают систему целевых показателей для ранжирования компонентов портфеля проектов. Предлага-

емые критерии для формирования портфеля проектов согласуются с требованиями методики целепостановки SMART и включают следующие критерии: рост выручки от продаж; снижение себестоимости продукции; рост доли рынка; рост рыночной капитализации компании. Рейтинг компонента портфеля проектов определяется по сумме баллов вклада в достижение приведенных выше целевых показателей.

Ключевые слова: стратегический портфель проектов, компоненты портфеля, типология компонентов портфеля, экспертно-аналитические методы, ранжирование компонентов, балансировка портфеля, целевые показатели портфеля

СПИСОК ИСТОЧНИКОВ

1. Бартенева О.А. Методы управления стратегическим портфелем проектов компании : дис. ... канд. экон. наук. М. : РАНХиГС, 2012. 155 с.
2. Бартенева О.А. Основные принципы формирования стратегически ориентированного общекорпоративного портфеля проектов крупной компании // Российское предпринимательство. 2010. Т. 11. № 1 (2). С. 42–46. URL: <https://cyberleninka.ru/article/n/osnovnye-printipy-formirovaniya-strategicheski-orientirovannogo-obshchekorporativnogo-portfelya-proektov-krupnoy-kompanii>
3. Аньшин В.М., Бархатов В.Д. Управление портфелем проектов: сравнительный анализ подходов и рекомендации по их применению // Управление проектами и программами. 2012. № 1 (29). С. 20–40.
4. Мазур И.И., Шапиро В.Д., Ольдерогге Н.Г. Управление проектами : учебное пособие. 2-е издание / под общ. ред. проф. И.И. Мазура. М. : Омега-Л, 2004. 405 с.
5. Управление проектами: основы проектного управления : учебное пособие / под общ. ред. проф. М.Л. Разу. М. : КНОРУС, 2006. 768 с.
6. Керцнер Г. Стратегическое управление в компании. Модель зрелого управления проектами / пер. с англ. М. : ДМК-Пресс, 2018. 321 с.
7. Управление проектами. Продвинутый курс : учебное пособие / под общ. ред. проф. М.В. Грачевой. М. : Экономический ф-т МГУ им. М.В. Ломоносова, 2017. 404 с.
8. Кендалл Д.И., Роллинз С.К. Современные методы управления портфелями проектов и офис управления проектами : Максимизация ROI / пер. с англ. М. : ПМСОФТ, 2004. 338 с.
9. Марков О.А. Управление портфелем проектов в строительстве на стратегическом уровне // Синергия. 2016. № 5. С. 5–1. URL: <https://www.elibrary.ru/item.asp?id=27529406>
10. Dickinson M., Thornton A., Graves S. *Technology portfolio management: optimizing interdependent projects over multiple time periods* // IEEE Transactions on Engineering Management. 2001. No. 4 (48). Pp. 518–527. DOI: 10.1109/17.969428
11. Шутова Д.А., Реут Д.В. Динамический процесс управления портфелем проектов // Инновации в менеджменте. 2018. № 4 (18). С. 64–73. URL: <https://www.elibrary.ru/item.asp?id=36798832>
12. Cooper R.G., Edgett S.J., Kleinschmidt E.J. *Portfolio management in new product development: lessons from the leaders-I* // Research-Technology Management. 1997. Vol. 40. Issue 6. Pp. 16–27. DOI: 10.1080/08956308.1997.11671170

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The economics of innovative startups in construction: a methodology for selecting startups to be financed by a corporate venture fund

The article addresses the future of the task of developing a diversified innovative economy in Russia by means of drawing the attention of the state (as evidenced by the establishment of numerous funds, accelerators, and business angels), Russian and foreign private investors to the venture business activity. In our country, the venture industry is at its inception, but its core players are already in place: they are Russian and foreign venture capital funds, associations of business angels, corporate venture funds, public-private venture funds and the "fund of funds" (the Russian venture company). The intensity of the venture capital investment activity is low, and there is no state support system available. Financial transformations can decelerate the slow formation of the venture industry if there is no awareness of the importance of this activity for the development of the economy of the Russian Federation. At the same time, the availability of a significant amount of innovative research, needed for commercialization, creates the need for venture financing and the future change of the venture industry. High-quality management of venture investments can be implemented within the framework of a consolidated method: investment; control; formation and increase of importance for owners, institutional investors and society.

At the same time, the examination of the investments, that have already been made, contributes to the development of certain knowledge, skills, avoidance of fatal mistakes in the selection of projects, conclusion of agreements and management of companies.

The conference speakers addressed the most relevant issues of construction cost examinations which are essential when the cadastral value of real estate facilities is contested in court and when causes, conditions, circumstances and the mechanism of accidents, failures, and casualties in the course of construction and operation of construction facilities are identified. Hence, the most relevant problems of forensic structural engineering and construction cost examinations were considered, and the most effective solutions were developed.

Keywords: digital innovative solutions, venture business, innovative developments, investment management

The formation of venture financing in Russia, the dynamic phase of which dates back to the early 2010s and the beginning of the present decade, has resulted in a situation where venture funds are mainly established at the expense of the state budget and with the proactive involvement of state development institutions, namely the "Russian Venture Company" (RVC), as well as private venture investments, although there is a need for the venture funds to be established by large corporations. Foreign researches have proven the fact that corporations, analyzing their innovative progress as an inseparable component of their business activity and applying various relevant theories for this purpose (the "open innovation" model, the "design thinking" model, and others), have long been focused on the establishment of their own venture funds (the first ones appeared half a century ago). And the companies on the Russian construction market are no exception. We can address the cases of large development companies as GC PIK, MR Group, GC Osnova, and others. As of 2018, corporate investments in Europe reached 11...14 % of the total share of venture investments, while there were more than 15,500 corporate venture capital programmes¹. As a matter of clarification, about 35 % of the world's largest corporations, that are on the Fortune 500 list, have their own corporate

venture funds. Up to 55 % of the largest companies in Europe and 70 % of US companies contribute funds to corporate venture programmes. Such global brands as General Electric, Philips, Microsoft, BMW Group maintain their own venture funds. At the moment, large Russian holding companies are also trying to follow their example (Promsvyazbank, AFK Sistema, Gazprom, and others). The interest in this topic, together with the lack of expertise in this sector in Russia, led to the launch of the programme "The practice of Forming Corporate Venture Funds at Russian Companies" in 2018. The purpose of the programme is to increase motivation and encourage large holding companies to establish their proprietary venture funds, increase core competencies and skills of their employees in the corporate venture investment sector².

Parameters for evaluating startups in the construction industry. Analysts advise using certain norms as startup evaluation parameters³: 1) revenue dynamics, revenue-to-expenses ratio, raised investments, number of patents or patent applications (except trademark patents), these data are requested directly from rating residents; projects that do not submit the initial data are excluded from the

² Club of Directors for Science and Innovation. URL: <http://ird-club.ru/activity/vent>

³ Top-50 Russian venture startups. Secret of the firm. Kommersant.ru — 2013. URL: <http://www.kommersant.ru/doc/2266343>

¹ Rusbase Company. URL: <http://rusbase.com/news/5facts-cvc/>

study; 2) uniqueness (the number of competing startups in this sector) is calculated on the basis of the number of initial participating projects across market sectors; 3) market development strategies by the beginning of the next year to be selected by the experts of investment funds. Further, values of all coefficients go up by matching them with the maximum value. The final parameter is analyzed for each startup by summing indexes for each of the indicators, and a rating is made on the basis of this parameter (Table).

It is necessary to rely on the main assessment tools for understanding the pre-investment value to set up a corporate venture fund in the construction industry⁴.

The Berkus method. This is the principal effective way of evaluating a product. The Berkus method is applicable, if the pre-investment cost does not exceed \$ 2 million; this requirement perfectly complies with requirements for construction startups due to costly innovative solutions in the construction sector. The Berkus method is used for startups that are not profitable yet.

The method of summation of risk factors or the SFR method. This is a more progressive modification of the Berkus method. It requires to determine the initial price as a weighted average parameter for similar results across the construction sector. Risk factors are estimated in multiples of \$ 300,000; above \$ 600,000 for a very low risk and below 400,000 for a very high risk. Here is an example of the Trace Air product and its competitors in the Russian market. In this situation, the most problematic thing, as in many assessment tools, is to generate up-to-date data for similar products. The SFR method is used for startups that are not yet integrating profits.

The method of comparable operations. For the specified methodology, it should first of all be necessary to develop a metric that will acceptably demonstrate the product price. This may be a non-classical metric for the sector in which the product is formed: MRR is the constant monthly income (SaaS), the number of specialists (recruitment agencies), the number of retail outlets (retail), the patent fund (construction), WAU as the number of active customers per week (messaging), etc. In most cases, information extracted from profit and loss statements should be used, including sales, gross profit, EBITDA. The method of comparable operations is used both for startups that are not yet making a profit, and for those who are profitable. It can also be applied to startups in the construction sector, since all core parameters correspond to the construction and innovation sector of the economy.

The balance sheet value demonstrates the net value of the company, i.e. the material balances of the product. The balance sheet value method is difficult to use in relation to startups, due to the fact that it is based on the price of tangible assets of a holding company, whereas most startups own intangible assets, such as research mechanisms in a biotech startup, a user registry and integrated software in an Internet startup, etc. It is also relevant for the market of construction innovations, since the assets of startups are of great importance if compared to the production capacities of large Russian corporations.

The discounted cash flow method. Provided that the product functions correctly and generates certain revenues every year, it can be noted that the relevant product cost is an integrated amount of all projected cash flows for the subsequent years, if the construction startup will be well-demanded with account taken of the features of its operation.

The principal startup evaluation methods

The evaluation method	Indicator level
Principle	From 10...50 % From 50...100 %
The Berkus method	The assessment is based on 5 main success factors
The method of summation of risk factors	The assessment is based on the base cost, based on 10 classical reasons for risk
The scoring method	The estimate is based on the weighted average parameter of the cost selected for the target company
The method of comparable operations	The evaluation is conducted using a triple rule with a KPI applied to a similar company
The balance sheet value method	The assessment is made using the value of tangible assets of a corporation
The liquidation value method	The valuation is based on the liquidation price of tangible assets
The discounted cash flow method	The estimate is based on the totality of all potential cash flows to be generated
The first Chicago method	The assessment is conducted using the weighted average analysis of three scenarios
The venture capital method	The valuation is based on the return on investment projected by investors

The First Chicago Method. The first Chicago method generates revenues by analyzing three predictable scenarios: the lowest profitability scenario, the average profitability scenario, the highest profitability scenario. This is a classical method that can also be applied to the construction sector of startups.

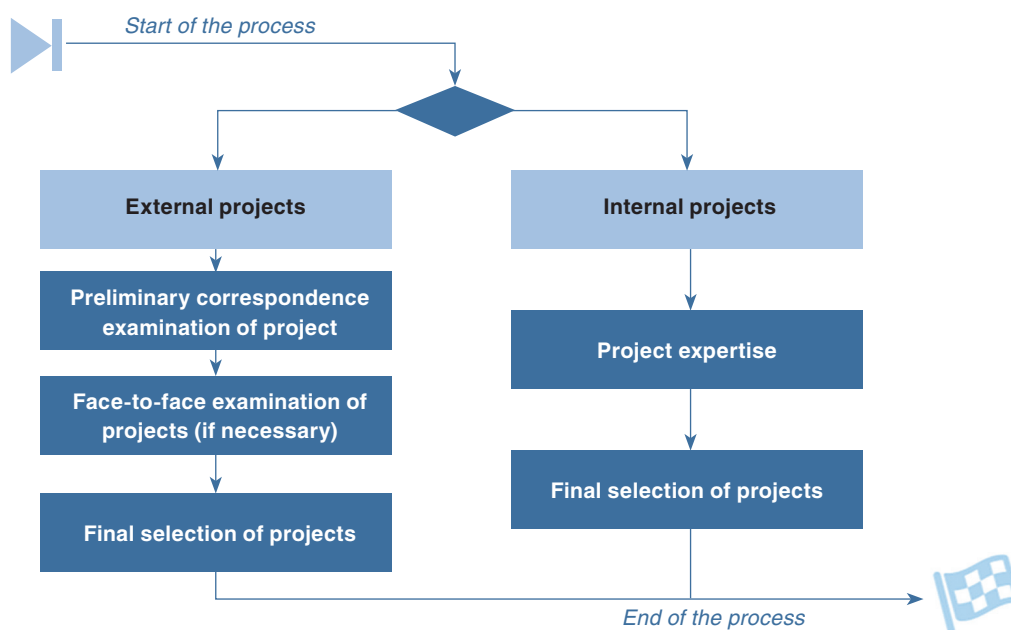
The venture capital method. At any moment of the product implementation, the investor has the opportunity to identify the required level of return on investment (ROI). The venture capital method is generated both for startups that are not yet making a profit, and for profit makers (Fig.).

Selection of projects for participation in the corporate accelerator (a corporate venture fund). The procedures for selecting participants of a corporate accelerator differ for external and internal projects⁵.

The procedure for selecting construction projects by stages and the class is similar to the process developed in the form of business accelerators, and it includes 3 stages: the implementation of the off-site examination of projects, the implementation of face-to-face examination of projects, and final selection. The requirements applied in the process of selecting projects for the corporate accelerator differ from those used in the business accelerator. It depends on the difference between the business models of business accelerators and corporate accelerators. The corporate accelerator of a development company, when selecting projects, uses both parameters that are applied when selecting projects for a business accelerator (for example, the correspondence between the product

4 The main methods of evaluating startups. URL: <https://www.iidf.ru/media/articles/money/9-metodov-otsenki-startapa-s-kommentariami/>

5 Research of the world and Russian experience in the development of corporate accelerators. URL: https://www.rvc.ru/upload/iblock/dfd/o2_rvc_accl_otchet.pdf



Description of the business process "Selection of projects for participation in the corporate accelerator"

vector to the technology focus of the accelerator in the construction industry; the availability and capacity of the market for the generated idea; the chances of commercialization of the proposed idea; the project development stage), as well as the secondary parameters, used to assess to what extent the idea generated by the participants of a construction startup is suitable for solving the task of a development company, whether startup participants have the opportunity to interact with a construction corporation, whether a synergistic effect can be triggered with the help of the company in respect of the generation of the technology proposed by the participant. The control over internal products, as a rule, is executed pursuant to a well-balanced procedure, which does not include the stage of face-to-face examination due to the lack of the need for a special procedure for evaluating the team, namely the involvement of the team in the project development and well-balanced cooperation with the development company.

To perform the selection, experts of a corporate accelerator within a development company often contract external analysts, having strong skills and expertise in the field of interaction with real estate startups (PropTech, Constech) and their establishment: members of teams of successful construction startups, consulting companies (the big four leading audit companies and venture funds (the largest Russian companies)⁶. To get the necessary experts involved, corporate accelerators can seek support from their partners (general designers, general contractors, external consultants).

The main criteria of successful selection of products and teams for the corporate accelerator of a development business company are:

- the availability of a consolidated product selection system, which includes the necessary register of parameters needed to assess the prospects for commercialization by construction startups that are at an early stage;
- the availability of partners who provide access to various

high-level experts in the construction sector and are able to perform a high-quality examination of innovative products in the construction sector.

The establishment of a corporate venture fund in the construction industry, namely, at development companies, can be implemented from the pattern of Build Up, an accelerator of technology startups, headquartered in Skolkovo, as well as the Internet Initiatives Development Fund (IIDF) [1]. The following relevant selection criteria can be identified, which are necessary for funds, accelerators, business angels in 2021⁷:

1. The team, its functionality and capabilities. It is important that the skills of the founders complement each other.
2. How effectively the founders communicate, both within the team and with the outside world.
3. A strategic vision shared by all founders. If, when an offer to buy a startup is made, disagreements arise within the team, and one founder wants to sell the startup, while the other wants to continue its development, this situation means that such a vision does not exist.
4. A proof of the product's meeting the market expectations.

It is also possible to rely on methods of selection criteria that will help funds to evaluate startup⁸:

Evaluation method 1: Comparison. The most optimal method is to determine the estimated cost of a construction startup by analyzing it in comparison with competitors in the construction market. The basic idea of this method is to evaluate a startup in comparison with other similar construction products. The comparison method allows to analyze startups, operating in the same sector and offering potentially similar construction services, and provides an overview of how their valuation compares with the

⁶ The Microsoft Startup Accelerator Program Opens for Business. URL: <https://news.microsoft.com/2007/10/03/the-microsoftstartup-accelerator-program-opens-for-business>

⁷ GOST R 57363–2016. Project management in construction. Activities of the project manager (technical customer).

⁸ SP 333.1325800.2017. Information modeling in construction. Rules for the formation of an information model of objects at various stages of the life cycle.

cost of the proposed startup. It enables to optimally use non-standard indicators, as well as classical coefficients of sales, gross revenues, EBITDA, and other values. The comparison method has the advantage that, depending on the parameter, it should be used both for initial and post-investment evaluation. In a successful case, when an assessment is made, it is necessary to add the available data about another product compared with the original one.

Assessment method 2: Compliance. This is a method of evaluation that is focused directly on the wishes of an investor. At this stage, an investor has specific investment wishes, and in the course of the selection process, he will choose construction startups that "meet" these specific parameters. If an investor wants to provide an amount of \$ 100 thousand to \$ 250 thousand to a construction startup and get about 10 % of the company's capital, it is necessary to select the products that meet certain requirements and at the same time can be part of a certain exit plan, which is absolutely necessary. This method of assessment is the least scientific of all seven methods. It is more about what it is more convenient for an investor to work with, rather than how much a startup actually costs. In fact, this method is not so much about a detailed analysis of each construction startup, as about finding those startups that will be able to achieve the investor's goals.

Valuation method 3: Discounted Cash Flow (DCF method).

The analysis of a real estate startup can be performed by projecting a specific cash flow. The idea of this mechanism is to look at a startup as an entity owning some other investment asset, namely, real estate. It is necessary to evaluate and discount the future cash flows of a construction startup in order to arrive at the current valuation. This method is not suitable for construction startups with any type of financial reporting. In addition, it is necessary to apply the projected cash flows and in the future discount them back to the present time to obtain an evaluation. This factor can be used at subsequent capital raising stages, when the startup has specific reliable financial indicators and higher predictability⁹.

Evaluation method 4: The Venture Capital Method. The application of the venture capital method is performed by the centralization of the three above-mentioned methods: comparison, matching (compliance) and cash flow. A comparison method is used to find out the selling value of a construction startup. Next, it is necessary to apply this assessment to move back and make an assessment that will meet the investor's goals. To understand how this method is implemented in practice, it is necessary to analyze it more carefully. In a situation when an investor intends to invest in a construction startup, the optimal exit time will come in three years. To move on to the current assessment, it is necessary to focus on the projected revenues of a particular construction startup in three years. At the next stage, it is necessary to take income, multiply it by the profitability coefficient and get the final cost (to know the amount for which a construction startup can actually be sold in three years at an IPO or through an industry sale) [2]. The investor (fund, accelerator, incubator) also needs to get repaid, and for this purpose, the Internal Rate of Return (Internal Rate of Return, IRR) is calculated. It can be 25 %, or the market value for startups in the construction sector.

Evaluation method 5: De- or reconstruction. This methodology uses a straightforward approach to determine the value of a startup based on deconstruction or reconstruction of an enterprise. Deconstruction analyzes the liquidation of an enterprise, for example, in connection with bankruptcy. Deconstruction does not take into account the cost of a business idea or other similar intangible assets¹⁰. Reconstruction, on the other hand, approaches the assessment from the viewpoint of the leading assets of a startup and analyzes how much it will cost to reproduce them, that is, to perform the reconstruction of assets.

Evaluation method 6: Combination. This technique combines the value of various elements of a construction startup to identify its current cost. The method is close to the comparison method: 5 principal parameters are generated to launch a construction startup, and the startup is analyzed in comparison with similar startups in the construction sector. In fact, the potential cost of a construction startup is estimated by considering what other startups could do, if they had these specific elements [3].

The establishment of a corporate venture fund in the construction industry, let alone, in development sector, is still an understudied topic in our country, despite the fact that over the recent years leading Moscow development companies have been actively developing digital products, software, as well as partner digital products, when a development company integrates its solutions with a company that provides comprehensive artificial intelligence and cloud services.

It is important to develop a proper strategy for the selection and future interaction with the winning companies to design the way the company's product will be implemented in the operational management of development companies and general contractors.

Will it be aimed at improving the company's own business processes, such as the on-site construction monitoring? Will it improve the quality of the company's digital services or increase the percentage of involvement of artificial intelligence products in the operational business processes of companies?

An integrated macroeconomic environment, the transformation of customer requests, the need to reduce costs boost the demand for technology among development structures. At the same time, they themselves turn into startups by establishing their own IT departments and developing IT products. Development companies plan to independently automate business processes that have already been created, and they start looking for external products in those areas in which they have not worked before, where it is necessary to create a new business model from scratch (in particular, products for dynamic pricing or platforms that bring a developer together with the property technologies market players). At the same time, if low-tech products are generally popular in the West, in Russia it is a utopia, because developers need productive technologies that ultimately bring results [4].

Leading Russian development companies, when searching for startups and solutions, encounter several major complications: a lack of ready-made products on the market, problems with combining existing solutions: basic solutions are often not suitable, because most leading companies have their own business processes. At the same time, it is problematic to integrate several similar or complementary solutions.

⁹ GOST R 58439.1–2019. Organization of information about capital construction projects. Information management in construction using information modeling technology.

¹⁰ GOST R 57363–2016/ Project management in construction. The activity of the project manager (technical customer).

► CONCLUSIONS

Based on the above, we can identify a number of proposals that should be taken into account by startups operating on the market of venture investments or planning to enter it and have equity in corporate venture funds:

1. Have more contacts with potential consumers, because most startups have insufficient sectoral experience and understanding of internal business processes of customers. One of the acceptable tools for solving this issue is an accelerator, that helps to better analyze customer requests, formulate a valuable proposition more clearly and improve the product.

2. It is not necessary to copy successful Western business models. The practice of using business models of foreign large companies, with regard for the local features of the industry, may not always be in demand and feasible in Russia.

3. It is necessary to pre-calculate the merger of a new product with existing/related products¹¹. Most development companies consider this as one of the main problems they encounter when looking for external ideas on the market.

4. The client needs not only a methodology, but also its application scenarios and certain measurable results of using a new solution (for example, cost optimization, a higher number of users).

5. If the user of the solution is a development company, it is better to focus automation solutions on the new business processes rather than the relevant ones. The following competitive niches

¹¹ GOST R 52292-2004. Information technology. Electronic exchange of information. Terms and definitions.

Экономика инновационных стартапов в строительстве: методика отбора для финансирования корпоративным венчурным фондом

В данной статье рассматривается будущая задача организации в России инновационной диверсифицированной экономики путем повышения внимания к венчурному бизнесу как со стороны государства (об этом свидетельствует создание многих фондов, акселераторов, бизнес-ангелов), так и со стороны российских и зарубежных частных инвесторов. Венчурная отрасль в нашей стране только начинается создаваться, но уже организованы и реализуются ее основные участники: российские и зарубежные венчурные фонды, ассоциации бизнес-ангелов, корпоративные венчурные фонды, государственно-частные венчурные фонды и «фонд фондов» (Российская венчурная компания). Динамика венчурного капитала происходит не спеша, а определенной системы государственной поддержки не сформировано. Финансовые трансформации могут тормозить и без того статичное формирование венчурной индустрии, если не будет сознания важности данной сферы для развития экономики Российской Федерации. Вместе с тем присутствие весомого количества инновационных исследований, нужных для коммерциализации, создает необходимость в венчурном финансировании и будущем изменении венчурной отрасли. Качественное управление венчурными инвестициями может быть реализовано в процессе совокупного метода: вложение; контроль; формирование и увеличение важности для владельцев, институциональных инвесторов и общества.

Вместе с тем экспертиза уже реализованных инвестиций способствует выработке определенных знаний, навыков, уклонению от фатальных ошибок при селекции проектов, заключению соглашений и руководству компаниями.

are of particular attention: products for improving the customer expertise and adding value for the client, ERP systems for real estate management during the entire life cycle, communication platforms for different market players, digital solutions in construction.

6. A solution should be as optimal as possible both from the standpoint of control (the "one button" principle), and from the standpoint of the customer's costs for its application and reconciliation with the present solutions.

REFERENCES

1. Dmitriev A.N., Bareshenkova K.A., Marchenkova S.V. *The concept of Moscow building construction complex transition of digital technologies of information modeling. Modern problems of project management in the investment and construction sector and environmental management : materials of the IX International scientific and practical conference dedicated to the 112th anniversary of the PRUE. G.V. Plekhanov (Moscow, April 10–14, 2019). V.I. Resina (ed.). Moscow, 2019; 208–220. URL: <https://elibrary.ru/item.asp?id=37238127> (rus.).*
2. Rodin E.N. Dmitriev A.N. *Improvement of traditional methods to assess the investment efficiency considering the specifics of start-ups. Science and business: ways of development. 2014; 3:129–134. URL: <https://elibrary.ru/item.asp?id=21634880> (rus.).*
3. Dmitriev A.N., Vladimirova I.L. *BIM technologies in building construction projects management in Russia. Industrial and Civil Engineering/Promyshlennoe i grazhdanskoe stroitelstvo. 2019; 10:48–59. DOI: 10.33622/0869-7019.2019.10.48-59 (rus.).*
4. Dmitriev A.N., Popova O.A. *Results and recommendations on experimental construction in Moscow. Building Materials, Equipment, Technologies of the 21st Century. 2008; 11(118):12–15. (rus.).*

Ключевые слова: цифровые инновационные решения, венчурный бизнес, инновационные разработки, инвестиционное управление

СПИСОК ИСТОЧНИКОВ

1. Дмитриев А.Н., Барешенкова К.А., Марченкова С.В. Концепция перехода на внедрение цифровых технологий информационного моделирования в московском строительстве // *Современные проблемы управления проектами в инвестиционно-строительной сфере и природопользовании* : мат. IX Междунар. науч.-практ. конф., посвящ. 112-летию РЭУ им. Г.В. Плеханова (г. Москва, 10–14 апреля 2019 г.) / под ред. В.И. Ресина. М., 2019. С. 208–220. URL: <https://elibrary.ru/item.asp?id=37238127>
2. Родин Е.Н. Дмитриев А.Н. Совершенствование традиционной методики оценки эффективности инвестиций с учетом специфики стартапов // *Наука и бизнес: пути развития. 2014. № 3. С. 129–134. URL: <https://elibrary.ru/item.asp?id=21634880>*
3. Дмитриев А.Н., Владимиров И.Л. Технологии информационного моделирования в управлении строительными проектами России // *Промышленное и гражданское строительство. 2019. № 10. С. 48–59. DOI: 10.33622/0869-7019.2019.10.48-59*
4. Дмитриев А.Н., Попова О.А. Итоги и рекомендации по экспериментальному строительству в Москве // *Строительные материалы, оборудование, технологии 21 века. 2008. № 11(118). С. 12–15.*

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to be financed by a corporate venture fund. *Real estate: economics, management*. 2021; 4:36-41.

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Л.И. Павлова. Москва. Дом Васнецова. Рисунок, тушь, перо

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The cost modeling of urbanized areas

In the context of rapid urbanization and urban population growth, cities enjoy particular attention in the spatial development agenda. The complexity of searching for promising city-forming factors, as well as insufficient investments into the development process do not allow to found new cities in Russia. At the same time, the experience of a number of foreign countries shows that solving this problem is not only feasible, but also cost-effective. Researchers, specializing in urban planning, architects and urbanists offer various development models for urban areas, agglomerations, and urbanized territories. However, in most of their works, the issue of the amount of financing required for the basic infrastructure in such territories remains unexplored. The co-authors formulate the principles of economic and urban planning modeling of cities in an effort to clarify the concept of "urbanized territories". The proposed criteria for scenario transitions, that accompany the development of urbanized territories, will allow to use the available resources more efficiently. As recommended by the co-authors, the distribution of costs among the main subjects of formation of an urbanized territory on the basis of principal infrastructure blocks will prevent any excessive pressure on the country's budget system. As a result of the cost modeling focused on the development of an urbanized territory with the population of 500 thousand people, it has turned out that the per-resident investment amount, needed to found a new settlement, reaches about 7.16 million.

Keywords: *urbanized areas, development scenarios, infrastructure for daily living activities, city-forming factors, agglomeration, urban design*

Modern development processes, expanding from local zones and territories to global areas, most often arise, unwind, build momentum and fade away in cities. Hence, the importance of cities increases at all stages of an economic cycle. In the conditions of a recession, cities neutralize the negative impact of deteriorating living conditions, during the periods of recovery, especially at the initial phases, cities become poles of growth.

