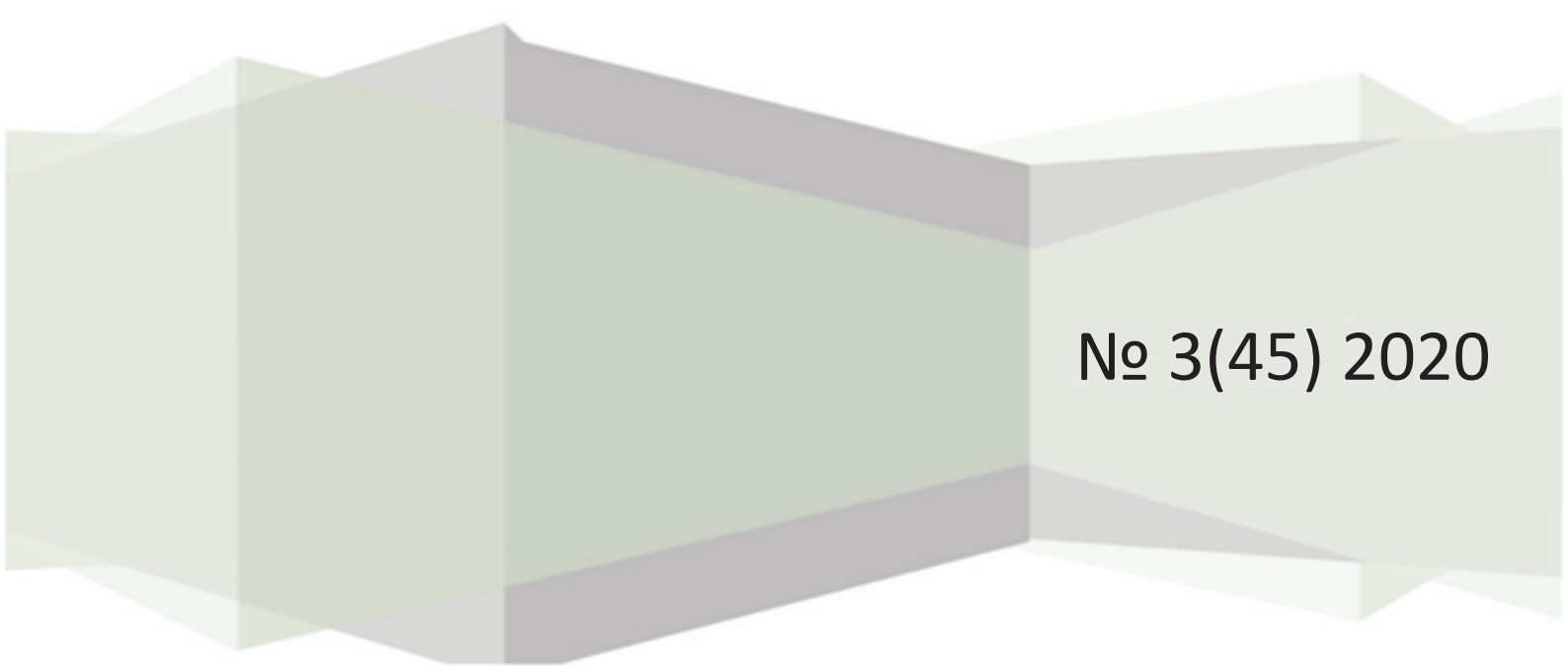


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## Architectural Image in the Art of Trecento

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**Key words and phrases:** allegory; architectural image; architectural depiction in painting; Giotto; linear perspective; reverse perspective; Proto-Renaissance; Trecento.

**Abstract.** The research aims to describe the features of the architectural image of the Trecento period. The research objectives are to determine the nature of the reproduction of architectural objects and spaces, to assess the relevance of the symbol and allegory, to study the influence of new techniques (perspective image) on the artistic image. The research hypothesis is that the creation of an architectural image, its content and audience perception directly depend on the cultural and religious contexts of the era. The research method is the denotative analysis of the architectural image. It is concluded that the architectural image in the Trecento period begins to lose its rigidly determined function of the symbol and acquires a spatial “objectivity”. Also, the architectural image acts as an identification marker and actively participates in the disclosure of the main idea of the content.

### Introduction

The general definition of the Trecento culture was defined when the first manifestations of the Renaissance appeared in Gothic art. Philosophical ideas and aesthetic principles of the time formulated in the work “Summa Theologica” by St. Thomas Aquinas: a work of art must be clear, holistic and harmonious. Previously, the task of an artist was only to symbolically convey, the idea of the divine and the invisible world. The natural landscape or architectural environment was very rare and only suggested a sketchy outline. New theological thinking recognized the autonomous existence of man and earthly life as organic unity with the supernatural [5, p. 5].

Art in its theme continued to be religious and by nature it revealed the beginnings of secular art. In the conditions that previous strict norms ensuring the communicative nature of the medieval art ceased to be efficacious, the most reliable language of painting could become “a language based on the experience of direct perception ... Symbolic art was being transformed and becoming more lifelike” [4, p. 98]. Symbolism does not immediately fades in Renaissance painting, but gradually dissolves in real images, transforming into allegory – a system of “attached” parable images. Over the course of several centuries, the focus of artistic interests has gradually shifted from searching for the best ways to present sacred texts to developing methods for faithfully convey a visible fragment of reality [2, p. 220].



## Duccio and Giotto

The main line of development of the European art, the beginning of its revolutionary change can be traced in the works of the masters of the Italian Proto-Renaissance of two cities: Florence and Siena. By example of comparison are artists of the Siena school of Duccio and Martini with the Florentine Giotto, these changes in art are clear.

In Siena, the Byzantine style was adopted as an official. In Duccio's works was the continuation of the Byzantine "hieratic" tradition in painting. Although he attempted to convey the three-dimensionality of objects, the illusory nature and depth of the architectural landscape looks archaic in the absence of perspective. Two panels of his famous "Maesta" (1308–1311) depict "The Appearance of Christ behind closed doors" and "The Incredulity of St. Thomas". Two canonical scenes take place against the background of the same conditional portal with an attempt to build perspectives "by eye". As a result, several rows of apostles try to fit on a strip of less than thirty centimeters.

The work of Giotto di Bondone looks completely innovative in comparison with these Siena artists. "Each of Giotto's paintings is a universe in itself, in which the power of heaven is expressed only in the events described, that universe however follows its own laws in the artistic reconstruction of these events, which determine the artistic significance of the figures, their concept, routine, position in space and interconnection" [3, p. 151]. Its perspective construction is an example of an intuitive understanding of the importance of realistic depiction of objects and space. His work is intuitive because there is conditionally direct and reverse perspective, characteristic of the end of the Duecento. For example, in the Basilica of Saint Francis of Assisi (frescoes of the upper basilica), the fresco "St. Francis Praying in the Church of San Damiano" (1297–1299) is an example of the opposite perspective, and the fresco "The Pope approving the statutes of the Franciscan order" (1296–1304) and "Saint Francis preaching before Pope Honorius III" (1297–1300) – direct. Nevertheless, it was in his art that for the first time, objects received materiality and volume.

With new artistic expressive means, Giotto enriched the medieval style and creative thinking of obligatory symbols. The most obvious example is the fresco "Massacre of the Innocents" in the Scrovegni Chapel (1305). Architectural forms create a space that resembles a scene with a backstage (a technique very typical for Giotto, in an hypertrophied form is a "stage box"). A classic contrast between architectural forms is necessary to emphasize the confrontation of the characters – a Christian rotunda temple and a pagan Edicule with marble inlay flank the scene. The use of the clear structure of compositional lines facilitates the understanding of the plot, and the laconic interpretation of the forms and the logic of the spatial whole increase the semantic significance of the details.

The same technique of the "moralizing landscape" was used in the fresco "Renunciation of Worldly Goods" (San Francesco in Assisi, 1297–1300): relatives are shown against the background of rich houses, the saint and the bishops in the background of the chapels, although not similar to church buildings but revealing nevertheless a ritual character. In the same fresco "The Apparition of St Francis at Arles": the architectonics of the cathedral behind the saint testifies to the strength of the Franciscan order. Giotto's idea of a perceived visual image and the construction of space are inextricably linked. The logic of the expansion of space is determined by the plot action.

Giotto's significance in the landscape can be summarized in the following words: he understood the significance of the connection between the figures and the background, he understood the organic integrity of things, and finally, he took the first steps in the sense of

transferring space [1, p. 91]. Giotto was the forerunner of the great masters of the Renaissance.

### **The concept of the space of artists of Siena of the 14th century**

The next generation of artists, who belonged to a native of Siena Simone Martini, already felt the influence of Giotto. In “Cardinal Gentile da Montefiore paying homage to St. Martin” (1320–1325, San Francesco in Assisi), Cardinal and St. Martin are under the Gothic canopy, having a strong perspective reduction. With great assumption, the prototype of the veduta can be called “Guidoriccio da Fogliano at the siege of Montemassi” (1330–(?)), Simone Martini. The horseman and the horse, combined in a single geometric ornament demonstrate complete independence from the desert landscape with the image of two fortified cities. The picture plane of the landscape and the picture plane of the equestrian rider are parallel and exist autonomously. Architectural images by function still serve as a symbol (two defeated fortresses), and by the image method, absolutely uncoordinated vanishing lines of volumes of impossible geometry.

There is no doubt there is an influence of Giotto in the work of the Lorenzetti brothers from Siena. Spatial constructions and perspectives were the two problems resolved by Pietro Lorenzetti. For example, “The Approval of the New Carmelite Habit by Pope Honorius IV”, the predella panel of the altar of the Carmelite monastery in Siena (1328–29). The action takes place in a complex architectural space with depth; the proportions of human figures and buildings are close to reality.

A certain degree of realism was achieved by his brother Ambrogio Lorenzetti in the allegories of “good” and “bad” rule in the Palazzo Pubblico in Siena (1337–1339) – the first philosophical and political allegory in the medieval art. This is an image of an ideal city, although some buildings resemble the sights of Siena. The details in perspective and the various points of view in the image give a wide panorama as never seen before. People create the urban landscape so its structure is logical, straightforward and geometric, in contrast to the image of the bucolic landscape. “Ambrogio’s perspective is of a purely empirical nature, and the observance of proportions between the figures and the landscape does not bother him in those cases where it seems important, and on the background to present people’s activities with perfect clarity, to express their well-being ... But the general effect, nevertheless, has been achieved, and it can be expressed in two words: credibility and spaciousness” [1, p. 107]. “Lorenzetti achieved even greater spatial plausibility in the altar painting “Presentation at the Temple” (altar of St. Crescentius in the Cathedral of Siena, 1342). A sharp reduction in the space of the temple is perceived as preparation for a renaissance, consciously arranged central perspective. Although the simultaneous display of architecture inside and out is still a tribute for an archaic artistic tradition. It is believed that Lorenzetti managed to find a better ratio of the human figure and architecture than Giotto and realistic images began to replace architectural symbols.

### **The influence of Florentine art on architectural images in the works of Italian Trecento artists**

In the first half of the 14th century in Florence, Giotto was the most significant, but not the only artist. Taddeo Gaddi, a student of Giotto, in the fresco “Introduction of Mary in the Temple” (1330–1338) in the Chapel of Baroncelli of the Basilica of Santa Croce in Florence convincingly demonstrates adherence to the ideas of the teacher. At the same time, Gaddi more accurately conveys space, finds unusual lighting solutions, which achieves a greater artistic expressiveness



of the plot, departing from the limitations of the Giotto's space, using complex architectural "backstage".

For the first time in medieval Italian painting, we encounter a conscious depiction of the historical environment from Maso di Banco in the painting of the Chapel of Bardi di Vernio in the already mentioned Basilica of Santa Croce, "Pope Sylvester I turning away a dragon and reviving its victims" (1335). The action takes place against the backdrop of the ruins of the Roman Forum, which are basic shapes, not decorated with a large number of architectural details, as was customary in the late Gothic period. The column and the collapsed arch are needed to indicate the scene.

The work of Guariento di Arpo was influenced by Giotto's frescoes in the Scrovegni Chapel. But while emphasizing Giotto's style, he made it more gothic. In the fresco "Consecration of Bishops in Africa" (1348, Padua, Eremitani Church), all the characters are placed inside a complex structure of columns, arches and vaults.

Artists in Tuscany, Umbria and Lombardy, to varying degrees, used the achievements of Giotto. But sometimes they were completely abandoned in favor of a refined gothic aesthetics, such as the master of the Orcagna circle.

The exact compositional construction of the masters of the first half of the Trecento, the correct perspective, the important role of light is something new that will later be reflected in the work of Masaccio and in the art of the early Quattrocento. And in the last decades of the fourteenth century and at the beginning of the fifteenth, Gothic has become a topical area internationally. However, at the end of the Trecento, the close relationship of space with figures and the objective world (like Giotto) was again perceived by Altichiero and Spinello.

Altichiero da Verona (Aldighieri da Zevio), the largest representative of the late Trecento, was the author of the fresco cycle in Oratorio di San Giorgio (Chapel of St. George, Padua, 1379–1384). His image of space and buildings was realistic and consistent. Fresco "Death of St. Lucy" was housed in the narthex of a Gothic basilica resembling the Cathedral of St. Anthony. Here the architectural imagination of Verona masters reached its limits. Halls, balconies, galleries, apse, bridges, towers – all this was combined into a whimsical integrity and in all it should be noted rationality and logic. All parts were interconnected, the whole structure was strictly logical, balanced; everything was full of rhythm, measure, tact [1, p. 127].

The most significant work of Spinello Aretino was the painting of Sala di Balìa (1408–1410), one of the halls of the Palazzo Pubblico in Siena. They traced the desire for a realistic image of space, the foundations of which were laid by Giotto and Ambrogio Lorenzetti. The perspective is not built correctly, but the relationship between the figures and the space seems logical.

## Conclusion

The central figure of the Italian Proto-Renaissance was Giotto, who, with his empirical studies, brought a closer step to the discovery of mathematical linear perspective and first posed the main question, how to convey three-dimensionality on a picture plane. The debate between naturalistic painting (Giotto) and Gothic art was the main theme of the Trecento art.

Experiments in the field of transmitting spatial depth and compositional distribution of characters led to a new concept of the relationship between objects in an image. At the beginning, an architectural object is perceived as a conditional model in the background with wrong perspective. Further, the architectural object, remaining in the background, moves to the middle plan, increases to scale and creates an illusion of perspective. And in the third stage: the object receiving internal architectonics, is structurally complicated, and the plot action takes

place already inside it. Since the rules of the direct / central perspective have not yet been formulated, it is impossible to call its construction correct.

The role of the symbol becomes less didactic. The Italian artists Trecento first of all solved the problems of adequate representation of the plot in the context of the architectural structure.

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### Архитектурное изображение в искусстве треченто

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**Ключевые слова и фразы:** аллегория; архитектурное изображение в живописи; архитектурный образ; Джотто; линейная перспектива; обратная перспектива; Проторенессанс; треченто.

**Аннотация.** Целью исследования является описание особенностей архитектурного изображения периода треченто. Задачи исследования: определить характер воспроизведения архитектурных объектов и пространств, оценить востребованность символа и аллегории, изучить влияние новых технических приемов (перспективное изображение) на художественный образ. Гипотеза исследования: создание архитектурного изображения, его контент и зрительское восприятие находятся в прямой зависимости от культурно-религиозного контекста эпохи. Метод исследования: денотативный анализ архитектурного изображения. Результаты: архитектурное изображение в рассматриваемый период начинает терять жестко детерминированную функцию символа, приобретает пространственную «объектность», выступает в качестве идентификационного маркера, активно участвует в раскрытии основной идеи произведения.

