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CONTENT

ART STUDIES

ECONOMIC SCIENCES

MEDICAL SCIENCES

PEDAGOGICAL SCIENCES

PHILOLOGICAL SCIENCES

PHYSICS AND MATHEMATICS

POLITICAL SCIENCES

PSYCHOLOGICAL SCIENCES

SOCIAL SCIENCES

TECHNICAL SCIENCES

ART STUDIES

НЕКОТОРЫЕ ОСОБЕННОСТИ ЭТНИЧЕСКОЙ МУЗЫКИ

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SOME FEATURES OF ETHNIC MUSIC

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АННОТАЦИЯ

Музыка, как наиболее информативный вид духовной культуры, также играет значительную роль в формировании самосознания этноса. Музыка играет важную роль в этнической идентификации. Песня может передавать элементы языка (синтаксические, фонетические, лексические формы), утраченные или нормализованные в других языках. Статья посвящена характеристике типологических особенностей этномузыки.

ABSTRACT

Music, as one of the most information-intensive types of spiritual culture, also plays a significant role in the formation of the self-awareness of an ethnic group. Music plays a significant role in ethnic identification. A song can convey elements of a language (syntactic, phonetic, lexical forms) that have been lost or normalized in other languages. The article is devoted to the characteristics of the typological features of ethnomusic.

Ключевые слова: этномузыка, этномузыкальное мышление, народное музыкальное творчество, культура; этнос, система, музыкальный стиль, интонация.

Keywords: ethnomusic, ethnomusical thinking, folk music, culture; ethnicity, system, musical style, intonation.

Ethnic culture is a system, the integrity of independent, interconnected of elements. We can name the main components: language, religion, worldview, economy, everyday life, food, law, history, art, etc. Some of presented subsystems (and their system-forming elements) are presented as an invariant that allows preserving the uniqueness of an ethnic group, despite natural, social, political, historical complexity of existence.

It should be noted that ethnic culture is characterized not only by a complex hierarchical organization, internal and external functioning, but also self-regulation, the ability to change one's states, historical (spatio-temporal) dynamics. In this connection, we consider it necessary to turn to synergetics the science of the processes of self-organization of systems of different directions: physical, biological, technical, social, cultural.

Ethnic culture as a nonlinear system due to fluctuations cannot be in a state of equilibrium. The stable steady state inherent in the system itself changes under different conditions. Changes in states are determined both by external influences and the system itself. The elements that make up the system, called oscillators in synergetics, are determined from whole and in interaction with other elements lead themselves differently than they would if they were independent. For studying level of interaction between elements of ethnic culture it is necessary to use structural-functional, multifactorial approaches, typologization methods aimed at identifying a general, functionally related analysis of hierarchically ordered structures.[1, p 3-5]

The artistic activity underlying art is syncretistic, unlike other types of human activities that are dissected and specialized. Artistic activity is formed earlier than other types of activities, since human childhood and the "childhood of humanity" are characterized by a syncretic integrity of consciousness.

Let's focus on one of the art forms - ***music***. Music is a temporary, long-lasting form art, in contrast to spatial types of art (sculpture, architecture, painting), the most abstract, allowing in the process of long procedural perception to comprehend dramaturgy images Music, according to the structure of ethnic culture, also reflects the worldview of the ethnic group, life, traditions, customs.

Musical culture consists of music itself and the spheres of social life that interact with it. It stands out for its greatest ability to unite people around itself, to unite them and carries a huge amount of information about the ethnic group. The manifestation of musical culture of its unifying capabilities is facilitated by its accessibility to the broad masses, the ability to rhythmize human actions and the universality of language.

Musical culture is an integral part of the national culture of any ethnic group. It carries ethnic characteristics along with other types of culture. Musical culture is one of the main components of the process of personal enculturation. Musical culture can serve as one of the means by which one can identify the national traits of a particular people and even identify the ethnic community to which a particular example of musical culture belongs. Music also serves for the self-identification of

an individual both in relation to his own ethnic group and to other ethnic communities.