The development of most cities is primarily associated with economic and social conditions that have a decisive impact on education and urban development. In terms of economic geography, these conditions are usually called city-forming factors. The most common city-forming factors are the availability of minerals in the immediate vicinity, the extraction of which, taking into account the available technologies, will be economically efficient and environmentally acceptable, a good transport location and the possibility of efficient use of existing natural resources, primarily renewables. Given these factors, elements, forming the environment of urbanized territories, are created; they include industrial enterprises, transport highways, administrative, scientific, educational, cultural and other institutions, including those of extra-urban significance [1].

Only 5 new cities have been built in Russia over the past 20 years¹. At the same time, if the experience of the People's Republic of China is considered, one can notice that since 1950, an average of 7 new cities appear in this country every year. As a result, the level of urbanization has increased from 10.6 to 59.6 % there, cities are the country's new growth points providing 56 % of the total GDP [2, 3].

The proposal to found new cities in Siberia, made by the Minister of Defense of the Russian

Federation, has enhanced the role of cities in the modern economic policy, sovereign territorial integrity and defense². New cities will serve as large scientific, industrial and economic centres. However, the main problem, that hampers the implementation of this initiative, is uncertainty in the amounts, sources and dates of funding to be provided for these purposes. Some experts believe that the cost of new cities to be built in Siberia will exceed 10 % of the budget of the Russian Federation (that is, over 2 trillion rubles). At the same time, the construction of one city with the population of 300 thousand residents will cost about 1 trillion rubles, half of which will be spent on the construction of the engineering and transport infrastructure³.

Given the increasing role of cities, the accelerated pace of urbanization and the emerging trends in the establishment of new and development of old cities, the co-authors consider it appropriate to investigate the issue of the cost modeling of urbanized territories, which has predetermined the purpose of this study.

In the generally understood that urbanized territories are large and complex spatial formations consisting of many closely located metropolitan areas — megalopolises, urbanized regions [4]. In the European countries, such territories are referred to as urban areas, or the area surrounding the main city with an increased population density comparable to the density of the main city and (or) different from the density of the surrounding rural space [5, 6]. In Russia, such territories are associated with an urban agglomeration, which means the territory of

² Siberia will grow into cities: from the idea of Sergei Shoigu to the embodiment. Kommersant. Krasnoyarsk. URL: <https://www.kommersant.ru/doc/4997799>

³ Experts named the cost of building new cities in Siberia. FederalPress. URL: <https://fedpress.ru/news/24/society/2803480>

¹ The youngest cities in Russia. Vectorme. URL: <https://vectorme.ru/europe/russia/samye-molodye-goroda-russia>.

a city united with the territories of other municipalities by stable social, economic and business ties [7].

In an effort to generalize the terminology, in the study the co-authors suggest that urbanized territories, demonstrating several city-forming factors, encompass the territory of a large city, taken together with adjacent settlements, which are closely functionally and spatially interconnected by common labour, financial, resource and other flows. As a rule, the centre of urbanized territories is a large city, while poles of local growth may be located in these territories. Sustainable value chains are formed within the boundaries of urbanized territories.

At the same time, one of the key conditions for classifying a particular territory as urbanized, in addition to common borders, is the density of the population permanently residing in the territory (DP).

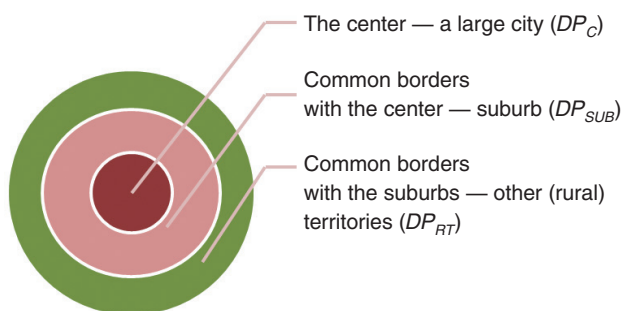
The principle of formation of an urbanized territory is shown in Figure, according to which (1):

$$\begin{cases} DP_C \geq DP_{SUB} \\ DP_{SUB} > K_D DP_{RT} \end{cases}, \quad (1)$$

where DP_C is the population density in the territory of a large city which is the centre of an urbanized territory, people/ha; DP_{SUB} is the population density in the territory of the suburb, which is within the boundaries of an urbanized territory, people/ha; DP_{RT} is the population density in the remaining (rural) territories which are beyond the boundaries of an urbanized territory, people/ha; K_D is the coefficient of the boundary population density, used to indicate the boundary of the transition from urbanized territories to rural ones and vice versa (in the study, the co-authors propose to take it as being equal to 1.5).

As of 2020, urbanized territories of Russia represent 129 agglomerations with a total population of about 93.5 million people (almost 64 % of the country population), occupying a total of about 700 thousand sq.km (only 4 % of the territory of Russia) [8]. In agglomerations, the population growth is concentrated mainly in agglomerations that have millions of residents and where a large city serves as the centre.

Specialists in urban planning research, architects and urbanists offer various development models for urban areas, agglomerations, and urbanized territories. V.L. Glazychev's works address the analysis of development of territories together with urban development problems: he considers the development of territories and evolution of the city as an organic whole [9]. Despite the fact that in his works the author presents a personal image of urbanization and development of the urban environment as a process, addresses the extensive foreign experience and suggests measures for the formation of comfortable urban infrastructure, the issue of the effective modeling of a high-quality environment in urbanized territories remains



The principle of urbanized territory formation

undiscovered. An urban development strategy based on "campus models", proposed by other researchers, as well as the modeling of urban development patterns using the theory of classical homogeneous structures do not take into account the features of our country and are not applicable to all types of territories [10, 11]. However, the issue of the required amount of financing of the basic infrastructure in urbanized territories remains unexplored by the basic theories and models of urban development.

Before proceeding to the cost modeling of urbanized territories, it is necessary to determine the strategy of their development in the territory of a country. The spatial development strategy of the Russian Federation for the period up to 2025 declares the development of large and largest urban agglomerations as the main focus ⁴. This means that in the near future development is planned for 15–25 largest agglomerations with the population of 500 thousand people. From the point of view of economy, this approach is quite reasonable and logical. However, excessive centralization and consolidation of the country population in the context of its extensive territory involves geopolitical risks that threaten its territorial integrity. To mitigate possible risks, the co-authors propose to switch to decentralization and deurbanization of the western part of Russia with the even distribution of settlements across the territory.

Each city C_i consists of basic infrastructure elements: Social infrastructure S_i ; Engineering infrastructure En_i ; Public and business infrastructure P_i ; Infrastructure of economic activities Ec_i ; Housing infrastructure H_i ; Transport infrastructure T_i .

The co-authors suggest that the modeling of the development of urbanized territories should entail different development scenarios, depending on the planned population size, and the target values are: 1) 300 thousand people; 2) 500 thousand people; 3) 750 thousand people; 4) 1,000 thousand people.

At the same time, the key is to develop step-by-step scenario-based transitions from small to big population numbers to ensure the sustainable development of an urbanized territory. Basic conditions for the transition to a new development scenario are:

1. Reaching maximum population numbers in an urbanized area (2):

$$H_i \rightarrow H_i^{\max}, \quad (2)$$

where H_i is the population number within the boundaries of an urbanized territory, people; $H_i^{\max}$ is the maximum population number entailed by the i -th development scenario, people.

2. Attaining the target value according to the evaluation criterion of capitalization of urban assets (3) [12]:

$$K_i^A = C_i^A / I_i > 1, \quad (3)$$

where K_i^A is the valuation criterion of the asset capitalization for the i -th development scenario (minimum value $K_{\min}^A = 11$); C_i^A is the total value of urban assets for the i -th development scenario, rub.; I_i is the total amount invested into the development of an urbanized territory for the i -th scenario, rub.

3. Generation of city-forming factors (clusters) in an urbanized territory in the process of its development (4):

$$CF_i = CF_{base} + [CF_{add} (i - 1)], \quad (4)$$

where CF_i is the minimum required list of core factors for the i -th scenario; CF_{base} is the basic city-forming factor that served as the basis for an urban area; CF_{add} are additional city-forming factors in different

⁴ Strategy of spatial development of the Russian Federation for the period up to 2025 : Decree of the Government of the Russian Federation dated 13.02.2019. No. 207-r.

► areas necessary for the sustainable development of an urbanized area; i is the development scenario for an urbanized area ($i = 1...4$).

The general formalized cost model for the development of urbanized territories will be presented as formula (5):

$$C_i = \sum_{j=1}^n S_j + \sum_{j=1}^n E n_j + \sum_{j=1}^n P_j + \sum_{j=1}^n E c_j + \sum_{j=1}^n H_j + \sum_{j=1}^n T_j. \quad (5)$$

The structural elements of each infrastructure block are addressed in detail in Table that is used as a case modelling the cost of forming an urbanized territory with the population of 500 thousand people.

Having analyzed the Table 1 data, one can see that the total cost of building a new city with the population of 500 thousand people, including basic infrastructure elements, will amount to more than 3.58 trillion rubles, or 7.16 million rubles per future resident.

At the same time, it is noteworthy that when the infrastructure of economic activity is created, manufacturing enterprises with high-performance jobs must be the basis of this block of infrastructure and the city as a whole. This will allow not only to implement the task set by the President of the Russian Federation to the Federal Assembly of the Russian Federation in 2012, but also ensure the growth of the aggregate labour productivity, an increase in the standard of living, an increase in tax deductions, which will together affect the growth of the gross regional product. It is important to mention that the share of high-performance jobs in the total structure of jobs in a highly urbanized territory under the initial development scenario should exceed 60 % and gradually, in the process of transition to a higher-level scenario (i (IX) = 1,000 thousand people), this share will decrease, giving way to jobs in the industry of services offered to the local population.

The analysis of the breakdown of costs by infrastructure blocks shows that the largest cost share deals with the housing

infrastructure (33.63 %), and the smallest one deals with the public and business infrastructure (0.31 %).

Given that the significant cost of building a new city in an urbanized territory, that entails a 1.5 budget overrun in terms of funds allocated from the federal budget each year and designated for national projects (from 2.2 to 2.7 trillion rubles for 2020–2023), it is necessary to provide co-financing tools together with private businesses. They should be based on the principles of mutually beneficial cooperation with a consensus of interests of both the public authorities (federal, regional, local ones) and business entities (small, medium, large ones), with regard for the opinion of society (residents, public organizations, non-profit organizations, etc.). The co-authors consider it appropriate to adhere to the following structure of financing activities when forming the cost part in the course of the cost modeling in an urbanized area (6):

$$\begin{cases} I_{UT} = \sum_{i=1}^n (I_{FB}^i + I_{RB}^i + I_{LB}^i + I_{PB}^i); \\ \frac{\sum_{i=1}^n T_{UT}}{\sum_{i=1}^n C_{MI}} \geq 0, \end{cases} \quad (6)$$

where I_{FB}^i is the amount of the federal budget investments for the development of an urbanized territory in the i -th scenario, rub.; I_{RB}^i is the amount of investments from the regional budget for the development of an urbanized territory in the i -th scenario, rub.; I_{LB}^i is the amount of investments from the local budget for the development of an urbanized territory in the i -th scenario, rub.; I_{PB}^i is the amount of private business investments for the development of an urbanized territory in the i -th scenario, rub.; T_{UT} is the total amount of tax deductions within the boundaries of an urbanized territory in the i -th scenario, rub.; C_{MI} is the total cost of maintaining infrastructure within the boundaries of urbanized territories, rub.

The cost modeling of the urbanized territory development

No.	Element of the infrastructure block	The need per unit of measurement	The need for the entire urbanized area	The volume unit cost, thousand rubles ⁵	The cost for the entire urbanized territory, million rubles
Social infrastructure S_i					
1	Pre-school education institutions	100 seats per 1 thousand inhabitants*	50,000	750	37,500
2	General education institutions	180 seats per 1 thousand inhabitants*	90,000	1,180	106,200
3	Educational organizations of higher education	170 students per 10 thousand people**	8,500	1,650	14,025
4	Professional educational organizations	270 students per 10 thousand people**	13,500	1,500	20,250
5	Urban-level healthcare institutions that provide assistance in hospitals	13.47 beds per 1 thousand people**	6,735	3,500	23,572.5
6	District-level healthcare institutions providing outpatient care	18.15 visits per shift per 1 thousand people**	9,075	1,510	13,703.25
7	Public gyms	200 sq. m of floor space for 1 thousand people*	100,000	53.0	5,300
8	Swimming pools	100 sq. m water mirrors for 1 thousand people*	50,000	93.5	4,675

Continuation of the Table

№	Element of the infrastructure block	The need per unit of measurement	The need for the entire urbanized area	The volume unit cost, thousand rubles ⁵	The cost for the entire urbanized territory, million rubles
9	Planar sports facilities	1950 sq. m of the total area for 1 thousand people ^{***}	975,000	9.9	9,652.5
10	Universal sports and entertainment halls, including those that have artificial ice	9 seats for 1 thousand people [*]	4,500	2,540	11,430
11	Public (universal) libraries	1 per 100 thousand population ^{***}	5	230,000	1,150
12	Museums	4 items per city district ^{***}	4	128,000	512
13	Concert halls (houses of culture)	5 seats for 1 thousand people [*]	2,500	293	732.5
Total for block S_i					248,702.75
Engineering infrastructure En_i					
14	Power supply	2,640 kWh/year for 1 person [*]	1,320 GW	2,590	3,418.8
15	Heat supply	43.9 kCal per 1 sq. m ³	1,025 MW	340	348.5
16	Water supply and discharge	220 l/day. (6.6 cubic meters/month) for 1 person ^{***}	3,300,000 m ³ /month	0.045	148.5
17	Gas stations	1 station for 1,200 cars ^{***}	125	4,650	581.25
18	General commodity warehouses for food items	77 sq. m for 1 thousand people [*]	38,500	25	962.5
19	General warehouses of non-food products	217 sq. m for 1 thousand people [*]	108,500	35	3,797.5
20	Landfills for solid waste disposal	300 kg per 1 person per year [*]	150,000 tons per year	4,015	602,250
Total for block En_i					611,507.05
Public and business infrastructure P_i					
21	City management institutions	1 item per city district ^{***}	9,450 m ²	39.2	370.44
22	Recreation and recreation facilities (parks, gardens, squares, boulevards)	10 sq. m/person [*]	500 ha	16,218	8,109
23	Municipal archives	1 item per city district ^{***}	3,000 m ²	43.0	129
24	District (city) courts	1 item per city district ^{***}	3,700 m ²	48.0	177.6
25	District department of internal affairs (2nd category, staff 300–450 people)	1 item for 150 thousand people [*]	4 items with a total area of 18,400 m ²	36.5	671.6
26	Housing and maintenance organizations	1 item per residential area with the population of up to 80 thousand people [*]	7 items with a total area of 9,100 m ²	36.5	332.15
27	Funeral service	1 item for 500 thousand people [*]	1 item with an area of 1,000 m ²	41.3	41.3
28	Fire depots	1 item per 100 thousand people [*]	5 type II fire depots for 6 cars	36,965 (for 1 car)	1,108.95
29	Wedding palaces	1 item per 200 thousand people [*]	3 items with a total area of 4,500 m ²	61.8	278.1
Total for block P_i					11,218.14
Economic activity infrastructure Ec_i					
30	Business centres	1 item per 250 thousand people ^{****}	2 items with a total area of 70,000 m ²	67.0	9,380
31	Shopping and entertainment centres	280 sq. m for 1 thousand people [*]	140,000	55.0	7,700

End of the Table

№	Element of the infrastructure block	The need per unit of measurement	The need for the entire urbanized area	The volume unit cost, thousand rubles ⁵	The cost for the entire urbanized territory, million rubles
32	Consumer service enterprises	5 jobs per 1 thousand people [*]	2,500	2,500	6,250
33	Manufacturing enterprises (high-performance)	100 jobs per 1 thousand people [*]	50,000	20,980	1,049,000
34	Non-food trade establishments	70 sq. m for 1 thousand people [*]	35,000	65.0	2,275
35	Food trade institutions	30 sq. m for 1 thousand people [*]	15,000	75.0	1,125
36	Catering establishments	40 seats for 1 thousand people [*]	20,000	55.0	1,100
37	Bank branches	1 operating cash register for 30 thousand people [*]	5 items with a total area of 10,000 m ²	65.0	650
38	Hotels	6 beds for 1 thousand people [*]	3,000	1,100	3,300
39	Movie theatres	35 seats for 1 thousand people [*]	17,500	99.2	1,736
40	Theatres	8 seats for 1 thousand people [*]	4,000	3,459	13,836
41	Circuses	5 seats for 1 thousand people [*]	2,500	1,296	3,240
42	Pharmacy organizations	1 item per 13 thousand people [*]	39	2,500	97.5
Total for block Ec_i					1,099,689.5
Housing infrastructure H_i					
43	Residential buildings (including multi-apartment and individual housing)	40 sq. m for 1 person [*]	20,000,000	60.0	1,200,000
44	Municipal housing stock (1% of the population)	15 sq. m for 1 person [*]	75,000	55.0	4,125
Total for block H_i					1,204,125
Transport infrastructure T_i					
45	Streets and the road network	20 % of the built-up area of the city district ^{***}	21,200 ha ^{****}	13,000	275,600
46	Automobile station	Passenger capacity with an estimated daily departure from 4,000 to 6,000 ^{**}	250	1,000	250
47	Railway station	1 item per city ⁴	1	15,000,000	15,000
48	Airport	1 item per city ^{****}	1	19,000,000	19,000
49	Metro	1 station per 100 thousand people ^{****}	5	19,000,000	95,000
Total for the block T_i					404,850
In total, in an urbanized area with the population of 500 thousand people					3,580,092.44

^{*} The need was determined in accordance with SP 42.13330.2016⁵.

^{**} The need was determined in accordance with Resolution of the Government of the Krasnoyarsk Territory No. 631-p⁶.

^{***} The need was determined in accordance with Decision of the Krasnoyarsk City Council of Deputies No. V-299⁷.

^{****} The need was determined in accordance with [13];

^{*****} The cost was determined on the basis of data on similar items, as well as in accordance with Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation No. 120/pr; 123/pr; 124/pr; 125/pr; 128/pr; 129/pr; 131/pr; 132/pr; 136/pr; 137/pr; 139/pr⁸.

⁵ Urban planning. Planning and construction of urban and rural settlements : (SP 42.13330.2016) : approved by Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation No. 1034/pr dated 30.12.2016 with amendments and additions in ed. from 03.20.2020.

⁶ On approval of regional standards of urban planning design of the Krasnoyarsk Territory : Resolution of the Government of the Krasnoyarsk Territory dated December 23, 2014. No. 631-p.

⁷ On approval of local standards of urban planning design of the Krasnoyarsk city district : Decision of the Krasnoyarsk City Council of Deputies dated 04.09.2018. No. V-299.

⁸ On approval of enlarged Construction Price Standards : Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation dated 11.03.2021. No. 120/pr; 123/pr; 124/pr; 125/pr; 128/pr; 129/pr; 131/pr; 132/pr; 136/pr; 137/pr; 139/pr.

At the same time, we propose to distribute costs among the main subjects of formation of an urbanized territory with regard for basic infrastructure blocks (7–10):

$$I_{FB}^i = C_S^i + 0,8C_{En}^i + 0,2C_{Ec}^i + C_T^i, \quad (7)$$

$$I_{RB}^i = C_{PI}^i + 0,2C_{En}^i + 0,2C_H^i, \quad (8)$$

$$I_{MB}^i = C_P^i + T_{UT}^i, \quad (9)$$

$$I_{PB}^i = 0,8C_{Ec}^i + 0,8C_H^i, \quad (10)$$

where IC_S^i is the amount of costs of creating social infrastructure in the i -th development scenario, rub.; C_{En}^i — is the amount of costs of creating engineering infrastructure in the i -th development scenario, rub.; C_T^i is the amount of costs of creating transport infrastructure in the i -th development scenario, rub.; C_{PI}^i is the amount of costs of creating public and business infrastructure in the i -th development scenario, rub.; C_H^i is the amount of costs of creating housing infrastructure in the i -th development scenario, rub.; C_P^i is the amount of costs for the population living within the boundaries of an urbanized territory in the course of their life, rub.; C_{Ec}^i is the cost of creating the infrastructure for the economic activity in the i -th development scenario, rub.

In the context of an emerging design and construction trend, the cost modeling of the development of urbanized territories, with account taken of an integrated approach to the formation of their infrastructure based on different scenarios and the proposed criteria for scenario transitions, will serve as an incentive for the sustainable development of not only these territories, but also the country as a whole, since more than 75 % of Russia's GDP is created by cities. Synchronization of existing and prospective state programs at all levels of management with the involvement of private investors and the formation of special tax regimes in urbanized territories will help to neutralize the "shock" effects that the country's budget is exposed to.

REFERENCES

1. Soboleva O.N. *Fundamentals of urban planning and planning of populated places : an educational and methodological guide*

to practical and independent work. Rostov-on-Don, RGUPS, 2017; 24. (rus.).

2. Meng C., Du X., Ren Y., Shen L., Cheng G., Wang J. Sustainable urban development: An examination of literature evolution on urban carrying capacity in the Chinese context. *Journal of Cleaner Production*. 2020; 277:122802. DOI: 10.1016/j.jclepro.2020.122802

3. Yang J., Han M.M., Yao H.M., Liu T., Wang Y.H. Comprehensive evaluation of urbanization development quality in Four East China Provinces. *IOP Conference Series: Earth and Environmental Science*. 2020; 594(1):012005. DOI: 10.1088/1755-1315/594/1/012005

4. Yusin G.S. The settlement system of Russia — current trends and tasks of scientific support. *The Future of Russia. National projects. Problems and prospects : collection of scientific reports*. Moscow, MARKHI, 2021; 28–33. (rus.).

5. Efimov V.S., Sarchenko V.I., Lapteva A.V., Shishatskiy N.G., Efimov A.V., Bryukhanova E.A. The city — idea and practice. Krasnoyarsk, Sib. feder. un-t, 2019; 522. (rus.).

6. Battarra R., Gargiulo C., Zucaro F. Future Possibility of Smart and Sustainable Cities in the Mediterranean Basin. *Journal of Urban Planning and Development*. 2020; 146(4):0000610.

7. Sarchenko V.I. Properties of urban real estate development programs. *Journal of Economy and entrepreneurship*. 2015; 6-3(59-3):826–829. (rus.).

8. Kosareva N., Polidis T.T., Popov R.A., Puzanov A.S. Economic performance of Russian regions' capital cities. *Area Development and Policy*. 2021; 6(2):166–180. DOI: 10.1080/23792949.2020.1830707

9. Glazychev V.L. The city without borders. Moscow, Territory of the Future, 2011; 400. (rus.).

10. Puchkov M.V. Strategies for the development of urbanized territories: campus models as a means of managing regional development. *Academic Bulletin of UralNIIPROEKT RAASN*. 2011; 1:30–34. URL: <https://www.elibrary.ru/item.asp?id=16116176> (rus.).

11. Patrakeev I.M., Pogorelov A.A. Modeling the development of urban systems based on the theory of homogeneous structures. *Scientific Notes of the V.I. Vernadsky Crimean Federal University. Geography. Geology*. 2013; 26(1):116–126. (rus.).

12. Sarchenko V.I. Real estate space-territorial development. *Vestnik MGSU [Proceedings of Moscow State University of Civil Engineering]*. 2015; 1:103–111. DOI: 10.22227/1997-0935.2015.1.103-111 (rus.).

13. Sarchenko V.I. Methodology of development and implementation of innovative solutions for complex residential development of the territories of the general plan of the city with hidden investment potential. Krasnoyarsk, ISI SFU, 2014; 239. (rus.).

Стоимостное моделирование урбанизированных территорий

В условиях стремительной урбанизации и роста городского населения особое внимание в повестке пространственного развития уделяется городам. Сложность поиска перспективных градообразующих факторов, а также недостаток инвестиций в развитие не позволяют создавать в России новые города. При этом опыт ряда зарубежных стран показывает, что решение данной проблемы не только возможно, но и экономически эффективно. Учеными-градостроителями, архитекторами и урбанистами предлагаются различные модели развития городских территорий, агломераций, урбанизированных территорий. Однако в большинстве их работ не изученным остается вопрос необходимого объема финансирования базовой инфраструктуры на такого рода территориях. Уточняя понятие «урбанизированные территории», авторы в статье формируют принципы их экономико-градостроительного моделирования. Предложенные критерии сценарных переходов при развитии урбанизированных территорий позволяют более эффективно использовать имеющиеся ресурсы. Рекомендованное авторами распределение затрат среди основных субъектов формирования урбанизированной территории по базовым инфраструктурным блокам позволит избежать чрезмерной нагрузки на бюджетную систему страны. В результате стоимостного моделирования развития урбанизированной территории с населением 500 тыс. чел. выясни-

лось, что при создании нового поселения на одного жителя необходимо порядка 7,16 млн руб. инвестиций.

Ключевые слова: урбанизированные территории, сценарии развития, инфраструктура жизнедеятельности, градообразующие факторы, агломерации, проектирование городов

СПИСОК ИСТОЧНИКОВ

1. Соболева О.Н. *Основы градостроительства и планировка населенных мест : учебно-методическое пособие к практическим и самостоятельным работам*. Ростов-на-Дону : ФГБОУ ВО РГУПС, 2017. 24 с.

2. Meng C., Du X., Ren Y., Shen L., Cheng G., Wang J. Sustainable urban development: An examination of literature evolution on urban carrying capacity in the Chinese context // *Journal of Cleaner Production*. 2020. Vol. 277. P. 122802. DOI: 10.1016/j.jclepro.2020.122802

3. Yang J., Han M.M., Yao H.M., Liu T., Wang Y.H. Comprehensive evaluation of urbanization development quality in Four East China Provinces // *IOP Conference Series: Earth and Environmental Science*. 2020. Vol. 594. Issue 1. P. 012005. DOI: 10.1088/1755-1315/594/1/012005

4. Юсин Г.С. Система расселения России — актуальные тренды и задачи научного обеспечения // *Будущее России. Национальные проекты. Проблемы и перспективы : сб. науч. докл. М. : МАРХИ, 2021. С. 28–33.*

5. Ефимов В.С., Сарченко В.И., Лаптева А.В., Шишацкий Н.Г., Ефимов А.В., Брюханова Е.А. Город — идея и практика. Красноярск : Сиб. федер. ун-т, 2019. 522 с.
6. Battarra R., Gargiulo C., Zucaro F. Future possibility of smart and sustainable cities in the mediterranean basin // *Journal of Urban Planning and Development*. 2020. Vol. 146. Issue 4. P. 0000610.
7. Сарченко В.И. Свойства программ развития городской недвижимости // *Экономика и предпринимательство*. 2015. № 6–3 (59–3). С. 826–829.
8. Kosareva N., Polidis T.T., Popov R.A., Puzanov A.S. Economic performance of Russian regions' capital cities // *Area Development and Policy*. 2021. Vol. 6. Issue. 2. Pp. 166–180. DOI: 10.1080/23792949.2020.1830707
9. Глазычев В.Л. Город без границ. М. : Территория будущего, 2011. 400 с.
10. Пучков М.В. Стратегии развития урбанизированных территорий: кампусные модели как средство управления региональным развитием // *Академический вестник УралНИИпроект РААСН*. 2011. № 1. С. 30–34. URL: <https://www.elibrary.ru/item.asp?id=16116176>
11. Патракеев И.М., Погорелов А.А. Моделирование развития городских систем на основе теории однородных структур // *Ученые записки Крымского федерального университета имени В.И. Вернадского. География. Геология*. 2013. Т. 26. № 1. С. 116–126.
12. Сарченко В.И. Пространственно-территориальное развитие недвижимости // *Вестник МГСУ*. 2015. № 1. С. 103–111. DOI: 10.22227/1997-0935.2015.1.103-111
13. Сарченко В.И. Методология разработки и реализации инновационных решений по комплексной жилой застройке

территорий генплана города со скрытым инвестиционным потенциалом. Красноярск : ИСИ СФУ, 2014. 239 с.

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Л.И. Павлова. Москва. Театр Вахтангова. Рисунок, тушь, перо

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Some issues of the integrated development of public transport in the Barnaul agglomeration

The development of motor transport is the most important factor, determining the quality of life of urban population. Hence, the topic of the work is relevant. The pronounced social nature of public passenger transport should translate into the guaranteed high quality conveyance of the least affluent categories of passengers.

The article studies the state and quality of passenger transport in the city of Barnaul, analyzes the operation of passenger transport organizations, and transportation payments made by the population. The article identifies the main problems of passenger transportation, including consequences of the poor-quality operation of transportation organizations in Barnaul and offers solutions towards the optimal development of the transport system.