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## Practical Application of the Method of Organizing Repair and Construction Works in Public Buildings Using Their Organizational and Technological Reliability

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**Key words and phrases:** repair and construction work; big data; organizational and technological reliability; public buildings.

**Abstract.** The purpose of this article is to summarize the practical application of the methodology to increase the effectiveness of organizational decisions in organizing repair and construction work (**R-CW**) in public buildings. To achieve the goal, a repair and construction organization was chosen, on the basis of which the methodology was applied. The working hypothesis is the assumption that it is possible to increase the efficiency of organizational decisions during R-CW in public buildings in the face of resource constraints based on the analysis of “big data”. The result of the application of the methodology was the formation of an organizational solution and its assessment of the organizational and technological reliability (**OTR**).

The purpose of applying the methodology for providing technical assistance in organizing R-CW is to assess organizational decisions that are being developed as part of a work production project (**W-PP**) [1]. Based on this assessment, it is concluded that the organizational decision is reliable [2]. The technique can be applied both when choosing the best solution from several, and when evaluating one solution if it is the only one.

The methodology was applied in the repair and construction organization “Baumetall Group” with the organization of the R-CW for the reconstruction of the facade of the Pavlovsky Business Center.

In the process of developing W-PP, an organizational and technological solution was formed, which is presented in Fig. 1.

Key features of an organizational decision are:

- breakdown of the building by grips in the amount of 8 pcs.;
- manual dismantling;
- manufacture of mounting panels at the place of work;
- manual device pits, awnings, porches;
- piece delivery of window and door blocks.

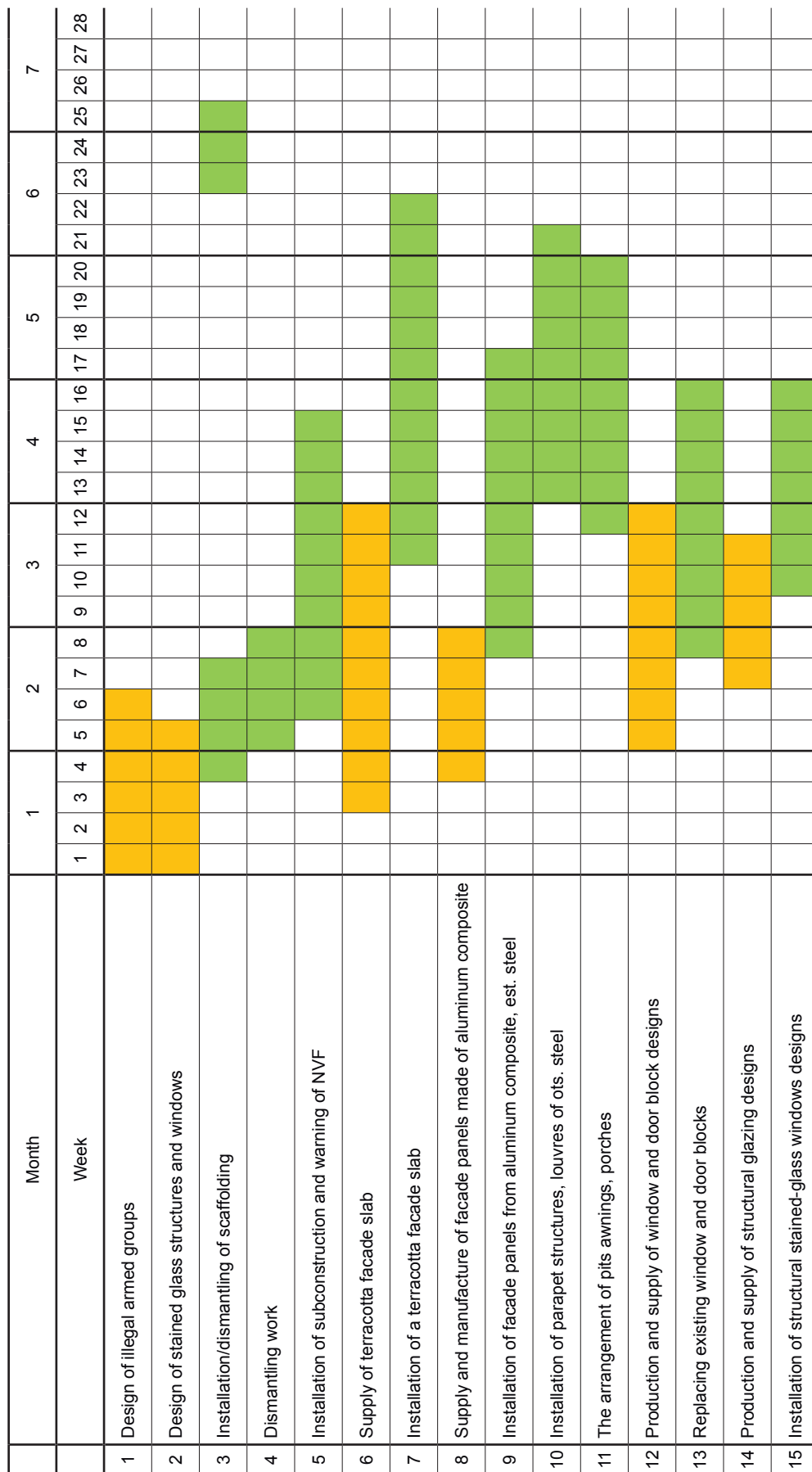


Fig. 1. A linear schedule of work

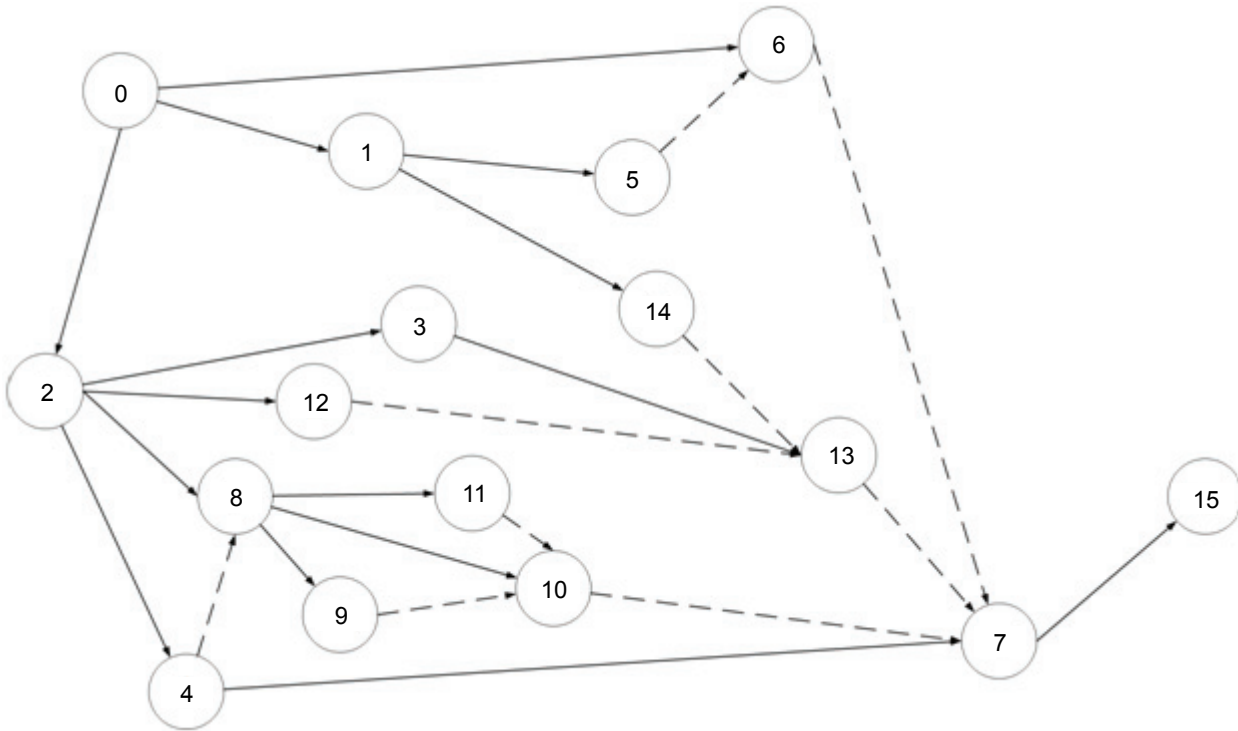


Fig. 2. Network schedule of work

In addition to this organizational decision, the possibility of splitting the grips into 12 pieces, the use of a mechanized method for dismantling, manufacturing part of structures at the plant, etc., was considered. But the leadership of the repair and construction organization planned to conduct the R-CW on the primary conditions.

Thus, as part of the application of the methodology, it is necessary to evaluate the effectiveness of one organizational decision as part of 15 types of work.

The total estimated duration of the work was 101 days, and the planned deadline is 104 days. Under such conditions of limitations in time parameters, the assessment of TNA is an important task [4].

To apply the OTR support methodology, a network diagram was developed, presented in Fig. 2.

The basis for evaluating the duration of each type of work is the formula:

$$t_i = \frac{V_i Y_i}{Q_i},$$

where  $t_i$  is the duration of  $i$ -th job,  $i$  is view PCP;  $Y_i$  is an indicator of the complexity of the  $i$ -th job (person-day / unit units);  $V_i$  is total amount of  $i$ -th job (unit of work);  $Q_i$  is the amount of labor resource (people).

The value of  $Y_i$  is a random variable that obeys the normal distribution law, since there are a significant number of factors affecting the complexity in the process of performing R-CW.  $Y_i$  calculation was based on the analysis of “big data” on the following factors: experience, constraint, labor discipline of workers, localization of the front of work. The term “big data” has a different number of interpretations. In the framework of the study, the analysis of “big data”

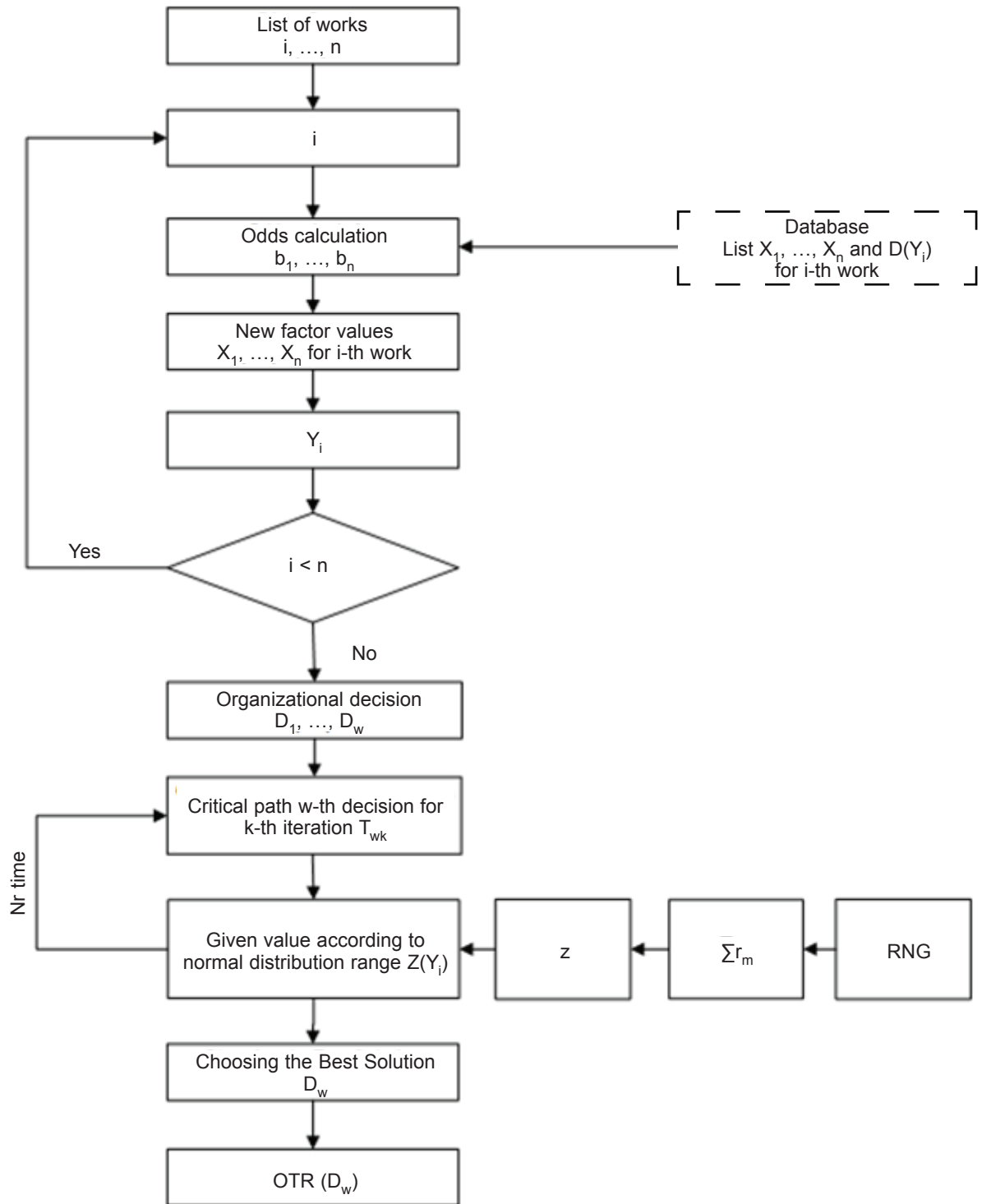


Fig. 3. Block diagram of the support model for the OTR of the R-CW organization

refers to the analysis of heterogeneous, unstructured information [3; 5].

The general scheme for providing OTR based on the analysis of “big data” is presented in Fig. 3.

As a result of the application of the method, the OTR indicator was 92 %, which indicates the high reliability of the developed organizational solution.



Thus, thanks to the application of “big data” analysis methods, namely, the regression method, we were able to evaluate the SN of the formed solution and, as a result, draw the conclusion of the reliability of the solution.

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### Практическое применение методики организации ремонтно-строительных работ в общественных зданиях с учетом обеспечения их организационно-технологической надежности

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**Ключевые слова и фразы:** большие данные; общественные здания; организационно-технологическая надежность; ремонтно-строительные работы.

**Аннотация.** Целью написания статьи является обобщенное описание практического применения методики для повышения эффективности организационных решений при организации ремонтно-строительных работ (РСР) в общественных зданиях. Для достижения цели была выбрана ремонтно-строительная организация, на базе которой проводилось апробирование методики. Рабочей гипотезой является предположение о возможности повышения эффективности организационных решений при проведении РСР в общественных зданиях в условиях ограничений по ресурсам на основе анализа «больших данных». Результатом применения методики явилось формирование организационного решения и его оценка с точки зрения организационно-технологической надежности.

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UDK 71

## The Interaction of Infrasound and Architectural Monuments on Examples of Ancient Castles

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**Key words and phrases:** ancient castles; architectural principles; fortress; ghosts; infrasound; infrasound waves; paranormal; sources.

**Abstract.** The article deals with the problem of interaction of such phenomenon as infrasound with the defensive architecture of medieval castles. The aim of the article is to analyze the main sources of infrasound waves and their negative impact on the psychological and physical characteristics of the human body. The article summarizes the practical experience of studying infrasound waves of the past years. On the basis of the studied data on the nature of the distribution of the studied waves, the author makes an assumption about the possible direct connection of infrasound with various paranormal phenomena characteristics of ancient castles. The issue requires further, more practical study.