Rhythm is the basis of musical culture. The sense of rhythm is fundamentally motor in nature. This brief formulation essentially provides a materialistic explanation of the effect of music on the listener. The sense of musical rhythm has not only a motor, but also an emotional nature: it is based on the perception of the expressiveness of music. It is in the rhythmic organization of music that the ethnic uniqueness of musical culture is manifested.

The peculiarities of the rhythmic organization of the musical culture of a particular ethnic group are the element of ethnic culture on the basis of which its identification is made. Musical culture and its rhythmic organization plays a decisive role in the worldview and behavior of an individual, and carries within itself value criteria that allow one to accurately socialize in a given society.

The ethnic uniqueness of musical culture, conditioned by the social history of a particular ethnic group, has great stability - for centuries in one culture or another the same conceptual ideas about the essence of music, its meaning, purpose, and relationship with other branches of art have been retained.

Modern cultural studies are less interested in music than other types of culture, people, religion, technology, science and much more. At the same time, musical culture plays, without exaggeration, a colossal role in the life of modern man. The main purpose of musical culture is in human communication. The peculiarity of musical communication is the unity of people of any size.

Rhythm plays one of the most important roles in the life of all mankind. It is not without reason that many scientists and artists speak about the rhythm of F as the most important element in the life of an individual. The study of the ethnic originality of the rhythmic organization of various cultures is necessary because, in connection with the intensification of the process of globalization that has captured humanity, such a concept as national culture, which includes literature, music and other components of ethnic culture, are gradually disappearing, “dying out”, being replaced by a pseudoculture that often does not have no value.

In a musical culture that is formed on level of feeling, the most characteristic national features are persistently preserved. Thematic theme of the musical heritage of ethnic groups is holistic, meaningful and correlates with the category of the universal.

The musical culture of an ethnic group is a system since musical culture represents a holistic

a complex of elements (mentality, intonation, musical thinking, activities for the creation, storage, perception, reproduction of musical values) and all subjects of this type of activity, which are interconnected with each other, it is considered as an element of the system mor of a wide order (nature, existence, sphere of social life), while elements of musical culture can be systems of a lower order.

Ethnomusical thinking, which is formed in the process of comprehending folklore material, has its own specificity in connection with the significant special features that folk musical art has. Folk musical art is an artistic phenomenon, an integrity in which the worldview, worldview and worldview of the people are hidden, and the energy messages of the ancestors are encoded.The folk song combines spiritual meaning, sensual nature, energy and adequate mulinguistic structure, identity of content achievedtions and forms, the unity of “subsigns and elementarysigns" .[2, p. 11-15] In folk music, great the amount of information transmitted in the unconscious level by “charging” with special energy during adjusting the human energy field to frequency energy field of folk singing melodies, resoning at its frequency. A folk song is born not as a result of experiencing environmental confrontation of the general world and a person’s worldview, how often happens in the classical tradition, but arises out of sympathy position in the world, out of kinship with it, out of love and connection to people and nature. This world-sensing position has a beneficial effect per person, and this is the power of folk musicki, this is its vitality, indestructibility, vitality.

The intonation of the beauty of life – here that permeates the folk melod, and this is the property of the matter - folk music art is attractive for different generations, carries within itself the “space of true worldview" [4, p. 49], with which every chant, phrase, song. In a folk song they merge together “ours” and “alien”, and this “alien” is intonation formulas that have been used for centuries, “a sense of mental or" several generations of ancestors in which the combination the wisdom and beauty of their worldview flowed together. In connection with the above, ethnomusical thinking is a process realized in intonation the process of reflecting reality and creative creation giving-correction of subjective images in support on the ideas formed in the musical consciousness national “constants” that carry ethnic originality of worldview and musical language specific people. Ethnomusical thinking is a process of spiritual-intonation communication with the world, people, the community itself combat through ethnomusical language.