The co-authors propose to use methods, based on the driver's observations, automatic recorders, polling methods, cross-sectional surveys or coupons, to improve the operation of transport routes.

Keywords: public transport, Barnaul city, route network, unregulated tariffs

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INTRODUCTION

As of the end of 2019, 29 passenger transportation enterprises, having different legal forms of organization, were in operation in the city of Barnaul. They included 16 limited liability companies, 12 individual entrepreneurs, and 1 municipal unitary enterprise¹.

The urban route network has eighty-one routes, including sixty-nine bus routes and twelve electric transport routes¹.

About seven hundred and eighty public transport vehicles are in operation in the capital of the Altai Territory. They include one hundred and eighty electric vehicles, up to three hundred large-sized buses, including about one hundred and forty low-floor buses, and three hundred small-sized buses. The passengers are concentrated along the routes, connecting the western part of the city with its business centre. Modernization and optimization of the transport system is relevant for the city of Barnaul. The main purpose of the work is to study the problems of passenger transportation and prepare proposals for their optimization.

The network of tram and trolleybus routes in the city of Barnaul and the pedestrian accessibility of bus stops is quite well developed, as it has access to almost all residential areas.

MATERIALS AND METHODS

Neighborhoods, whose pedestrian accessibility exceeds ten minutes in terms of electric transport, were monitored within the framework of the development of a comprehensive traffic management pattern [1]. A map, showing duplicated existing routes of public transport was used to analyze the transport system in the city.

One of the main reasons for the extensive duplication of urban routes is the Barnaul town planning pattern, since the development of its network of streets and roads is restrained in the direction from large-scale residential housing areas to the city centre. The territory, full of natural and artificial barriers, complicates the development of the urban transport network, as the construction of massive artificial structures, including bridges and overpasses, is costly.

RESULTS

According to the results of a survey on urban passenger transport traffic, conducted by the Municipal Unitary Enterprise "Tsentrtrans" in Barnaul, the daily traffic reaches about six hundred thousand passengers, which is twenty-eight percent less than the passenger traffic number identified in the survey conducted over ten years ago [2]. A decrease in the passenger traffic is also confirmed by an increase in the number of motor vehicles, that exceeds three hundred cars per thousand of residents.

Since December 2016, an electronic travel payment system has been in operation. It uses the "Convenient Route" technology, launched in Barnaul. Sixty-three routes (or seventy-eight percent) of public urban vehicles are connected to this system. 67,070,291 trips were made (6,097,299 trips per month) during the 11 months of 2018; 73,130,991 trips (6,648,272 trips per month) during the 11 months of 2019.

Since 01.08.2019, certain categories of citizens, registered in the Federal and Regional registers as social assistance recipients, have been using transport cards. On average, social assistance recipients make 2,425 thousand trips every month.

As for the passenger traffic, traced by bank wires, during the 11 months of 2018, 16,135,081 trips were made (1,466,825 trips per month), and

¹ The official website of the Barnaul City Administration. URL: <https://barناول.org>

▶ 30,779,845 trips were made during the 11 months of 2019 (2,798,168 trips per month)².

As a result, we have identified an increase totaling at 14,644,764 trips or 90.8 %. First of all, this increase was triggered by the introduction of bank card payments in February 2019; in addition, it was boosted by the transfer to the transport cards of social assistance recipients in August 2019.

If we analyze the passenger traffic on electric transport during the 9 months of 2019, electric transport was used by 38 million 254 thousand passengers, which is 2.3 % (882.0 thousand) passengers less than in the same period of the previous year³.

In order to optimize costs, the schedule of electric transport vehicles was revised with a reduction in the number of vehicles on weekends and holidays. As a result, the occupancy of cars increased, because in 2018 61.5 people were transported per hour, and in 2019 this number went up to 64.2 people. Hence, the growth rate was 4.4 %.

The passenger traffic has the following structure: the share of paying passengers is 50.2 %, while the share of social assistance recipients is 49.8 %. The main reason for the large number of trips made by social assistance recipients is, of course, the low per-trip price.

The structure of trips is as follows: in 2018, cash payments amounted to 76 %, non-cash payments reached 24 %; in 2019, cash payments amounted to 44 %, non-cash payments — 56 %.

The share of non-cash trips increased by thirty-two percent if compared to 2018.

Currently, the largest share is the one of the trips made by social assistance card holders, it has reached forty-six percent, the share of trips paid for using bank cards is sixteen percent, fourteen percent is the share of trips paid for by electronic travel cards of pensioners, and seven percent of passengers use electronic wallets to pay for their trips.

Given that a passenger, being a System user, does not have to perform any additional operations (connection, activation of an electronic means of payment) to find out the fare using a contactless bank card, the electronic payment system can invalidate a personal transport card in case of its issuance to a citizen who does not have the right to use the card to pay for a trip.

Over the entire period of operation of the system, about one hundred and fifty-five thousand cards have been distributed. More than sixty thousand cards (39 %) were sold to certain categories of citizens, registered in the Federal and Regional registers of recipients of social assistance.

The share of paying passengers is 50.2 %, the share of social assistance recipients is 49.8 % in the structure of electric transport passengers. The main reason for the large number of social assistance recipients among passengers is the low fare payable by holders of social transport cards [3].

Ten trams and two trolleybuses were overhauled, a new tram was supplied in 2009–2012, according to the regional program.

In 2012–2014, the municipal enterprise obtained two new trams, eight new trolleybuses, at the expense of the company's funds, one tram was overhauled within the framework of different programs at various levels. Currently, two hundred tram cars and forty trolleybuses need a repair. The cost of a new tram starts from twenty million rubles, the cost of an overhaul of a tram car is six

million rubles, the cost of a new trolleybus is fifteen million rubles. In 2019, 109 trams and 25 trolleybuses were repaired in Barnaul.

The municipal enterprise has 287 trams and trolleybuses, including two hundred and twenty-seven trams. The wear of tram cars is 97 %, the wear of trolleybuses is 83.3 %.

The standard service life of a tram is fifteen years. The average age of trams is thirty-three years. The standard service life of trolleybuses is ten years, and the average age of trolleybuses is twenty-one years.

DISCUSSION

In 2019, the company launched an overhaul of trams in a tram depot. When a tram car is overhauled, its chassis, roof, the lining of the passenger compartment are replaced, the tram car is insulated, passenger seats and electrical wiring are replaced [4]. In addition, electrical wiring is upgraded to reduce the risks of technical malfunctions and the amount of energy consumed by a tram up to fifty percent.

In 2020, after the launch of a high-alert mode, passenger traffic went down by seventy percent. Due to a nose dive of the passenger traffic numbers, the number of vehicles on the line went down by fifty percent.

The passenger transport occupancy rate is monitored on a daily basis, and the same about the checking of masks on the faces of passenger.

At the terminal stops, measures are taken to check whether public transport enterprises fulfill the requirements dealing with the sanitary treatment of vehicles [5]. Administrations of urban districts, acting in collaboration with the Barnaul Department of the State Emergency Service, have designed routes for notifying the population using mobile means of notification, checking the rules of conduct compliance by citizens and organizations in the context of a high-alert and emergency situation.

In 2020, more than six hundred bus stop pavilions, underground pedestrian crossings, and Barnaul public areas were cleaned twice in compliance with the sanitary and hygienic requirements.

Since 30.03.2020, employees of the city administration have conducted 11 inspections to check the implementation by public transport enterprises of a set of preventive sanitary treatment actions in respect of transport vehicles [6]. Inspectors also asked line workers to demonstrate their personal disinfectants and masks. Also, control is conducted over the sanitary treatment of public vehicles (wiping handrails, seat backs, ventilation of cabins). According to the results of inspections, letters are sent to public transport enterprises with a request to provide line workers with protective items, check the availability of disinfectants, and generate awareness about the need to take preventive measures at the terminal stops [7]. Inspections are made at the terminal stops Spartak-2, the Spartak Square, Furniture Factory, the V.N. Bavarin Square, and the Victory Square.

RESULTS

Barnaul has launched a municipal programme on the development of the urban road transport system until 2025⁴. This municipal programme entails the subsidizing of socially significant and electric

2 AMIK Information Service. URL: <https://www.amic.ru/news/458137>

3 CBM Center trans. URL: <https://tk-barn.ru>

4 On approval of the Plan for the development of regular transportation of passengers and luggage by road and urban ground electric transport of the city district the city of Barnaul for 2016–2020 : Resolution of the Administration of the city of Barnaul dated 18.07.2016 No. 1447. URL: <http://docs.cntd.ru/document/438985392>

transport routes from the city budget to ensure the transport accessibility of particular settlements and gardening establishments.

The annual amount of urban budget subsidies is about two hundred and twenty million rubles.

Barnaul trams and trolleybuses can be overhauled within the framework of targeted programs, including the program on the development of the transport system of the Altai Territory, which entails measures for the development of urban electric transport, but the financial resources, needed for their implementation, will be provided from the city budget starting from 2023.

Therefore, the following measures must be taken to develop public transport in the city of Barnaul.

It is necessary to ensure high quality transport services, efficient production of vehicles and competitive transport services, so that passenger transportation organizations are able to successfully operate in the transport market [8].

When optimizing the route network in the city, it is necessary to reduce the level of duplication of urban passenger transport routes. At the same time, it is necessary to ensure the minimal duplication of suburban and urban routes. As a solution to this problem, it is necessary to cut suburban bus routes at the nearest transfer point within the city borders [9].

Also, Barnaul needs complete modernization of urban public transport to be funded from regional, local and federal budgets [10].

The project, proposed by VEB.RF, encompasses the renovation of the fleet of vehicles and the introduction of intelligent traffic management systems such as dedicated lanes, traffic lights, recording/documentation facilities to ensure comfortable and safe trips and increase the velocity and attractiveness of public transport [11].

To ensure the transport accessibility of suburban areas, a motor transportation division was organized at the Municipal Unitary Enterprise Gorelektrotrans of Barnaul. It will entail the purchase of eco-friendly buses (the city needs about sixty of them) running on gas fuel [12].

In turn, such a large-scale modernization will affect the tariff policy in the field of passenger transportation and will require an annual revision of fares, an increase in the tariff gap between electronic and cash payments [13].

It will be impossible to optimally develop the transport system in the city of Barnaul and other cities of the Russian Federation without the implementation of the above approaches.

REFERENCES

1. Alekseeva I.M. *Statistics of motor transport*. Moscow, Exam Publ., 2005; 352. (rus.).
2. Bernstein M.L., Rachstadt A.G. *Metallography and heat treatment of steel*. Vol. 1. Moscow, 2013; 128. (rus.).
3. Demikhov V.Yu. *Sales activity management in corporate systems of the transport complex*. Moscow, VINITI RAS, 2008; 180. (rus.).
4. Kokin A.S., Levikov G.A. *Freight forwarding services in international cargo transportation*. Moscow, Infotropik Media Publ., 2011; 576. (rus.).
5. Kuzmin A.S. *International transportation*. Moscow, TetraSystems Publ., 2008; 128. (rus.).
6. Kurganov V.M. *Logistics. Transport and warehouse in the supply chain of goods*. Moscow, Book World Publ., 2004; 432. (rus.).
7. Jacobs J. *The death and life of great American cities*. New York : Vintage books, 1961; 473.
8. Levikov G.A. *Management of transport and logistics business*. Moscow, TransLit Publ., 2007; 224. (rus.).
9. Panova O.N. *Methodological foundations for optimizing the parameters of the system for the development of long-distance passenger traffic*. Moscow, LKI Publ., 2011; 160. (rus.).
10. Troitskaya N.A., Chubukov A.B. *Unified transport system*. Moscow, Academy Publ., 2013; 240. (rus.).
11. Nikiforov V.V. *Logistics. Transport and warehouse in the supply chain*. Moscow, GrossMedia, ROSBUKH Publ., 2008; 192. (rus.).
12. Forman R.T.T. *Urban regions — Ecology and Planning beyond the City*. Cambridge University Press, 2008; 478.
13. Russ T.H. *Site planning and design handbook*. Second Edition. New York, McGraw-Hill, 2009; 507.

Некоторые вопросы комплексного развития общественного транспорта Барнаульской агломерации

Развитие автомобильного транспорта является важнейшим фактором, определяющим уровень качества жизни городского населения, поэтому тема его работы является актуальной. Яркий выраженный социально значимый характер осуществления деятельности общественного автомобильного пассажирского транспорта должен выражаться в гарантированности высокого качества перевозок наименее обеспеченным категориям пассажиров.

В статье рассматривается состояние и качество работы пассажирского транспорта на территории города Барнаула, проведен анализ работы пассажироперевозящих организаций, оплата транспортных услуг населением. В статье обозначены основные проблемы пассажирских перевозок, в том числе описаны последствия некачественной работы автоперевозчиков для города Барнаула и предложены пути их решения для оптимального развития транспортной системы.

Для корректировки режимов работы существующих маршрутов предложено использовать методы, основанные на наблюдениях водителя, применении автоматических регистраторов, а также методы опросов, срезовых обследований или талонов.

Ключевые слова: общественный транспорт, Барнаул, маршрутная сеть, нерегулируемые тарифы

СПИСОК ИСТОЧНИКОВ

1. Алексеева И.М. *Статистика автомобильного транспорта*. М. : Экзамен, 2005. 352 с.
2. Бернштейн М.Л., Рахштадт А.Г. *Металловедение и термическая обработка стали*. Т. 1. М., 2013. 128 с.
3. Демихов В.Ю. *Управление бытовой деятельностью в корпоративных системах транспортного комплекса*. М. : ВИНТИ РАН, 2008. 180 с.
4. Кокин А.С., Левилов Г.А. *Транспортно-экспедиционные услуги при международных грузоперевозках*. М. : Инфотропик Медиа, 2011. 576 с.
5. Кузьмин А.С. *Международные перевозки*. М. : ТетраСистемы, 2008. 128 с.
6. Курганов В.М. *Логистика. Транспорт и склад в цепочке поставок товаров*. М. : Книжный мир, 2004. 432 с.
7. Jacobs J. *The death and life of great American cities*. New York : Vintage books, 1961. 473 p.
8. Левилов Г.А. *Управление транспортно-логистическим бизнесом*. М. : ТрансЛит, 2007. 224 с.
9. Панова О.Н. *Методологические основы оптимизации параметров системы развития пассажирских перевозок на дальние расстояния*. М. : ЛКИ, 2011. 160 с.
10. Троицкая Н.А., Чубуков А.Б. *Единая транспортная система*. М. : Академия, 2013. 240 с.
11. Никифоров В.В. *Логистика. Транспорт и склад в цепочке поставок*. М. : Гроссмедиа, РОСБУХ, 2008. 192 с.
12. Forman R.T.T. *Urban regions — Ecology and Planning beyond the City*. Cambridge University Press, 2008. 478 p.

13. Russ T.H. *Site planning and design handbook. Second Edition.* New York : McGraw-Hill, 2009. 507 p.

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Л.И. Павлова. Москва. Особняк Рябушинского. Рисунок, тушь, перо

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A method of indefinite resource factors and systemic correction of time conflicts in construction schedules

When construction work schedules are developed, numerous time parameters are taken into account. Even full account of these parameters cannot guarantee a feasible work schedule. The identification of time conflicts, arising in this case, and their solutions, is a rather labour-intensive process even in the context of computer-aided work scheduling performed using project management software. The analysis and elimination of time conflicts, presented in the article, are based on the improvement of the method of uncertain resource factors. The proposed methodology is focused on feasible construction work scheduling in the case when restrictions, associated with time characteristics, do not allow to set up a construction work timeline. The main feature of the improved method of indefinite resource factors is the simplex algorithm used to find a basic solution in the case of a negative slack, represented in the form of equations, which in the aggregate represent an invalid basic solution. Negative values of base variables, obtained in this case, allow to design integrated regulatory impacts, that allow for the systemic generation of feasible construction schedules that take account of time constraints having an adverse effect.

Keywords: *scheduling and construction management, schedule conflicts, feasible work schedule, project management software*

INTRODUCTION

When construction work schedules are developed, numerous time parameters are taken into account to set up the required work performance timelines. Project management software is a recognized construction scheduling tool [1, 2]. The methodology of their operation is based on the extensive use of network scheduling methods and work schedule optimization. However, not only network scheduling techniques, but also time coupling methods of construction are employed to make up construction schedules [3, 4]. In the international practice, time coupling methods can be termed differently [5, 6]. In any case, work scheduling based on different principles, can be optimized by the algorithms relying on completely different concepts [7–9]. In the future, construction work schedules will be monitored and controlled in the process of implementation to ensure the pre-set construction characteristics [10]. As a result, construction work schedules are adjusted both in the course of their development and implementation. Hence, the adjustment of construction schedules maintains relevance from the beginning of construction scheduling to its final completion.

The main parameters of a construction schedule include its time characteristics, which are traditionally called “the work schedule”. Notably, events, included in the work schedule, may be delayed due to various circumstances. The reasons for the project delay may be late issuance of a construction permit, a delayed receipt of specifications for the utility connection, etc. And since the date of the facility commissioning may be unchanged, the actual time, left for the construction work, is reduced, and hence, the work schedule needs specific adjustments. A similar situation can occur in the course of construction. For example, if a regular construction process monitoring session identifies that the amount of construction work

actually performed is smaller than the amount of work specified in the construction schedule, a larger amount of work should be planned for the time left before the construction completion date. As a result, a so-called time conflict may arise, and its resolution will need rescheduling.

As noted above, project management software programmes encompass scheduling, rescheduling, and monitoring tools, such as Primavera [11] and Microsoft Project (MP) [12]. In the future, we will take advantage of the MP software, since it has a supplementary function of task programming in the Visual Basic for Applications software language. Project management software, such as MP, time conflicts are resolved iteratively, and this technique involves a search through all tasks potentially affecting the conflict. In this case, each sequential iteration is accompanied by a message stating that the completion of this task is impossible at a given time due to a scheduling conflict. The following recommendations are made:

- a change in the type of restrictions;
- a removal of relationships between conflicting types of work;
- a reduction in the task performance time;
- task rescheduling within the framework of the construction work schedule.

Moreover, if a task is composite, each of the above recommendations refers to simple assignments within its structure.

The result of this approach is the step-by-step search through all works along an indefinite path that has features of the critical path method, since the generation of its time characteristics is based on the topology of previous works. If, for example, we address a construction work schedule, consisting of approximately 1,000 items of work, and only the parameters of the last one can be potentially adjusted, then

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► software recommendations have to be analyzed hundreds of times to get the time conflict solved. This is a rather tiresome assignment for a specialist responsible for construction process scheduling. As a result, there is a need for a new approach to time conflicts, based on the replacement of step-by-step iterations with a systemic definition and analysis of corrective procedures.

METHODS

The approach we propose, focused on adjusting construction schedules, is based on the application of the method of indefinite resource factors. Therefore, to learn more about the essence of this method, it is necessary to focus on an algorithm for calculating work performance schedules, also known as the method of indefinite resource coefficients. In [13], the case of the Lakhta Center multifunctional facility ("Lakhta Centre") is addressed to describe the algorithm for assigning prescriptive completion time to unique construction projects. The algorithm is focused on the calculation of the total construction time, provided that each work item is completed within the minimum possible time $t_{\min}$ by the maximum manpower $R_{\max}$. Here, the estimated construction time will be equal to the minimum value of $T_{\min}$, and the assignment of the prescriptive completion time T_d should be more important. As a result, the remainder of T_d and $T_{\min}$ will be positive. This remainder represents a time slack that may be employed to extend the period for the performance of particular work items. The method of indefinite resource factors calculates the time, needed to perform particular items of work, according to formula (1):

$$t = t_{\min} + at_{\min}, \quad (1)$$

where a is the unknown resource factor, used to calculate the period added to the minimum time, which is identified by a linear relationship.

The functional relationship between the resource factor and the value of unknown resources R is determined by the formula:

$$a = (R_{\max}/R) - 1. \quad (2)$$

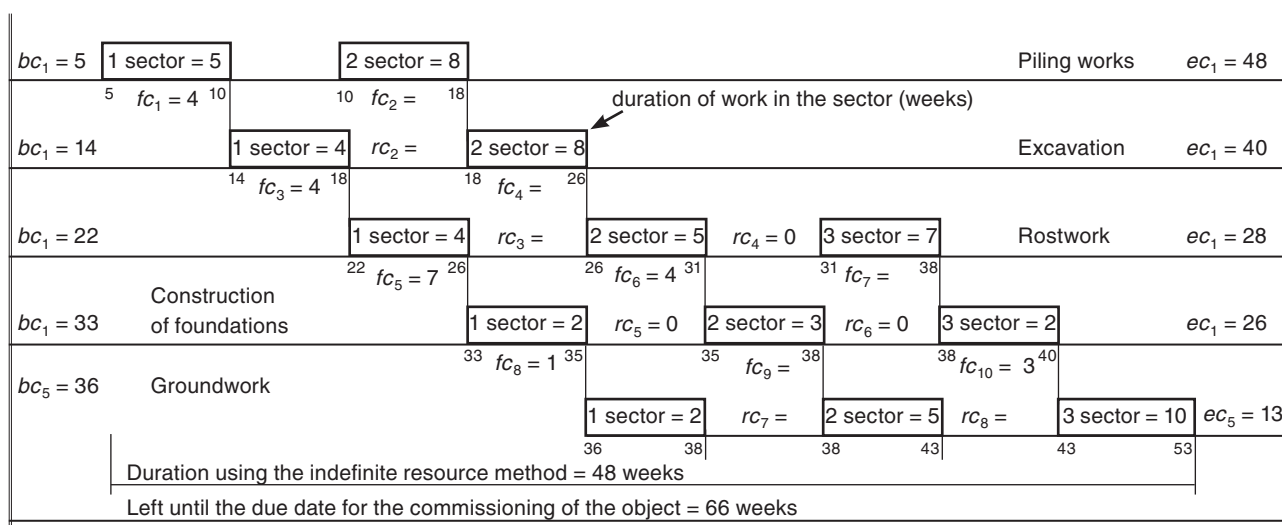
If the time, designated for the performance of each type of work, included in the construction schedule, is presented in this way, the workforce minimization will be equivalent to the maximization of the total time, designated for the performance of each item of work.

An excerpt from the Lakhta Centre construction schedule, presented in [13], is shown in Fig. 1.

The system of equations, describing the Lakhta Centre organizational and technological diagram (OTD), is provided below:

$$\begin{aligned} 1) & bc_1 + 13a_1 + rc_1 + ec_1 = 53; \\ 2) & bc_2 + 12a_2 + rc_2 + ec_2 = 54; \\ 3) & bc_3 + rc_3 + rc_4 + ec_3 = 50; \\ 4) & bc_4 + 7a_4 + rc_5 + rc_6 + ec_4 = 59; \\ 5) & bc_5 + 17a_5 + rc_7 + rc_8 + ec_5 = 49; \\ 6) & bc_1 + 5a_1 + fc_1 + 12a_2 + rc_2 + ec_2 = 49; \\ 7) & bc_1 + 13a_1 + rc_1 + fc_2 + 8a_2 + ec_2 = 45; \\ 8) & bc_2 + 4a_2 + fc_3 + 16a_3 + rc_3 + rc_4 + ec_3 = 46; \\ 9) & bc_2 + 12a_2 + rc_2 + fc_4 + 12a_3 + rc_4 + ec_3 = 42; \\ 10) & bc_3 + 4a_3 + fc_5 + 12a_4 + rc_5 + rc_6 + ec_4 = 55; \\ 11) & bc_3 + 9a_3 + rc_3 + fc_6 + 5a_4 + rc_6 + ec_4 = 52; \\ 12) & bc_3 + 16a_3 + rc_3 + rc_4 + fc_7 + 2a_4 + ec_4 = 58; \\ 13) & bc_4 + 2a_4 + fc_8 + 17a_5 + rc_7 + rc_8 + ec_5 = 47; \\ 14) & bc_4 + 5a_4 + rc_5 + fc_9 + 15a_5 + rc_8 + ec_5 = 46; \\ 15) & bc_4 + 7a_4 + rc_5 + rc_6 + fc_{10} + 10a_5 + ec_5 = 49. \end{aligned} \quad (3)$$

The first 5 equations in system (3) are the resource equations. These equations consolidate all workers engaged in the same type of work, which is a standard practice for an organization using continuous construction methods. Other equations sequentially include all linear relationships that determine the dependence of subsequent work on prior work. Each of the fifteen equations has unknown resource coefficients that determine potential increases in the initially accepted minimum term of work performance. Resource relationships, presented in the equations, determine the duration of breaks scheduled within the framework of sequential work performance for selected sectors. Initial relationships determine the time between the project launch date and the date of introduction of pre-set resources into the construction process. Final relationships



Designation:

bc — initial connections; rc — resource links between sectors (fronts) one type;
 ec — end connections; fc — frontal connections between sectors of different types.

Fig. 1. An excerpt from the organizational and technological diagram for constructing Lakhta Centre [13]

determine the time frame between the completion date of work types and the final construction completion date.

The solution to the system of equations (3), focused on minimizing the labour resources, is reduced to the problem resolvable using the linear programming method, similar to the one described in [14]. As a result, the following objective function is added to the system of linear equations (3).

$$Z = 13a_1 + 12a_2 + 16a_3 + 7a_4 + 17a_5 \rightarrow \max. \quad (4)$$

In Fig. 1, the estimated project term is 48 weeks, while the corresponding prescriptive term is 66 weeks. Hence, the slack time, needed to minimize resources, is equal to 18 weeks. The feature of the task to be accomplished is the initial generation of an acceptable basic solution at the first stage to be followed by the minimization of labour resources at the second stage. Therefore, at the first stage of the optimization problem resolution, only relationships are used as the base variables, leaving resource variables as free ones to ensure the minimum estimated time for the performance of initially agreed-upon work performance terms, which should be less than the prescribed ones. If this condition is met, then the slack time for each equation is not negative; each equation has one base variable, while other variables are equal to zero and are considered as the free ones. Fig. 1 shows slack time values in the equations, which, ultimately, determine the terms of corresponding relationships. The resulting work schedule is shown below the rectangles that specify work sectors and their minimum terms.

It is rational to assume that this problem cannot be solved using the method described above, if less than 48 weeks remain before the construction project completion date. This method needs more improvements to solve problems arising in the context described in the previous paragraph.

RESULTS AND DISCUSSION

Let's consider a 45-week reduction in construction time before commissioning. If this schedule is made using the critical path method, this supplementary constraint can be taken account of. If we use the method of indefinite resource coefficients, this constraint

will also be resolved automatically in the process of finding an acceptable basic solution. The improvement of this method consists in the fact that a certain order of input of base variables is added to algorithm. If all resource relationships are moved to the end of the original simplex matrix, then system (3) is solved by means of searching for the next base variable with a forced return to the beginning to obtain a solution having zero values of resource relationships. This solution is shown in Fig. 1, and the search for an acceptable basic solution is addressed in [15]. If front relationships are placed at the end of the matrix simplex, their values will be equal to zero in the solution. In addition to these solutions, an alternative critical path solution can be obtained. In this alternative solution, non-zero values of resource and front relationships will be simultaneous, and this fact is addressed in monographs [3, 4].

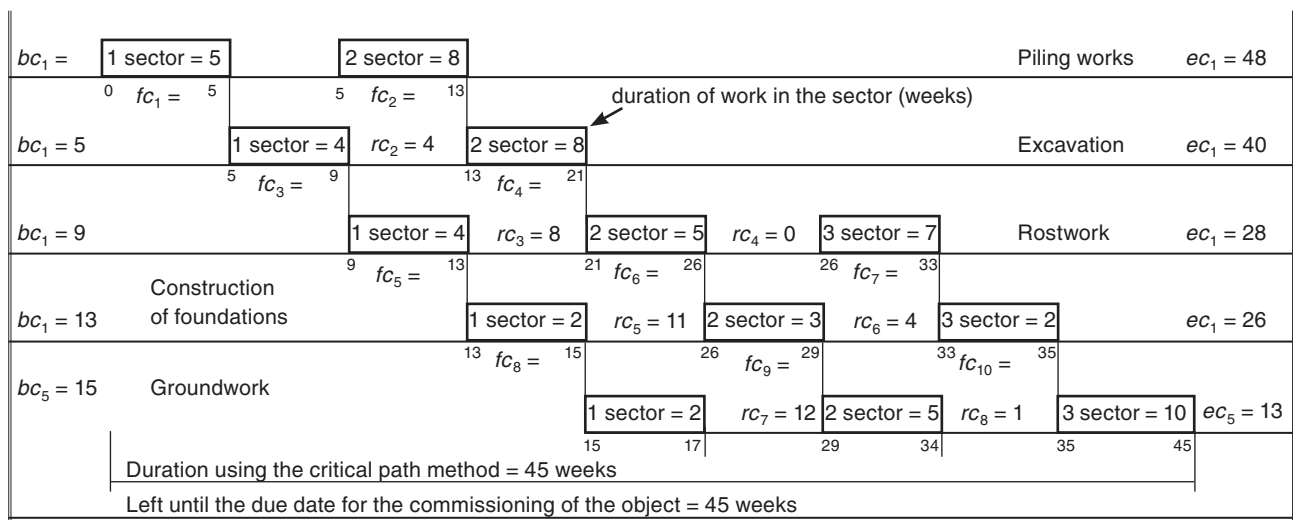
The solution to the original problem, that encompasses a reduction in the time before the facility commissioning to 45 weeks, is shown in Fig. 2.