### Introduction

The castle is one of the monuments of medieval architecture, causing a special practical interest. What does the word “castle” conjure up in your mind? The image of a majestic fortress with high incredibly beautiful towers, luxurious corridors with amazing interior decoration or a gloomy, frightening place with dark winding corridors, full of mysticism and ghosts. This different description is due to the fact that although the castle for a long time served to protect against enemy forces, over time, the aesthetic component prevailed in the architecture of the castles, because the appearance and size became a reflection of the prestige and power of the owner. Of course, from an architectural point of view, the castle is nothing but a fortified dwelling of feudal lords and their families, in other words it is a fortress. It is a silent structure characterized by exceptional architecture, unique location and its inaccessibility, and sometimes mysterious history.

The castles were often built on the hills, thereby increasing the influence of powerful gusts of wind, which are a source of powerful low-frequency waves. We also can often meet the castles, erected on the bays or some coastal territories, islets. Strikes same nautical waves about the bank, firstly, cause small seismic fluctuations in the ground, and secondly, contribute to changes

in pressure air, thereby becoming new source of infrasound waves. And interestingly, such phenomena as an infrasound in old castles can be also generated by corridors and windows, if the speed of drafts in them and the geometric parameters of the premises coincide properly [1].

### **What is infrasound?**

Infrasound (from lat. infra-below, under) is elastic waves of similar sound, but with frequencies below area audible human frequencies. Typically, the upper limit of the infrasound region takes the frequency of 16–25 Hz. The lower limit of the infrasound range is uncertain.

In the recent years, the interest to the infrasound increased, as the amount of artificial infrasound sources, such as transport means (cars, buses, tramways, locomotives, aircraft, helicopters and others), road machines (road rollers), compressors (piston, centrifugal, impeller, screw type and others), blowers, ventilators increased.

But there are also a lot of natural infrasound sources existing all the time. Infrasound is contained in the noise of the atmosphere, forest and sea. The source of infrasound vibrations are lightning discharges (thunder), as well as explosions and gunshots, its source can be storms and hurricanes, as well as some types of earthquakes. In the earth's crust, there are concussions and vibrations of infrasound frequencies from a variety of sources, including explosions, collapses and transport pathogens. Infrasound is characterized by low absorption in various media, as a result of which infrasound waves can propagate over very long distances in air, water and in the earth's crust.

### **What is the influence of infrasound?**

A negative result was produced in 2009, when the "Haunt" Project used infrasound (18.9 Hz and 22.3 Hz) as part of an experiment to construct a haunted room. Some participants reported anomalous sensations such as a sense of presence, vertigo and terror, however experimenters reported that they had "failed to provide any support for the postulated link between the presence of infrasound and the experiencing of anomalous sensations" [2].

With a relatively low intensity of infrasound exposure, a person may experience a complex of unpleasant sensations: dizziness of a non-systemic nature, nausea, difficulty breathing, abdominal pain, feeling of depression, fear [3]. However these sensations wear a temporary character and after a small hiatus infrasound impact they disappear. With more intense exposure to infrasound, in addition to dizziness and abdominal pain, there are sensations of dry mouth and scratching in the throat, cough, suffocation, anxiety, and increased irritability.

Numerous studies conducted on people caught in the zone of action of low-frequency waves, gave reason to scientists to believe that infrasound is dangerous for humans, for their health. These waves provoke the loss of sensitivity of the organs designed to adjust the balance of the body. In turn, this loss is the cause for ear pain, brain damage, pain in the spine. Some scientists and psychologists believe that infrasound is the main and most serious cause of psychological disorders.

Infrasound always exists, even when people believe that the atmosphere is quiet. That is, the existence of what we can not even suspect at the moment or second, has a direct impact on us (both psychological and physical).

### **The architecture of the castle**

The castle was originally defined as a fortified dwelling of the feudal Lord, accommodating a

complex of all necessary services for defense, and the main function of the castle was to protect the territory, all other functions were considered as secondary.

Until the end of the X century castles were built mainly of wood and were often a two – story wooden tower, on the top floor of which lived the feudal Lord, and in the lower – the squad and servants.

Over the decades, the structure of such fortified castles changed. There were many variants of castle architecture. But since the castle is primarily a fortress, and the level of military technology in different countries was about the same, the general principles of construction and basic fortification elements remained unchanged for many countries.

The castle had very simple requirements – it must be inaccessible to the enemy, provide surveillance of the terrain, have its own source of water and perform representative functions.

Around the beginning of the X century in the era of feudalism the most characteristic of Western Europe type of castles-donjon formed (from the Latin dominion, which is home of the owner of the estate). Donjon included a phased line of defense. Inside the lower courtyard of the castle many religious and economic buildings were housed. Higher, on the bulk of the hill the residential tower of the feudal Lord was located. The seigniorial and economic parts were connected by a wooden drawbridge, which could be easily removed and, if it's necessary, turn the feudal home into an independent defensive site.

All these constructions of the castle were surrounded by a powerful oak palisade with a system of a drawbridge. Such a feudal castle was very impregnable and could defend itself for a long time when attacked by enemies [4].

Around the beginning of the XI century, feudal lords began to build stone castles, usually surrounded by two or even three high stone walls with loopholes and watchtowers. The most important defensive element was the outer wall of worked stone or brick. From above on its inside side a gallery for defenders of fortress proceeded.

The castle was surrounded by a deep moat. Access to the castle was by means of a drawbridge, which descended on heavy iron chains. The tower had a massive oak gate, bound with iron. Behind the false tower a sliding door in the form of a cast-iron lattice was located, and in the center still the main multi – storey tower – “donjon” worsened. Dungeons often served as a prison where in chains the enemies of the Lord (his prisoners), rebellious vassals and the guilty in anything the peasants languished. One floor was isolated from the other. From one floor of the tower, the only way to get to the other was by a narrow and steep spiral staircase. The ascent was carried out only one after the other – so narrow it was [5].

Due to the exceptional thickness of the walls it was almost impossible to destroy the tower. The construction was completed by an open platform with a crenellated crown, where a catapult or other throwing weapon was usually installed to fire the enemy. There the standard of the owner of the castle was also hoisted. This castle tower was the highest building of the castle, it provided surveillance of the surroundings, served as a refuge. Thus, the feudal castle was a real fortress that protected the feudal Lord from «external» enemies-other feudal lords and from his servants.

### **Haunted castles**

With a careful study of almost every castle to the surface pops up a legend or just a little story about the ghost, wandering in the walls of the former feudal fortress. What is important is that they are very closely related to the historical events that took place there in isolation, with its own internal history of the castle.

## Statistics

At least one third of the population of the United States believes in ghosts. And almost one quarter of Americans believe they have had some sort of an encounter with ghosts. After 1013 participants were questioned about what they believe by telephone, a 2007 AP-Ipsos poll found that approximately 34 % of Americans believe in ghosts, with about 23 % claiming they have either been in the presence of a spirit or actually seen one. For comparison, the Baylor Religion Survey released in 2006 used telephone and mail, finding that 37 percent of people surveyed from around the country believed that places can be haunted, with nearly 20 percent believing we can have communication with disembodied human spirits – ghosts [6].

The analysis from YouGov Profiles of nearly 12,000 people who affiliate with Christianity and a control set of 39,000 British people representative of the whole population reveals that about 30 percents believe in ghosts [7].

### Edinburgh castle, Scotland

Edinburgh castle stands 443 feet (135 metres) above sea level and overlooks the city of Edinburgh from a volcanic crag called Castle Rock. Between 1296 and 1341, the castle was twice captured by English invaders and twice retaken by the Scots, so it has a very rich history, which is full of bloody and tragic events. Mysterious murders and insidious conspiracies, hundreds of prisoners tortured in the dungeons of the castle raised many legends [8].

On a huge mysterious dungeon of the castle haunts the Ghost of the vanished Piper, who was sent to look for a way out. And the headless Ghost of the drummer, who beats the drum roll at the approach of danger, it can be seen in the courtyard of the castle in the predawn hours.

### Dunluce Castle, Northern Ireland

Dunluce Castle is a now-ruined medieval castle. The place of its erecting was chosen not by chance – on all sides the fortress was surrounded by steep cliffs, and from the “big land” it was possible to get to it only by the bridge. Dunluce castle has its own little secret. 25 meters under the castle rock there is a natural through cave with access to the sea, called “Mermaid’s Cave”. The legend says that once one of the lords Macquillan had an only daughter named Maeve Roe, who willfully refused to marry the groom chosen by the father, for that she was imprisoned by an angry parent in the tower. One night during a severe storm, she and her lover Reginald O’kaan decided to escape – the young people went down to the cave of the Mermaid and got into a boat, but the fragile vessel was caught by the waves and broke on the rocks. Maeve’s restless spirit is said to moan at night in her prison tower.

### Predyamsky castle, Slovenia

The first written mention of the Predyamsky castle occurs in 1274. The castle was built in front of the entrance to a large cave. Predyama is a completely impregnable fortress. The cannons and catapults posed just a little danger to the massive defensive walls literally built into the rock, and the inner rooms of the castle were generally in a cave. In the XIV–XV centuries, the castle was destroyed by a series of long sieges and earthquakes. In 1567, the castle was restored, along with numerous secret tunnels and passages, which are still haunted by the ghosts of many soldiers who died in the castle walls. From the dungeons and tunnels



under the castle you can clearly hear various noises and footsteps.

The case for a potential causal link between infrasound exposure and reported anomalous experiences was made in 1974 by Professor Michael A. Persinger. He stated that despite the lack of public data with which to compare paranormal reports, infrasound is “an excellent candidate for at least some types of precognitive experiences. Weak infrasound energy from ambient sources could evoke vague responses and lead to reports of feelings of foreboding, depression of impending doom ahead of natural phenomena such as earthquakes or storms” [9].

### **Vic Tandy and his research**

One evening, computer Scientist Vic Tandy was in his laboratory at the University in Coventry (England). Suddenly he felt that someone was watching him. He looked around and saw something gray and misty and shapeless moving toward him. It moved and looked straight at him. But suddenly, only half a meter away from Vic, it seemed to melt into thin air. When the first horror passed, Tandy decided to study the phenomenon and put it on solid scientific ground [10].

The idea came about by accident. The day after Tandy had seen the Ghost in the laboratory, he had brought his rapier with him to repair for the competition he was about to enter. He held it in a vise and saw the rapier begin to waver. This strange vibration made Vic think of resonant vibrations like those produced by sound waves. For example, when the music is very loud, dishes in the closet begins to ring. But then, strangely enough, there was complete silence in the laboratory. Then the scientist measured the sound background with the help of special equipment.

As it turned out, it was very noisy in the room. He did not hear it because the sound waves had a relatively low frequency that the human ear does not perceive (infrasound). After a short search for the source of the sound, it was found: it was coming from the air conditioner fan installed not so long ago. As soon as the scientist turned it off, the blade stopped vibrating.

Subsequent studies of sound waves measured by him in the laboratory had a frequency of 18.98 Hertz, which is roughly the same as the frequency of movement of the human’s eyeball. In nature, too, there are sounds in the infrasonic wave range, if for example strong gusts of wind hit the walls of ancient towers. These sounds penetrate the thickest walls. Especially strong howls of wind are formed in the corridors, which are shaped like a tunnel [11].

So perhaps the answer for question about ghosts in ancient castles can be found just in human psychology, because most people who visited a particular castle were familiar with its bloody and tragic history. But it is also possible that there is a scientifically explicable natural phenomenon that can promote the emergence occurrence of various visions that we take for reality in our minds.

### **Conclusion**

The architecture of the ancient castles, due to the evolving historical situation, as already mentioned, was primarily aimed at the construction of a structure capable of withstanding numerous external invasions as well and for as long as possible.

From the above, it can be assumed that the principles of construction of castles, the main characterizing constituents such as thick stone walls, high towers, long corridors and tunnels and the place of its erecting whether it’s rock, high hill, or a coastal area, are directly connected with such natural phenomena as infrasound. It combined with known subconscious history of the



castle exerts the most adverse on us influence, perhaps, causing images those ghosts dwelling in the castles.

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### Взаимосвязь инфразвука и архитектурных сооружений на примере старинных замков

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**Ключевые слова и фразы:** архитектурные принципы; инфразвук; инфразвуковые волны; источники звука; крепости; паранормальные явления; призраки; старинные замки.

**Аннотация.** В статье поставлена цель: рассмотреть проблемы взаимосвязи такого явления, как инфразвук, с оборонительной архитектурой средневековых замков. Задачей статьи является анализ основных источников инфразвуковых волн и их негативного влияния на психологические и физические характеристики человеческого организма. Статья обобщает практический опыт исследования инфразвуковых волн прошлых лет. На основании изученных данных о характере распространения исследуемых волн авторами сде-

лано предположение о возможной прямой связи инфразвука с различными паранормальными явлениями, характерными для древних замков. Вопрос требует дальнейшего более детального практического изучения.

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## Promising Directions of Solving Socio-Economic Problems of Rural Territories

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**Key words and phrases:** formation and implementation of the rural budget; local budget; rural infrastructure; rural territories; small businesses; socio-economic problems.

**Abstract.** The purpose of the research is to substantiate proposals for the development of rural areas of a particular region. In this case, it is necessary to solve a number of problems related mainly to the formation and further development of small forms of management. Programs for the development of rural settlements should contain a set of economic indicators linked to resource provision, individual performers and implementation periods. Regional governing bodies are offered some of the most promising areas of socio-economic development of rural areas in the existing natural and economic zones.

The analysis of the development of rural territories of the Ryazan region in the context of individual natural and economic zones allows formulating certain proposals for the further development of these territories. At the same time, in terms of the further development of the rural territories of the region, it is advisable to take into account the differentiation according to the natural-economic and historical social conditions, as well as the standard of living of the population. The population of rural areas in the current economic situation performs a number of important functions, including: socio-demographic, cultural, recreational and environmental. All this must be taken into account when deciding on the further development of small forms of management and agricultural production in a single territory.

It is assumed that the main problems restraining the development of small business in the region should be considered: slow process of creating favorable infrastructure; low rates of development and increase in the number of small enterprises in the manufacturing sector; insufficient regulatory framework; poor implementation of regional small business development programs; weak information base; insufficient interaction of the regions [1; 4].

At the same time, the small businesses (**SBs**) in the village include: private farms (**PFs**); fruit farming, vegetable farming; subsistence farming and sole proprietors. Private farming and legally registered sole proprietors in rural areas are major structural entities among small businesses. Private farmers are engaged not only in the production of agricultural products. The role of these entities in the village solves many infrastructural positions, including many social

problems. The rural family is an integral mechanism of a single whole agricultural organism, which in many respects forms the way of life of farmers. Of particular importance in terms of the development of rural areas should be given to small businesses. Moreover, in the current economic situation, the main problems in terms of the further development of small forms of management in the territories of rural settlements are as follows:

- insufficient amount of own assets and funds for acquiring new high-tech equipment;
- lack of qualified specialists in rural areas;
- high interest on bank loans;
- lack of necessary infrastructure for living in rural areas;
- poorly developed system of state support for small businesses.

At the municipal level, special importance in terms of the development of rural territories and small business is assigned to the development, adoption and implementation of socio-economic programs integrated with the development programs of rural territorial settlements. In particular, the adoption and implementation of such program activities will help to some extent reduce the negative impact of various adverse factors on the development of small business forms. In modern conditions, the development of these forms of management on a given territory, stabilization and increase in the number of employees working in them, the organization of new industries are the main and primary tasks of local and municipal self-government bodies. The implementation of the adopted program documents at various levels of government will create more favorable social and economic conditions for the development of small and medium-sized businesses. At the same time, it is advisable to prevent the adverse trend outlined in recent years for a significant reduction in enterprises and organizations of various organizational and legal forms of ownership in the municipalities of the region. All this will lead to further sustainable and favorable development of rural areas and the formation of middle-class entrepreneurs, which will become a significant base in terms of social stabilization of the whole society.