Ethnomusical thinking is complex of abilities: ability to holistically intonation reading of information, differentiation of individual signs (meanings, values), the ability to instantly establish understanding the connections between images, intonations (signs, values), the ability to correct semi- the given intonation meanings in accordance with the prescribed rhodopean tradition, the ability to produce introduction of new signs, meanings within the framework of the national style, creative modeling ability given signs (meanings, meanings) in accordance with with your own plans. In musical thinking there are the same types operations, as in ordinary thinking: definition, comparison, analysis, generalization, grouping, classification, judgment, inference. However, during the musical thinking on a folklore basis, a person operates conveys both meanings, knowledge, signs, and intonations, chants, phrases, timbres, constantly adjusting them in accordance with the folk singing tradition of the ethnic group.

Ethnomusical thinking is a process creative. One of the important indicators of developed ethnomusical

thinking is the ability model new musical signs (abstract and specific) based on a wide range of life phenomena and images based on Tradition. Play plays a big role in ethnomusical thinking. There is no musical information as coming from outside, and accumulated in the “memory storeroom”, as well as available in the “pantry of the unconscious.” In progress obtaining musical information are involved hearing, imagination, musculoskeletal system. Part of the incoming musical information is washed away words, meanings, folded into intonation, is subjected to human musical consciousness assessment and correction tuning in accordance with the inner world of mancentury, another part of the information is accepted unconsciously specifically, at the bodily-motor level; the third part accepted as given, thanks to “pleasantness”, “closeness” to the inner world. [3, p 56-57] And the more information mation, which corresponds to internal potencies soul, the closer the work, the more spiritual experience that belonged to the ethnic group, individuals, the person perceives. The foundations of ethnomusical thinking are laid occur from infancy due to the accumulation a certain stock of intonation-auditory preplacements in the “memory storeroom”. Specific part music information already exists thanks to gene memory. In the course of the development of ethnomusical thinking, there is a dialogue with modernity and with the past “episystem”, and in dialogue with modern ethnolinguistic culture of a representative of an ethnic group, perceived May new signs, meanings, intonations must be implemented to exert an “ethnic-preserving function”, protecting the in national symbols of native music. The ethnic characteristics of folk music are multidepends on the originality of the singing-melodic system. A theme that has evolved over the centuries in every ethnic group. In many folk melodies there is a combination of typical, expressive, selected by time and national hearing songs that carry national identity to native song melody. These singing intonations, liketattered and worn from constant use, carry the calls of their ancestors, and each representative of the ethnic with genetic hearing, perceives deeply in the subconscious them and responds to them.

However, every nation has a typical emotional the constant was formatted in a certain way in depending on geographical and historical conditions residence, mentality, national character, theme traditions of the people, and typical national-original chants have become an integral part of the national thinking of each representative of the ethnic group. Some help in ethnomusical thinking nii have body movements, both conscious and unconscious. From this perspective, the intonation becomes bodily-meaning-sound generalization [4. p. 151]. On the native music is generally a phenomenon of “intonation-spiritual-physical, and many musical texts are about one hundred welded with bodily movement, and without bodilyexpressions they lose their attractiveness and inintensity of impact, its energy.”

Folk music is “understood by the body”, and this happens as a consciously and during conscious action. "Byattention to the body" disturbs the personal and collective new unconscious, and on the basis of impulses going from them comes the “understanding” of the musicalth works. At this level a person operates musical intonations as “collapsed highcalls of the whole body" [4, p. 170]. With folklore intonation, hidden intonation unfolds in “gesture-mimic-sound intonation [4, p. 170]. Development of the ability to operate with meanings, knowledge kami within the chant is one of the important greatest abilities. Melos is the main expression body of thoughts and feelings, emotional and semantic coholding. Of great importance for understanding especially musical thinking at this level has interpretation of the modal organization of a folk song. The basis of folk melodies is singing. However the process of the birth of folk melodies, especially late origin, largely depends not only on combining songs, but also from the “struggle” of foundations inside the tune and the “reference points” to which it strives voice. Thus, in the process of formation of the peoplesinging melodies are used. A special role for the formation of a national mulinguistic thinking have “chants-formulas”, i.e. tunes that are the result of the originalth process of genre generalization and which performare associated with various verbal texts related to aiming for a certain moment of the ritual or having certain household function. Such tunes are called.They are also standard, polytext.[6]