Fig. 2 shows that the solution is in full compliance with the calculated linear organization of construction, conducted according to the method of continuous work performance, set forth in monographs [3, 4]. Here, the results obtained using the critical path and continuous work performance methods fully coincide. It has been theoretically proven that the total work performance time, calculated using the critical path method, is considered to be minimal [1]. Let's consider the construction time reduction to 42 weeks. The calculation results are shown in Fig. 3.

Fig. 3 shows that the number of base variables is equal to 14, one fewer than the number of equations. The resulting system of equations is inconsistent, and the work schedule shown in Fig. 3 is not fully defined. Let's consider an equation missing a base variable.

$$\begin{aligned} & -bc_1 - 13a_1 - rc_1 - fc_2 - 8a_2 - fc_4 - 12a_3 - rc_{41} - \\ & - fc_7 - 2a_4 - fc_{10} - 10a_5 - ec_5 = 3. \end{aligned} \quad (5)$$

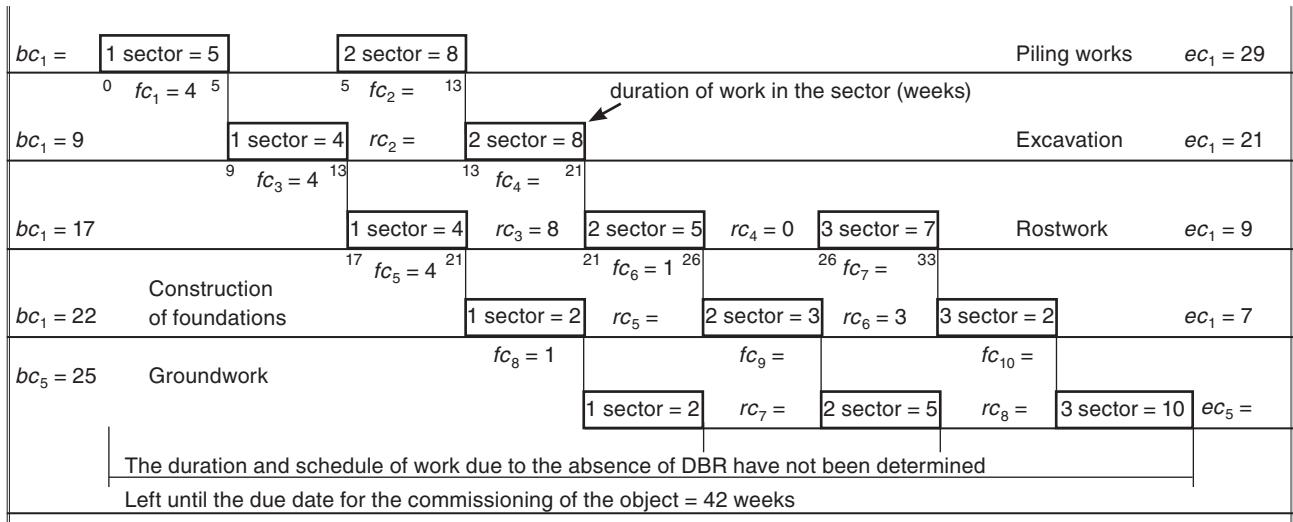
If all signs are changed to the opposite on both sides of the equation, then the equation changed in this way can be defined as follows: it is the sum of activereationships located along the critical path. The resulting negative time slack is the difference between



Designation:

be — initial connections; rc — resource links between sectors (fronts) one type;
ec — end connections; fc — frontal connections between sectors of different types.

Fig. 2. Lakhta Centre construction schedule featuring a shorter time period left before the facility commissioning (45 weeks)



Designation:

be — initial connections;

ec — end connections;

rc — resource links between sectors (fronts) one type;

fc — frontal connections between sectors of different types.

Fig. 3. Lakhta Centre construction schedule featuring a shorter time period left before the facility commissioning (42 weeks)

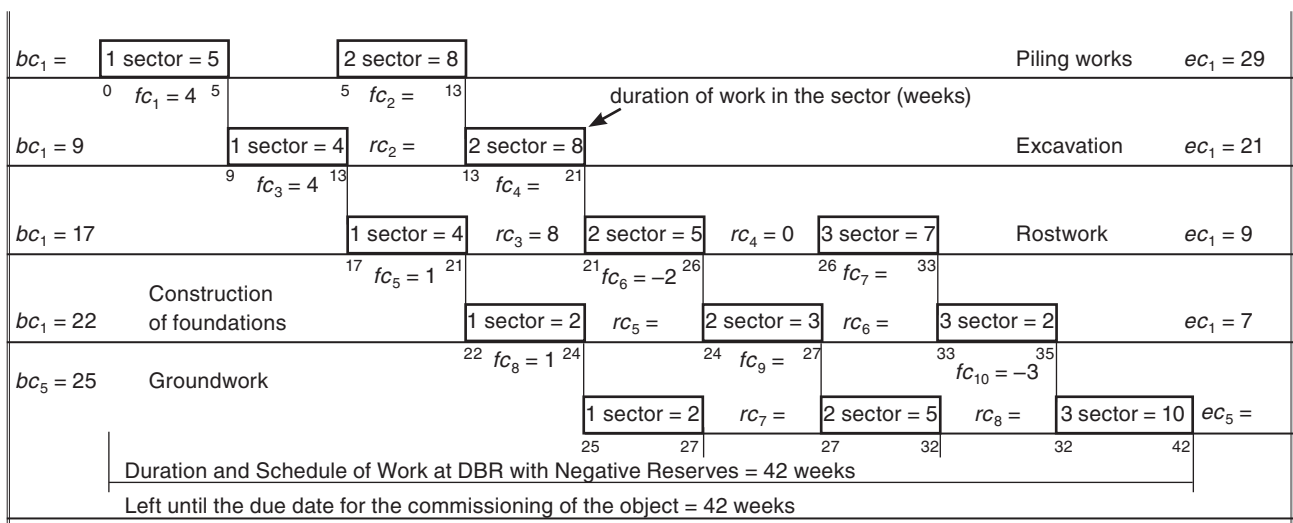
the prescribed work time and the sum of critical items of work. As a result, the absence of a base variable allows to propose the following procedure to improve the algorithm for finding a basic solution.

As for non-basic equations, it is necessary to change all signs to the opposite and reapply the standard algorithm to a new system of equations. A replacement for an invalid basic solution is needed because negative time slacks are used to achieve a new solution. When attaining an invalid basic solution, we obtain negative values of base variables, as shown in Fig. 4.

As a result, a solution is obtained that has two negative front relationships are present: these are the fc_6 relationship, which has a value of -2, and the fc_{10} relationship, which has a value of -3 weeks. In fact, the presence of negative relationship values

indicates that the dependent event should be rescheduled to an earlier date. In the practice of construction scheduling, such a combination of work is used quite often, since not all subsequent work items must necessarily be launched upon completion of prior work items. If such an assumption is acceptable from the standpoint of construction technology, negative time lags can be entered into the construction schedule to allow for further adjustments to the work performance schedule. Table shows adjustments made in the MR software, which translate into a construction schedule which can be perfectly feasible in 42 weeks.

The result shows that the proposed time conflict resolution method can generate system information, used to make management decisions aimed at resolving time conflicts. Simultaneously, the



Designation:

be — initial connections;

ec — end connections;

rc — resource links between sectors (fronts) one type;

fc — frontal connections between sectors of different types.

Fig. 4. The basic solution featuring negative timeframes for the relationships

The MR spreadsheet showing the resolution to a time conflict using negative time lags

ID	Connections	Task name	Duration	Start	Finish
0		Tower	42 week	11.10.21	29.07.22
1		Piling works	13 week	11.10.21	07.01.22
2		1 sector	5 week	11.10.21	12.11.21
3	2	2 sector	9 week	15.11.21	07.01.22
4		Excavation	16 week	15.11.21	04.03.22
5	2	1 sector	4 week	15.11.21	10.12.21
6	5; 3	2 sector	8 week	10.01.22	04.03.22
7		Rostwork	24 week	13.12.21	27.06.22
8	5	1 sector	4 week	13.12.21	07.01.22
9	8; 6	2 sector	5 week	07.03.22	08.04.22
10	9	3 sector	7 week	11.04.22	27.05.22
11		Construction of foundations	22 week	10.01.22	10.06.22
12	8	1 sector	2 week	10.01.22	21.01.22
13	12; 90H — 2 weeks	2 sector	3 week	28.03.22	15.04.22
14	13; 10	3 sector	2 week	30.05.22	10.06.22
15		Groundwork	27 week	24.01.22	29.07.22
16	12	1 sector	2 week	24.01.22	04.02.22
17	16; 13	2 sector	5 week	18.04.22	20.05.22
18	17; 140H — 3 week	3 sector	10 week	23.05.22	29.07.22

solution shown above is not limited to merely fixing negative time lags. A regulatory action can be more universal. For example, given the analysis of an equation that does not have a base variable, it is possible to determine such reductions in the work performance time that lead to the elimination of negative slacks. This approach is consistent with maximizing resource ratios. A similar comprehensive procedure can be launched by combining extended work performance timeframes with negative time lags. Further studies will provide relevant materials.

CONCLUSION

The study, presented in the paper, aimed at improving the method of indefinite resource factors, focuses on an acceptable schedule of construction work if restrictions imposed on time characteristics prevent the calculation of a construction schedule. The main feature of the proposed method of indefinite resource coefficients is the use of a simplex algorithm for finding a basic solution in the context of equations describing negative time slacks, which together represent an invalid basic solution. Negative values of base variables, obtained in this case, allow to make a governing influence, that enables the development of a feasible schedule, with regard for adverse time limits.

REFERENCES

1. Ahuja H.N. *Construction performance control by networks*. New York, 1979; 636.
2. Barkalov S.A., Voropaev V.I., Sekletova G.I. *And other mathematical foundations of project management : textbook. manual / ed. V.N. Burkov. Moscow, Higher School Publ., 2005; 421. (rus.)*.
3. Afanasyev V.A. *Stream organization of construction*. Leningrad, Stroyizdat publ., 1990; 160. (rus.).
4. Hejducki Z., Rogalska M. *Time coupling methods construction scheduling and time/cost optimization*. Wroclaw, Oficyna wydawnicza politechniki wroclawskiej, 2011; 100.
5. El-Rayes K., Moselhi O. *Resource-driven scheduling of repetitive activities*. *Construction Management and Economics*. 1998; 16(4):433-446. DOI: 10.1080/014461998372213
6. Selinger S. *Construction planning for linear projects*. *Journal of the Construction Division*. 1980; 106(2):195-205.
7. Khaled El-Rayes, Osama Moselhi. *Optimizing resource utilization for repetitive construction projects*. *Journal of Construction Engineering and Management*. 2001. Vol. 127. Issue 1. Pp. 18–27. DOI: 10.1061/(ASCE)0733-9364(2001)127:1(18)
8. Rogalska M., Bozejko W., Hejducki Z. *Time/cost optimization using hybrid evolutionary algorithm in construction project scheduling*. *Automation in Construction*. 2008; 18(1):24-31. DOI: 10.1016/j.autcon.2008.04.002
9. Adeli H., Karim A. *Scheduling/cost optimization and neural dynamics model for construction*. *Journal of Construction Engineering and Management*. 1997; 123(4):450-458. DOI: 10.1061/(asce)0733-9364(1997)123:4(450)
10. Eldin N.N., Senouci A.B. *Scheduling and control of linear projects*. *Canadian Journal of Civil Engineering*. 1994; 21(2):219-230. DOI: 10.1139/194-025
11. Bovteev S.V., Kolosova E.V., Rybtsov E.I., Frolov V.I., Tsvetkov A.V. *Management of investment construction projects based on primavera*. Moscow, Saint Petersburg, SPbGASU – PMSOFT, 2008; 456. (rus.).
12. Kuperstein V.I. *Microsoft Project 2010 in project management*. Moscow, Liters Publ., 2010; 507. (rus.).
13. Chakhkiev I.M. *Optimization directive construction duration of unique objects (for example, MFC "Lahta Center")*. *Real Estate: Economics and Management*. 2014; 1-2:20-25. URL: <https://www.elibrary.ru/item.asp?id=23298139> (rus.).
14. Bundy B. *Fundamentals of linear programming*. Moscow, Radio and Communication Publ., 1989; 176. (rus.).

- 15. Bolotin S.A., Klimov S.E., Simankina T.L. Optimization of resource allocation in scheduling using the method of uncertain resource factors.

Метод неопределенных ресурсных коэффициентов и системная коррекция временных конфликтов в календарных графиках

При формировании календарных графиков строительства принимается во внимание множество временных параметров, полный учет которых не всегда приводит к нахождению допустимого расписания работ. Поиск источников, возникающих при этом временных конфликтов и вариантов их устранения является достаточно трудоемким процессом даже в условиях автоматизированного календарного планирования в программах управления проектами. Представленные в статье анализ и устранение временных коллизий базируются на совершенствовании метода неопределенных ресурсных коэффициентов. Целевая направленность предлагаемой методики направлена на формирование допустимого расписания строительных работ в случае, когда ограничения, связанные с временными характеристиками, не позволяют рассчитать календарный график строительства. Основной особенностью предлагаемого совершенствования метода неопределенных ресурсных коэффициентов является использование симплекса алгоритма поиска базисного решения при отрицательных резервах времени уравнений, которые в совокупности представляют недопустимое базисное решение. Полученные при этом отрицательные значения базисных переменных позволяют сформировать такие комплексные регулирующие воздействия, применение которых дает возможность системного формирования допустимого календарного графика с учетом неблагоприятных временных ограничений.

Ключевые слова: календарное планирование и управление строительством, временные коллизии календарных графиков, допустимое расписание работ, программы управления проектами

СПИСОК ИСТОЧНИКОВ

1. Ахьюджа Х. Сетевые методы управления в проектировании и производстве / пер. с англ. под ред. В.Н. Калашникова. М.: Наука, 1979. 638 с.
2. Баркалов С.А., Воропаев В.И., Секлетова Г.И. и др. Математические основы управления проектами: учеб. пособие / под ред. В.Н. Буркова. М.: Высшая школа, 2005. 421 с.
3. Афанасьев В.А. Поточная организация строительства. Л.: Стройиздат, 1990. 160 с.
4. Hejducki Z., Rogalska M. Time coupling methods construction scheduling and time/cost optimization. *Oficina Wydawnicza Politechniki Wrocławskiej*, Wrocław, 2011. 100 p.
5. El-Rayes K., Moselhi O. Resource-driven scheduling of repetitive activities // *Construction Management and Economics*. 1998. Vol. 16. Issue 4. Pp. 433–446. DOI: 10.1080/014461998372213
6. Selinger S. Construction planning for linear projects // *Journal of the Construction Division*. 1980. Vol. 106. Issue 2. Pp. 195–205.
7. Khaled El-Rayes, Osama Moselhi. Optimizing resource utilization for repetitive construction projects // *Journal of Construction Engineering and Management*. 2001. Vol. 127. Issue 1. Pp. 18–27. DOI: 10.1061/(ASCE)0733-9364(2001)127:1(18)
8. Rogalska M., Bożejko W., Hejducki Z. Time/cost optimization using hybrid evolutionary algorithm in construction project scheduling // *Automation in Construction*. 2008. Vol. 18. Issue 1. Pp. 24–31. DOI: 10.1016/j.autcon.2008.04.002

Scientific Herald of the Voronezh State University of Architecture and Civil Engineering. Construction and Architecture. 2005; 1:101. (rus.).

9. Adeli H., Karim A. Scheduling/cost optimization and neural dynamics model for construction // *Journal of Construction Engineering and Management*. 1997. Vol. 123. Issue 4. Pp. 450–458. DOI: 10.1061/(ASCE)0733-9364(1997)123:4(450)
10. Eldin N.N., Senouci A.B. Scheduling and control of linear projects // *Canadian Journal of Civil Engineering*. 1994. Vol. 21. Issue 2. Pp. 219–230. DOI: 10.1139/194-025
11. Бовтеев С.В., Колосова Е.В., Рыбцов Е.И., В.И. Фролов, Цветков А.В. Управление инвестиционными строительными проектами на основе PRIMAVERA. М.; СПб.: СПбГАСУ – ПМСОФТ, 2008. 456 с.
12. Куперштейн В.И. Microsoft Project 2010 в управлении проектами. М.: ЛитРес, 2010. 507 с.
13. Чакхияев И.М. Оптимизация директивной продолжительности строительства уникальных объектов (на примере МФК «Лахта Центр») // *Недвижимость: экономика и управление*. 2014. № 1–2. С. 20–25. URL: <https://www.elibrary.ru/item.asp?id=23298139>
14. Банди Б. Основы линейного программирования. М.: Радио и связь, 1989. 176 с.
15. Болотин С.А., Климов С.Э., Симанкина Т.Л. Оптимизация ресурсораспределения при календарном планировании с использованием метода неопределенных ресурсных коэффициентов // *Научный вестник Воронежского государственного архитектурно-строительного университета. Строительство и архитектура*. 2005. Вып. 1. С. 101.

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The international building challenge: a unique example of collaboration between European universities

The built environment is diverse in Europe. The establishment of a research group on "innovative real estate management" in 2010 marked the start of development of study programmes on the built environment at several universities in the Netherlands. The idea was to draft a game programme for students to compete for developing the best real estate design. Soon IBC became an international student exchange programme, allowing multidisciplinary student groups from different European cities to make the best propositions for a real estate case.

In the years to follow, more international participants joined the programme to add diversity and multidisciplinary to the IBC project. It is a serious cross-cultural undertaking in which different experiences, approaches, visions, creativity, innovativeness, languages and personal skills interact for a very short period of time.

These requirements illustrate the complexity of the task that needs high professionalism, cross-cultural and cross-functional approaches to achieve the best results in a dynamically changing real estate industry facing new challenges and longing for new education strategies. Despite the COVID-19 travel restrictions, students are still provided with a broad selection of interesting practical cases and an opportunity to cooperate with their foreign colleagues online.

Today the following respected education institutions participate in the IBC project: University of Applied Sciences Saxion (Netherlands), RANEPa (Russia), MGSU (Russia), Moscow Architectural Institute (Russia), Vives University College (Belgium), University of Duisburg (Germany), Westminster University (England).

Keywords: *International Building Challenge, innovative project, student exchange programme, redesign, development, cross-functionality*

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INTRODUCTION

The world of the built environment is dissimilar and diverse in Europe. For example, the Netherlands faces big challenges and it needs to enhance the sustainability of the housing stock and combat the long-term vacancy of commercial buildings. These are the major assignments for the Dutch building industry to do over the next decades.

In 2010, a research group on "innovative real estate management" was established; this group initiated the development of study programmes on built environments at several Dutch universities. It was a search for high-quality educational resources that would capture the attention of students [1]. One of the ideas was to design a game programme in which students would have to compete for making the best building design proposition. The idea of a competition between student groups in a well-structured environment was welcomed with enthusiasm.

THE HISTORY OF IBC

In 2015, Glenn Stern of the Dutch Saxion University of Applied Sciences took the initiative to design an international student exchange programme in which international, multidisciplinary student groups would compete to make the best proposition for a real estate case in different cities in Europe. Stern was a member of the earlier mentioned faculty. That year, we had our first contact with Moscow universities and in 2016 the first international case in which Moscow students from RANEPa, MGSU, B&D and

Saxion battled for the best redesign of the Mysovo Manor in Dolgoprudny, Moscow region.

In the years to follow more international participants joined the project to make IBC more diverse and multidisciplinary. Enschede (the Netherlands), Oostende (Belgium), Berlin (Germany), London (England) and, of course, Moscow launched their projects on different study cases within the IBC concept, and the whole programme gained popularity as the time progressed.

IBC 2016, MAY 1–10. MYSOVO MANOR, DOLGOPRUDNY REDESIGN DEVELOPMENT.

The workshop was organized by the National Association of Fachwerk Architecture Researchers (NOIFA), the Russian Academy of National Economy and Public Administration (RANEPa) and the University of Applied Sciences "Saxion" (the Netherlands). The event was hosted by the Institute of Business and Design, the Moscow State University of Civil Engineering, the National Institute of Design and the Dolgoprudny History and Art Museum. The project partners were Neso Nuffic Russia, the Moscow Institute of Architecture (State Academy), the National Institute of Modern Design, the Naukograd Development Union of Russia, the Dutch-Russian International Centre, the Mega-design faculty of Technology College 21, Keim company, Regional Resources and NLK Domostroenie. The total number of participants, including students, tutor experts and jury members, exceeded fifty people [2].

The assignment was to renovate a municipality-owned yard building and the surrounding part of the

territory of the Kuznetsov estate (Mysovo, Moscow region, Russia). The building dates back to the early twentieth century; it features the Tudor-Elizabethan style, and it used to have a fachwerk first floor. It is a monument of history and architectural heritage of regional significance.

Within the framework of the project, conditions of interaction between developers, engineers, architects, designers and customers were simulated for the first time [3]. At the same time, the workshop was a unique venue for a dialogue between representatives of different design, educational, and technical communities supported by the leading specialized universities in the Russian capital. In addition, participants surveyed and measured the buildings of the Kuznetsov estate and visited the Dolgoprudny Historical and Art Museum (Fig. 1) to get better insight into the socio-cultural context of the studied area.

Students benefited from lectures on unique architectural and town-planning features of the estate, the history and evolution of the fachwerk technique in the context of the architectural practice, the use of silicate paints in the restoration of fachwerk buildings, innovative wood use in the frame pavilions in Moscow parks, local trends and their alteration in contemporary Russia [4].

Final redevelopment presentations shortlisted three winners in the following nominations: "The best development solution", "The best architectural and design solution" and "The best engineering and construction solution".

IBC 2017, MAY 2-12. REDESIGN OF TREKHGORNAYA MANUFACTORY PAVILION NO. 24, MOSCOW

The project session assignment was to solve integrated architectural, engineering, construction, design and development tasks

for the benefit of a historical building, meeting BREEAM international environmental requirements [5].

Rozhdestvenka architectural bureau was an IBC 2018 special partner and customer. The partners of the workshop were Trekhgornaya Manufactory, "Neso Nuffic Russia", GBU "Mosstroyinform", Moscow State "Stanislavsky Electrotheater", Vinzavod Contemporary Art Center, "EligoVision" company, the developer of interactive technologies.

Among the participants were graduate students and undergraduates of Saxion University of Applied Sciences (The Netherlands), IIM RANEPa (Moscow), B&D Institute (Moscow), Moscow Institute of Architecture (MARHI), Moscow State University of Civil Engineering (MGSU). The total number of participants, including experts and jury members, exceeded 80 people (Fig. 2).

The workshop had several parts: research, "a creative workshop", a tour of the building given by project experts, discussion and presentation [6]. Tutors (group leaders), specialists in architecture, design, development, engineering equipment, ecology and landscape supported teams throughout the whole IBC workshop. Final team presentations proved that IBC 2018 had successfully set new academic cross-functional standards in the real estate and building industry training.

In 2018, the IBC project developed into a more integrated module within the curriculum of several European universities (Fig. 3). The number of participating students was rising and the event was gaining interest from other universities in Europe; the universities of Westminster and Duisburg/Essen joined the IBC project.

More often than not, facilities, selected for redevelopment, were local cultural heritage buildings, for example, the Patrikeev estate (White Pillars) built in 1907 by architect Shekhtel and considered one of his masterpieces. The assignment was to breathe new life



Fig. 1. The IBC 2016 impressions. Photos by Glenn Stern



Fig. 2. Impression of the Moscow case, 2017. Photos by Glenn Stern



Fig. 3. A student group working on the Enschede case in 2018. Photo by Glenn Stern

into the estate and the picturesque adjacent territory, while preserving numerous historical and architectural items, as well as the famous Art Nouveau style of the famous architect. At the development stage, the teams identified socially significant concepts of using an estate building, adjacent buildings and the park, for example: an educational centre for schoolchildren, an art residence for painters and sculptors with exhibition areas, a centre for spiritual development, a fantasy club for active and cognitive leisure, as well as a coworking space with an art gallery and a museum of the history of Khimki, etc.

Due to the COVID 19 pandemic, it was impossible to organize a live version of the IBC event in 2020, although the preparations for the challenge were underway. Against the background of the universities struggling to maintain their regular programmes in the online format, unfortunately, IBC 2020 was cancelled. Although deprived of the opportunity to travel to the case project site due to the COVID-19 restrictions, IBC 2021 still took place in a new interesting online format. Table 1 below sums up IBC study cases for the period from 2016 to 2019.

INTERNATIONAL BUILDING CHALLENGE 2021, MAY 10–21

Despite the global pandemic, IBC 2021 project enabled international student teams to meet again for this truly challenging task of preparing their redevelopment cases exclusively in the online format (Fig. 4, Table 2). As usual, all groups had their university lecturers as tutors to coordinate the group progress. The students had an extra challenge of working together as complete strangers. As usual, undergraduate and graduate students from development, architecture, urban planning faculties took part in the project.

The mechanism of project implementation did not change significantly: students from participating universities could independently choose any of the cases announced by the organizers from any partner university and join any of the international teams to conduct collective work on the project development using the source materials. During the 10-day project session, international teams participated in master classes, trainings, listened to online lectures, delivered by teachers from participating universities and studied modern trends. As usual, the result of the project session was a competitive presentation of projects developed for each case. Fluent English was a must same as in the previous years.

All participants received memorable certificates, and the winners received diplomas from the host party.

Participation in the project enabled universities, for instance, MGSU, to develop a short-term practice-oriented study programme for students from foreign universities. This programme can be used annually for a similar international practice of foreign students, as well as summer schools, and attract foreign students to enroll in Master's degree programmes.

The MGSU workshop "The concept of spatial development of suburban creative cluster "Melnica Space ExUrban Hub" in Tula region" (Fig. 5) was among the most interesting and challenging. ANO Center for the Development of territories "GorodZagorod" acted as a project partner.

Table 1. Summarized IBC study cases in 2016–2019

Year 2016	
Moscow	Mysovo Manor
Enschede	Polaroid Building
Year 2017	The number and type of pests
Moscow	Trekhgornaya Manufactory (a factory)
Enschede	Polaroid Building
Berlin	A new building in the existing environment
Dusseldorf	Integrating a historical building into a new environment
Year 2018	
Moscow	Redevelopment of the territory of the State Memorial Estate of P.I. Tchaikovsky
Enschede	Robson Factory. Redesign.
Friedrichsdorf	Hospital Transformation
Wurzburg	Transformation of an airplane shed
Year 2019	
Moscow	Renovation of the Patrikeev estate ("White Pillars")
Enschede	Redesign of an established neighbourhood
Oostende	Expansion of the existing Vives University building
London	Design of a sub-plan for the Elephant Park project
Eschweiler	Redesigning environment around the City Hall
Berlin	New building, inner city location

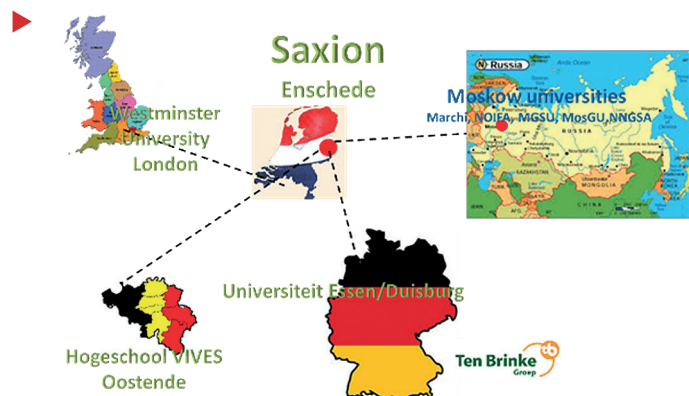


Fig. 4. Participating Universities/Organizations 2021 (source: Glenn Stern)

The project assignment was to integrate “Melnica Space” into the natural environment, including local villages, cottage settlements, the district centre, industrial and market zones, roads. The design of the transport network and infrastructure for pedestrians and cyclists, as well as electric vehicles was needed. “Melnica Space” should have become a point of attraction for young active locals from Zaoksky district, Tula and nearby mid-sized towns. To create and nurture a production centre for grassroot initiatives based on the values of the creative sharing economy was also among other assignments of the project. Participating teams had to formulate a unique culture and social code for “Oka” micro-region and develop business ideas for the three largest cities (maybe more) to bring investments to develop Oka with “Melnica Space” as the heart of the community.