Solving the problems of socio-economic development and improving the governance structure of municipalities laid down in development programs must necessarily be integrated with the respective development programs of individual rural territories [2; 3]. Moreover, rural development programs must meet the needs of the population living on its territory and ongoing market processes. Such programs for the comprehensive socio-economic development of a rural settlement should contain a certain idea of the necessary goals and resources, take into account the potential of the territory and the main measures for the socio-economic development of rural settlements in the future. Programs for the development of rural settlements should contain a set of economic indicators linked to resource provision, individual performers and implementation periods. All measures should be aimed at achieving strategic goals related to the socio-economic development of the rural settlement. The main goals associated with the development of a rural settlement and scientifically-based program activities, as well as the necessary resources, are advisable to constantly adjust and supplement during budget execution in relation to the prevailing conditions and situations.

For further the scientific and technological development of the agricultural sector of the economy of the Ryazan Region, it is advisable to separately develop a state regional policy for the use of rural territories in natural and economic zones. Thus, in the North-Eastern natural and economic zone of the region, production is carried out on low-fertile forest soils, fields and populations are scattered over land use territory over considerable distances, small-contour fields that do not allow the use of high-performance equipment and modern technologies for the production of crop and livestock production. Only in the Klepikovskiy municipality there are 242 villages, 4 farms, in 31 settlements there are simply no permanent residents [5]. In our opinion,

in the long term, it is advisable to transfer part of these lands for use to the state forest fund. Production in these territories is unprofitable and requires significant government assistance and support to agricultural producers. It is also necessary to identify promising settlements for living with the organization of the necessary social conditions. It is proposed, in order to increase the efficiency of small business forms in this zone:

- create a rational mechanism for the sale of finished products produced by small enterprises, with the predominance of cooperatives;
- provide preferential credit conditions, subject to the availability of interest rates on loans;
- provide a timely and reliable system of information and consulting support;
- provide constant state assistance and support;
- create special leasing programs.

The state policy of many foreign countries in terms of the use of such territories is based on maintaining the land in an appropriate agrotechnological state, preserving the rural way of life of the population and instilling in young people a love of agricultural labor.

A special economic state social policy should be used for further development of rural territories of the central and southern natural and economic zones. In the central natural and economic zone there is a good prospect of the revival and further development of horticultural and vegetable gardening cooperatives. It is advisable to organize an additional number of cooperatives. All this will improve the food supply of the population with fresh high-quality food products due to the labor of the residents themselves. Great prospects for development have enterprises in the southern natural and economic zone, where black soil prevails with huge land masses, which makes it possible to widely use high-performance equipment and modern technologies in crop production and animal husbandry. It is advisable to optimize tax legislation in terms of providing greater autonomy to local authorities by establishing tax regimes that allow the formation of deficient local budgets and make wider use of them in terms of social development.

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**Перспективные направления  
решения социально-экономических проблем сельских территорий**

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**Ключевые слова и фразы:** малые формы хозяйствования; местный бюджет; сельская инфраструктура; сельские территории; социально-экономические проблемы; формирование и исполнение сельского бюджета.

**Аннотация.** Целью научного исследования является обоснование предложений по развитию сельских территорий отдельного региона. При этом необходимо решить ряд задач, связанных в основном с формированием и дальнейшим развитием малых форм хозяйствования. Программы по развитию сельских поселений должны содержать комплекс экономических показателей, увязанных по ресурсному обеспечению, отдельным исполнителям и срокам реализации. Региональным органам управления предлагаются отдельные наиболее перспективные направления социально-экономического развития сельских территорий по существующим природно-экономическим зонам.

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## Assessment of Investment Construction Sector Development

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**Key words and phrases:** assessment of development; investment-construction sector; life cycle; technique for analysis.

**Abstract.** The paper explores relevant questions of analysis of investment-construction sector development. The research objective is design of the method for estimation of investment-construction sector development. In accordance with the research objective the following tasks were defined: to identify the main stages of using of the author's technique for analysis of investment-construction sector development; to describe the method for assessing the investment-construction sector development; to use the assessment technique of investment-construction sector development for analysis of its development. The research hypothesis consists in assumption that stages of investment-construction sector's life cycle can be identified on the basis of using of phase analysis. During the research process the following methods were used: abstraction method, classification method, method of comparison, analysis, synthesis. As a result of the research the method for estimation of investment-construction complex development is offered, the essence of the technique for analysis of investment-construction complex development is described, estimation of investment-construction complex development is implemented.

Availability of information about the development of the investment and construction sector (ICS) [1] is one of the main conditions for effective management of this process. In our opinion, the assessment of the development of an ISC is one of the main stages in the methodology for analyzing the ICS development. In view of the above, this paper offers a method for assessing the ICS development, and also reveals the content of the author's methodology for analyzing the ICS development.

The method of analysis of the ICS development involves the implementation of five stages. At the first stage, you must select the territory within which the operation of the ICS is considered. The second stage involves identifying the stages of the life cycle of the ICS based

**Table 1.** Frequency of manifestation of stages of the life cycle of the investment and construction complex

Federal District	Stage	Frequency of manifestation				
	Beginning	Growth	Prosperity	Slowdown	Decline	
Central Federal District	2	7	3	4	1	
Northwestern Federal District	3	5	3	6	0	
Volga Federal District	4	5	2	5	1	
Ural Federal district	3	5	2	4	3	
Siberian Federal District	4	6	1	5	1	
Far Eastern Federal District	3	6	1	6	1	

**Table 2.** Assessment of the development of the investment and construction sector based on the stages of its life cycle

The territory of the investment construction sector	Number of points	Ranking position
Central Federal District	25	1
Northwestern Federal District	22	2
Volga Federal District	20	3
Ural Federal district	19	4
Siberian Federal District	19	4
Far Eastern Federal District	18	5

on the application of the method that we have already considered in the corresponding work [23]. The implementation of the life cycle analysis of the ICS at the third stage is based on the development model [24], the use of which allows us to take into account the influence of various driving forces on the development of the ISC. At the fourth stage, the development of the ISC is evaluated. The application of this method is completed by predicting the development of the ICS.

Since it is proposed to use regression models for predicting the development of ISC, the development of which was also discussed earlier [25], this paper will cover in more detail various aspects of the assessment of the development of ISC.

In our opinion, the assessment of the ICS development can be based on data obtained by identifying the stages of the ICS life cycle. Previously, we have already identified the mentioned stages of development for six Federal districts (Central, North-Western, Volga, Ural, Siberian, and far Eastern Federal districts) for the period from 2000 to 2017 [23], so we use these results in this work as initial data.

It is proposed to evaluate the ICS development within different territories taking into account the frequency of manifestation of each stage of its life cycle (Table 1) (based on a scale from 0 points to 3 points).

In terms of the need to increase construction volumes and increasing levels of housing [22]

Results (q)	Increase	Qualitative and quantitative $T_{pq}/T_{pr} \gg 1$	Qualitative and quantitative	a) if $T_{pq}/T_{pr} > 1$ , qualitative and quantitative changes b) if $T_{pq}/T_{pr} = 1$ , qualitative changes c) if $T_{pq}/T_{pr} < 1$ , quantitative changes
	Remain unchanged	Qualitative $T_{pq}/T_{pr} > 1$	No positive changes $T_{pq}/T_{pr} = 1$	No positive changes $T_{pq}/T_{pr} < 1$
	Decrease	a) if $T_{pq}/T_{pr} < 1$ , no positive changes b) if $T_{pq}/T_{pr} = 1$ , no positive changes c) if $T_{pq}/T_{pr} > 1$ , quantitative changes	No positive changes $T_{pq}/T_{pr} < 1$	No positive changes $T_{pq}/T_{pr} \ll 1$
		Decrease	Remain unchanged	Increase
		Resources (r)		

Fig. 1. Correlation of growth rates of results and resources

the most preferred stages of the ICS life cycle, in our view, are the stage of beginning, growth and prosperity, as they are characterized by the increase of the gross regional product (**GRP**) by kind of economic activity (**FEA**) “Construction”. Taking into account the characteristics of the indicated stages [23], the manifestation of each of them (beginning, growth, prosperity) within the ICS life cycle will be estimated at 1 point, 2 points and 3 points, respectively. As for the slowdown and decline stages, we will evaluate the manifestation of each of them at 0 points, taking into account the reduced performance of the ISC at these stages, as well as their other characteristics. The final assessment of the ICS development is the sum of points for all stages of its life cycle.

As a result of the assessment of the ICS development on the basis of these stages in six Federal Districts, their rating was compiled (Table 2).

The position in the ranking is determined by constructing a ranked series of descending type based on the values of the final assessment of ITS development, presented in points. The first place in the ranking is assigned to the ICS of the Federal District with the highest number of points, and the last place is assigned to the ICS of the Federal District with the lowest number of points.

Thus, the first place in this ranking for the period from 2000 to 2017 was the ICS of the Central Federal District, the second place was the ICS of the Northwestern Federal District, and the third place was the ICS of the Volga Federal District. The fourth place was shared by the representatives of the Ural and Siberian Federal Districts. The fifth place was the ICS of the far Eastern Federal district.

Along with the previously considered assessment of the ICS development based on the stages of its life cycle, it is proposed to use an assessment that takes into account the presence of positive quantitative and qualitative changes in its activities.

To identify both qualitative and quantitative changes in the ICS functioning, it is advisable to

Table 3. Dynamics of positive changes in the functioning of the investment construction complex

Period	Central Federal District	Northwestern Federal District	Volga Federal District	Ural Federal District	Siberian Federal District	Far Eastern Federal District
2000–2001	Qualitative and quantitative	Quantitative	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative
2001–2002	Quantitative	Quantitative	Not found	Not found	Not found	Not found
2002–2003	Qualitative and quantitative	Quantitative	Quantitative	Quantitative	Quantitative	Qualitative and quantitative
2003–2004	Not found	Not found	Not found	Not found	Not found	Not found
2004–2005	Qualitative and quantitative	Qualitative and quantitative	Quantitative	Not found	Quantitative	Qualitative and quantitative
2005–2006	Not found	Quantitative	Quantitative	Qualitative and quantitative	Quantitative	Qualitative and quantitative
2006–2007	Quantitative	Qualitative and quantitative	Quantitative	Qualitative and quantitative	Quantitative	Not found
2007–2008	Qualitative and quantitative	Quantitative	Qualitative and quantitative	Qualitative and quantitative	Quantitative	Qualitative and quantitative
2008–2009	Not found	Qualitative	Not found	Qualitative	Qualitative	Qualitative and quantitative
2009–2010	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative	Qualitative and quantitative
2010–2011	Quantitative	Quantitative	Quantitative	Quantitative	Quantitative	Quantitative
2011–2012	Qualitative and quantitative	Quantitative	Quantitative	Not found	Quantitative	Not found
2012–2013	Quantitative	Qualitative	Qualitative and quantitative	Qualitative and quantitative	Not found	Not found
2013–2014	Qualitative and quantitative	Not found	Quantitative	Qualitative and quantitative	Quantitative	Qualitative
2014–2015	Not found	Not found	Not found	Not found	Not found	Quantitative
2015–2016	Qualitative and Quantitative	Quantitative	Qualitative	Qualitative and quantitative	Qualitative and quantitative	Quantitative
2016–2017	Not found	Qualitative	Not found	Not found	Not found	Not found

**Table 4.** Frequency of positive quantitative and/or positive qualitative changes in the investment and construction sector

Changes	Frequency of occurrence		
	Positive quantitative	Positive Qualitative	Positive Qualitative and Quantitative
Federal District			
Central Federal District	4	0	8
Northwestern Federal District	8	3	3
Volga Federal District	7	1	4
Ural Federal district	2	1	8
Siberian Federal District	8	1	3
Far Eastern Federal District	3	1	7

use the ratio of the growth rate of results to the growth rate of resources [2; 25], various variants of which are presented in Fig. 1.

In this paper, in order to identify these changes, the GRP value for foreign economic activity "Construction" (in comparable prices, millions of rubles) was considered as the results of the ISC operation, and the amount of investment in housing, buildings (other than residential) and structures (in comparable prices, millions of rubles) for the period from 2000 to 2017 was considered as resources.

As a result of calculating the ratio of growth rates of the listed indicators based on the corresponding source data [3–21] for six Federal districts, periods were identified that were characterized by positive quantitative changes, positive qualitative changes, and positive qualitative and quantitative changes (simultaneously). In addition, periods characterized by the absence of positive quantitative and positive qualitative changes were identified (Table 3).

It is proposed to evaluate the development of the ISC within different territories taking into account the frequency of positive quantitative and positive qualitative changes in ITS functioning (table 4) (based on a scale from 0 points to 3 points).

Since qualitative changes more profoundly characterize the process of development of ISC than quantitative changes, the manifestation of positive quantitative, positive qualitative, as well as positive quantitative and positive qualitative changes (simultaneously) will be evaluated in 1 point, 2 points and 3 points, respectively. The absence of positive quantitative and / or positive qualitative changes will be evaluated at 0 points. In this case, the final assessment of the development of a particular Federal district ICS the sum of points for all the periods during which the listed changes were detected.

As a result of the assessment of the development of ISC based on the identification of designated changes in six Federal districts, their ranking was compiled, shown in Table 5.

In addition, by summing the number of points for a ranking based on the stages of the ICS life cycle in the context of the listed Federal Districts with the number of points for a ranking based on the identification of positive quantitative and/or positive qualitative changes, the corresponding overall ranking was compiled (Table 6).

Thus, as a result of the study, a method for assessing the ICS development was developed, based on both identifying the stages of the ICS life cycle, and identifying its positive quantitative and qualitative changes. In addition, the content of the methodology for analyzing the ICS

**Table 5.** Assessment of the development of the investment and construction sector based on the identification of positive quantitative and/or positive qualitative changes

The territory of the investment construction sector	Number of points	Ranking
Central Federal District	28	1
Northwestern Federal District	28	1
Volga Federal District	26	2
Ural Federal district	23	3
Siberian Federal District	21	4
Far Eastern Federal District	19	5

**Table 6.** General assessment of the development of the investment and construction complex

The territory of the investment construction sector	Number of points	Ranking
Central Federal District	53	1
Northwestern Federal District	47	2
Volga Federal District	45	3
Ural Federal district	44	4
Siberian Federal District	41	5
Far Eastern Federal District	38	6

development was disclosed, and the development of ISC in six Federal districts was evaluated using the method of assessing the development of ISC.

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## Оценка развития инвестиционно-строительного комплекса

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**Ключевые слова и фразы:** жизненный цикл; инвестиционно-строительный комплекс; методика анализа; оценка развития.

**Аннотация.** Рассматриваются актуальные вопросы анализа развития инвестиционно-

строительного комплекса (**ИСК**). Целью исследования является разработка метода оценки развития ИСК. В соответствии с целью исследования были определены следующие задачи: выделить основные этапы применения предлагаемой автором методики анализа развития ИСК; раскрыть сущность метода оценки развития ИСК; применить метод оценки развития ИСК в целях анализа его развития. Гипотеза исследования заключается в предположении о том, что выявление стадий жизненного цикла ИСК может осуществляться посредством применения фазового анализа. В процессе исследования были использованы следующие методы: метод абстрагирования, метод классификации, метод сравнения, метод анализа, метод синтеза. В результате исследования был предложен метод оценки развития ИСК, представлено содержание методики анализа развития ИСК, проведена оценка развития ИСК.