Musical thinking, formed on folk lore basis, it is impossible without creative operameanings and specific laws, without variation repetition - repetition of any melodic composition plex or chant in a modified form. Variation chant involves combining and rearranging chants, melodic turns, intonations, which, however, in general they do not change their genre affiliation the melody, nor its emotional and semantic essence ness. When improvising a tune, they play an important role typical songs that serve as strong points mi to create melody. For example, one of the principles variations – “calendar”[3].

Thus, ethnomusical thinking is the ability for analytical-synthetic processing. A combination of abstract and concrete signs, showing specifically in the ability to organize movements folk melodies by moving from foundation to foundation, singing of the foundation, striving for the foundation in the course of alternatingtion of filled and unfilled passages, “closure” let us stand the tune; in the ability to tighten and expand finedynamic revolutions, perform jumps and filling jump; in the ability to repeat, alternate, compare, vary the songs; in the ability to organize sound new space in the relationship between musical and rhythmic form and song verse, the ability to operate with breathing in general, honest organization of the melody, the ability to operate formation within the framework of standard structures of syllabic and internal rislog melody, ability to use “formula tunes” in certain context, to comprehend their genre affiliation, ability to operate with themes brahmi depending on the genre of the song, ability to vary signs within a single new genre and stylistic coloring, emotional semantic content, ability to operate with signs in conditions two-voice in the style of heterophony and bourdon diaphony, the ability to connect meanings and acoustics signs with bodily movements that enhance them significance and impact.

Folk music, like music in general, is a phenomenon intonation. Musical folklore is not characteristic Venna character depiction, it carries within itself “the energy of the worldview of a typical representative ethnos" [4].

The surrounding world is displayed compressed in a generalized, conditional way in sound symbols, and this is not a random phenomenon, and “polished” by centuries of traditionaltion. To a greater extent, archaic folk music carries contains a certain emotional tone of our prekovs, “codes” of emotional states, “clumps” of people eternal energy, differently expressed and displayed new. “Intonation-plot prototypes of lo-music localized in the socio-cultural space – time me. The intonation language of music stores memory about its history of mankind" [4, p. 58].

Artistic and figurative language of different nations united in its essential, archetypal forms, that allows people to perceive different nationalities taste music from different ethnic groups and times. Happened generalization of the perception of the world and space by many people and selection of adequate symbols that carried and emotional, and genre, and stylistic, and national nal-peculiar characteristics. [5]

"First Music" world, nature, space is refracted in consciousness and sub the consciousness of the people under the influence of many factors: worldview, national character, social relationships, everyday life. Strong, organized life, growing self-awareness of the people gives rise to strong and developed those tunes. Moreover, in a folk song these typical fabulys are drawn up according to the laws of tradition in a specific national style. As noted by V.V. Medushevsky, "before the size of intonation decreases cultural styles, genres, entire artistic eras along with their contents understanding their social and ideological content. These different streams are compressed into a musical-linguistic intonation of culture – national, historical, in individual-style, figurative-thematic intonations come to life again in the creative phenomena of later times men" [4, p.57].

A folk song is a micromodel of a sounding brass mos, the surrounding world and musical consciousness masses of people of a specific ethnic group, embodied in odefined intonation form and designed in accordance with tradition. It should be noted, however, that a folklore work with developed intonation the onic form is the unity of preintonation (protointonation) and specific intonations reflecting the soul spiritual-sensual meanings. The folk song has simple, complete form, but this form carries itself a holistic model of “sound behavior”.