Partner universities organized and delivered relevant lectures to all participants of the project session on:

Sustainability: climate control, energy management; ventilation in the days of Corona;

Computer Software: energy calculations to conform to current building regulations; anticipated ideas of contemporary architecture in the Russian avant-garde.

All teams demonstrated high motivation, willingness to search for non-standard solutions, professionalism and readiness to solve urban planning problems using modern construction technologies.

The idea of the workshop and the workshop itself allowed student participants to benefit in three different ways.

First of all, it is a possibility for students to increase their international exposure by participating in a project rather than a travel

activity. The work on a foreign case gives students a chance to better understand the industry approaches in other countries and improve their expertise that they can contribute to other best practice cases in the future. A multi-cultural team experience gives them a chance to build up effective communications within a diverse group, learn new communication techniques and broaden their soft skills.

Second, the teams are multi-professional, and the setting imitates a project environment, since all participants have developers, architects, designers, construction engineers and other related professionals on board. During the workshop participants can better understand how different professionals communicate, what goals they pursue, and guess the project value.

Moreover, project participants have an opportunity to attend lectures given by tutors from different universities and professions. So, they learn through seminars and lectures as well as in the course of practical work.

In the beginning, team work looks like a bundle of people talking different languages and living in different culture codes, while by the end of the workshop, they often become a team understanding each other's values and problems, helping to achieve better results altogether.

At the final workshop, that happened to be online, RANEPА presented a case on a local community centre suggested by one of the MBA students. The opportunity to involve different levels of education in a proper way might also improve the results of the workshop. The international exposure is very important for students in the context of the pandemic and its consequences, as well as some political complications that bring back fences and impose limitations. Of course, the online format does not allow to feel the case, see the project with one's own eyes and work at one table. At the same time, this format might enable more students from different countries to participate and bring in more interesting cases in diverse locations.

WHAT IS AN INTERNATIONAL BUILDING CHALLENGE CONCEPT TODAY?

The mission of the “International Building Challenge” is to enable students majoring in various areas of knowledge — architects, engineers, economists, developers, sociologists and others — to interact efficiently as one team pursuing a common goal while tackling the problem from different angles using the professional expertise and competences.

The International Building Challenge is a programme that represents a two-week local real estate project for students from several European universities. The first week is intended for the preparation of the case with all the necessary data being provided by the organizers, hosts or customers. Numerous online lectures on the case related topics, creativity workshops, master classes and panel discussions could be launched at this stage to help students get the right mind-set and deepen their understanding of the important issues to be solved. During the second week students travel to their case destination to join project groups and meet local students, or start online team work preparing the final case presentations. At the end of the second week project teams present their final proposals to a professional jury of industry experts and tutors.

Usually, all IBC cases require cross-functional student competences in such fields as construction, financial management and accounting, architectural design, construction engineering, urban design, and others. Still, all assignments located in different cities,

Table 2. IBC 2021 welcomed the following participating universities

University	Study case
1. Vives University Oostende Belgium	Transformation of a historic building near the harbour of Oostende
2. Moscow State University of Civil Engineering, Moscow, Russia	Design of the ExUrban Hub in Zaoksky district, Moscow
3. RANEPА, Moscow, Russia	
4. Westminster University, London, England	Designing a Visitors Centre in Hyde Park, London
5. Saxion University of Applied Science, Enschede, the Netherlands	Transformation of an old Gymnasium school in Deventer

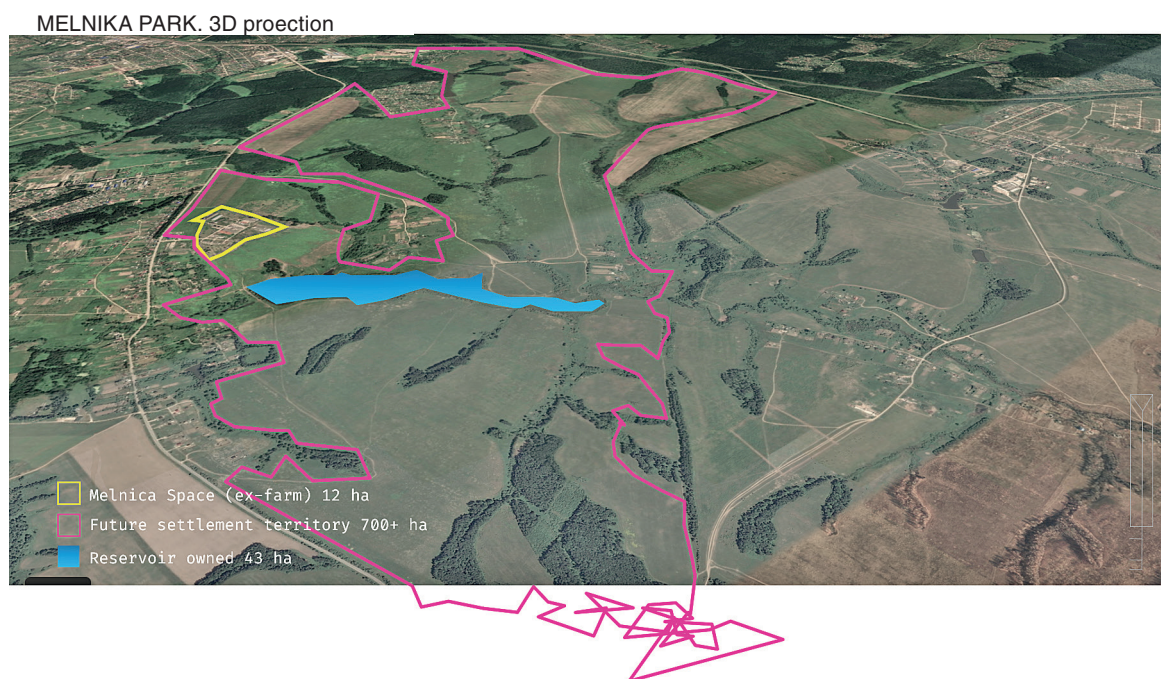


Fig. 5. The map of Melnica Space ExUrban Hub (Tula region)

feature specific demands and circumstances. For instance, the De-venter case 2021 (the Netherlands) presentations were assessed by the following criteria:

- architecture: the aesthetic quality of design;
- financial feasibility: the first draft of an investments budget;
- total cost of ownership for the 20-year period;
- structural feasibility analysis in terms of the proposed changes and choices;
- functional quality: qualitative judgement on solutions suggested to implement the client's functional requirements;
- description of the renovation process;
- proof of energy neutral design of buildings;
- an urban plan for the entire site.

This list illustrates the complexity of the task, requiring high professionalism, cross-cultural and cross-functional approaches to guarantee better results in a dynamically changing real estate industry facing new challenges and requiring new educational strategies.

Therefore, nowadays International Building Challenge is a serious project setting new educational standards, marrying different cultures, expertise, approaches, visions, creativity, innovativeness and other personal skills, creating something unique in a very short period of time.

It is considered by all participants to be a great way of bringing institutes and industry together and making use of fresh and

diverse points of view coming from international student teams. One of the participants expressed his emotions in the following way: "The International Building Challenge" is my best experience gain from the whole academic course!"

REFERENCES

1. Abaev A.L., Maslevich T.P., Safronova N.B. Issues of implementation of process management in practice of higher educational institutions of textile industry. *Textile Industry Technology. Series: Proceedings of Higher Educational Institutions*. 2019; 2(380):65-80. URL: <https://elibrary.ru/item.asp?id=41152357> (rus.).
2. Safronova N.B., Urubkov A.R., Maslevich T.P., Minaeva N.L. Effective team: quantitative methods of formation : monograph. 2nd ed. Moscow, Dashkovi K Publ., 2019; 172. (rus.).
3. Urubkov A.R., Safronova N.B., Papelnjuk O.V. Method of forming the teams during the implementation of project management in the textile industry. *Textile Industry Technology. Series: Proceedings of Higher Educational Institutions*. 2018; 2:40-44. (rus.).
4. Safronova N.B., Velskaya G.G., Maslevich T.P. Methodical support of the project work for the formation of entrepreneurial competencies in higher education. *Modern Competition*. 2018; 12:1(67):27-32. (rus.).
5. Gavrilina O.P., Safronova N.B. Leader and team: the path to success : collection of reports of the XI International Scientific and Practical Student Conference. Moscow, April 2018. Moscow, Dashkov i K Publ., 2018; 348. (rus.).
6. Safronova N.B., Urubkov A.R., Maslevich T.P., Minaeva N.L. Effective team: quantitative methods of formation : monograph. Moscow, Dashkov i K Publ., 2018; 148. (rus.).

International building challenge: уникальный пример сотрудничества европейских университетов

Рынок недвижимости в Европе демонстрирует удивительное разнообразие. Создание исследовательской группы по инновационному управлению недвижимостью в 2010 г. ста-

ло началом разработки инновационной образовательной программы по недвижимости в нескольких университетах Нидерландов. Идея состояла в том, чтобы создать программу для студентов, которые будут проводить защиту лучшего кейса redevelopment объекта недвижимости. Вскоре инициатива International Building Challenge (IBC) стала международной университетской программой академического обмена, позво-

ляющей многопрофильным студенческим командам из разных уголков Европы бороться за признание своего проекта лучшим проектом реновации в сфере недвижимости. С годами рост числа международных участников придал IBC проекту все более разнообразный, креативный и междисциплинарный характер. Сегодня это — серьезный образовательный инновационный проект, в рамках которого в сжатые сроки приходят в соприкосновение и взаимодействуют различные культурные коды, исследовательские подходы и профессиональные навыки участников.

Задачи, решаемые в ходе проектных сессий, требуют высокого профессионализма, кросс-культурного и кросс-функционального подхода, в целях достижения наилучших результатов в динамично меняющейся индустрии недвижимости, сталкивающейся с новыми вызовами и требующей новых образовательных стратегий. Несмотря на ограничения на поездки из-за COVID-19, студентам по-прежнему предоставляется широкий выбор интересных практических кейсов и возможность сотрудничества со своими иностранными коллегами в режиме онлайн. На сегодняшний день среди участников IBC такие уважаемые учебные учреждения, как Университет прикладных наук Саксион (Нидерланды), РАНХиГС (Россия), МГСУ (Россия), МАРХИ (Россия), Университетский колледж Vives (Бельгия), Университет Дуйсбурга (Германия), Вестминстерский Университет (Англия).

Ключевые слова: *International Building Challenge*, инновационный проект, университетская программа академического обмена, редевелопмент, кросс-функциональность

СПИСОК ИСТОЧНИКОВ

1. Абаев А.Л., Маслевич Т.П., Сафронова Н.Б. Вопросы внедрения процессного управления в практику высших учебных заведений // *Известия высших учебных заведений. Технология текстильной промышленности*. 2019. № 2 (380). С. 65–80. URL: <https://elibrary.ru/item.asp?id=41152357>
2. Сафронова Н.Б., Урубков А.Р., Маслевич Т.П., Минаева Н.Л. *Результативная команда: количественные методы формирования* : монография. 2-е изд. М. : Дашков и К, 2019, с. 172.
3. Урубков А.Р., Сафронова Н.Б., Папельнюк О.В. *Методика формирования команд при внедрении проектного управления*

на предприятиях текстильной промышленности // Известия высших учебных заведений. Технология текстильной промышленности. 2018. № 2. С. 40–44.

4. Сафронова Н.Б., Вельская Г.Г., Маслевич Т.П. *Методическое обеспечение проектной работы для формирования предпринимательских компетенций в высшей школе // Современная конкуренция*, 2018. Т. 12. № 1 (67). С. 27–32.

5. Гаврилина О.П., Сафронова Н.Б. *Лидер и команда: путь к успеху : сб. докл. XI Междунар. науч.-практ. студ. конф. Москва, апрель 2018 г. М. : Дашков и К, 2018. 348 с.*

6. Сафронова Н.Б., Урубков А.Р., Маслевич Т.П., Минаева Н.Л. *Результативная команда: количественные методы формирования* : монография. М. : Дашков и К, 2018. 148 с.

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Strategy of Chinese development companies in the Russian market

Of all foreign investors, Chinese financiers are most interested in the Russian market. Chinese companies contribute their management system, machinery and construction materials to development projects. China is a leader in making effective use of BIM technologies. Chinese researchers are developing innovative solutions that can be contributed to projects developed in Russia. The co-authors of the article focus on the case of Park Huamin multifunctional facility, the most ambitious large-scale project in the history of the Russian – Chinese cooperation. Thanks to the project management principles prevailing in China, investors from China successfully implement development projects in Russia for the benefit of both great cultures. They also introduce Chinese management models, designated for investment and construction projects (ICP) in the Russian market, thus, increasing the efficiency of the Russian development industry and the national economy as a whole.

Keywords: investment and construction project, real estate development, Chinese management model, innovative technologies, international cooperation

INTRODUCTION

The Russian construction market has reached a new level of development over the last five years. It is one of the fastest growing markets in the world. Despite the negative economic consequences of the pandemic crisis, as well as an increase in the value of real estate, construction demand keeps growing. Due to the growing demand, construction volumes exceeded pre-pandemic levels in the early 2021. The growing investment allure of the Russian realty has played an important role in boosting the real estate demand. The construction industry is increasingly attracting foreign investment. The interest of foreign investors in the Russian real estate market has been growing intensively since Russia became member of the WTO. According to the information available at that time [1], the share of foreign investment in the Russian construction industry was 15 %. The average market profitability of investment and construction projects (ICP) in Russia was 200...300 %, while it reached mere 5 % in Europe. These figures are associated with the oversaturation of the European market with unique profitable facilities. As of the 3rd quarter of 2021, the share of foreign investors was mere 3.7 %. It had been 9 % in the beginning of 2020, before the pandemic. However, the construction industry remains the most promising and reliable asset for capital investment. The Russian construction market is not yet oversaturated with attractive investment projects, which means that the interest in and relevance of investing in construction and real estate industries will remain high for a long time. Foreign investors are concerned about the legal regulation of activities in Russia. Investors need guarantees that their ongoing projects will be safe. It is necessary to enhance the legislative framework and improve the investment climate. In Russia, any development activity needs a construction permit as well as numerous related approvals. All these processes can postpone the project implementation and boost financing costs. Therefore, foreign investors doubt

the profitability of such projects. Regulatory processes can delay the implementation of large-scale development projects by several years. As a result, the interests of project parties may change, and they may have to relaunch the project¹.

Once resolved, these issues will make development activities, conducted by foreign investors, more transparent and rise the investment allure of the country.

Foreign investors believe that commercial real estate is the most attractive investment, because the construction of commercial areas is a more comprehensible process for foreign developers. It has no extensive encumbrances inherent in residential real estate in Russia [2–4]. Foreign investors mainly focus on office and retail facility development.

Of all foreign investors, Chinese financiers are most interested in the Russian market. This article discusses some of the features of their activities related to the implementation of ICP, including the evolution of management models of construction companies in China. China W Group Corporation (or “W Group”) was founded in 1950, and now it is the core company supervised by the State Assets Supervision and Management Commission of the State Council. The principal foreign entities, comprising W Group, are located in 34 countries around the world, they include 8 local and foreign companies listed on the stock exchange. W Group has a total of about 200,000 employees. W Group's operating income reached 414.65 billion yuan in 2016; it is ranked 133rd on the list of the 500 largest companies of the world and the second largest metal producer in the world. W Group created the real estate sector. In 1984, it was among the first Chinese companies, engaged in real estate development. It invested in the construction of the Beijing Shangri-La Hotel, W Plaza, Hong Kong W Building, Dandong International Trade Build-

¹ Foreign investment in Russia is breaking records. URL: https://fingazeta.ru/ekonomika/mirovaya_ekonomika/459956/

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ding, Wilmington Hotel in the USA and other well-known construction projects. W Group founded W Group Shenyang Iron and Steel Company in Shenyang City in 2003, Liaoning Province, specializing in the supply of high-quality steel to key projects (such as Beijing Bird's Nest, a high-speed railway, etc.). W Group Real Estate was officially founded in Shenyang City, Liaoning Province in 2009.

W Group Real Estate was listed by the Central State Commission for Supervision and Asset Management as a core real estate company among 16 largest enterprises engaged in the real estate business in 2010 [5].

The Design-Bid-Build (DBB, 2009–2014) project management model is a relatively traditional management model used by the government corporations. According to the pattern of interaction between ICP participants, construction and design are performed by different ICP stakeholders. The traditional pattern is known as the "design-bid-build" model, since contract tenders are held when the project design is completed [6].

When applying a traditional approach to a project, a construction company, that has decided to participate in a tender, obtains design (and engineering) documentation as part of the tender documentation, including a detailed list of assignments, which allows the future contractor to calculate the cost of construction fairly accurately.

W Group has stopped using this management model, as it has a number of weaknesses, such as:

- longer deadlines for construction projects in comparison with other project implementation patterns;
- a highly probable overrun of agreed-upon construction costs (accepted by the customer and proposed by the tender winner);
- a highly probable failure to meet the work performance deadline according to the contract terms and conditions;
- a time gap between design and construction, since they are performed by different organizations, and the contractor is not involved in the design process;
- high involvement of the customer in the management of design and construction of a construction facility.

Many customers have a team of employees involved in the management of construction projects. However, there is a large number of customers, for example, W Group, that do not consider it expedient and economically justified to conduct the direct day-to-day management of a construction project. Such customers often do not want to have the necessary qualifications and resources and prefer to delegate more authority to contractors, professional consultants and hired managers [7].

W Group corporation operates the "amoeba management" system (2015 — present), that stimulates corporate growth and ensures profit making through decentralization into thousands of small business units focused on a consumer.

All big companies have to solve the issue of how to maintain the pace of development and employee engagement. Over the years, managers and management theorists have formulated the whole range of approaches to the problem of self-managed teams and self-organizing systems.

The purpose of all these solutions is to have managers and employees develop a stronger sense of responsibility to improve the performance of their departments.

Over the years, the management technology, known as "amoeba management" has been a key factor of W Group's growth and success. At W Group, the concept of "amoeba" denotes

the smallest business unit, capable of multiplying and changing its shape in response to market changes. In other words, the purpose of "amoeba management" is to give a self-regulating response to the business world, characterized by dynamic changes [8–12].

The "amoeba management" system was developed so that minor executives, who are not aware of the intricacies of operational activities and finance, have the opportunity to assess their contribution to the success of the company.

Each "amoeba" unit, that usually has 5 to 50 employees, must work independently, creating its own ways of interacting with other "amoebas" and ensuring profitable growth. "Amoeba management" is designed to give a quick response to market changes, high-quality customer service and delegate authority to employees.

However, "amoeba management" is focused both on the efficiency management and the implementation of strategic solutions, both at the level of the company as a whole and at the level of its business units. In other words, "amoeba management" is a quality management system.

The driving force of amoebas is fundamentally different from that of other companies. In most organizations, executive management is responsible for development, while "amoeba management" delegates some of their authorities to employees towards successful growth of the company.

At W Group, the collective contribution of employees is a key factor of corporate success. Employees, interacting with employees from other departments, behave as independent owners and business partners.

The internal coordinate system is set at formal daily meetings. The budget of the next month is reviewed there; the implementation of the plan for the previous month is checked; the yesterday's results are discussed today; a brainstorming session is held to offer new ideas to improve the quality of the customer service. Usually, all interested employees attend the meetings, some of them are employed with production, R&D and quality management departments.

Instead of establishing a centralized procurement department, W Group has developed a pattern, in which "amoebas" act as independent units and negotiate transfer prices both between themselves and with external customers.

By delegating individual "amoebas" the right to make decisions, the company accelerates its actions. "Amoeba management" provides W Group's business units with management mechanisms needed to adjust the price, the quality and the delivery time to the customer needs.

The "amoeba management" system, implemented by W Group, largely depends on strong leadership and effective implementation of strategies. The company has many employees who are highly skilled in technology and production operations. Nevertheless, W Group is in need of employees who can take responsibility for the overall management of new "amoebas". W Group has two solutions. Firstly, all new managers and employees are trained, and their new knowledge is consolidated at the daily meetings held by each "amoeba". Secondly, W Group promotes its corporate values, which serve as the "decision-making compass".

The corporate mission says that the goal of W Group is "to create opportunities for the material and intellectual growth of all employees and the improvement of society in a joint effort". It helps to simplify the decision-making process and manage the employees' focus. Since the company's goal is the "management in which everyone participates", managers are expected to be fair and attentive to employees [13].

As for the application of the Chinese ICP management experience in the present-day Russian market, initially, Chinese investors were interested in the border territories of Russia, where a major portion of their investments was concentrated. As the time progressed, investors attained a higher level of project implementation efficiency and entered major Russian cities. The projects, implemented by Chinese developers, are the most efficient and economically profitable undertakings.

Development projects, implemented by China in the Russian territory, enjoy the backing of both sides. In the Russian market, Chinese development companies have a number of advantages over other foreign investors. Their strength is the project management technique. China has C-PMBOK, a project management body of knowledge. The life cycle is its backbone; it has several principal areas of activities and knowledge. Flexibility is a distinctive feature of Chinese management. The main feature is the high evaluation of employees. The goal of employees is to implement the project with maximum efficiency, and remuneration depends on the result.

China applies not only its own management system, it also uses its own machinery and construction materials, when implementing development projects. China is a leading user of BIM technologies. Chinese researchers are developing their own innovative solutions that can soon be contributed to projects implemented in Russia. The main advantage of Chinese technologies, materials and machines is their cost, which is significantly lower than the one of European projects. Hence, Chinese investors manage to make their projects maximally effective.

Huamin Park is the case of a Chinese ICP management model in Russia. CSCEC (Chinese State Construction Engineering) LLC, a major Chinese construction company, has an office in Moscow. The flexible Chinese management and business strategy is key to its success. CSCEC LLC demonstrates a successful combination of China's values and Russia's peculiar features. The top management of the company are Chinese managers, who successfully implement and control Chinese management approaches. The company draws special attention to the development of employees, evaluation of creative proposals and a rational approach to problem solving. All these features are characteristic of the Chinese management system.

Huamin Park is a spectacular example of an investment project implemented by CSCEC LLC. Moscow Huamin Park has a long history. Russian President Vladimir Putin and Premier of the State Council of the People's Republic of China Zhu Rongji agreed to construct a business centre back in 2001. They located a site in Wilhelm Peak Street close to the Botanic Garden metro station in 2004. Three years later, the first stone was laid, which was followed by a long pause in the project implementation. The project took shape in 2013, when CPA Reserve presented the first architectural concept of the facility. Its implementation, however, had to be postponed once again, and only at the end of 2016 construction workers finally reached the site. The business centre was ultimately constructed by the Russian branch of the China State Construction Engineering Corporation. The project is managed by AECOM².

The shape and composition of the facility was determined by the site. It borders the central part of the botanic garden and the two nearby highways. The facility has an excellent location: it borders the park and the Yauza River. Hence, investors obtained

access to a convenient triangular area. The concept of the business centre was developed very quickly because the site is located on a hill. Designers decided to build a business center that would occupy almost the whole land plot, and they also wanted it to face eastwards, where the park borders the Botanic Garden metro station. Sunrise is essential for the Chinese, so this decision is among the most successful ones.

As a result, all of the most important elements of the facility, including 70 % of its hotel rooms, the same number of apartments and the main element — a 21-story office building — face the park, while the backyard is hidden away from the noisy road. To sum up, Huamin embodies the concept of old China and traditional Chinese architecture, on the one hand, and new modern China, focused on the future.

The Chinese party made corrections during the design process. The most important ones dealt with the project architecture. All solutions have preserved their original concept. However, Chinese customers did not like sharp and dynamic corners of the business centre building. The fact is that such accents trigger a negative reaction in the Chinese traditional culture. These details are not typical for the Chinese architecture. Chinese investors asked to smooth the corners. Now the business centre has a smooth and soft shape. Facades also needed some changes. Architects designed several versions of facades that were dynamic, complex, and imaginative. However, Huamin has a certain vision of its brand and position in the Chinese and world markets. The customer wanted facades to be stricter, solemn, and impressive. Designers proposed vertical walls. This idea was accepted. Vertical slats were placed on the facades, which not only emphasized the shape, but also turned ordinary walls into media screens. They will be able to broadcast images.

Having decided upon the facades and shapes, the company addressed the colour pattern typical for the Chinese culture. The main colours are white, red and golden. Designers used these colors in the project. Copper was used instead of gold; it decorated the elements of the entrance space.

Red was used to colour the stylobate. Initially, designers wanted to cover the facades of the stylobate with copper panels, but their Chinese colleagues asked them to think of something more substantial and stable. Therefore, designers substituted metal for red granite. It took a long time to select the material, its colour, and the granite quarry.

The business centre has three buildings with the total area of 100 thousand square meters: a 22-storey five-star hotel that has 340 rooms, a 12-storey 100-room apartment hotel, and a 21-storey Class A office facility. The buildings share a stylobate, that will accommodate conference halls, restaurants, shops, as well as a fitness club with a swimming pool. Two underground floors will have parking lots for 640 cars.

The project is noteworthy for a number of unique design solutions and materials. Indeed, when creating the facade of the main entrance area, double-glazed windows, having the height of 8 and 10 m were used for the first time in the Russian practice; they have glass triplex racks with a cross section of 400 × 45 mm. This design let the maximum amount of sunlight into the hall.

The blind facades of the buildings are finished with Red Dragon marble, mined in Brazil, processed and sliced in Italy, and delivered to Russia. A giant 12 × 40 m copper panel above the main entrance was brought from Germany. According to AECOM experts, the size, colour and texture of the panel makes it the centrepiece of the facade, that has copper lamellas with built-in elements of the media

2 Rychagov M. Celestial expansion. Chinese are investing billions in Russian business. URL: <https://www.forbes.ru/biznes/368233-podnebnaya-ekspansiya-kitaycy-investiruyut-milliardy-v-rossiyskiy-biznes>

► facade installed. The signs of the digital era, however, co-exist in perfect harmony with nature: we will mention the garden with flower beds, lawns and shrubs on the roof of the stylobate. Another spectacular solution was a lantern over the conference hall and the swimming pool, as well as an elevated walkway with panoramic glazing connecting the stylobate and the offices. The buildings of the business centre occupy only three of five hectares allocated to the facility. The remaining two hectares are occupied by the country's first traditional Chinese park. Being designed in strict conformity with Feng Shui, the park is a unique vehicle capable of "transferring" the architectural traditions of the Celestial Empire to Russia.

To maintain the maximum authenticity, tons of processed stone were delivered from China and the Caucasus. It was carefully sorted and "carelessly" scattered around the park by a specialist who had arrived from China. The most intricate plants, like paper birch, were brought from the German nurseries. However, traditional wooden gazebos, decorated with hand-made figures of mythical creatures, were made from Russian raw materials in Nizhny Novgorod.

Although there were no problems with the imitation of Chinese nature, the use of traditional Chinese finishing materials turned out to be next to impossible. The architectural project entailed the use of roof tiles and facade plinths created by Chinese craftsmen by hand according to an old recipe, but products made of natural materials cannot withstand the harsh Russian climate and would have never achieved the quality certification. The solution turned out to be surprisingly simple: the laboratory developed a new composition for the mixture by adding kaolin, or white clay, to its traditional ingredients.

Plants traditionally grown in Beijing and Shanghai, as well as the eastern regions of Russia, were selected for the park. The total of 430 trees and 1,690 shrubs were planted. The most peculiar of them include pointed yew, hemlock, Nivaki and Watery pines in the front yard of the facility, Amur cork tree, black birch with incredibly beautiful trunks, various types of beautifully blooming apple trees and plums, and indispensable weeping willows over the pond. Trees were complemented with beautifully blooming deciduous and coniferous shrubs, as well as natural flower beds that had peonies, hostas, astilbas and crocuses covering the area of 216 m². The centrepiece of the park is an artificial pond with ornamental fish, surrounded by four buildings with traditional Oriental courtyards that will accommodate a house of tea ceremonies, a souvenir shop, a special hall for exhibitions and a Chinese restaurant. This contrast between cutting-edge features and traditional traits will be characteristic of the area.

The construction of this project was completed in 2021. The total amount of investment made by the Chinese companies and corporations reached \$ 300 million. The concept makes this project unique. Its buildings are styled as the houses in North China. During the whole period of implementation of this investment and construction project, the commissioning deadline was postponed four times because of the examination sessions of the Moscow construction supervision authority: this project was closely monitored by the state in the process of its implementation.