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## Pharmacological-Economic Efficiency of Bacterial Echerichia Coli Lysate in Complex Therapy of Chronic Pyelonephritis

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**Key words and phrases:** bacterial lysate of *E. coli*; chronic pyelonephritis; increased utility; lipoperoxidation; pharmacological economic efficiency.

**Abstract.** Urinary tract infections are quite frequent among bacterial infections. The aim of the study is to compare the pharmacological economic efficiency of monotherapy with an antibacterial drug of the cephalosporin series of the third generation cefixime and combination therapy of cefixime with lyophilized *E. coli* bacterial lysate in patients with chronic pyelonephritis against the background nephrolithiasis in the phase of active inflammation. A prospective study involved 115 patients with secondary chronic renal failure associated with the presence of nephrolithiasis in phase active inflammation for 12 months at the base of the Nizhnevartovsk city polyclinic of Nizhnevartovsk during 2012–2015. The experimental research was carried out in the Central Research Laboratory of “Tyumen State Medical University” of the Ministry of Health of Russia. Supplemental administration of *E. coli* bacterial lysate tends to decrease the number of exacerbations of chronic pyelonephritis and antibiotic therapy after 12 months of observation which leads to a decrease in the frequency of relapse of the disease, the need for the inpatient treatment and provides an increase in the duration of the full clinical and laboratory remission, and is also associated with an increase inefficacy and increased utility compared with patients receiving standard therapy. To reduce the average relapse rate, the proportion of patients with the need for inpatient treatment and increase in the duration clinical and laboratory remission in patients with secondary chronic pyelonephritis volume in the phase of active inflammation it is recommended to have a complex therapy cefixime in a daily dose of 400 mg, for 10–14 days combined with lyophilized bacterial lysate of *E. coli*. 6 mg, for 12 weeks.

## Introduction

Urinary tract infections (**UTI**) (among which chronic pyelonephritis take a leading position in the structure causes of chronic kidney disease (**CKD**) [1–3; 5–7].

The study aims to investigate the pharmaco-economic the effectiveness of cephalosporin antibiotic monotherapy series III generation cefixime and combination therapy of cefixime with lyophilised bacterial lysate of *E. coli* in patients with chronic pyelonephritis on the background of nephrolithiasis is in the phase of active inflammation. According to a 12-month prospective observation, the pharmacological effectiveness of various schemes of using lyophilised bacterial lysate of *E. coli* in patients with chronic pyelonephritis volume in the phase of active inflammation was evaluated.

## Materials and research methods

A total of 115 patients with secondary chronic pyelonephritis associated with the presence of nephrolithiasis in the phase of active inflammation. The age of patients with chronic renal failure ranged from 22 to 53 years and averaged  $39.7 \pm 9.6$  years. Among the examined patients with chronic renal failure, 22 men (18.2 %) and 93 women (76.8 %), the average age of men is  $49.9 \pm 6.2$ , which is significantly higher ( $p < 0.05$ ) the parameter of women with chronic renal failure is  $37.4 \pm 8.56$ .

All examined individuals underwent generally accepted methods of clinical examination, such as analysis, including analysis of complaints and anamnestic data, physical examination, clinical minimum, biochemical blood test.

The glomerular filtration rate was determined by the Cockcroft-Gault formula, common urinalysis, urine analysis according to the method of Nechiporenko, functional state kidneys were evaluated according to the results of the Zimnitsky test. All patients underwent pathogens of urinary tract infections were identified lowering their sensitivity to antimicrobial agents in accordance with standards. Instrumental methods included ECG, ultrasound of the abdominal organs cavities, survey and excretory urography, patients examined by a dermatologist neurologist and gynecologist (women). Criteria for inclusion in the study: secondary chronic renal failure diagnosed on the basis of new clinical classification of N.A. Lopatkin and V.E. Rodoman (1974) on background of nephrolithiasis in the phase of active inflammation; lack of resistance microflora to cephalosporins of the third generation; age 18–59 years. The patient informed consent to participate in the study and compliance the doctor's instructions regarding the prescribed therapy and the clinical laboratory research were obtained.

For the comparative study of the effect of monotherapy with antibacterial preparation of cephalosporin series III generation and various schemes of combination bath therapy with an immune-stimulating drug, random selection Ki (envelope method) patients were randomized into two groups:

Group 1 consisted of 44 patients with chronic renal failure in the phase of active inflammation, receiving the complex therapy of cefixime (Supraks Solutab) in a daily dose of 400 mg, for 10 days.

Group 2 comprised 71 patients with chronic renal failure in the phase of active inflammation, receiving the complex therapy of cefixime + an immunostimulating drug ("Su-PraxSolutab" in a daily dose of 400 mg, for 10–14 days + Uro-Waxom Om Pharma, S.A. 6 mg 1 time per day, duration of administration 28 days).

Next, the participants of the 2nd group were divided into two further subgroups, depending

on the duration of the intake of lyophilized bacterial lysis and E. Coli: 2A group, consisting of 35 people with chronic renal failure in the phase of active inflammation, received cefixime and an immune stimulating drug as part of complex therapy 4 weeks. 2B subgroup, consisting of 36 people with chronic renal failure in the phase of active inflammation received half-cefixime and immune stimulating medicines for 12 weeks. The study protocol was approved by the Ethics Committee.

### Methods of pharmacological economic analysis

The pharmacological economic research measured only direct costs. The cost-effectiveness ratio (**CER**) was calculated using the formula:  $CER = DC/Ef$ , where CER is the cost-effectiveness ratio; DC is direct costs on medical treatment of one patient; Ef is the effectiveness of the treatment. For cost-benefit analysis (**CBA**), the number of days without exacerbation of the disease were used as indicators.

### Findings

Within 12 months of evaluating long-term results, the average often the recurrence of chronic renal failure in patients of the 1st group was  $1.38 \pm 0.25$  cases / year, in patients of group 2A –  $0.81 \pm 0.16$  cases per year, and with prolonged use of immune active drug –  $0.47 \pm 0.12$  cases per year. The total share of individuals without disease recurrence the chronic pyelonephritis in the first group amounted to 34.1 % (15/44), while in group 2A – 42.9 % (15/35) and in the 2B group – 58.3 % (21/36), which is higher than the parameters of the 1st group ( $p = 0.03$ ). The proportion of persons with the need for inpatient treatment for 12 months in 2B group amounted to 2.8 % (1/36), while in the 1st and 2nd group, similar parameters accounted for 22.7 % (10/44) and 14.3 % (5/35), respectively.

Thus, the inclusion in the complex therapy of the phase of active with CRP lysate of E. Coli with a course duration of 12 weeks is associated with a statistically significantly lower relative risk (**RR**) and chance ratio hospitalization over the next 12 months of observation, as from regarding the group receiving only standard therapy, and relative ly patients with a 4-week course of treatment.

In patients with chronic renal failure of the 1st group, the duration of a complete clinical and laboratory remission was  $63.4 \pm 12.3$  days, in the group with 4 weekly use of immune-active drug –  $90.7 \pm 26.3$  days, which is statistically significantly more ( $p < 0.05$ ), in patients of the 2B group –  $157.5 \pm 26.3$  days, which is significantly higher as a result of group 1 ( $p < 0.05$ ), and similar values of group 2A respondents ( $p < 0.05$ ).

In group 1, the duration of complete clinical and laboratory remission when the duration of E. Coli was  $73.4 \pm 14.1$  days, whereas in the presence of another flora significantly less –  $52.7 \pm 9.5$  days. In the group with 4 weekly use of immuno-active drug, the duration of remission averaged  $99.9 \pm 181.6$  days and  $86.49 \pm 16.9$  days, respectively, which also indicates the presence of significant differences. Against this background, in patients with a 12-week appointment by distinguishing E. Coli lysate, no significant differences were found for this parameter.

The analysis of the pharmacological economic effectiveness of using lysate E. coli in the complex treatment of complicated urinary tract infections in phase active inflammation showed that the use of the latter on the attraction of 4 weeks accompanied by a 2.12-fold increase in economic efficiency (**CER**) based on the number of patients without exacerbations of the

disease, increasing 1.9 times the cost-effectiveness based on the number of patients without the need for hospitalization and an increase in utility, when calculating the quantity days before the exacerbation of the disease 2.4 times in comparison with the group receiving standard therapy.

Against this background, a 12-week course of therapy with *E. coli* lysate was accompanied by an increase in reading in similar parameters in comparison with a 4-week course of 1.9, 1.6 and 2.4 times, and compared with the standard treatment protocol 4.1 times, 3 times and 5.9 times, respectively.

The results of a study of the effectiveness of treatment of complicated urinary infections driving ways, depending on the sown flora at the time of inclusion in the following indicate that the administration of *E. coli* lysate is effective regardless of the sown flora.

The data obtained scientifically substantiate the feasibility and advantage of 12 week course of therapy with *E. coli* lysate in combination with antibacterial preparations of the third generation cephalosporin series starting from the active phase inflammation, regardless of the etiological factor.

### Conclusion

Thus, when conducting the study, it was found that the first group of patients with chronic renal failure receiving complex conventional therapy, the duration of complete clinical and laboratory remission when sowing *E. coli* amounted to  $73.4 \pm 14.1$  days, while in the presence of another flora significantly less –  $52.7 \pm 9.5$  days. In the group with the 4-week use of the immune active drug, the duration of remission averaged  $99.9 \pm 181.6$  days and  $86.49 \pm 16.9$  days, respectively, which also indicates the presence of statistically significant. Against this background, in patients with a 12-week treatment with Vaxomano significant differences were found for this parameter. Indicated the circumstance, most likely, is due to the fact that macromolecules obtained by mechanical lysate of microbial cells, capable of stimulating activation both acquired and innate immunity, increasing the level of general IgG and secretory IgA [11; 14], stimulating the production of cytokines by macrophages. Immune competent cells in Peyer's plaques and on B-lymphocytes [9], and also stimulate T-lymphocytes, contributing to the activation of the synthesis of endogenous interferon [4].

Consequently, the analysis of pharmacological economic effectiveness of the 4-week treatment was accompanied by an increase of the economic efficiency (CER) by 2.12 times based on the number of patients without exacerbations of the disease, an increase of 1.9 times of the economic efficiency per quantity patients without the need for hospitalization and increased utility, when calculating by the number of days before the exacerbation of the disease 2.4 times in comparison with the group receiving standard therapy. Against this background, a 12-week course of therapy of *E. coli* was accompanied by an increase in similar parameters in comparison with a 4-week course of 1.9, 1.6 and 2.4 times, and in comparison with standard scrap treatment by 4.1 times, 3 times and 5.9 times, respectively. Data obtained scientifically substantiate the feasibility and benefits of a 12-week course of the Uro-Vaxom therapy in combination with cephalosporin, antibacterial drugs of the third generation series, starting from the phase of active inflammation, regardless of logical factor.

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### **Фармако-экономическая эффективность бактериального лизата *Escherichia coli* в комплексной терапии хронического пиелонефрита**

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**Ключевые слова и фразы:** бактериальный лизат *E. coli*; липопероксидация; рост полезности; фармако-экономическая эффективность; хронический пиелонефрит.

**Аннотация.** Цель: изучить в сравнительном аспекте фармако-экономическую эффективность монотерапии антибактериальным препаратом цефалоспоринового ряда III поколения цефиксимом и комбинированной терапии цефиксима с лиофилизированным бактериальным лизатом *E. coli* у больных хроническим пиелонефритом на фоне нефролитиаза в фазе активного воспаления. Проведено проспективное исследование с участием 115 больных с вторичным хроническим пиелонефритом. Дополнительное назначение бактериального лизата *E. coli* ассоциируется с тенденцией к уменьшению количества обострений хронического пиелонефрита и курсов антибактериальной терапии по истечении 12 месяцев наблюдения, что приводит к уменьшению частоты рецидивов заболевания. Для уменьшения средней частоты рецидивов необходимо назначение комплексной терапии цефиксимом в сочетании с лиофилизированным бактериальным лизатом *E. coli*.

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## Risk Assessment in Different Periods of the Organizational Life Cycle

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**Key words and phrases:** risk factors; organization's life cycle; risk assessment.

**Abstract.** The purpose of this article is to study the assessment of the impact of organization risk factors at different stages of its life cycle. Tasks: to determine the stages of the organization's life cycle, to characterize the factors most significant for each stage, to assess on a four-point scale the significance of these factors for the organization at different periods of its existence. The research hypothesis is the possibility of using factors that are most important during certain periods of the organization's life cycle when assessing company risks using expert estimates. The following methods were used in the work: description, modeling method, expert assessment method. The following can be indicated as the results: factors that influence the risks at different periods of its life cycle are highlighted, using of the proposed factors when assessing the risks of the organization by expert assessments is possible.

Recently, researchers of life cycles of organizations (**LCOs**) most often use the works of I. Adizes [1; 2], who's conception makes diagnostics of the problems of the company possible and allows to solved them by organizational changes. Recognizing that each company is unique, he believes that there are patterns common to all organizations, and their development is similar to the evolution of a living organism based on the common laws of biology. The main idea of his work is the effective activity of the company involves the correct and timely implementation of the basic functions of its management, including: meeting of the market and consumers needs, following organizational procedures, encouraging entrepreneurship, creating an atmosphere of cooperation in the company. At the same time, some of them (satisfaction of needs and adherence to the accepted procedures) are short-term activity [11, p. 138], due to possible rapid changes in the market environment which lead in turn to necessity of the restructuring of administrative functions. Others (encouraging entrepreneurship and maintaining an atmosphere of cooperation) are considered as permanent one, long-term responsibilities of senior management [3, p. 56]. All these four functions create the "genetic code" of the company, and each stage of its life cycle determines when and which of them arise, gain strength or die out [7]. They are developed not the same way at each particular moment; their strengthening or weakening often indicates the company's "illness" or the growth's costs. The sequence of development and weakening

of all four functions reflects the organization's life cycle. Realizing this, the manager can timely manage the company, while stimulating or "holding" the components of the genetic code.

According to the I. Adizes, the LCOs model main stages of organization development are courtship, infancy, the stage of rapid growth (Go-go), adolescence, prosperity, stabilization, aristocracy, early bureaucratization, bureaucratization and dying of the company. Each stage entails certain tasks that must be solved and risk factors more-less inherent to the very LCOs stage. So at the courtship stage, the main task is to prove the viability of a business idea or/ and using of new methods and materials. For an organization just start up, such characteristics as a high level of entrepreneurial energy and management by the owner of the company are typical. Labor activity is energetic, and even aggressive in character [6, p. 7]. Since there is not enough experience and knowledge of their strengths and weaknesses, problems with the fixed assets of the company, with the delivery dates and the search for a specialization sphere arise. A distinctive characteristic of the second stage of the LCOs – infancy is gain organization's function to meet of the market and customers needs, the formation of an understanding how a business idea that was formed at the courtship stage can be transformed into a way of making money, and technical equipment is still particular important. The main characteristics of the participants in this stage of the life cycle are dedication, creativity and flexibility, which ensures success [12, p. 120]. The general nature of the movement at this stage is that at first, the efforts are intensified, but the result grows slowly, then it grows faster, and from a certain moment the company grows without increasing efforts [4]. This means that a workable business model is built and started to act. During the period of rapid growth, there is financial stability and increase in sales, threats deal with understanding of the functioning's boundaries, the ability to make a difficult decision regarding the transition from intuitive management to professional administration is particular important [5]. The organization responds by increasing the number of employees, expanding the share of the occupied market. The stage of adolescence is characterized, first of all, by an increase in the level of specialization, delegation of authority and decentralization. It is at this stage that the organization begins to create its own rules and management procedures, as well as organizational structures [10]. A growing company is beginning to approach its heyday. In the processing through this stage, considerable attention is paid not only to structural transformations within the company, but also to strengthening its role, both in the sphere of its activity and in the wider context of the economic and social life of the territorial community, the place of its functioning. This is followed by the stabilization phase, which is characterized by a lower level risk, but also lower profitability. Financial flows are directed to the extensive growth of the organization, research activity is minimized. The stage of aristocracy is associated with increased attention to the image of the company to the detriment of innovation. In foreign markets, the company is still holding its position, however, this situation is taken for granted and the company ceases to fight for market niche. The stage of early bureaucratization characterized by the search for the "guilty", whose active actions on trying to find ways out of prevailing circumstances for the company, which are often perceived as destructive. It is important to mark another stage in the organization's life cycle, such as bureaucratization and the dying of a company. A general characteristic of this phase is the sale of assets, the elimination of potential losses, the beginning of a reduction of employees.

Table 1 represents attempts to distribute risk factors according to their significance for different periods of the LCOs. As the main risk factors, we will take the 5 M technique proposed by Kaoru Ishikawa, in the framework of which Machine, Method, Material, Milieu (environment), Man (human being) were analyzed [9]. We apply a four-point rating scale, we denote the maximum degree of significance by the "+" sign, the minimum by "-", intermediate values mean,

**Table 1.** The significance of risk factors at various stages of the organization's life cycle

	Machine	Method	Material	Milieu	Man
Courtship	–	+	+	+	+
Infancy	–/+	+/-	+/-	+/-	+
The stage of rapid growth (Go-go)	–/+	+	+/-	–	–
Adolescence	+	–/+	–/+	–/+	+/-
Prosperity	+	+/-	–	–/+	–
Stabilization	+/-	–	+/-	+	–/+
Aristocracy	–/+	+/-	–/+	–	–/+
Early bureaucratization	–	–/+	–/+	+/-	+
Bureaucratization and dying of the company	+	–/+	–	+	–/+

located closer to the maximum significance – “+/-” and located closer to the minimum – “–/+”.

It can be noted that using of the proposed factors is possible in internal monitoring of a risk score, one of its problems is a danger of missing internal changes that characterize the transition to the next stage of the LCOs because of daily routine activities, and in assessing the risks of an organization using an expert method. The method of expert assessments is qualitative and involves a group of people who are engaged in the analysis and combining their knowledge in this area of interest [8, p. 154]. They may be local, regional, national or international. Assessments are formed to combine “legitimate” knowledge, but may also include creative perspectives [11]. The aim-setting phase involves the definition of operational and reporting aims.

Expert risk score by expert assessment method is implemented in several stages. It is necessary to aim be measurable, so that it is possible to determine its attainability. This is one of the most important stages, therefore, it is important to set clear and specific aims. If they are defined effectively, then the assessment gives a high result. Then, at the second stage, using risk classifications, it is necessary to determine the events and the most significant factors that may have negative consequences for the organization. It is at this stage that it is possible to use the risk factors proposed in Table 1, distributed according to degree of significance for the various stages of the LCOs. At the third stage, an assessment and comparative characteristics of each risk separately and their interaction is carried out. At this stage, each risk selected in the previous step is described in detail. The more detailed and corrected the risk is described, the higher the chance to minimize its consequences. The risk assessment stage is time/labor-consuming and includes methods such as preparing questionnaires, where the responding person can mark the risks that he has already encountered, or supplement the questionnaire with his own options [13, p. 154].

Identification of main indicators, such as the amount of losses, the possibility of a factor influencing risk and the risk occurring probability, allows one to calculate the integral indicator. The integral indicator is a key element of the risk assessment and analysis mechanism [8, p. 129]. It is calculated separately for each identified risk according to the following formula:

$$I = aP + bC + cM.$$

Here  $I$  is the integral indicator;  $a$  is the value of the probability of risk occurrence;  $P$  is point score of the probability of risk occurrence;  $b$  is the value of the possible losses from the onset of risk;  $C$  is point score of the possible losses;  $c$  is the value of the controllability factor;  $M$  is risk controllability score.

The point score are calculated empirically and take into account indicators that the organization already has. The point's score should be distributed on a scale from 0 to 10 and determine the expected level of risk, that is, indicate its significance for the company. Weights can also be estimated using the expert method and have a total amount of 1. Then integral indicator is a result of multiplication and summation of weights and point's score. The integral indicator determines the primary risk, the risk that requires observation and the risk that can be neglected in lack of cash.

Risk assessment should be implemented by each organization, it should be carried out taking into account the changes that the company is bear out, those risk factors that are most significant in different periods of the LCOs. With the effective use of risk score and risk management, the impact of threats on the organization is reduced, making the company's work stable and systematic.

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### Оценка рисков в различные периоды жизненного цикла организации

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**Ключевые слова и фразы:** жизненный цикл организации; оценка риска; факторы риска.

**Аннотация.** Целью написания статьи является изучение оценки влияния факторов риска организации в разные этапы ее жизненного цикла. Сформулированы следующие задачи: определить этапы жизненного цикла организации; охарактеризовать факторы, наиболее значимые для каждого этапа; провести оценку значимости этих факторов для организации в различные периоды ее существования по четырехбалльной шкале. Гипотеза исследования: возможно использование факторов, наиболее важных в определенные периоды жизненного цикла организации, при анализе рисков компании методом экспертных оценок. В работе использованы следующие методы анализа: описание, метод моделирования, метод экспертных оценок. В результате предложены и оценены факторы, влияющие с различной степенью на риски организации в различные периоды ее жизненного цикла, найдена возможность использовать предложенные факторы при проведении анализа рисков организации методом экспертных оценок.

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## GIS-Monitoring of Labor Mobility in the Region Using the Example of the Moscow Region

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**Key words and phrases:** big data; geographic information systems (GIS); labor; regional economics; spatial analysis; time losses; transport network.

**Abstract.** The study is aimed at analyzing the mobility of labor resources in the region using GIS services. Within the framework of the project, a methodology for continuous automatic collection and accumulation of information on the state of the transport network and weather conditions was developed, tested and introduced. Based on this information, it is possible to analyze the important tasks of the regional economy: temporary and financial losses of residents of the Moscow Region on the home-work path, as well as identify patterns of traffic congestion from various weather factors.

The study of labor mobility in the region is an important task of the theory and practice of regional management, and the lack of primary data is the main problem. Thus, one of the main tasks of the project was to develop, debug, and launch an automatic data collection system for continuous monitoring of the Moscow region transport network based on information provided by the Yandex.Traffic GIS platform.

As a basis for applying this method, a sample with evenly distributed coordinates within the Moscow region that characterize the places of residence and work of people was used. Information on the sample is recorded as two geographical coordinates (latitude, longitude) obtained using GIS services.

The router (GIS program on the Yandex.Traffic server) builds the path between any two points on the map on the roads, which means that in its calculations it takes into account the traffic congestion of the real roads. Thus, there is no need to take the coordinates of real people. It is important to select the sample in such a way that the home-work routes evenly cover the transport network of the analyzed territory. For example, to assess the state of roads inside the Moscow Ring Road (MKAD), you set a number of residents who live evenly along the MKAD radius and work in the vicinity of the center of Moscow. In this case, the home-work routes built by the router cover the entire transport network within the MKAD (first of all, radii),

and regular collection of information on the sample allows monitoring the state of the MKAD transport network.

After a comprehensive study of the situation and conducting various tests, two monitoring samples were formed:

1) for general monitoring of the transport network of the Moscow region, the sample consists of 20 thousand people living at radii of 20, 50, and 80 km from Moscow and working in the center (within a radius of 5 km from the center); the distances are selected to monitor the near, medium, and long-distance mobility of agglomeration residents;

2) to monitor the transport accessibility of cities in the Moscow region, a sample of residents living in the centers of 60 of the largest settlements in the Moscow region and working in the center of Moscow was formed.

The source material for automatic collection and storage of monitoring data was the software developed in previous projects on GIS analysis of pendulum labor migration in the Moscow region (RFBR: No. 11-06-00323 and No. 14-06-00249). In order to solve the problem of generating and analyzing initial data, the software was modified and adapted for: working with samples, automating query execution, organizing data storage, debugging data collection time intervals [1–4].

In the process of collecting and saving data for each sample item programmatically to the Yandex.Maps server a request is made to build a car home–work, work–home routes (in both directions): taking into account traffic jams, without taking into account traffic jams. The received information is saved in the database hourly. The amount of information taken is about 1000 thousand records per day [ $20,000 \text{ (sample)} * 24 \text{ (hours)} * 2 \text{ (round-trip route)}$ ] and 350 million per year (~ 2 GB of the disk space per year).

During the collection of statistical data, some problems with the operation of GIS services were revealed. The Yandex.Maps platform analyzes the number and systematic nature of the map query sent to it, and when the quantity of the map query goes beyond the allowable values, the requestor is added to the “black list” with an access blocking. As a result of the analysis of different models of interaction with the GIS service, the principle is implemented when the collection program is launched from several servers with different addresses (or works through different proxy servers). Each copy of the program works with its own part of the total sample. Thus, adapting the algorithm to the distribution of requests to the GIS service between different sources of information collection solves the problem with some restrictions on the number of requests.

Of particular interest in the project is the automatic collection of weather data. For these purposes, an automatic data collection system for continuous weather monitoring in the Moscow Region was developed, debugged and launched. Data collection is carried out automatically, from the site: <https://openweathermap.org>, 4 times a day at the nodes of the coordinate grid. Information about the weather in settlements by geographical coordinates is collected according to the following characteristics: temperature, pressure, humidity, cloudiness, wind speed, wind direction, atmospheric pressure.

Thus, automatic collection and accumulation of time series by the state of the road network and weather conditions was organized. In the subsequent comparison of these data using correlation analysis, as well as various machine learning models, it will be possible to test experimentally the hypothesis about the relationship of the state of the transport network (in terms of traffic jams) with weather conditions. A priori, this connection should be, therefore, its experimental verification is interesting. Of interest is the dynamics of this correlation depending on various weather factors (temperature, humidity, etc.), seasonality (season), and spatial

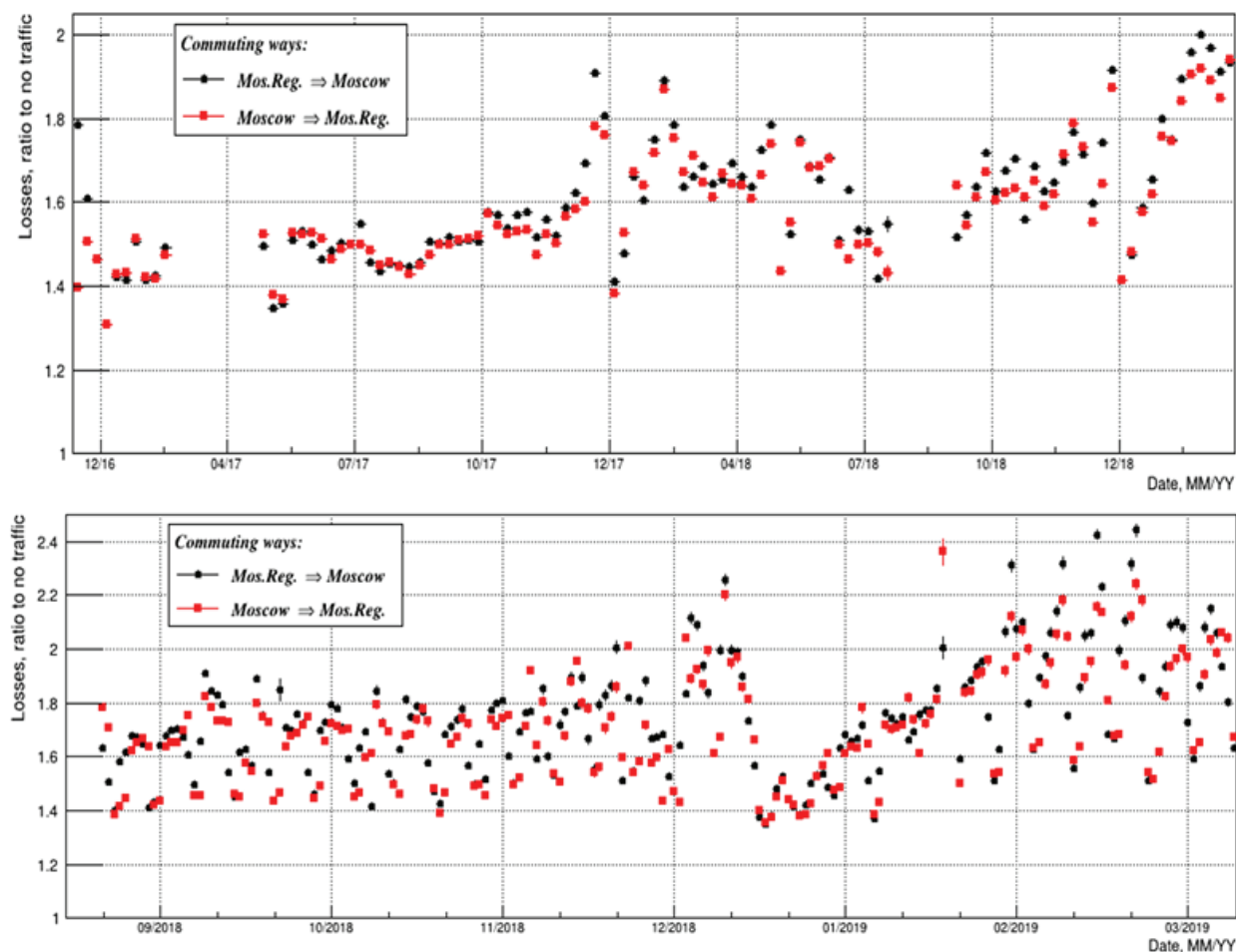


Fig. 1. Average relative intra-weekly (up) and intraday (down) home-work travel losses

dependences.

The next stage of work was the development of methods for analyzing the accumulated data. First, cyclic time losses of three groups of our sample were analyzed (short/medium/long home-work trips 20/50/80 km, respectively) within a day and a week, characteristic patterns were found, which were also confirmed in our other studies [2–4]. Next, the dynamics of the average intra-weekly and intraday time losses for home-work trips was presented, as shown in Fig. 1, which shows a cyclical increase in the time loss indicators.

Note: the vertical scale of the figure shows the ratio of current time losses to ideal losses (trips without traffic jams). Gaps characterize the lack of data collection for technical reasons.

An important step in the work is the visualization of the received data. For these purposes, the site <http://mtmstudio.ru/> was created, on which the project's functionality is being developed. To begin with, a test data output (visualization) of 50 people from the sample was made, their place of residence and work is shown. Further on the website will be placed monitoring indicators in a user-friendly form.

In the course of work on the project, the following scientific results were obtained:

1) for the first time, a technique has been proposed for monitoring the transport network and weather in the region, unique data have been received and continue to accumulate, on the basis of which indicators for loading transport networks will be developed, traffic forecasting

problems will be solved, etc.;

2) for the first time, a software package has been developed that fully implements the technical implementation of automatic monitoring of the transport network and weather in the region;

3) for the first time, preliminary quantitative estimates of transport losses have been made.

Thus, the paper solves the problem of systematically obtaining a large amount of data on traffic congestion in the Moscow region. This project is being implemented in accordance with the global trends in big data analysis for solving various types of economic problems, including monitoring population mobility. It should be noted that this topic is being actively developed by both domestic and Western experts for use in predictive models.