Стратегия китайских девелоперских компаний на российском рынке

Наиболее значительный интерес к российскому рынку среди всех зарубежных стран проявляют китайские инвесторы. При реализации девелоперских проектов Китай применяет не только свою систему управления, но и использует собственное оборудование и строительные материалы. Китай — лидер

CONCLUSION

Hence, the rhythm of modern life forces development companies to transform frequently and rapidly to adapt to the external conditions. Huamin Park is the most ambitious and large-scale project in the history of cooperation between Russia and China. Thanks to the application of the project management principles prevailing in China, investors from China manage to successfully implement development projects in Russia. These principles benefit both great cultures and contribute to the introduction of Chinese ICP management models in the Russian market, increasing the efficiency of the Russian development industry and the national economy as a whole.

REFERENCES

1. *Russian statistical yearbook. 2012 : Statistical compilation. Rosstat. R76. Moscow, 2012. (rus.)*
2. Sternik G.M., Sternik S.G. *Evaluation of the mid-market investment returns in real estate development when forecasting the housing market. Studies on Russian Economic Development. 2017; 28(2):204-212. URL: <https://www.elibrary.ru/item.asp?id=29675690> (rus.)*
3. Grabovy P.G., Sternik S.G., Khrustalev B.B. *Influence of "Excessive Standards" in construction on efficiency of the residential real estate development. Revista Geintec-Gestao Inovacao e Tecnologias. 2021; 11(3):2228-2242. DOI: 10.47059/revistageintec.v11i3.2087*
4. Sternik S.G., Gareev I.F., Akhmetgaliev T.A. *Development of a digital service for real estate transactions. Real estate: economics, management. 2021; 1:25-34. URL: <https://www.elibrary.ru/item.asp?id=47111159>*
5. Peng Yun. *Beijing: Press about the construction of China. China Construction Industry Press, 2010.*
6. Li Sanxi, Xu Rong. *Comprehensive analysis of the internal control of the real estate enterprise. Beijing, China Market Press, 2010.*
7. Hu Weimin. *Internal control of the enterprise and enterprise risk management: a practical guide. Beijing, Electronic Industry Press (Electronic Industry Press).*
8. Jin Zheng. *Discussion on the dilemma and measures to improve the management of real estate development projects. Economic Handbook of Science and Technology. 2015; 13:195-196.*
9. Adler R., Hiromoto T., Suzuki H. *Amoeba management and organizational ambidexterity. International Journal of Productivity and Performance Management. 2019; 69(2):405-427. DOI: 10.1108/IJPPM-07-2018-0254*
10. Wang Xiaojie, Jiang Rengui, Wu Wenping, Ma Bin, Zhu Jiwei. *Research and Application of Dynamic Construction Management based on BIM5D. IOP Conference Series: Earth and Environmental Science. 2019; 234:012007. DOI: 10.1088/1755-1315/234/1/012007*
11. Urban W., Czerska J. *Reaching an entrepreneurial management system of amoebas. A qualitative insight into the European experiences. Ekonomia i Zarzadzanie. 2016; 8(1):7-18. DOI: 10.1515/emj-2016-0001*
12. Guo Z., Song S. *Construction cost of chemical plant based on dynamic management technology. Chemical Engineering Transactions. 2018; 71:457-462. DOI: 10.3303/CET1871077*
13. Wang Haiyan. *Discussion on the company's internal real estate management strategy. Modern business. 2013; 9:151.*

по использованию BIM-технологий. Китайские исследователи разрабатывают собственные инновационные решения, которые могут быть использованы в скором времени в проектах, реализуемых в России. Авторы статьи рассматривают кейс многофункционального комплекса «Парк Хуамин» (наиболее грандиозный и масштабный проект за всю историю сотрудничества России и Китая): благодаря применению принципов управления проектами, преобладающих в Китае, поскольку

инвесторам из Китая удается с успехом реализовывать девелоперские проекты в России. Это взаимно обогащает обе великие культуры и способствует внедрению китайских моделей управления инвестиционно-строительными проектами на российском рынке, повышая эффективность российского девелопмента и национальной экономики в целом.

Ключевые слова: инвестиционно-строительный проект, девелопмент недвижимости, китайская модель управления, инновационные технологии, международное сотрудничество

СПИСОК ИСТОЧНИКОВ

1. Российский статистический ежегодник. 2012 : стат. сб. / Росстат. Р76. М., 2012.
2. Стерник Г.М., Стерник С.Г. Оценка среднерыночной доходности девелопмента при прогнозировании рынков жилья // Проблемы прогнозирования. 2017. Т. 28. № 2. С. 204–212. URL: <https://www.elibrary.ru/item.asp?id=29675690>
3. Grabovoy P.G., Sternik S.G., Khrustalev B.B. Influence of "Excessive Standards" in construction on efficiency of the residential real estate development // Revista Geintec-Gestao Inovacao e Tecnologias. 2021. Vol. 11. Issue 3. Pp. 2228–2242. DOI: 10.47059/revistageintec.v11i3.2087
4. Стерник С.Г., Гареев И.Ф., Ахметгалиев Т.А. Development of a digital service for real estate transactions // Недвижимость: экономика, управление. 2021. № 1. С. 25–34. URL: <https://www.elibrary.ru/item.asp?id=47111159>
5. Peng Yun. Beijing: Press about the construction of China. China Construction Industry Press, 2010.
6. Li Sanxi, Xu Rong. Comprehensive analysis of the internal control of the real estate enterprise. Beijing: China Market Press, 2010.
7. Hu Weimin. Internal control of the enterprise and enterprise risk management: a practical guide. Beijing: Electronic Industry Press (Electronic Industry Press).
8. Jin Zheng. Discussion on the dilemma and measures to improve the management of real estate development projects // Economic Handbook of Science and Technology. 2015. Vol. 13. Pp. 195–196.
9. Adler R., Hiromoto T., Suzuki H. Amoeba management and organizational ambidexterity // International Journal of Productivity and Performance Management. 2019. Vol. 69. Issue 2. Pp. 405–427. DOI: 10.1108/IJPPM-07-2018-0254
10. Wang Xiaojie, Jiang Rengui, Wu Wenping, Ma Bin, Zhu Jiwei. Research and Application of Dynamic Construction Management

based on BIM5D // IOP Conference Series: Earth and Environmental Science. 2019. Vol. 234. P. 012007. DOI: 10.1088/1755-1315/234/1/012007

11. Urban W., Czerska J. Reaching an entrepreneurial management system of amoebas. A qualitative insight into the European experiences // Ekonomia i Zarzadzanie. 2016. Vol. 8. Issue 1. Pp. 7–18. DOI: 10.1515/emj-2016-0001

12. Guo Z., Song S. Construction cost of chemical plant based on dynamic management technology // Chemical Engineering Transactions. 2018. Vol. 71. Pp. 457–462. DOI: 10.3303/CET1871077

13. Wang Haiyan. Discussion on the company's internal real estate management strategy. Modern business. 2013; 9:151.

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A development strategy for the construction industry in Uzbekistan: organizational aspects of implementation

The mid-term programme that oversees the development of the construction industry in Uzbekistan is entitled "The Strategy for the steadfast and innovative development of the construction industry in Uzbekistan in 2021–2025" ("the Strategy"), adopted on 27 November, 2020. The implementation of this programme requires a set of actions to be taken not only at the government level, but also at the level of construction companies to streamline the organisational activities, initiated by construction companies themselves. The article addresses organizational problems that accompany the modernization of construction organizations against the background of the main approaches, specified in the Strategy.

Keywords: construction, strategy, construction organization, organizational framework, consolidate, modernization

INTRODUCTION

In Uzbekistan, the construction industry gained momentum in 2017, when the President of Uzbekistan initiated the Strategy for the steadfast development of the country in five priority areas in 2017–2021 [1]. Drawbacks in the administration of the construction field were analysed; the State Committee on Construction and Architecture was reorganised; the main objectives of the Ministry of construction were determined; fundamentals of urban planning regulations were substantially amended; construction quality assurance procedures were improved; digitization of the construction field was considered [2–6]. The extent of concern, expressed by the head of the state over the development of the construction field, confirms the relevance of problems in the field. One of important acts, that determines the development of the construction industry in long term, is the Presidential Decree "On approval of the modernization strategy for the steadfast and innovative development in the construction industry of the Republic of Uzbekistan in 2021–2025" [7]. This act determines the priority areas in the field of construction, i.e.:

- a) urban development of territories and effective public involvement in this process;
- b) improving the quality and safety of urban planning activities;
- c) ensuring the transparency and rationality of administrative procedures in the field of urban planning activities, as well as increasing the efficiency of corporate activities in the construction industry;
- d) digitalization of urban planning activities; introduction of modern information and communication technologies into the industry;
- e) improving the system of training, retraining and advanced training of personnel; developing the research potential in the urban planning activities.

The implementation of these plans requires all business entities to develop effective measures to improve their performance. Of particular importance for the construction complex is the third direction of modernization of construction, an

increase in the efficiency of organizations, in particular "... stimulating the use of modern project management methods by private business entities performing the functions of the customer"¹.

It should be noted that over the last four years there have been positive changes in the industry, which is the result of the recent measures. Statistics indicate the accelerated development of the investment and construction sector (Table 1).

These data allow us to investigate the state of the investment and construction sector in several directions. First, during the period under review, there was an increase in the share of construction in the total gross domestic product (from 5.7 % in 2017 to 9.2 % in 2020). For comparison, in 2018 the share of construction in the GDP of Kazakhstan was 6.0 %, Kyrgyzstan — 10.1 %, Azerbaijan — 8.6 %². This trend indicates positive changes in the structure of the country's macroeconomic indicators. Secondly, investments in fixed assets have increased. Over the recent years, the value of this indicator has reached about 177 %, and machinery, being a highly efficient investment, has taken up a substantial share in this amount. Equipment investments have outperformed construction work and other investments.

The analysis shows that the quantitative indicators of construction work as the subject of investments and construction work performed by the contractor do not coincide (85,402.1 and 87,823.8 billion soms in 2020). We can explain it by the fact that part of the construction work is conducted within the framework of investment projects without the involvement of contractors.

In our opinion, the share of small businesses in the total number of operating construction organizations is quite big. According to the statistics, there are only 222 large construction companies operating in

¹ Official site of the State Committee of the Republic of Uzbekistan on Statistics. URL: www.stat.uz

² Share of construction in GDP. URL: <https://w3.unece.org/PX-Web/ru/CountryRanking?IndicatorCode=8>

Table 1. Key indicators of the investment and construction sector in the Republic of Uzbekistan in 2017–2020

Indicator	Years			
	2017	2018	2019	2020
The share of construction in the total GDP, %	5.7	6.1	6.4	9.2
Total investments in fixed assets, billion sums, including	60,719.2	107,333.0	189,924.9	202,000.1
buildings and structures	36,613.7	53,344.5	82,339.0	85,402.1
machines, equipment, inventory	19,126.5	42,611.2	93,367.7	104,524.1
other	4,979.0	11,377.3	14,217.6	12,073.9
Construction, billion soms	34,060.8	47,260.7	68,854.4	87,823.8
The number of operating construction organizations, thousand units	25.5	30.4	36.2	40.9
Including small businesses	23.8	29.0	27.3	40.7
The number of people employed in the construction sector, thousand people	1,480.2	1,205.5	1,238.1	1,348.5
The average number of employees in a construction organization, people	58	39	45	45

the country. In our opinion, the construction industry needs to study this market segment, since the implementation of construction work by small businesses cannot ensure the necessary transparency of the economic activity, the introduction of modern technologies and the quality of construction facilities. In addition, the analytical table includes indicators that give an idea of the size of construction companies. The data indicate a small number of employees in construction organizations (45 in 2020), which is a constraining factor in the innovative development of the industry.

DATA AND METHODS

The study of trends in the development of the construction industry is closely linked with the analysis of statistical data. In this connection, the co-authors used the materials of the State Committee of The Republic of Uzbekistan on Statistics³ and the data of the Ministry of Construction of the Republic of Uzbekistan³.

The electronic rating of construction organizations characterizes the problems of construction organizations. In accordance with Resolution No. 699 issued by the Cabinet of Ministers of the Republic of Uzbekistan on November 9, 2020 "On measures on introduction of the procedure for determining and maintaining the register of design, surveying and construction organizations", starting from January 1, 2021, the Ministry of Construction of the Republic of Uzbekistan has maintained an electronic rating of construction organizations.

The electronic rating accumulates the data provided by construction organizations, and statistical data. In total, there are seven groups of assessment indicators: the personnel policy, the financial performance, competitiveness, work experience, material and technical base, occupational safety, production efficiency. Construction and installation companies are divided into four groups based on the approved estimates (A — high, B — medium, C — satisfactory, D — low), each of which, in turn, has three levels of reliability (first, second and third). As a result, the electronic rating identifies only 12 hierarchical levels of construction and installation organizations.

At the beginning of 2021, a rating of 38,630 construction organizations was compiled, and as of September 10, the electronic rating had 44,489 organizations (Table 2)³.

As the table shows, there have been no major changes in the ranking of construction companies over the past months. The overwhelming majority of organizations are rated as "Satisfactory" and "Low". The share of organizations with a "low" rating has significantly increased. A slight increase in the share of organizations at the "medium" level cannot serve as the basis for a positive assessment.

RESULTS AND DISCUSSION

The studies also indicate the availability of extensive unused reserves in the construction sector, which hinder the economic reforms in the industry. These include the low production potential of design and construction organizations, outdated materials and construction technologies, the lack of qualified personnel, poor urban planning standards, and many other factors. Many of these problems are of an organizational and economic nature; they require a proactive policy of economic entities in the field of construction.

The main feature of the current state of affairs in the construction industry is the role of small and very small firms in the performance of construction work. Table 1 shows an increase in the share of small businesses in the construction industry in 2020. Despite all the advantages of small businesses and entrepreneurship in the market economy environment, this situation is extremely bad for the construction industry. Small enterprises are significantly inferior to large businesses in terms of the development strategy and construction machinery.

High-quality management is one of important problems of small businesses in the construction industry. We have conducted a survey of construction sites in the city of Samarkand and contractors employed there.

The results of our survey of construction projects of the beginning of 2021 show that 60 out of 83 construction projects are being implemented by limited liability companies (72 %), 10 are implemented by private construction companies and firms (12 %), and 13 are being implemented by private entrepreneurs (16 %).

³ Official site of the Ministry of Construction of the Republic of Uzbekistan. URL: <http://mc.uz/qurilish-pudrat-tashkilotlari-elektron-reytingi/>. (Accessed September 15, 2021).

Table 2. The analysis of the rating of construction organizations in the Republic of Uzbekistan

Level of rank	As of 1 February, 2021		As of 10 September, 2021		Difference +, –	
	Number of organizations	Share, %	Number of organizations	Share, %	by numbers	by share
AAA	0	—	0	—	0	—
AA	0	—	0	—	0	—
A	0	—	1	—	+1	—
Total highest	0	—	1	—	+1	—
BBB	2	—	4	0	2	—
BB	27	—	551		524	—
B	276	—	762		486	—
Total medium	305	0.79	1,317	2.96	1,012	2.19
CCC	4,078	—	7,035	—	2,957	—
CC	9,647	—	8,214	—	–1,433	—
C	5,313	—	1,108	—	–4,205	—
Total satisfactory	19,038	49.29	16,357	36.77	–2,681	–12.52
DDD	10,698	—	12,957	—	2,259	—
DD	193	—	1,796	—	1,603	—
D	8,396	—	12,061	—	3,665	—
Total low	19,287	49.92	26,814	60.27	7,527	+10.33
Total	38,630	100	44,489	100	5,859	100

Hence, we can make a conclusion that the construction capacity of the city is quite high and it consists of private entities.

Limited liability companies and private construction firms use their own equipment and have strong material resources at their disposal, which cannot be said about individual entrepreneurs in the construction industry. Almost all equipment at such facilities is rented or owned by a subcontractor.

The survey shows that only 8 facilities are constructed by organizations that have over 30 workers. The construction of the overwhelming majority of facilities (54 %) is performed by organizations having the workforce potential of up to 10 workers, 23 % — up to 20 workers, and 13 % have 21 to 30 workers. This also indicates a large number of small business entities on construction sites.

The next stages of the research is a study on the management of construction organizations (Table 3). We proceed from the assumption that the availability of more than four managers means the availability of a formal organizational structure in a construction organization.

The data show that the majority of urban construction organizations have management teams of three managers; 13 % — two managers, and 18 % of them have one manager. Only 17 % of construction organizations have enough managers to ensure the formal distribution of management functions.

The next object of analysis is the study of the degree and quality of education of leaders. As shown by the survey, 81 % of managers have higher education. At the same time, 16 % do not have good quality education, which hinders the development of their competitiveness. As for the managers who have higher education, 26 % have degrees in civil engineering, 33 % have

degrees in other technical sciences, and 24 % have higher education not related to construction. A survey of managers showed that only 15 % of managers have 15+ years of work experience in construction, 12 % — up to 15 years, 20 % — over 5 years, and 36 % have experience of up to 5 years. This suggests that leadership skills in construction are still inadequate.

The survey revealed a number of objective factors that have a negative impact on the improvement of the rating indicators of construction organizations in the city of Samarkand. One of the main factors is the inadequate stimulation of the activities of small and large construction organizations. Creation of a favourable environment for small businesses impedes the growth of construction organizations and makes large businesses economically uncompetitive.

The second organizational factor is the widespread use of subcontracting agreements in the field of construction. Given the current position of the general contractor in relation to a construction organization, it is absolutely not necessary to have a strong

Table 3. Construction companies and their management teams

Number of managers	Number of organizations, units
1 person	15
2 persons	11
3 persons	43
4 persons and more	14
Total	83

material and technical base. It is enough to enter into a subcontract agreement with specialized small firms. As a result, the quality of construction decreases, and innovative development in the construction industry decelerates.

At the same time, various models of the small business involvement in the construction industry are successfully implemented worldwide. Production capacity and competitiveness improvement is the basis for regulating small businesses. Given the international experience in managing small businesses in the construction industry, we can assume that there are two methods of improving the organizational environment in the construction sector of the Republic of Uzbekistan [8].

The first one is associated with the creation and development of the industrial infrastructure of small businesses. This practice is widespread in processing industries. The purpose of this solution is to create a network of commercial service enterprises, which solve certain issues of production support on a contractual basis. Given a large number of similar small organizations and a large number of contracts, the effectiveness of external infrastructure can eliminate the shortcomings of small enterprises. We propose to use production outsourcing tools as production infrastructure. For example, at present, the rental of construction machinery is a traditional form of construction mechanization. The establishment of strong companies, that own enough machinery, can make it possible to solve the problem of small construction organizations in terms of construction machines and raise the level of comprehensive mechanization of labour-intensive processes. The outsourcing of the personnel is another important area to be improved. The involvement of accounting, design and other outsourcing companies could significantly improve the management quality at construction organizations. The attempts, made by the Chamber of Commerce and Industry of the Republic and its regional branches to assume the functions of the personnel to be outsourced, have not yet yielded the desired result due to the excessive bureaucratization of this structure. We believe that these special-purpose companies should be established in response to the challenges on the construction market.

The second method is associated with the increase in the number of large organizations in the construction industry. High investment attractiveness of the construction industry motivates big businesses to establish modern high-tech construction organizations, but, unfortunately, this process is very slow and rather difficult. In the near future, one should not expect a boom in the sphere of big businesses in construction. Therefore, it is necessary to create the necessary market mechanisms for the conversion of small construction organizations into new production facilities. Economic interests are the most important driving forces behind the merger processes. This practice is known as business mergers and acquisitions in a competitive marketplace. By pooling capital and increasing capacity, companies intensify innovation processes and boost the production efficiency. If there is a real opportunity in the construction market to increase the return on capital investments through mergers, this chance will be taken

by entrepreneurs. This method is typical for highly developed market regulation mechanisms. Therefore, it is necessary to limit the preferences and benefits offered to small businesses in the construction sector.

CONCLUSION

The studies on the development of organizational and economic mechanisms in construction show that at present the industry mainly relies on small businesses. The need to dramatically improve management in construction is confirmed by a large number of decrees and resolutions issued by the President of the country.

Small businesses in construction have some disadvantages, such as the inability to bring enough machinery to a construction site and ensure the efficiency of construction work, the low quality of construction work and management. We believe that the industry should create conditions for the development of companies with powerful material and technical base and qualified personnel.

The growth of small construction organizations should be provided with the necessary organizational and legal framework. We believe that the time has come for the economic legislation to define such concepts as "a construction company", "a design and construction organization", "a production and construction association", "a production and construction holding company". Other types of partnership relations can be offered to small construction organizations to ensure the accelerated development of the economy of the Republic of Uzbekistan.

REFERENCES

1. On the strategy of actions for the further development of the Republic of Uzbekistan : Decree of the President of the Republic of Uzbekistan No. UP-4947 dated February 7, 2017.
2. On measures to radically improve the system of public administration in the construction sector : Decree of the President of the Republic of Uzbekistan No. UP-5392 dated April 2, 2018.
3. On additional measures to optimize the procedure for the implementation of design and construction work in capital construction : Decree of the President of the Republic of Uzbekistan No. UP-5445 dated May 22, 2018.
4. On additional measures to deepen reforms in the construction industry of the Republic of Uzbekistan : Decree of the President of the Republic of Uzbekistan No. UP-5963 dated March 13, 2020.
5. On measures to radically improve the quality of construction and installation works and improve the control system in construction : Resolution of the President of the Republic of Uzbekistan No. PP-4586 dated February 5, 2020.
6. On measures for the widespread introduction of information and communication technologies in the construction sector : Resolution of the President of the Republic of Uzbekistan No. PP-4464 dated September 20, 2019.
7. On approval of the strategy of modernization, accelerated and innovative development of the construction industry of the Republic of Uzbekistan for 2021–2025 : Decree of the President of the Republic of Uzbekistan dated November 27, 2020, No. UP-6119.
8. Usmanov I., Buriev H. The main tasks of the construction industry of the Republic of Uzbekistan. *Problems of architecture and construction (scientific and technical journal)*. 2020; 4(2):118-121. (rus.).

Организационные аспекты реализации стратегии развития строительной отрасли Узбекистана

Программным документом развития строительства в Узбекистане на среднесрочный период является «Стратегия модернизации, ускоренного и инновационного развития строи-

тельной отрасли Республики Узбекистан на 2021–2025 годы», принятая 27 ноября 2020 г. Реализация данной стратегии требует разработки комплекса действий не только на уровне государства, но и в рамках низовых структур строительной отрасли, причем совершенствование организации этих действий должно инициироваться самими строительными организациями. В настоящее время стимулирующим фактором развития

строительных организаций является внедрение электронного рейтинга подрядных организаций и соответствующий этому порядок участия в тендерных торгах. Чем выше рейтинг подрядной организации, тем больше шансов получить договор на строительство крупных объектов. Вместе с тем, данный порядок значительно ухудшает конкурентные позиции малых и средних строительных организаций. Учитывая тот факт, что большинство действующих подрядных организаций относятся к субъектам малого бизнеса, возникает актуальная задача ускоренной их модернизации. Авторами проведено исследование стратегических возможностей малых строительных организаций, по результатам которого сделаны соответствующие выводы. Данная статья посвящена изложению полученных результатов, анализу и особенностям решений организационных проблем модернизации отрасли по основным направлениям Стратегии в строительных организациях.

Ключевые слова: строительство, стратегия, строительная организация, организационные отношения, укрупнение, модернизация

СПИСОК ИСТОЧНИКОВ

1. О стратегии действий по дальнейшему развитию Республики Узбекистан : Указ Президента Республики Узбекистан № УП-4947 от 7 февраля 2017 г.
2. О мерах по коренному совершенствованию системы государственного управления в сфере строительства : Указ Президента Республики Узбекистан № УП-5392 от 2 апреля 2018 г.
3. О дополнительных мерах по оптимизации порядка осуществления проектных и строительных работ в капитальном строительстве : Указ Президента Республики Узбекистан № УП-5445 от 22 мая 2018 г.
4. О дополнительных мерах по углублению реформ в строительной отрасли Республики Узбекистан : Указ Президента Республики Узбекистан № УП-5963 от 13 марта 2020 г.

5. О мерах по коренному повышению качества производства строительно-монтажных работ и совершенствованию системы контроля в строительстве : Постановление Президента Республики Узбекистан № ПП-4586 от 5 февраля 2020 г.

6. О мерах по широкому внедрению информационно-коммуникационных технологий в сферу строительства : Постановление Президента Республики Узбекистан № ПП-4464 от 20 сентября 2019 г.

7. Об утверждении стратегии модернизации, ускоренного и инновационного развития строительной отрасли Республики Узбекистан на 2021-2025 годы : Указ Президента Республики Узбекистан № УП-6119 от 27 ноября 2020 г.

8. Усманов И., Буриев Х. Основные направления развития сферы строительства в Республике Узбекистан // Проблемы архитектуры и строительства (научно-технический журнал). 2020. № 4 (Часть 2). С. 118–121.

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UDC [69+332.8]:34

Construction, management of construction projects and forensic examination in the innovations of the legislative system

The article provides an overview of the main changes in the legal regulation of public relations in the field of construction, real estate management, housing and utility services, as well as the legal cases on the cadastral value of the real estate considered in court from July 1, 2021 to December 1, 2021.

The co-authors draw attention to the most significant transformations of the legal regulation system, aimed at improving the behavior of the state and subjects of their industry. These innovations influence the legitimate interests of citizens, acting as construction co-investors. The co-authors also address the implementation of construction projects, the introduction of standard project documentation, mechanisms allowing developers to obtain compensations for the rise in the cost of building materials.

Keywords: amendments, legislation, construction supervision, forensic structural engineering examination, forensic land examination, state registration of real estate, construction co-investors, estimated cost of construction, apartment building, market value, utilities, subsidizes mortgage, "garage amnesty", urban planning

The information from the following open sources was used to make an overview: the official website of the State Duma of the Federal Assembly of the Russian Federation; the official Internet portal of legal information <http://www.pravo.gov.ru>; Rossiyskaya Gazeta Internet portal; ConsultantPlus legal reference system; Garant information and legal portal; RBC Real Estate information portal; CIAN information portal; official website of the Government of Russia; the official website of the Ministry of Construction, Housing and Utility Services of the Russian Federation; the official website of the Ministry of Energy of Russia; the official website of the Federal State Budgetary Institution "FKP Rosreestra"; the official website of the Federal Taxation Service of Russia; the official website of the Ministry of Emergency Situations of Russia.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION DATED 28.05.2021 NO. 815 [1]; INFORMATION OF FAU "GLAVGOSEXPERTIZA RUSSIA"

Since September 1, 2021, a new list of national standards and codes of rules has been in effect, as a result of which the compliance with the requirements of the Federal Law "Technical Regulations on Safety of Buildings and Structures" is mandatory. As of September 1, the list of mandatory requirements is reduced by more than 3.8 thousand positions, including references to documents of voluntary application. The new list has no norms, the application of which is advisory. In addition, the document expands the possibilities of using new materials and design solutions, excluding requirements limiting their use.

It is established that:

- the project documentation and (or) the results of engineering surveys accepted by the developer or technical customer, the development of which began in the period from August 1,

2020 to September 1, 2021 and which are submitted for examination, are checked for compliance with national standards and codes of rules (parts thereof) included in the list approved by the Decree of the Government of the Russian Federation dated 07.04.2020 No. 985, or in a new list at the choice of the developer or technical customer;

- the project documentation and (or) the results of engineering surveys accepted by the developer or technical customer, the development of which was started before August 1, 2020 and which are submitted for examination, are checked for compliance with national standards and codes of rules (their parts) included in the list approved by the Decree of the Government of the Russian Federation dated 26.12.2014 No. 1521, or in a new list at the choice of the developer or technical customer.

The list was updated after analyzing the current regulatory technical documents and with the active participation of representatives of the industry and the expert community. It is assumed that the abolition of excessive building codes in Russia will allow developers to accelerate the implementation of projects by 35 %.

A similar Decree of the Government of the Russian Federation No. 985 of 04.07.2020 becomes invalid.

FEDERAL LAW NO. 273-FZ DATED 01.07.2021 [2]; ROSREESTR INFORMATION DATED 19.07.2021

On July 1, 2021, Federal Law No. 273-FZ of July 1, 2021 "On Amendments to the Federal Law "On Participation in the Shared Construction of Apartment Buildings and Other Real Estate Objects and on Amendments to Certain Legislative Acts of the Russian Federation" and Certain Legislative Acts of the Russian Federation" entered into force, which supplemented Part three of

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► **Article 41 of Federal Law No. 73-FZ of May 31, 2001 “On State Forensic Expertise in the Russian Federation” [3].** According to the amendments, from July 1, 2021, the Government of the Russian Federation may establish a list of types of forensic examinations conducted exclusively by state forensic expert organizations.

The draft decree of the Government of the Russian Federation “On approval of the list of types of forensic examinations conducted exclusively by state forensic expert organizations” was posted on the Federal Portal of RLA Projects on October 11, 2021 (Project ID 01/01/10-21/00121310). In the list of types of examinations conducted exclusively by state forensic expert organizations, it is proposed to include judicial construction and technical and judicial land management expertise in cases related to challenging the cadastral value of construction objects and the territory functionally related to them, as well as land management objects in order to improve the procedure for establishing the market value of real estate objects in terms of conducting a forensic examination when challenging the cadastral value.

Ensuring the production of these forensic examinations exclusively by state forensic expert organizations will solve the problem associated with the dishonesty of non-state forensic experts in the production of forensic examinations in cases related to the establishment of the cadastral value of real estate and land plots.

Provisions aimed at increasing guarantees of the rights and legitimate interests of citizens participating in shared-equity construction have come into force. In order to finance measures to complete the construction of unfinished construction projects, the construction of apartment buildings and other real estate objects as part of the settlement of the developer's obligations to the construction participants, the Fund for the Protection of the Rights of Shareholders has been granted the right to attract funds from the participants of shared-equity construction for the construction (creation) of an apartment building and (or) other real estate objects. The funds of the participants of shared-equity construction are sent to the settlement account of the Fund opened in an authorized bank in the field of housing construction. In respect of these funds, bank support is provided. These provisions apply to shared-equity construction contracts concluded after July 1, 2021.

The Federal Law “On Assistance to the Development and Improvement of Management Efficiency in the Housing Sector and on Amendments to Certain Legislative Acts of the Russian Federation” [4] contains provisions on the Unified Housing Construction Information System (UHCIS). The UHCIS is created, operated and modernized by a Single Institute for Development in the housing sector, which collects, processes information for its inclusion in the system, stores such information, provides access to it, provides it, places it and distributes it.

The UHCIS is a set of information contained in databases and information technologies and technical means that ensure its processing, designed for complex automation of the processes of collecting and processing information in the housing sector and ensuring all types of information interaction (exchange) in accordance with the regulatory legal acts of the Russian Federation.

A list of information to be posted in the UHCIS is provided.

Interaction through the UHCIS of individuals and legal entities in the provision of state and municipal services (functions) to them, as well as the implementation of other services (services) is carried out using the public services portal in cases and in accordance with the procedure established by the Government of the Russian Federation.

The list of functions and powers carried out by the Fund for the Protection of the Rights of Shareholders is expanding.

Such new functions and powers include:

- performing legal and other actions as an agent of a non-profit organization in the organizational and legal form of the foundation established by the subject of the Russian Federation, including transactions related to the sale of residential and non-residential premises, parking spaces in the objects owned by the Foundation of the subject of the Russian Federation, the completion of construction of which was carried out with the involvement of the Fund;
- performing the functions of a technical customer, including carrying out construction control by the Fund or a legal entity specially created by it for these purposes, including by creating a special legal entity by the Fund for the purpose of performing such functions, in relation to apartment buildings and (or) other real estate objects, the completion of which is carried out by the Fund of the subject of the Russian Federation using funds provided by the Fund.

The Foundation has the right to create commercial and non-profit organizations on the territory of the Russian Federation to achieve the goals of its creation, to contribute to the authorized capital of such organizations land plots with inseparable improvements located on them, transferred to the Foundation on the prescribed grounds.

In order to settle the obligations of the developer to the construction participants in accordance with the procedure established by Article 201.15-1 of the Bankruptcy Law, if it is impossible to complete the construction of unfinished construction objects on the land plot on which the construction object is located or should be built, due to the restrictions established by law, the Fund may decide to finance measures for the construction of apartment buildings and other real estate objects on another land plot, located in state or municipal ownership and provided to the Fund for rent or gratuitous use in accordance with land legislation for the construction of apartment buildings and other real estate objects. In the event of a decision on financing measures for the construction of apartment buildings and other real estate objects, the Fund prepares project documentation, which may provide for changing the project documentation of unfinished construction objects, performs engineering surveys for the construction (creation) of apartment buildings and (or) other real estate objects specified in this part, and also conducts an examination of such project documentation and the results of engineering surveys.

At the same time, the list of purposes for which the Fund's property can be used is expanding. Such goals include, in particular, financing the preparation of project documentation, the execution of engineering surveys, as well as the examination of project documentation and the results of engineering surveys necessary for the construction (creation) of apartment buildings and (or) other real estate objects.

FEDERAL LAW NO. 191-FZ DATED 11.06.2021 [5]; ROSREESTR LETTER DATED 02.07.2021 NO. 11-4975-AB/21 [6]; ROSAVIATION LETTER DATED 12.08.2021 NO. EX-29096/04 [7]; ROSREESTR INFORMATION DATED 19.07.2021

On July 1, 2021, a law came into force that expands the opportunities of participants in public discussions and public hearings, as well as clarifying the regime of the airfield territory. During the period of posting the project to be considered at public discussions or public hearings, and information materials to it and the

exposition of such a project, participants in discussions (hearings) who have passed identification have the right to make suggestions and comments to the organizer in the form of an electronic document.

The corresponding change was made to paragraph 3 of Part 10 of Article 5.1 of the RF Civil Code.

In addition, a number of changes affect the regime of the aerodrome territory. For example, it has been established that the list of restrictions on the use of land plots providing for a ban on the construction, reconstruction, operation of certain types of capital construction facilities in the seventh subzone of the aerodrome territory is determined taking into account the possibility of applying measures to prevent and eliminate negative physical effects and based on the results of calculation and assessment of risks to human health.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1670 DATED 30.09.2021 [8]

On October 20, 2021, amendments were made to housing legislation, as a result of which general requirements for the organization and implementation of regional state housing control (supervision) were defined. State housing control (supervision) is carried out by the authorized executive authorities of the subjects of the Russian Federation.

The subject and objects of control (supervision) are defined.

The State housing supervision authority classifies the objects of supervision to one of the categories of risk of harm (high, medium, moderate and low) in accordance with the established criteria.

According to the severity and scale of the potential negative consequences of non-compliance by legal entities and sole proprietors with mandatory requirements, the activities of controlled persons subject to regional state housing control (supervision) are divided into severity groups "A" and "B".

The group of severity "A" includes the activities of legal entities and sole proprietors for the management of apartment buildings, the provision of services and (or) the performance of maintenance and repair of common property in apartment buildings in relation to apartment buildings equipped with elevators and (or) a centralized gas supply system, including apartment buildings in which gas is used for the production of hot water and (or) heat supply services.

In other cases, the activities of controlled persons belong to the severity group "B".

Severity group "A" correlates with the categories of high and medium risk, severity group "B" — with the categories of moderate and low risk.

Within the framework of State housing supervision, preventive measures such as informing, summarizing law enforcement practices, warning announcements, counseling and a preventive visit are carried out.

The Decree of the Government of the Russian Federation of 11.06.2013 No. 493 "On State housing supervision" becomes invalid.

FEDERAL LAW NO. 170-FZ DATED 11.06.2021 [9]

The state construction supervision bodies are authorized to keep a register of capital construction objects, in respect of which they carry out state construction supervision. The subject of state construction supervision is being clarified. The subject of such supervision now includes, among other things, compliance with the requirements for ensuring the conservation of the capital construction facility and the requirements for the procedure for carrying out construction control.

The subject of state construction supervision in relation to capital construction projects, construction work, reconstruction of which has been completed, is in compliance with:

- requirements for a construction permit and compliance of the capital construction facility with the parameters specified in the construction permit, if a construction permit is required for the construction or reconstruction of the capital construction facility;
- compliance of the parameters of capital construction facilities with the maximum parameters of permitted construction, reconstruction of capital construction facilities, established rules of land use and development, documentation on the layout of the territory, and mandatory requirements for the parameters of capital construction facilities, if a construction permit is not required for the construction or reconstruction of the capital construction facility.

After the completion of the construction, reconstruction of the capital construction facility, the state construction supervision authority conducts an on-site inspection, according to the results of which the work performed is evaluated and a decision is made to issue an opinion on the compliance of the constructed, reconstructed capital construction facility with the requirements of the project documentation and (or) information model, or to refuse to issue such an opinion.

When exercising federal state control over the activities of national associations of SRO, the system of assessment and risk management of harm (damage) to legally protected values is not applied.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1006 DATED 25.06.2021 [10]

The conduct of federal state control over the activities of national associations of SRO is regulated. The procedure for the organization and implementation of federal state control over the activities of the National Association of SROs based on the membership of Persons performing engineering surveys and SROs based on the membership of persons preparing project documentation, as well as the National Association of SROs based on the membership of Persons carrying out construction has been established.

The control is carried out by the Ministry of Construction of Russia.

The subject of control is compliance by national associations with the mandatory requirements established by the RF Urban Planning Code. The objects of control are the activities, actions (inaction) of national associations, within which mandatory requirements must be met.

The following types of preventive measures are carried out: informing, generalization of law enforcement practice, warning announcement, counseling and preventive visit.

Control is carried out without carrying out planned control (supervisory) measures. Documentary and field inspections are carried out.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1087 DATED 30.06.2021 [11]

On July 2, 2021, the Regulation on Federal State Construction Supervision came into force. Federal State construction supervision is carried out by Rostekhnadzor and its territorial bodies.

The subject and objects of supervision are defined.

In the implementation of federal state construction supervision, the following types of preventive measures can be carried out: informing, generalization of law enforcement practice, warning announcement, counseling and preventive visit.

► Such control (supervisory) measures as documentary inspection, field inspection are carried out. At the same time, federal state construction supervision is carried out without carrying out planned control (supervisory) measures.

FEDERAL LAW NO. 275-FZ DATED 01.07.2021 [12]; ROSREESTR LETTER NO. 13/1-5758-AB/21 DATED 28.07.2021 [13]; ROSREESTR INFORMATION DATED 19.07.2021

Certain changes have been made and entered into force in the Urban Planning Code of the Russian Federation since July 12. The concept of working documentation is introduced, which is documentation containing materials in text and graphic forms and (or) in the form of an information model, according to which construction, reconstruction of a capital construction facility, and their parts are carried out. The working documentation is developed on the basis of the project documentation. Preparation of project documentation and working documentation can be carried out simultaneously.

The Government of the Russian Federation has the right to establish the procedure for conducting examinations of project documentation on the principle of "one window", according to which the said examinations are carried out on the basis of a single request from the applicant, and interaction between bodies, organizations authorized to conduct these examinations is carried out without the participation of the applicant.

Construction and reconstruction of capital construction facilities are now carried out in accordance with the project documentation and working documentation.

If changes are made to the working documentation that meet certain requirements, bringing the project documentation into compliance with such changes made to the working documentation is not required, provided that such changes to the working documentation are approved by the developer, the technical customer in accordance with the procedure provided for in part 15 of Article 48 of the UPC of the Russian Federation. In this case, changes to the working documentation approved by the developer or technical customer are recognized as part of the project documentation.

In cases determined by the Government of the Russian Federation, when carrying out routine repairs of buildings, structures, replacement and (or) restoration of individual elements of building structures of such buildings, structures (with the exception of elements of load-bearing building structures), elements of engineering support systems and networks of engineering support of such buildings, structures can be carried out.

With the adopted amendments, the legislator also clarified the requirements for the technical plan. Thus, information about a building, a structure or a single immovable complex, with the exception of information about their location, area, building area, is indicated in the technical plan on the basis of not only project documentation, but also a building permit, a structure (if such a permit is required for construction).

Since September 1, 2021, the issues of implementation of projects for the construction of capital construction facilities have been regulated. The UPC of the Russian Federation introduces the concept of "project for the construction of a capital construction facility", which means a list of activities carried out by the developer, technical customer, federal executive authorities, executive state authorities of the subjects of the Russian Federation, local self-government bodies and (or) other organizations for the construction,

reconstruction of a capital construction facility, commissioning of such an object, as well as state registration of rights to it.

The stages of implementation of the project for the construction of a capital construction facility are established, each of which includes a set of specific measures.

The Government of the Russian Federation approves an exhaustive list of documents, information, materials, approvals necessary for the implementation of measures during the implementation of the project for the construction of a capital construction facility.

Also, this Federal Law introduces the institute of standard project documentation. Standard design documentation is introduced to replace cost-effective reuse design documentation.

Project documentation that has received a positive conclusion of the state expert examination of project documentation and used in the construction, reconstruction of a capital construction facility, in respect of which permission has been obtained to put it into operation, by the decision of the federal executive authority authorized by the Government of the Russian Federation, may be recognized as standard project documentation.

Information about standard design documentation is included in the unified state register of expert opinions on design documentation for capital construction projects.

From the date of inclusion of information on standard project documentation in the unified state register of expert opinions of project documentation, the developer, the technical customer, the person who provided for the execution of engineering surveys and (or) preparation of project documentation in the cases provided for in parts 1.1 and 1.2 of Article 48 of the Civil Code of the Russian Federation, when carrying out architectural and construction design, construction, reconstruction of a capital construction facility, has the right to use standard project documentation prepared in relation to a similar capital construction facility. In this case, the design assignment specifies information about the standard design documentation, according to which it is planned to carry out such construction, reconstruction of the capital construction facility.

The Government of the Russian Federation may establish cases of mandatory use of standard project documentation.

Cost-effective reuse project documentation, information about which, as of October 1, 2021, is included in the unified state register of expert opinions on project documentation for capital construction projects, is recognized as standard project documentation.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1129 DATED 07.07.2021 [14]

Since July 17, 2021, the procedure for granting loans for the design, construction and (or) reconstruction of infrastructure facilities has been established on the basis of a concession agreement or agreements on public-private partnership, municipal-private partnership. Amendments were made to the Decree of the Government of the Russian Federation No. 2459 dated 31.12.2020. A specialized company has the right to grant a loan to a legal entity (legal entities operating under a simple partnership agreement (joint activity agreement)) implementing or planning to implement a project for the construction and (or) reconstruction of infrastructure facilities, which may be objects of a concession agreement or objects of a public-private partnership agreement, a municipal-private partnership agreement, for the purpose of designing, construction and (or) reconstruction of such facilities.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1160 DATED 12.07.2021 [15]

On July 22, 2021, amendments to the Decree of the Government of the Russian Federation dated December 23, 2016 No. 1452 "On monitoring the prices of construction resources" came into force [16]. It is envisaged that information on the indices of changes in the estimated cost of construction by groups of homogeneous construction resources should be posted in the Federal State Information System of Pricing in Construction starting in 2022, quarterly, no later than the 25th day of the second month of the quarter following the reporting one.

The concepts of "group of homogeneous construction resources", "consolidated list of representative construction resources", "lists of specialized construction resources" and "representative construction resource" are introduced.

ORDER OF THE MINISTRY OF CONSTRUCTION OF THE RUSSIAN FEDERATION DATED 02.20.2021 NO. 79/PR [17]

On August 21, 2021, changes to the Methodology for calculating the indices of changes in the estimated cost of construction came into force. It is envisaged that information on the indices of changes in the estimated cost is placed in the Federal State Information System of Pricing in Construction by inclusion in the federal register of estimated standards as reference information, and also published on the website of the Ministry of Construction of Russia.

The procedure for determining the estimated cost of construction and installation works, indices for individual construction resources is being clarified.

Among other things, the orders are defined:

- recalculation of the estimated cost in case of changes to the project documentation by the decision of the developer after receiving a positive conclusion of the state expertise, but before the date of conclusion of the state (municipal) contract;
- calculation of indices of changes in the estimated prices of services for the transportation of goods for construction by road;
- calculation of indices for groups of homogeneous construction resources.

The new edition contains recommended samples of the following forms: "Object resource statement", "Results of market analysis of current prices of material resources", "Calculation of current prices for the operation of construction machinery and mechanisms", "Calculation of the average monthly wage of a first-class worker employed in the construction industry".

FEDERAL LAW NO. 276-FZ OF 01.07.2021 [18]

Since September 1, 2021, legislative changes have been adopted in the field of providing technical conditions necessary for architectural and construction design. It has been established, for example, that the technical conditions for connection (technological connection) of capital construction facilities to engineering support networks used for architectural and construction design purposes are issued for the purpose of concluding a connection agreement (technological connection) without charging a fee within 7 working days.

The validity period of the technical conditions is established by the copyright holder of the network of engineering and technical support for at least 3 years or for at least 5 years in the case of complex development of the territory.

It provides for the possibility of establishing a fee for connection (technological connection) of capital construction facilities to engineering networks based on the stages of design, construction, reconstruction of facilities.

The features of reconstruction, overhaul of existing linear facilities in connection with the planned construction, reconstruction or overhaul of capital construction facilities are determined.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1812 DATED 10.22.2021 [19]

The mechanism that allows developers to compensate for the rise in the cost of building materials has been extended from November 9, 2021 to Government contracts concluded before October 1, 2021. Previously, this mechanism applied to government contracts concluded before July 1, 2021.

The mechanism provides for the right of contractors, in agreement with customers, to increase the price of government contracts due to the rise in the cost of construction materials by no more than 30 %.

We are talking about state contracts, the subject of which is the performance of works on construction, reconstruction, capital repairs, demolition of capital construction facilities, carrying out works on the preservation of cultural heritage objects and which are concluded in accordance with the Law on the Contract System.

At the same time, the list of customers is expanding, in contracts with which significant changes in terms of price increases can be made.

ORDER OF THE MINISTRY OF CONSTRUCTION OF THE RUSSIAN FEDERATION DATED 26.08.2021 NO. 610/PR [20]

From October 12, 2021, the recognition of apartment buildings that are in a limited operable technical condition will be carried out in accordance with the established procedure. The assessment and inspection of apartment buildings in order to recognize them as being in a limited operable technical condition is carried out by an interdepartmental commission established by the executive authority of the subject of the Russian Federation, on the territory of which such apartment buildings are located.

The decision to recognize apartment buildings as being in a limited operable technical condition is made by the executive authority of the subject of the Russian Federation (with the exception of apartment buildings, all premises in which are federally owned) within 30 calendar days from the date of receipt of the relevant decision of the commission.

The basis for recognizing apartment buildings as being in a limited operable technical condition is the technical condition of a building structure or an apartment building as a whole, established by a specialized organization, including the condition of the foundation soils, in which there are rolls, defects and damages that have led to a decrease in load-bearing capacity, in which there is no danger of sudden destruction, loss of stability or overturning, both the functioning of structures and the operation of such an apartment building are possible either by monitoring (monitoring) its technical condition, or by carrying out the necessary measures to restore or strengthen structures and (or) foundation soils and subsequent monitoring of the technical condition of such an apartment building.

If the grounds for recognizing an apartment building as being in a limited operable technical condition are eliminated, the applicants have the right to initiate a re-evaluation procedure and a survey of the technical condition of the apartment building.

► **ORDER OF THE MINISTRY OF CONSTRUCTION OF THE RUSSIAN FEDERATION DATED 08.18.2021 NO. 584/PR [21]**

The methodology of determining the standard value of one square meter of the total area of residential premises in the Russian Federation and the average market value of one square meter of the total area of residential premises in the subjects of the Russian Federation is updated. Previously, the calculation of the average market value of one square meter of the total area of residential premises in the subjects of the Russian Federation was carried out based on official statistics, the average cost of construction, the average cost of one square meter of the total area of residential premises purchased by participants of the main event "Fulfillment of state obligations to provide housing to categories of citizens established by federal legislation" of the state program of the Russian Federation "Providing affordable and comfortable housing and utilities to citizens of the Russian Federation", and also taking into account the deflator index.

In accordance with the new methodology, the calculation of the average market value of one square meter of the total area of residential premises in the subjects of the Russian Federation will be carried out on the basis of the average price of one square meter of the total area of residential premises in the primary market in the relevant subject of the Russian Federation according to Rosstat for the period preceding the settlement, with the exception of the subjects of the Far Eastern Federal District.

The deflator index is excluded from the calculation formulas.

A similar Order of the Ministry of Construction of Russia dated 17.12.2018 No. 816/pr. becomes invalid.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1017 DATED 25.06.2021 [22]

Since July 10, 2021, amendments to the Rules for the Provision of Utilities to Owners and Users of Premises in Apartment Buildings and Residential Buildings have come into force. The amendments are aimed at implementing Federal Law No. 351-FZ of 27.10.2020 "On Amendments to Articles 157 and 157.2 of the Housing Code of the Russian Federation regarding the Regulation of the Procedure for Changing the amount of payment for Utilities provided in Violation of the established requirements", which regulates the procedure for changing the amount of payment for utilities provided in violation of the established requirements.

It is provided that the management organization, homeowners' association or housing cooperative are obliged, among other things, to compensate the resource-supplying organization that provides utilities to owners and users of premises in an apartment building, the expenses actually incurred by it due to changes in the amount of utility fees due to the provision of utilities with interruptions exceeding the established duration and (or) with a violation of quality. The deadline for fulfilling such a duty is 10 working days from the date of receipt of the request of the resource supply organization.

Compensation is made if the provision of utilities with interruptions exceeding the prescribed duration and (or) with a violation of quality is caused by improper performance of duties for the maintenance and repair of common property in an apartment building by a person managing an apartment building, which is established by the inspection act, provided that there are no recorded violations of the quality of communal resources and (or) interruptions in the supply of communal resources by the resource-supplying

organization to the boundaries of common property in an apartment building and the boundaries of external networks of engineering and technical support of the specified house.

Also, on July 10, 2021, the Decree of the Government of the Russian Federation No. 354 dated 05.06.2011 "On the provision of utilities to owners and users of premises in apartment buildings and residential buildings" was excluded from the list of acts that are not covered by the mechanism of the "regulatory guillotine" [23].

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1295 DATED 31.07.2021 [24]

On August 10, 2021, amendments to the Rules for Providing Utilities to Owners and Users of Premises in Apartment Buildings and Residential Buildings came into force. It provides for the procedure for determining the payment for communal heating services in apartment buildings connected to centralized heat supply networks according to an independent scheme – through an individual heating point — that are equipped with a collective (communal) heat metering device and in which not all rooms are equipped with individual heat metering devices, taking into account the readings of the latter.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1700 DATED 07.10.2021 [25]

On October 19, 2021, changes to the Basis for the Formation of Indices of Changes in the Amount of Citizens' Fees for Utilities in the Russian Federation came into force. It is stipulated, in particular, that in the case of relocation of citizens from emergency housing stock within the framework of the implementation of the regional targeted program for the resettlement of citizens from emergency housing stock for the calculation and application of limit indices, the set, volume of utilities and tariffs (prices) for utilities in the base period (December of the previous calendar year) are assumed to be equal to the set, volume of utilities and tariffs (prices) for utilities that were in effect in the base period (December of the previous calendar year) within the boundaries of the settlement, municipal district, urban district for consumers in apartment buildings and (or) residential buildings of a similar degree of improvement, determined by the decision of the authorized executive authority of the subject of the Russian Federation.

The amendments are aimed at introducing a system of stimulating investments through guarantees of their return by introducing a procedure and determining the regulations for "long-term" (for the duration of the concession agreement and (or) investment program) approval by the Federal Antimonopoly Service of Russia of the excess by the subjects of the Russian Federation of the indices of changes in the amount of citizens' fees for utilities.

Point excesses can be allowed by the heads of regions in individual municipalities to attract and support investments in the housing and utilities sector aimed at modernization, reconstruction, new construction of communal facilities, to increase their energy efficiency and technical level in order to provide high-quality utilities.

Excess is possible only if there is a clear justification for the need to implement investment measures in accordance with the approved schemes of heat, water supply, sanitation, placed in the public domain, with the submission to the Federal Antimonopoly Service of Russia of documents in accordance with the list established by law.

At the same time, the obligation of the region to regularly provide a report on the implementation of investment measures is fixed, and in case of their non-fulfillment, the "long-term" agreement is subject to cancellation.

DECREE OF THE GOVERNMENT OF THE RUSSIAN FEDERATION NO. 1758 DATED 18.10.2021 [26]

On October 18, 2021, the preferential mortgage program was extended to the purchase and construction of private homes. Amendments were made to the Resolutions of the Government of the Russian Federation No. 566 dated 23.04.2020 [27] and No. 1121 dated 27.07.2020 [28].

In particular, it is provided that a preferential housing (mortgage) loan (loan) can also be issued:

- for purchase from developers — legal entities (with the exception of investment funds, including their management companies) or from developers — sole proprietors of individual residential buildings with land plots located on the territory of the Russian Federation, under purchase and sale agreements;
- for the acquisition by borrowers from legal entities (with the exception of investment funds, including their management companies) or from sole proprietors of individual residential houses on land plots located on the territory of the Russian Federation, under purchase and sale agreements, according to which legal entities or sole proprietors undertake in the future to transfer to borrowers ownership of individual residential houses that will be created after the conclusion of such agreements, with land plots;
- for payment by borrowers for the construction of individual residential buildings on land plots carried out under one or more contract agreements concluded by borrowers with legal entities or sole proprietors, or for the acquisition by borrowers of land plots located on the territory of the Russian Federation under purchase and sale agreements and payment for the construction of individual residential houses on them, carried out under one or more contract agreements concluded by borrowers with legal entities or sole proprietors.

The procedure for reimbursement of lost income within the framework of subsidies is being clarified.

The list of conditions under which the lost income is reimbursed to creditors has been supplemented.

The total amount of loans (loans) for which compensation of lost income is carried out has been increased to 2.4 trillion rubles (inclusive).

The application form for receiving compensation for lost income has been adjusted.

**FEDERAL LAW NO. 79-FZ DATED 05.04.2021 [29];
DECREE OF THE GOVERNMENT OF THE RUSSIAN
FEDERATION DATED 04.10.2021 NO. 1683 [30];
ROSREESTR LETTERS DATED 03.08.2021
NO. 01-5931-GE/21 [31] AND DATED 08.10.2021
NO. 11-01640/21 [32], ROSREESTR INFORMATION
DATED 15.06.2021 AND 18.10.2021**

On September 1, 2021, there were changes in the sphere of regulation of relations related to real estate. The law on "garage amnesty" comes into force. In particular, it is established that until September 1, 2026, a citizen using a garage that is an object of capital construction and erected before the date of entry into

force of the Urban Planning Code of the Russian Federation (December 30, 2004) has the right to grant ownership free of charge to a land plot in state or municipal ownership on which it is located, if:

- the land plot for the garage was provided to a citizen or transferred to him by any organization (including with which this citizen was in an employment or other relationship) or otherwise allocated to him or the right to use such a land plot arose from a citizen for other reasons;
- a land plot is formed from a land plot provided or otherwise allocated to a garage cooperative or another organization under which a garage cooperative was organized for the placement of garages, or the right to use such a land plot arose from the cooperative (organization) for other reasons and the garage and (or) the land plot on which it is located are distributed to the appropriate citizen on the basis of a decision of the general meeting of members of the garage cooperative or another document establishing such distribution.

At the same time, not only garage owners who meet the specified criteria can now use the "garage amnesty", but also their heirs or citizens who purchased a garage by agreement from such owners.

The issues of the use by citizens of lands or land plots in state or municipal ownership for the construction of garages that are non-capital structures, or for parking vehicles of disabled people near their place of residence have been settled.

Besides:

- single-storey garages that are blocked by common walls with other single-storey garages, information about which is entered in the Unified State Register of Real Estate as premises in a building or structure, are recognized as independent buildings;
- objects created before September 1, 2021, which, in accordance with the title or title documents or in accordance with the records of the Unified State Register of Real Estate, have the name or purpose "garage box", are recognized as garages.

**FEDERAL LAW NO. 120-FZ DATED 30.04.2021 [33];
ROSREESTR ORDERS DATED 01.06.2021 NO. P/0241 [34]
AND DATED 25.08.2021 NO. P/0368 [35]; ROSREESTR
LETTERS DATED 13.05.2021 NO. 14-3555-GE/21 [36] AND
DATED 20.07.2021 NO. 18-02191/21 [37]**

On October 28, 2021, amendments to Federal Law No. 218-FZ of 13.07.2015 "On State Registration of Real Estate" came into force [38]. The basic information about the real estate object, which is entered into the real estate cadaster, is being clarified.

The terms of state cadastral registration and state registration of rights in a number of cases have been determined.

It is possible to transfer to the registration authority an application for state registration of rights and documents attached to it through a notary (except if the applicant is a cadastral engineer).

The maximum allowable size of the parking space is no longer limited.

If the technical plan for a building, structure, or construction-in-progress object registered before January 1, 2013 is prepared solely for the purpose of entering information about the location of such objects on a land plot into the Unified State Register of Real Estate, then the preparation of the technical plan does not require the use of project documentation, commissioning permits or construction permits and the inclusion of copies thereof, as well as the inclusion in the technical plan of plans of all floors of a building, structure or plans of a building, structure.