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### ГИС-мониторинг мобильности трудовых ресурсов региона на примере Подмосквья

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**Ключевые слова и фразы:** большие данные; временные потери; географические информационные системы (ГИС); пространственный анализ; региональная экономика; транспортная сеть; трудовые ресурсы.

**Аннотация.** Работа нацелена на анализ мобильности трудовых ресурсов региона при помощи ГИС-сервисов. В рамках проекта разработана, опробована и внедрена методика

непрерывного автоматического сбора и накопления информации о состоянии транспортной сети и погодных условий. На базе этой информации можно анализировать важные задачи региональной экономики: временные и финансовые потери жителей Подмосковья на пути дом–работа, а также выявлять закономерности загруженности транспортных магистралей от различных погодных факторов.

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UDK 337

## Social and Economic Aspects of Distance Learning in Higher Education Institutions in Russia

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**Key words and phrases:** distance learning; economic and social consequences; information and distance education technologies; use of interactive training complexes.

**Abstract.** In order to study the socio-economic aspects of distance education in Russia, an analysis of the positive and negative consequences of the active introduction of distance technologies into educational practice was conducted. The interest in this issue is determined by the fact that in the current period, not only Russia, but almost the entire world has switched to the use of remote technologies in education and at work. It is necessary to analyze the economic, educational and social consequences of switching to distance learning. As a result of the research, the negative and positive aspects of distance learning as mediated learning based on information and distance educational technologies using interactive training complexes and appropriate organizational forms were identified.

In connection with the coronavirus pandemic, the economic crisis has manifested itself in a variety of areas, including education. All universities in the country were forced to switch to distance learning. Unfortunately, many universities were not ready either economically or technologically for the transition of the educational process to the Internet. This can be explained by several factors: first, the decision to switch to distance learning was made quickly and there was no time to create and/or improve e-learning and distance education technologies, second, some universities do not practice distance education in principle, and third, there are no regulations in universities on distance education technologies, as well as the lack of regulations on remote work of employees and remuneration for such work. The list presented is far from final, but these are the main factors.

The relevance of research on this topic is determined by the fact that now not only the entire country, but almost the entire world is studying and working remotely. It is worth understanding what distance learning is. Distance learning is mediated learning based on information and distance education technologies using interactive training complexes and appropriate organizational forms [4]. To put it simply, distance learning is learning using various Internet resources.



1997 marked the beginning of distance learning in Russia. In this year, the Ministry of Education issued order No. 1050 “On conducting an experiment in distance education”, which allowed for experimental distance education [2]. The 21st century has become a time of mass dissemination of the Internet; it has contributed to the popularization of distance learning in many areas of life, including universities. With the increasing popularity of distance learning and improving the Internet, various educational trainings, webinars, and online classes began to appear. Every year distance education became more and more popular. In 2005, the Ministry of education issued order No. 137 “On the use of distance education technologies”, according to which universities can monitor training using distance education technologies in person or remotely [3].

The popularization of distance learning is increasing every year and this is not surprising, because it is convenient. The student is not required to be present in the classroom, which saves time, a person engaged in distance education fosters self-organization – this is a flexible skill that is in demand in the modern world, the distance education format allows quick feedback between the teacher and students, as well as distance education can be continuous, people have the opportunity to learn almost all the time, and this is an indispensable attribute of any highly qualified specialist. This is all you need for successful distance learning. Now higher education is in demand in almost all spheres of life, the Internet is fast and accessible to everyone, a good specialist must stay up to date with the latest developments in their field, they must constantly study, improve their knowledge and skills, and the easiest way to do this is by organizing distance learning. Modern people are characterized by a constant desire for self-education; this is what distance learning can provide them.

As noted above, many universities have not introduced distance learning, but there are some that pay quite a lot of attention to this, and some universities have even developed their own educational platforms. For example, the Siberian Federal University has developed its own distance learning platform, which contains materials on various educational programs, such as the online service “Webinar” and “My SFU platform””. First Moscow State Medical University is one of the universities participating in the Digital University Project, so the forced transition to distance learning was not a big problem for them. All teaching materials are posted on the Unified educational portal of the University. Teachers of Lomonosov Moscow State University use the distance education portal of MSU “University without borders”, where they post video lectures, test and creative tasks, and conduct online seminars in the form of video conferences.

However, the transition to distance learning has caused difficulties for universities that are not so large. Most universities work with students via WhatsApp, V Kontakte platforms, which are not intended for the educational process in any way, and through the Moodle system, which is unable to cope with the load due to high traffic and often freezes. Teachers use the platforms that are more convenient for them, but not all of them are designed for learning, because there is either no time or no opportunity to master new educational services that are worth it. It is also worth noting that the funding of Russian education flagships is much higher than that of most other universities, which also causes problems. Many universities are not able to create their own internal educational platforms with video lectures, seminars and other educational tools due to the lack of proper equipment, which does not have the funds and qualified personnel to do this. And this problem exists in many Russian universities.

However, despite the difficult situation, it has its positive and negative sides. Most universities said that student attendance was much better and easier to control than in full-time education. It is also worth noting that the remote mode provides a great time savings, because at least you do not need to spend time on the road, which takes up most of the day, especially

in large cities. Another advantage is the development of a flexible skill of self-organization. A skill needed to achieve professional and personal success that is truly valued in employees, but not everyone possesses it. Thanks to remote mode, you can develop not only this skill, but also time management, planning, business writing, managing your own development, and many others. Another positive point noticed by several universities is that for many students, the screen of the gadget removes the psychological block. Students are becoming more involved in the discussion. And, probably, the most important advantage is the acceleration of the creation of a national system of control procedures for an online exam or test, where the entire process is monitored by an administrator. This procedure confirms the reliability of the results of exams and tests passed remotely. Creating such a system will be an important element of the Russian education system.

There are no fewer disadvantages to this rearrangement of the education system at the moment. First, students must be self-disciplined, constant presence at home relaxes, the atmosphere of work is absent, you can get up 5 minutes before the start of classes, and because of this, it can be difficult to force yourself to start studying the material and perform tasks, so not all students immediately learn the material. The number of homework assignments has increased significantly, as a result of which many teachers do not have enough time to check their work, since they also have to make different reports on the performance of students every week. It is also noted that many students are not used to expressing their thoughts in writing, so this format is not easy for them. In the most difficult situation, there are disciplines based on a laboratory base, which is almost impossible to translate online. For example, studying mathematics and physics involves writing formulas, it is quite difficult to type them on a computer, and therefore presentations are ineffective. There are still no good online platforms for classes, for example, Skype can't handle large groups, and Zoom shuts down after 40 minutes. The last disadvantage, which is very pronounced, is that many older teachers cannot independently configure access to the service for conducting classes in a remote format. As we can see, there are many more disadvantages, but it is possible that if the distance learning system begins to develop properly, all the disadvantages will soon disappear.

It is one thing to conduct classes remotely, but it is much more difficult to conduct exams online. In online mode, the student has more opportunities to "write off" the exam, therefore, he may not prepare for it, but then he will not have any knowledge. In the traditional form, it is still much easier; the teacher sees all the students live and controls their behavior. Control is a component that should be paid great attention to when developing distance learning.

Now you can find a large number of different educational platforms. The undisputed leader is the Moodle system, the platform is free, it is quite possible to understand it yourself, but still it is relatively difficult to configure.

There are two competing services Zoom and Skype. Let's look at their capabilities in the video conference format, which is the most preferred in training: Skype does not have the ability to show presentations and whiteboards, and for teaching this is a big minus, but they have the function of sending files to participants, which is not in Zoom. It would seem that Zoom is in the lead, but the biggest problem is that the duration of the video conference is no more than 40 minutes, and the pair lasts an hour and a half, so you have to log in again. Of course, now such platforms as "Vkontakte", "WhatsApp" and e-mail providers are also popular. However, there is no platform that combines all of the above services.

The current situation with coronavirus has shown that there are problems in the higher education system. It became a test of strength for many universities and showed how effectively the University implements and uses modern educational technologies. It would take a lot of

time, effort and resources to implement the distance learning format efficiently, but in the current situation, you have to do it in a few weeks, while conducting classes in parallel. Distance education has its pros and cons, but it is hardly possible to completely transfer the normal education system to online mode, however, it should be further developed.

Thus, we can conclude that it is necessary to improve the higher education system and work on the draft of new Federal state educational standards for higher education.

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### Социальные и экономические аспекты дистанционного обучения в высших образовательных учреждениях в России

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**Ключевые слова и фразы:** дистанционное обучение; информационные и дистанционные образовательные технологии; использование интерактивных обучающих комплексов; экономические и социальные последствия.

**Аннотация.** С целью исследования социальных и экономических аспектов дистанционного образования в России был проведен анализ положительных и отрицательных последствий активного введения в образовательную практику дистанционных технологий.

Интерес к исследованию этого вопроса определяется тем, что в текущий период не только Россия, но и почти весь мир перешел на использование удаленных технологий в образовании и на работе. Необходимо проанализировать экономические, образовательные и социальные последствия перехода на дистанционное обучение. В результате исследования выявлены негативные и позитивные аспекты дистанционного обучения как опосредованного обучения на основе информационных и дистанционных образовательных технологий с использованием интерактивных обучающих комплексов и соответствующих организационных форм.

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## International Nobel Information Centre as Collector and Keeper of Material Sources on Nobelistics

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**Key words and phrases:** Archive of the Nobel family and Nobel Prize Winners; electronic databases on nobelistics; International Nobel Information Centre (**INIC**); Museum of the Nobel family and Nobel Prize Winners; Nobel Prizes; Nobel scientific library; nobelistics.

**Abstract.** The article presented a brief history of the social-humanitarian, scientific and educational association, which has become authoritative in the International Nobel movement and world scientific practice over thirty years of work, has passed from an idea to a unique result with fundamental achievements, has developed into a center for the creation and development of nobelistics. The authors argue that the International Nobel Information Center (**INIC**) today is a vibrant sociocultural phenomenon, a collector, keeper and representator of material sources on nobelistics, requiring deeper analysis and reflection. The structure of the INIC contains: the Nobel scientific library, the Archive of the Nobel family and Nobel Prize Winners, the Museum of the Nobel family and Nobel Prize Winners, electronic databases on nobelistics.

Significant interest of the post-Soviet society is caused by such a phenomenon as the Nobel Prize. In this regard, it is interesting to reflect on the thirty-year scientific and educational activities of the International Nobel Information Center (**INIC**), which studies this phenomenon of world culture, forming nobelistics as the science of Nobel information, which actively promotes innovative forms of concentration and preservation of Nobel information, successfully combining the sociocultural functions of science and education, actualizing understanding its history, gaining theoretical and practical significance.

The purpose of the INIC creation was to concentrate of information about the activities of the Nobel family (first of all, Alfred Nobel), Nobel laureates, Nobel institutions and Nobel firms. This information, a huge in volume and important, was accumulated in different countries and numerous institutions. The founder of the association, Professor V.M. Tyutyunnik, saw the main task in creating a single center, which concentrates numerous physical sources on nobelistics, and researchers could study the legacy of the Nobel Prizes laureates in all nominations on this basis: physics, chemistry, physiology or medicine, literature, peace, economics.

INIC is successfully addressing this challenge today. The Center has created conditions for international use of the works of outstanding scientific pioneers. The INIC has become an international information structure, the essence of which are the collection, storage, processing and distribution of Nobel information, an organizational and methodical center of science and education, a platform for the international research in nobelistics, computer science and science of science [1].

The harbinger of the INIC, the scientific and technical cooperative “Informatics” was founded in 1987. Its Charter declared scientific and educational tasks, while the aim of the cooperators was to increase the productivity of scientists and specialists by promptly informing about new developments and promising areas of science and production. Naturally, Nobel laureates and their activities were meant. V.M. Tyutyunnik was elected chairman of the cooperative [2]. Beginning in 1967, that is long before the registration of an independent organization, activists of the future INIC on a public basis have done a great job of popularizing the Nobel Prizes, restoring names of representatives a large family of Nobels descendants, undeservedly forgotten in the USSR, having made more than five hundred publications on nobelistics [3].

It can be argued that the idea of creating the INIC has been successfully implemented: today it is one of the notable centers of the International Nobel Movement, which contributes to the authority of Russian science in the world. International Nobel events are systematically held in Tambov. The INIC has become a leading organization in the field of science of science and nobelistics. The INIC employees and its associate members in partnership with intellectuals from different countries are constantly working on thorough long-term production, scientific and educational projects. For example, in October 2017, at the 11th Nobel Congress in Tambov, Michael and Peter Nobels (the descendants of Alfred Nobel) announced the establishment of the International Prize of the Nobel Sustainability Trust (NTU, Switzerland) for outstanding research and development in the field of sustainable development of humanity, including in the field of alternative energy. The President of the INIC, Professor V.M. Tyutyunnik became the representative of the NTU in Russia [4, p. 6]. The event went beyond the Tambov region and the Russian Federation, prompting different responses in the world. The INIC, together with SALYS Company (Moscow), decided to expand the Nobel's offer by establishing annual international awards “for technological solutions that promote the sustainable development of mankind”. It was stated that the science-business synergy approach would lead to better selection of technology solutions, taking into account the study and implementation of international practices, and would contribute to the sustainable development of mankind. The founders of the awards announced the accompaniment of nominated technologies up to the launch into mass production and establishment of procurement and distribution chains [5]. The first awards were presented to the 31 winning teams in 2019 as part of the 12th Nobel Congress in Tambov [6].

In 2018, on the initiative of the INIC, the heads of scientific institutions of Tambov and Moscow met with a delegation of the Alassane Ouattara University in Bouake, Cote d'Ivoire. The Cooperation Treaty between INIC, SALYS Company and the A. Ouattara University was signed for cooperation in agriculture and medical research; an INIC branch in Cote d'Ivoire was planned. An agreement on cooperation in science and training between the Tambov State Technical University and the A. Ouattara University has also been signed. The document contains provisions for the creation and implementation of joint programmes for the application of digital technologies in agricultural production and on cooperation in the development of new biomedical applications [7; 8].

Features of the formation of the document fund of the archive and all other physical sources of the INIC (library, museum) led to the development of their own approaches to



Nobel information [9]; the center's staff have created a number of specific methods of working with it. The four main structures, which collect and store physical sources on nobelistics, are successfully functioning today in the INIC: the Nobel Scientific Library (**NSL**), the Archive of Nobel Family and Nobel Prize Winners (**ANF**), the Museum of Nobel Family and Nobel Prize Winners (**MNF**), the electronic databases on nobelistics (**EDB**) [10]. Universities include the study of the intellectual products of its activities; Tambov universities, for example, have accumulated experience of studying intangible heritage by students and graduate students on the basis of the INIC [11, p. 126–136].

The Tambov branch of the Moscow State University of Culture and Arts was a scientific and educational platform of the INIC in 1999–2016. Particularly attractive for students was the use of the INIC materials in the educational process. The application of its research practices and applied scientific programs played a significant role in the training of specialists. The Center received personnel support from the university teachers and students and used its material and technical base.

The founder and permanent head of the INIC, Professor V.M. Tyutyunnik, is rightly considered the founder of the nobelistics, born in Tambov and now recognized in the entire scientific world. Nobelistics is defined as the science of the formation, functioning, processing, analysis and dissemination of Nobel information, the object-oriented symbiosis of information science and science of science [12, p. 45–50]. The methodological basis of nobelistics has been repeatedly described by the INIC staff: a subject area has been defined; basic concepts have been developed; fundamental laws have been formulated; the theoretical foundations of nobelistics and basic algorithms of research technology have been established [13].

Thus, the history of the creation of the INIC in Tambov shows the potential of provincial scientists to solve complex scientific and educational problems, to carry out notable international projects. The socio-humanitarian activities of the Nobel Center not only contribute to raising the profile of Russian science at the international level, but also greatly enrich the sociocultural space of the region.

The INIC successfully combines the sociocultural functions of science, education and contributes to the informationization of society. The functions of the INIC phenomenon can be imagined as such: it intensively introduces man into the world of global science and culture; it broadcasts culturally designed patterns of activity and behavior; it promotes the socialization of personality and generational continuity; it ensures the transfer and embodiment of basic values, both world and national cultures it contributes to the knowledge of the discoveries recorded by the Nobel Prizes on the base of collection, storage and representation of physical sources [14].

The INIC organizes its activities taking into account the sociocultural conditions in which science and education are now developing. A striking example in this regard were: establishment of the International Prize in Humanism, which in 2018 was awarded to the poet and philosopher, cultural scientist and philologist, pacifist and literary editor, radio engineer and translator, historian M.A. Pekelis (Moscow) for publications of the Nobel level in the humanists and for the totality of works, merits and achievements that, in accordance with Alfred Nobel's dream, contribute to the sustainable development of humanity in various humanistic directions [15], and in 2019 to poet and philosopher, cultural scientist and philologist, literary editor and philanthropist S.S. Antipov (Moscow) with the same wording; adoption in 2019 of the INIC Nobel Scholarship Program, which is paid to students of three Russian universities [16].

Recently, the INIC has developed an original scientific and educational quantorium. In its quantum (NSL, ANF, MNF and EDB) you can get any Nobel information, study the activities of eminent representatives of science, literature, politics and economics, the Nobel family, Nobel



laureates and their discoveries on rare, and often the only one in the world artifacts, original literature in different languages, archival documents, such as letters from the Nobel laureates. There are more than five thousand books and brochures in the NSL. More than a hundred thousand documents are stored in the ANF. The conceptual idea of the museum exhibition (more than two thousand artifacts) is the belonging of the museum object to the Nobel theme. Archival and library materials, the INIC artifacts have scientific and educational value; they are mostly connected with specific regions of the Russian Federation. Therefore, it is not surprising that scientific and methodical publications are being created on the resource base of the Center, and a variety of literature, including textbooks, is published in the “Nobelistics” international publishing house [17; 18]. The Internet sites and databases created by the INIC contribute to the immersion of consumers of information in the problems of nobelistics.

The cultural and art analysis of the documentary base of the Center allows us to state: most of the materials studied belong to the heritage with high historical-cultural, artistic-aesthetic and ethnographic value. They also have other types of potential value that as scientific (documents on the results of the study within the framework of nobelistics; dissertation papers; literature published by INIC, etc.) and educational (scientific projects, educational projects, educational programs, etc.). Leading Russian scientists and foreign researchers (who worked with the documentary Nobel finds, artifacts and case materials of the Center) act as experts.

Thus, the INIC is:

- 1) a humanitarian and social association;
- 2) an information organization whose work is based on the collection, storage, processing and dissemination of Nobel information;
- 3) a scientific center designed to conduct research in the field of nobelistics by scientists from different countries.

The INIC is a sociocultural phenomenon that should be the object of multi-purpose study and deep reflection. The history of the INIC (as well as nobelistics) has not yet been written, it is one of the promising problems of further historical and cultural analysis.

The Nobel Center as an international subject takes into account in its work sociocultural development abroad, as a Russian actor – in Russia and its regions. The INIC introduces to the activities of regional information and resource structures not only time-tested, but also innovative forms and methods of collecting and disseminating of Nobel information [19]. This was convincingly confirmed by the work of the 12th Nobel Congress, which took place in Tambov in October 2019. The collection of materials of the scientific forum [6], as well as previous such issues [4; 20], contain a lot of information about the current practice of work in the field of informatization of production and business, science and education, and most importantly they concentrate in one place and in detail describe numerous physical sources on nobelistics. Such a representative collection of various documents of a single Nobel theme is unique.

In addition to the iconic Nobel Congresses, the International Scientific Conferences “Formation of a Professional in the Region” was an important event for the cultural life of the Tambov region. They contribute to the intellectual community of the region to establish business scientific cooperation with the world’s most famous scientists. Held in March 2019, the 20th jubilee Conference, cohosted traditionally by the Russian New University (Moscow), the University of the West Indies (Jamaica), the Alassane Ouattara University in Bouake (Cote d’Ivoire), the Tambov regional Branch of the Russian Academy of Natural Sciences and Tambov universities, has allowed renowned scientists from Russia, Germany, Austria, USA, Sweden, etc. state that 20 conference compilations focus on valuable materials to identify new approaches to uniting educational institutions and potential employers in improving training, research, and

addressing organizational and technological problems in the process of retraining professionals, the results of the exchange of experience of theoretical scientists and practitioners, support of young scientists and specialists, development of international relations in the interior of dialogue cultures.

The INIC also conducts research on the history and culture of the region. The results of the studies were framed as dissertations [21], monographs [22], scientific articles [23], diploma works [24], a series of three-dimensional stands for the anniversaries of Tambov, etc. An interesting innovation in science and education was the project of the INIC to create a problem group of leading university professors to develop the program of a special course “Nobelistics” as a scientific academic discipline for technical students, faculties of natural resources and humanities.

Representing the brief history and modern activities of the INIC in an inseparable connection with the birth and formation of nobelistics, it can be argued that the Nobel Center in Tambov achieved unique results in its development, becoming notable in the International Nobel Movement and world scientific practice, a vibrant sociocultural phenomenon. Further thorough comprehensive study of the history and modern activities of the INIC, its comprehensive scientific consideration and understanding will reveal patterns in the formation of nobelistics as a science, reveal the fundamental role of the INIC in this complex scientific process.

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### Международный Информационный Нобелевский Центр – собиратель и хранитель вещественных источников по нобелистике

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**Ключевые слова и фразы:** Архив семейства Нобелей и лауреатов Нобелевских премий; Международный Информационный Нобелевский Центр (МИНЦ); Музей семейства Нобелей и лауреатов Нобелевских премий; Нобелевская научная библиотека; Нобелевские премии; нобелистика; электронные базы данных по нобелистике.

**Аннотация.** Представлена краткая история социально-гуманитарного, научно-образовательного объединения, ставшего за тридцать лет деятельности авторитетным в международном Нобелевском движении и мировой научной практике, прошедшего от идеи к уникальному результату с фундаментальными достижениями, развившегося в центр создания и развития нобелистики. Авторы доказывают, что Международный Информационный Нобелевский Центр (МИНЦ) сегодня – яркий социокультурный феномен, собиратель, хранитель и репрезентатор вещественных источников по нобелистике, требующий более глубокого анализа и осмысления. В структуре МИНЦ: Нобелевская научная библиотека, Архив семейства Нобелей и лауреатов Нобелевских премий, Музей семейства Нобелей и лауреатов Нобелевских премий, электронные базы данных по нобелистике.

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## M.M. Bakhtin's Concept of the Discursive Voice and Its Implementation in the Text of the Report

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**Key words and phrases:** author; communicative cooperation; context; discursive voice; subject of speech; text of report.

**Abstract.** A high degree of reliability of information in a report is conveyed through the discursive voice of the journalist. The aim of this article is a full review of the implementation of the concept of discursive voice developed by M.M. Bakhtin. At the same time, a set of tasks is given in this respect: to define the concept of the term “discursive voice”, to determine the types of discursive voice in the text of report and to present their characteristics. Particular attention is paid to the relationship between the reliability of the information presented in the report and the discursive voice belonging to the author or another person. When identifying the features of the manifestation of a discursive voice within the framework of the report, the method of text analysis is used, as well as the method of component and semantic analysis. Summarizing the achieved results, it is worth noting that if socio-political or economic information is presented in the form of a report, it is understood and taken by the reading audience as relevant and reliable in contrast to news reports. Thus, when the voice of the journalist, the author of the report, clearly “sounds” in the statement, when a high degree of his presence in his own discourse is shown, the degree of reliability of the information seems the reader to be the highest.

A Newspaper report appears to be one of the specific discourses of mass media [2; 4; etc.]. A report is a type of media text in which a journalist presents some relevant socio-political, economic and cultural information. For the text of the report, an important aspect is the reliable verbalization of current facts and events. The main function of the report is the presentation of relevant information, which includes all-round coverage of current actual events and its inevitable processing from a certain angle. Quite often, reports present information based on ignorance or error, which, however, remains unnoticed by the readership due to the timely replacement of the original message with a new one containing more relevant information. A high degree of



reliability of the information in the report manifests the discursive voice of a journalist. In this case, the author of the report relies on his knowledge of the described event and appears to be a source of information. The journalist being the subject of rendering of a message context also determines the level of reliability of the information being reported and the evaluation of this reliability. A journalist who is sympathetic to the highlighted event or to the person whose statement he quotes will strive for maximum accuracy, in contrast to a journalist who is negative about the event or subject, whose discursive voice he manifests in the text of the report.

The concept of discursive voice developed by M.M. Bakhtin may become a theoretical basis for the analysis of professional discursive practices among journalists. The concept of utterance, judging by definition, is associated with the concept of voice, speaking personality, speaking consciousness. A written or oral statement exists only because it is generated by a voice and is expressed from the point of view of this voice. Moreover, the meaning of the statement is more an active process than a static entity. The meaning of the statement, in turn, is updated when at least two voices begin to contact, when the addressee's voice realizes the response to the addressant's voice [1, p. 415; 428; 431].

According to the views of M.M. Bakhtin, the discursive voice that belongs to the speaking subject always implements a socially marked language aimed at communicating some meaning. This is a necessary element of the process of generating social reality in the context of cultural activity. The voice manifested in this activity reveals the subjective intention of the speaking subject, as well as his "conceptual horizons and view of the objective world" [5, p. 51]. The discursive voice manifested within the framework of the text of the report turns out to be "embedded" in a certain linguistic and – more broadly – socio-historical, sociocultural context.

The concept of "discursive voice" is considered in the aspect of how the speaking subject (not only present in the situation's proposition, but any potentially found in the utterance) manifests itself in the audible commentary or, on the contrary, turns out to be "invisible" (but "audible") at a certain moment modeling reporting text.

The discursive voice is considered as a reference pointing out to the "sound" presence / absence of the speaking subject in one or another text segment, when the measurement of presence / absence itself is directly reflected in the textual manifestations of this or that speaker. Accordingly, in the process of identifying a discursive voice as part of the reporting, we give answers to the following questions.

1. Who "speaks" with the reader at a particular moment (specific part) of the text?
2. Whose voice is "hearing" the reader actually?

The discursive voice constructs the reality of communicative cooperation in the context of reporting and reflects the discursive practices of both the author of the report and other persons more competent in analyzing and presenting the socio-political situation that is the topic of the report.

With regard to the point of view expressed in the report, the concept of "discursive voice" is interpreted in the aspect of the subject whose knowledge of the situation is directly reflected in the text, whose information forms the basis of the content of the statement relevant to the reader, i.e. to whom this information is attributed, who is its actual source. If this actual knowledge of the situation belongs to the author of the report and the information comes from him, then the discursive voice in the statement reflects the journalist's "I" position. If knowledge comes from another subject (or subjects), the discursive voice in the statement belongs to "Another", expresses the point of view of "Another". For example.

1. «Почетная награда фестиваля («Шторм» на Сахалине), которую киношники называют самой дорогой, – приз зрительских симпатий – была вручена сериалу



Table 1. Typology of discursive voice

№	Type of discursive voice	Discursive Voice Characteristics
1	Collective voice	Expresses the values of collective responsibility
2	Humanistic voice	Expresses emphatic attitude to the needs of society
3	Individual voice	Expresses the personal values of the speaking subject
4	Institutional voice	Expresses the cooperation of the speaker subject with social institutions

«Эпидемия» [6, p. 12].

The degree of reliability of information is reduced if the author of the report relies on some statistics that appear to be a source of information. Introductory predicates introduce a low degree of reliability of information if the reportage text manifests the discursive voice of another person, on whose point of view the journalist relies in this situation. In this case, the author of the report uses another source of information.

2. «УЕФА рассматривает вопрос о переносе чемпионата Европы 2020 на декабрь. Об этом сообщают почти все ведущие СМИ» [6, p. 15].

The degree of reliability of the information covered is predetermined by a discursive voice (i.e., the explicit / indirect presence of the subject of speech in his own discourse), which is “voiced” in the text of the reportage. The discursive voice, “voiced” in the framework of the reportage text, is determined by the degree of its obvious expression and the degree of reliability of the information covered in turn is directly related to the degree of manifestation of the discursive voice. In the case when the voice of a journalist, the author of the report, “sounds” in the statement obviously, when a high degree of his presence in his own discourse is manifested, the degree of reliability of the information seems to be the highest to the reader. The opposite pattern also works in the text of the reportage: when the author’s voice “weakens” in favor of the voice of another person (who appears in this case as a source of information), the degree of reliability of the information covered also decreases.

Thus, there is a phenomenon of polyphony in the media, a characteristic feature of which is the heterogeneity of the subject of speech, the author’s ability to shift the space-temporal framework of the narration, as well as the presence of an internal dialogue between the author and the participants of the event.

In this interpretation, the phenomenon of polyphony fulfills the tasks pursued by journalists in the media report: on the one hand, the desire to express the author’s point of view and self-expression, on the other hand, the desire to hide subjectivity during the presentation of the interpretation of events.

Table 1 presents the typology of discursive voice, which can be represented in the text of the reportage [3].

Almost always, the message in the report is adjusted to exaggeration of its significance in order to attract the attention of consumers of information. In case when socio-political or economic information is presented in the form of a report, it is perceived by the audience as relevant and reliable, in contrast to news reports. This happens due to the fact that behind any report there is an activity aimed at a preliminary study of the highlighted event in order to accumulate relevant information.

Based on the principles of empirical research, we can conclude that there is a number of important parameters when choosing information in order to attribute it either to the category

of news reports or to the category of reports. The basic principle of selecting information is its relevance, i.e. information must certainly attract the attention of the public and at the same time be accessible for understanding of a wide readership.

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### «Концепция дискурсивного голоса» М.М. Бахтина и ее реализация в тексте репортажа

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**Ключевые слова и фразы:** автор; дискурсивный голос; коммуникативное сотрудничество; контекст; субъект речи; текст репортажа.

**Аннотация.** Высокая степень достоверности информации в репортаже передается через дискурсивный голос журналиста. Целью данной статьи является всестороннее рассмотрение реализации концепции дискурсивного голоса, разработанной М.М. Бахтиным. При этом ставятся задачи дать понятие термина «дискурсивный голос», определить типы дискурсивного голоса в репортаже и представить их характеристики. Отмечается, что в ходе исследования строится предположение о связи достоверности информации, представленной в репортаже, и дискурсивного голоса «Я» автора или «Я» другого лица. При выявлении особенностей проявления дискурсивного голоса в рамках репортажного высказывания применяется метод текстового анализа, а также метод компонентного и семантического анализа. Резюмируя достигнутые результаты, стоит отметить, что в том случае, если социально-политическая или экономическая информация представляется в виде репортажа, она воспринимается аудиторией как актуальная и достоверная, в отличие от новостных сообщений. Таким образом, когда голос журналиста, автора репортажа, отчетливо звучит в высказывании, когда проявляется высокая степень его присутствия в собственном дискурсе, степень достоверности информации кажется читателю наивысшей.

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