State authorities and local self-government bodies are now obliged to send documents (information contained in them) to the rights registration authority for entering information into the EGRN in case they make decisions (acts):

- on establishing or changing the permitted use of a building, structure; on granting permission for a conditionally permitted type of use of a land plot; on establishing compliance between the type of permitted use of a land plot specified in the application for establishing compliance of the type of permitted use of a land plot with the classifier of types of permitted use of land plots, and the type of permitted use of land plots established by the classifier of types of permitted use of land plots;
- about changing the purpose of the building, structure, premises.

In addition, certain provisions of the Order of the Rosreestr of 01.06.2021 No. P/0241 come into force.

REFERENCES

1. On Approval of the List of National Standards and Codes of Rules (Parts of Such Standards and Codes of Rules), as a Result of which Compliance with the Requirements of the Federal Law "Technical Regulations on the Safety of Buildings and Structures" is Mandatory, and on Invalidation of the Decree of the Government of the Russian Federation No. 985 of July 4, 2020 : Decree of the Government of the Russian Federation No. 815 of 28.05.2021.
2. On Amendments to the Federal Law "On Participation in the Shared Construction of Apartment Buildings and Other Real Estate Objects and on Amendments to Certain Legislative Acts of the Russian Federation" and Certain Legislative Acts of the Russian Federation : Federal Law No. 273-FZ dated 01.07.2021.
3. On State Forensic Expert Activity in the Russian Federation : Federal Law No. 73-FZ of 31.05.2001.
4. On Promoting the Development and Improvement of Management Efficiency in the Housing Sector and on Amendments to Certain Legislative Acts of the Russian Federation : Federal Law No. 225-FZ of 13.07.2015.
5. On Amendments to Certain Legislative Acts of the Russian Federation : Federal Law No. 191-FZ of 11.06.2021.
6. On the Application of Federal Law No. 191-FZ dated June 11, 2021 : Rosreestr Letter No. 11-4975-AB/21 dated 02.07.2021.
7. On the coordination of the placement of objects within the Boundaries of aerodrome Territories, air approach lanes and sanitary protection zones of civil aviation airfields : Letter of the Federal Air Transport Agency dated 12.08.2021 No. Ex-29096/04.
8. On Approval of general requirements for the Organization and Implementation of regional State housing control (supervision) : Decree of the Government of the Russian Federation No. 1670 dated 30.09.2021.
9. On Amendments to Certain Legislative Acts of the Russian Federation in Connection with the Adoption of the Federal Law "On State Control (Supervision) and Municipal Control in the Russian Federation : Federal Law No. 170-FZ of 11.06.2021.
10. On Approval of the Regulations on Federal State Control over the Activities of National Associations of self-regulating organizations : Resolution of the Government of the Russian Federation No. 1006 dated 25.06.2021
11. On Approval of the Regulations on Federal State Construction Supervision : Decree of the Government of the Russian Federation No. 1087 dated 30.06.2021.
12. On Amendments to the Urban Planning Code of the Russian Federation and Certain Legislative Acts of the Russian Federation : Federal Law No. 275-FZ of 01.07.2021
13. On the Application of legislation in connection with the Entry into Force of Certain Provisions of Federal Law No. 275-FZ dated 01.07.2021 : Letter of the Federal Register of 28.07.2021 No. 13/1-5758-AB/21.
14. On Amendments to the Resolution of the Government of the Russian Federation of December 31, 2020 No. 2459 : Resolution of the Government of the Russian Federation of 07.07.2021 No. 1129.
15. On Amendments to the Resolution of the Government of the Russian Federation of December 23, 2016 No. 1452 : Resolution of the Government of the Russian Federation of 12.07.2021 No. 1160.
16. On monitoring the prices of construction resources (together with the "Rules for monitoring the prices of construction resources") : Decree of the Government of the Russian Federation No. 1452 dated December 23, 2016.
17. On Amendments to the Methodology for Calculating the Indices of Changes in the Estimated cost of Construction, approved by Order of the Ministry of Construction and Housing and Communal Services of the Russian Federation dated June 5, 2019 No. 326/pr : Order of the Ministry of Construction of the Russian Federation dated 02.20.2021 No. 79/pr.
18. On Amendments to the Urban Planning Code of the Russian Federation and Certain Legislative Acts of the Russian Federation : Federal Law No. 276-FZ of 01.07.2021.
19. On Amendments to Certain Acts of the Government of the Russian Federation : Resolution of the Government of the Russian Federation No. 1812 dated 10.22.2021.
20. On Establishing the Procedure for recognizing Apartment buildings as being in a limited operable technical condition : Order of the Ministry of Construction of the Russian Federation No. 610/pr dated 08.26.2021.
21. On approval of the Methodology for determining the standard value of one square meter of the total area of residential premises in the Russian Federation and the average market value of one square meter of the total area of residential premises in the subjects of the Russian Federation : Order of the Ministry of Construction of the Russian Federation dated 08.18.2021 No. 584/pr.
22. On Amendments to Certain Acts of the Government of the Russian Federation regarding the Improvement of the Procedure for Changing the Amount of Payment for Utilities Provided in Violation of the Established Requirements : Decree of the Government of the Russian Federation No. 1017 dated 06.25.2021.
23. On the provision of public services to owners and users of premises in apartment buildings and residential buildings : Decree of the Government of the Russian Federation dated 06.05.2011 No. 354.
24. On Amendments to the Rules for the Provision of Utilities to Owners and Users of Premises in Apartment Buildings and Residential Buildings and Invalidation of subparagraph "d" of paragraph 5 of the Amendments to the Acts of the Government of the Russian Federation approved by the Decree of the Government of the Russian Federation dated February 27, 2017 № 232 : Decree of the Government of the Russian Federation No. 1295 dated 07.31.2021.
25. On Amendments to the Basis for the Formation of Indices of Changes in the Amount of Citizens' Fees for Utilities in the Russian Federation : Decree of the Government of the Russian Federation No. 1700 dated 07.10.2021.
26. On the Specifics of Determining the Limits of Funds for the Issuance of Housing (Mortgage) Loans (Loans) Issued to Citizens of the Russian Federation in 2020–2022, for which Credit and Other Organizations are reimbursed for Lost Income, and on Amendments to Certain Acts of the Government of the Russian Federation : Decree of the Government of the Russian Federation No. 1758 dated 18.10.2021.
27. On Approval of the Rules for Reimbursement to Credit and Other Organizations of Lost Income on Housing (Mortgage) Loans (Loans) Issued to Citizens of the Russian Federation in 2020–2022 : Decree of the Government of the Russian Federation No. 566 dated 23.04.2020.
28. On Approval of the Rules for Granting Subsidies from the Federal Budget to the joint-stock Company "DOM.RF" in the form of contributions to the property of the joint-stock company "DOM of the Russian Federation", which do not increase its authorized capital, in order to compensate credit and other organizations for lost income on housing (mortgage) loans (loans) issued to citizens of the Russian Federation in 2020–2022, and amendments to certain acts of the Government of the Russian Federation : Resolution of the Government of the Russian Federation No. 1121 of 27.07.2020.
29. On Amendments to Certain Legislative Acts of the Russian Federation : Federal Law No. 79-FZ dated 05.04.2021.
30. On Amendments to Certain Acts of the Government of the Russian Federation in Connection with the Adoption of Federal Law No. 79-FZ of April 5, 2021 "On Amendments to Certain Legislative Acts of the Russian Federation" : Resolution of the Government of the Russian Federation of 04.10.2021 No. 1683.

31. On the Implementation of the Provisions of Part 1 of Article 18 of Federal Law No. 79-FZ dated 05.04.2021 : Rosreestr Letter No. 01-5931-GE/21 dated 03.08.2021.

32. On "garage amnesty" : Rosreestr letter dated 08.10.2021 No. 11-01640/21.

33. On State Registration of Real Estate and Certain Legislative Acts of the Russian Federation : Federal Law No. 120-FZ dated 30.04.2021 "On Amendments to the Federal Law

34. On Establishing the Procedure for Maintaining the Unified State Register of Real Estate, the Form of a special Registration Inscription on a document Expressing the content of the Transaction, the composition of information included in a special registration inscription on a document Expressing the content of the Transaction, and the requirements for its completion, as well as the requirements for the

format of a special registration inscription on a document Expressing the content of the transaction, in electronic form, the procedure for changing information about the location of the boundaries of a land plot in the unified state register of real estate when correcting a registry error : Rosreestr Order No. P/0241 dated 01.06.2021.

35. On establishing the form of an extract from the household book about the citizen's right to a land plot : Order of the Federal Register of 25.08.2021 No. P/0368.

36. On Amendments Made by Federal Law No. 120-FZ of 30.04.2021 : Letter of the Federal Register of 13.05.2021 No. 14-3555-GE/21.

37. On the procedure for carrying out cadastral activities : Letter of Rosreestr dated 07.20.2021 No. 18-02191/21.

38. On State Registration of Real Estate : Federal Law No. 218-FZ of 13.07.2015.

Строительство, эксплуатация строительных объектов и судебная экспертиза в новациях системы правового регулирования

В статье представлен обзор основных изменений правового регулирования общественных отношений в сфере строительства, управления недвижимостью и жилищно-коммунальным комплексом, судопроизводства по делам, связанным с оспариванием кадастровой стоимости недвижимости с 1 июля 2021 года по 1 декабря 2021 года.

Авторы обращают внимание на наиболее значимые преобразования системы правового регулирования, которые имеют своей целью совершенствование взаимодействия государства и субъектов строительной индустрии, а также смежных с ней отраслей хозяйствования и судопроизводства, складывающегося на современном этапе в Российской Федерации. К таким изменениям следует относить: введение в действие нового перечня национальных стандартов и сводов правил, в результате применения которых на обязательной основе обеспечивается соблюдение требований Федерального закона «Технический регламент о безопасности зданий и сооружений», вступление в силу закона, направленного на повышение гарантий прав и законных интересов граждан — участников долевого строительства, установление порядка предоставления займов на цели проектирования и строительства объектов инфраструктуры на основании концессионного соглашения или соглашения о государственно-частном партнерстве, о муниципально-частном партнерстве, вступление в силу изменений Методики расчета индексов изменения сметной стоимости строительства, урегулирование вопросов реализации проектов по строительству объектов капитального строительства, введение института типовой проектной документации, распространение на государственные контракты, заключенные до 1 октября 2021 года, действия механизма, позволяющего компенсировать застройщикам удорожание строительных материалов, установление порядка признания многоквартирных домов, находящихся в ограниченно-работоспособном состоянии, включение в перечень видов судебных экспертиз, проводимых исключительно государственными судебно-экспертными организациями, судебной строительно-технической и землеустроительной экспертиз по делам, связанным с оспариванием кадастровой стоимости объектов недвижимости.

Ключевые слова: изменения, дополнения, законодательство, строительный надзор, судебная строительно-техническая экспертиза, судебная землеустроительная экспертиза, государственная регистрация недвижимости, участники долевого строительства, сметная стоимость строительства, многоквартирный дом, рыночная стоимость, коммунальные услуги, льготная ипотека, «гаражная амнистия», градостроительство

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1. Об утверждении перечня национальных стандартов и сводов правил (частей таких стандартов и сводов правил), в результате

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2. О внесении изменений в Федеральный закон «Об участии в долевом строительстве многоквартирных домов и иных объектов недвижимости и о внесении изменений в некоторые законодательные акты Российской Федерации» и отдельные законодательные акты Российской Федерации : Федеральный закон от 01.07.2021 № 273-ФЗ.

3. О государственной судебно-экспертной деятельности в Российской Федерации : Федеральный закон от 31.05.2001 № 73-ФЗ.

4. О содействии развитию и повышению эффективности управления в жилищной сфере и о внесении изменений в отдельные законодательные акты Российской Федерации : Федеральный закон от 13.07.2015 № 225-ФЗ.

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7. О согласовании размещения объектов в границах приаэродромных территорий, полос воздушных подходов и санитарно-защитных зон аэродромов гражданской авиации : Письмо Росавиации от 12.08.2021 № Исх-29096/04.

8. Об утверждении общих требований к организации и осуществлению регионального государственного жилищного контроля (надзора) : Постановление Правительства РФ от 30.09.2021 № 1670.

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18. О внесении изменений в Градостроительный кодекс Российской Федерации и отдельные законодательные акты Российской Федерации : Федеральный закон от 01.07.2021 № 276-ФЗ.

19. О внесении изменений в некоторые акты Правительства Российской Федерации : Постановление Правительства РФ от 22.10.2021 № 1812.

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27. Об утверждении Правил возмещения кредитным и иным организациям недополученных доходов по жилищным (ипотечным) кредитам (займам), выданным гражданам Российской Федерации в 2020 году : Постановление Правительства Российской Федерации от 23.04.2020 № 566.

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35. Об установлении формы выписки из похозяйственной книги о наличии у гражданина права на земельный участок : Приказ Федеральной службы государственной регистрации, кадастра и картографии от 25.08.2021 № П/0368.

36. Об изменениях, внесенных Федеральным законом от 30.04.2021 № 120-ФЗ : Росреестра от 13.05.2021 № 14-3555-ГЕ/21.

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The 100th anniversary of MISI–MGSU: milestones, events, achievements

2021 marks the 100th anniversary of MISI–MGSU — the leading civil engineering university in the USSR and modern Russia. The years of the university's century-old history were filled with bright events and outstanding achievements in the field of education, science, technology and public life, but the point is that MISI–MGSU has always been at the forefront of the country's development, contributing to the accomplishment of comprehensive strategic tasks dealing with the Russian economy to ensure the well-being of every citizen in the country. Many research papers have addressed the history of the university. It is impossible to address all major milestones of the century-long history of the university development in one article or even a book. This article is intended to introduce readers to the most significant dates in the history of MISI–MGSU and, thereby, identify the idea that brings generations of teachers, students and graduates into a single community proudly called "the MISI people". These dates are interwoven with the history of the country, the industry, institutes, departments, scientists, teachers and students, and everyone whose life is inextricably linked with the main civil engineering university of Russia. The National Research Moscow State University of Civil Engineering celebrates its centenary, relying on the experience and traditions of many generations of scientists, teachers and students, developing its established research schools and creating new areas of research, promptly responding to the needs of the real sector of economy and society as a whole. The university faces ambitious tasks, and its entire previous hundred-year history is the key to their successful solution.

Keywords: *Moscow State University of Civil Engineering, Moscow Institute of Civil Engineering, history, anniversary, milestones, achievements, dates, chronology, MISI, MGSU*

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1921

In 1921, the Moscow Practical Construction Institute was founded along with 28 new universities in the country. This year is considered to be the year of the MISI–MGSU foundation. The Institute has departments of Higher Mathematics, Engineering Geodesy, Heating, Structural Mechanics, Theoretical Mechanics and Physics. A scientific and technical library, having a stock of 3,000 printed publications, is established at the Institute [1, 2].

1922

The institute obtains premises in the Maly Khartonevsky Lane in Moscow. The Institute has 5 faculties: Architecture, Road transport, Hydraulic engineering, Peat and outdoor landscaping. In addition, there was a general education department for the preparation of persons who had no secondary education, and an evening college, transformed from courses of foremen and technicians [1, 2].

1933

MISI has a stable team of researchers and lecturers, including well-known researchers specializing in civil engineering. The research sector, which encompasses all areas of scientific work, is in operation [1, 2].

1935

MISI gets the name of V.V. Kuibyshev, a prominent Soviet statesman.

1940

MISI is the largest civil engineering university in the country: it has 1,672 students and 219 lecturers,

including 51 professors and 103 associate professors.

1941

The research work, performed by MISI scientists, has been reorganized to cater for the needs of the front. Many lecturers were delegated to participate in the construction of defense facilities, and later in the restoration of enterprises destroyed by the war [1, 2].

1945

In total, during the war years, MISI trained 840 civil engineers, 135 graduates received honors diplomas. In-depth research is conducted at the Institute throughout the wartime; it is primarily focused on the needs of defense. 51 lecturers were awarded orders and medals [1, 2].

1946

On August 15, 1946, a decree of the Presidium of the Supreme Soviet of the USSR was published. It said: "The Kuibyshev Moscow Institute of Civil Engineering is awarded the Order of the Red Banner of Labor for distinguished service in the area of training construction engineering personnel and in connection with the 25th anniversary of the foundation" [1, 2].

1954

The history of the Mytishchi branch begins: the first land plot is provided to launch the field training in the area of construction machinery.

1956

Since 1956, each year MISI students and lecturers spend summers on virgin land in the capacity of

- professional builders and launch the movement of student construction teams.

1959

On May 8, 1959, the Council of Ministers of the USSR issued a resolution on merging the Moscow Institute of Urban Construction Engineers with MISI. The Institute retains the name of V.V. Kuibyshev MISI. As a result, the largest construction university in the country was established; it had 7 thousand students, 570 lecturers, including 57 professors [1, 2].

1961

The MISI team became the first winner of the All-Union competition of the Club of the Merry and the Witty.

1967

The Government of the country made a decision to construct the "Big MISI". The Executive Committee of the Moscow City Council allocated a plot of 65 hectares along the Yaroslavskoye highway [1, 2].

1980

MISI took an active part in the preparation and holding of the 22nd Summer Olympics in Moscow, construction of sports and other facilities.

1985

The first-stage construction of the MISI complex along the Yaroslavskoye Highway is completed. The Institute had 43 thousand m² of educational space, and its classrooms, departments, offices and laboratories were equipped with the most advanced inventory. MISI became a largest university in the country. Later, another academic building was commissioned, at the same time the sports palace, located next to student and postgraduate dormitories, was commissioned. In the mid-1980s, the number of full-time MISI students reached 12 thousand [1, 2].

1988

MISI established the association of education and methodology for civil engineering specialties. It unites 28 civil engineering universities and about 100 industrial, polytechnic, technological universities of the former USSR, that have faculties of civil engineering.

1991

The Association of Construction Universities was established at MISI. The establishment of association of education and methodology and the association of civil engineering universities consolidated the ties between construction universities and marked the launch of professional collective guidance in the field of education and methodology for the entire system of training, retraining and advanced training in engineering and construction specialties.

1993

The Kuibyshev Moscow Institute of Civil Engineering was renamed into the Moscow State University of Civil Engineering (MGSU).

1999

High standards of the University student/graduate knowledge and skills were confirmed by its international appraisal performed

by the International Institute of Civil Engineers, the oldest professional organization in Europe, founded in 1818.

2004

The MGSU Board of Trustees was established. The Board of Trustees included representatives and managers of construction companies, the Government of Moscow and the Moscow region, large construction, research and design organizations willing to hire highly qualified university graduates and use project and scientific research results obtained at the university's research departments [3, 4].

2008

A new education and laboratory building with the total area of 12,700 m² was commissioned.

2010

MGSU obtained the status of a National Research University.

2012

MGSU was awarded the gold medal of the competition "100 best universities in Russia"; besides, the university was the winner in the nominations "The best innovative university", "The best industry-focused university" and "The best university in the field of partnership between science and production" [5, 6].

2015

On September 28, the solemn ceremony marked the opening of the athletics arena at NRU MGSU. The total area of the structure is 27.7 thousand m² [3, 5].

2019

The largest project in the history of the University was implemented. It encompassed the landscaping of the front park area of NRU MGSU.

2021

The Industry consortium of construction universities was established to attain the national goals of the Russian Federation, set in the Decree issued by the President of the Russian Federation on July 21, 2020. For the first time NRU MGSU was listed in Times Higher Education, a prestigious international ranking of the best universities.

REFERENCES

1. *Moscow State University of Civil Engineering: History and Modernity*. Moscow, ASV Publishing House, 2001; 381. (rus.).
2. Lyushin S.P. *MISI – MGSU — 75 years: Main stages of development : krat. ist. feature article*. Moscow, 1996; 123. (rus.).
3. Telichenko V.I. *NRU MGSU — XXI century*. T.A. Milk (ed.). Moscow, NRU MGSU, 2016; 96. (rus.).
4. Molokova T.A. *et al. Essays on the history of university education*. T.A. Milk (ed.). Moscow, MGSU, 2011; 172. (rus.).
5. Telichenko V.I. *National Research University. News of higher educational institutions. Building*. 2011; 10(634):3-8. (rus.).
6. Telichenko V.I. *Development of scientific and pedagogical schools of MGSU as the basis of building science and education in Russia. Theoretical foundations of building: a collection of reports of the XX Polish-Russian-Slovak seminar*. M., 2011; 88-93. (rus.).

100 лет МИСИ–МГСУ — вехи, события, достижения

В 2021 г. исполняется 100 лет со дня основания МИСИ–МГСУ — ведущего строительного вуза СССР и современной России. Годы вековой истории университета были наполнены яркими событиями и выдающимися достижениями в области образования, науки, техники и общественной жизни, но главное — МИСИ–МГСУ всегда был и остается в авангарде развития страны, внося свой вклад в решение стратегических задач российской экономики в целом и обеспечения благополучия каждого жителя страны. Исследованию истории университета посвящено немало научных трудов. В рамках одной статьи и даже одной книги невозможно отразить все значимые вехи вековой истории развития вуза. Настоящая статья призвана познакомить читателей с наиболее существенными датами истории МИСИ–МГСУ и тем самым обозначить канву, которая объединяет поколения преподавателей, студентов и выпускников в единую общность, которую принято гордо именовать «мисийцами». Между этими датами — судьбы страны, отрасли, институтов, кафедр, ученых, преподавателей и студентов, и каждого, чья жизнь неразрывно связана с главным строительным вузом России. Национальный исследовательский Московский государственный строительный университет встречает столетний юбилей, опираясь на опыт и традиции многих поколений ученых, преподавателей и студентов, развивая уже сложившиеся научные школы и создавая новые направления исследований, оперативно отвечая на потребности реального сектора экономики и общества в целом. Перед НИУ МГСУ стоят грандиозные задачи, и вся его предшествующая столетняя история служит залогом их успешного решения.

Ключевые слова: Московский государственный строительный университет, Московский инженерно-строительный институт, история, юбилей, вехи, достижения, даты, хронология, МИСИ, МГСУ

1921

В 1921 г. в числе 28 новых вузов страны был основан Московский практический строительный институт. Этот год и принято считать годом основания МИСИ–МГСУ. В составе института образованы кафедры высшей математики, инженерной геодезии, отопления, строительной механики, теоретической механики и физики. При вузе сформирована научно-техническая библиотека с фондом, включающим 3000 печатных изданий [1, 2].

1922

Вузу предоставили помещение в Малом Харитоньевском переулке г. Москвы. В институте работают пять факультетов: архитектурный, дорожно-транспортный, гидротехнический, торфяной и внешнего благоустройства. Кроме того, действует общеобразовательное отделение для подготовки к учебе лиц, не имеющих среднего образования (рабфак), и вечерний техникум, преобразованный из курсов десятников и техников [1, 2].

1933

В МИСИ сформировался стабильный профессорско-преподавательский состав, работают известные ученые в области строительства. Начал действовать научно-исследовательский сектор, включающий в себя все направления научной работы [1, 2].

1935

МИСИ присвоено имя В.В. Куйбышева, видного советского государственного деятеля.

1940

МИСИ — самый крупный строительный вуз страны: 1672 студента и 219 преподавателей, в том числе 51 профессор и 103 доцента.

1941

На нужды фронта перестроена научно-исследовательская работа ученых МИСИ. Многие преподаватели МИСИ откомандированы на строительство объектов оборонного значения, позже — на восстановление разрушенных войной предприятий [1, 2].

1945

Всего за годы войны МИСИ подготовил 840 инженеров-строителей, 135 выпускников военных лет получили дипломы с отличием. В институте в течение всего военного времени ведется серьезная научно-исследовательская работа, в первую очередь связанная с нуждами обороны. 51 человек из профессорско-преподавательского состава награждены орденами и медалями [1, 2].

1946

15 августа 1946 г. опубликован указ Президиума Верховного Совета СССР, в котором говорилось: «За выдающиеся заслуги в области подготовки инженерных кадров для строительства и в связи с 25-летием со дня основания наградить Московский инженерно-строительный институт им. В.В. Куйбышева орденом Трудового Красного Знамени» [1, 2].

1954

Начинается история филиала в г. Мытищи: осуществлен первый отвод земли для создания учебного полигона (базы) практик по строительным машинам.

1956

С 1956 г. студенты и преподаватели МИСИ ежегодно проводят трудовое лето на целине в качестве профессиональных строителей и своим примером закладывают основы движения студенческих строительных отрядов.

1959

8 мая 1959 г. принято постановление Совета Министров СССР об объединении Московского института инженеров городского строительства с МИСИ с сохранением за объединенным институтом названия МИСИ им. В.В. Куйбышева. В результате образовался крупнейший в стране строительный вуз, в котором 7 тыс. студентов, 570 преподавателей, в том числе 57 профессоров [1, 2].

1961

Команда МИСИ стала первым чемпионом Всесоюзных соревнований КВН.

► 1967

Принято решение Правительства страны о строительстве «Большого МИСИ». Исполком Моссовета выделил участок площадью 65 га вдоль Ярославского шоссе [1, 2].

1980

МИСИ принял активное участие в подготовке и проведении XXII летних Олимпийских игр в Москве, строительстве спортивных и других объектов.

1985

Завершено строительство первой очереди комплекса МИСИ на Ярославском шоссе. Институт получил 43 тыс. м² учебных площадей, на которых были оборудованы аудитории, кафедры, кабинеты и лаборатории, оснащенные самым современным для того периода оборудованием. МИСИ стал одним из крупнейших вузов страны. Позже был сдан в эксплуатацию еще один учебный корпус, а также дворец спорта, находящийся рядом со студенческими и аспирантскими общежитиями. В середине 1980-х гг. только на дневном отделении МИСИ обучается 12 тыс. студентов [1, 2].

1988

На базе МИСИ создано учебно-методическое объединение (УМО) по инженерно-строительным специальностям. В него вошли 28 строительных вузов и около 100 промышленных, политехнических, технологических вузов бывшего СССР, в которых имеются инженерно-строительные факультеты.

1991

При МИСИ создана Ассоциация строительных вузов (АСВ). Создание учебно-методического объединения и АСВ способствовало укреплению связей между строительными вузами и положило начало профессиональному коллективному учебно-методическому руководству всей системой подготовки, переподготовки и повышения квалификации по инженерно-строительным специальностям.

1993

Московский инженерно-строительный институт им. В.В. Куйбышева переименован в Московский государственный строительный университет (МГСУ).

1999

Высокий уровень знаний и навыков студентов и выпускников университета был подтвержден первой среди вузов России международной аккредитацией МГСУ Международным институтом инженеров строительства — старейшей профессиональной организацией Европы, основанной в 1818 г.

2004

Учрежден Попечительский совет МГСУ. В состав Попечительского совета вошли представители и руководители

строительного комплекса, Правительства Москвы и Московской области, крупных строительных, научных и проектных организаций, заинтересованных в высококвалифицированных выпускниках университета, а также в использовании на практике научных и проектных разработок вузовской науки [3, 4].

2008

Введен в эксплуатацию новый учебно-лабораторный корпус (УЛК) общей площадью 12,7 тыс. м².

2010

МГСУ получил статус Национального исследовательского университета (НИУ).

2012

Успехи МГСУ отмечены золотой медалью конкурса «100 лучших вузов России», кроме того, университет стал победителем в номинациях «Лучший инновационный вуз», «Лучший профильный вуз» и «Лучший вуз в области партнерства науки и производства» [5, 6].

2015

28 сентября состоялось торжественное открытие легкоатлетического манежа НИУ МГСУ. Общая площадь построенного сооружения — 27,7 тыс. м² [3, 5].

2019

Реализован самый масштабный в истории университета проект благоустройства фасадной парковой зоны НИУ МГСУ.

2021

Для реализации национальных целей Российской Федерации, определенных Указом Президента Российской Федерации от 21 июля 2020 г., образован Отраслевой консорциум строительных вузов. НИУ МГСУ впервые вошел в престижный международный рейтинг лучших вузов Times Higher Education.

СПИСОК ИСТОЧНИКОВ

1. *Московский государственный строительный университет: История и современность*. М.: Изд-во АСВ, 2001. 381 с.
2. Люшин С.П. *МИСИ-МГСУ — 75 лет: Основные этапы развития*: Крат. ист. очерк. М., 1996. 123 с.
3. Теличенко В.И. *НИУ МГСУ — XXI век* / под общ. ред. Т.А. Молоковой. М.: НИУ МГСУ, 2016. 96 с.
4. *Очерки истории университетского образования* / под ред. Т.А. Молоковой. М.: МГСУ, 2011. 172 с.
5. Теличенко В.И. *Национальный исследовательский университет // Известия высших учебных заведений. Строительство*. 2011. № 10 (634). С. 3–8.
6. Теличенко В.И. *Развитие научно-педагогических школ МГСУ как основы строительной науки и образования России // Теоретические основы строительства: сб. докл. XX польско-российско-словацкого семинара*. М., 2011. С. 88–93.

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