Thus, ethnomusical thinking onthis level includes the ability to communicate with one’s ancestors in time, with representatives of the ethnic group in space, ability to operate with emotional-spirits meaningful meanings within the framework of an expanded work with taking into account the subtext (worldviews, life nor the life of the ethnic group), ability to compare new information with existing experience and the “birth” of a neoplasm personal meaning, “spiritual information” that gives idea of the system “I and the cosmos”, “I and the world”, “I and other people", ability to operate with specific signs, elements of musical language within the framework of a holistic forms taking into account genre specifics and national originality, the ability to weave and unravelnia".[2, p. 66-67] Of the singing-subvocal tissue, ability to operate with timbres, ability to variation of musical-rhythmiforms in their relationship with song verse, the ability to combine singing with dance movements in compositions and gestures.

CONCLUSION*:* Ethnomusical thinking involves creatively operating with “subsigns” and signs in accordance with a certain nationally peculiar tradition within the framework of holistic, developed intonation form, operating the formation of artistic “communities” of genre, stylistic, formative order, creation of new meanings, meanings, signs, intonation forms in a certain national folk singing traditiontions. It involves creative coordination, correction and modeling of meanings and specific signs at all levels: phonetic, syntactic and compositional within the national tradition. This musical thinking at this stage is represented is a certain instrument through which a person resonates with the “sound of life”, a hidden sound pure “harmony of the world”, folded into crystals of folklore hay creativity. Possessor of a high level of musical thinking are usually masters singers, people who can not only perform native songs at a high level, but also them, varying the current chants, chants within a certain tradition.

Thus, it can be stated that the ethnolinguistic thinking of an individual is a complex ability, including a figurative reflection of the world, creative correction and creation of images, established connections between them in accordance with folk tradition diction, which allows preserving the folk-singing maintonation skills, ability to compose and vary formation of tunes and echoes, to pass on to future generations of folk musical culture.

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ECONOMIC SCIENCES

APPLICATION OF FUZZY MODELING FOR TASK ALLOCATION IN IT PROJECT MANAGEMENT

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ABSTRACT

Distribution and allocation of resources belong to complex multicriteria tasks. In relation to this, in the management of projects involving the creation of informational products, there is a pressing need to develop efficient and versatile methods for optimal task allocation among performers. One possible tool to enhance the justification of decisions made by the project manager of companies engaged in the development of informational products can be fuzzy logic, allowing for the handling of poorly structured and imprecise information using natural language.

The article proposes a fuzzy model for managing IT project tasks, enabling the use of natural language categories with the aim of enhancing decision-making efficiency under uncertain conditions and reducing costs in the event of adverse situations. The characteristics of a project to create an informational product are discussed, a standard scheme of the task management process in an IT project is developed, and the appropriateness of using the apparatus of fuzzy systems for task management is demonstrated. Using the mathematical apparatus of fuzzy logic will allow the project manager to work with variables expressed in qualitative categories, without resorting to average values, thus enhancing the quality of decisions made in project management.

Within the scope of the work, the task of evaluating the success of task execution by developers is considered. Six input linguistic variables and one output have been identified, for each of which term sets and membership functions have been developed. An expert rule base has been constructed, comprising 81 production rules; a fuzzy system model for task management based on the Fuzzy Logic Toolbox for MatLab has been developed. The Mamdani algorithm is employed as the fuzzy inference scheme. The results of the model's functioning are presented, which may prove useful for IT project managers in practice.

Keywords: IT project, management of the project for the creation of an informational product, task management, fuzzy systems, linguistic variables, membership functions, Fuzzy Logic Toolbox for MatLab.

STATEMENT OF THE PROBLEM

One of the means to achieve effective results, aiding in success and profitability across various economic sectors, is increasingly becoming project management. This methodology is most often employed by outsourcing firms when executing IT projects. Managing a project focused on the development of information products is a massive, resource-intensive, and intricate endeavor that demands high competency from the involved experts. The main distinction between an IT project and projects in other sectors (like construction, manufacturing, etc.) lies in the fact that project management in the realm of informatization interacts with intangible outcomes.

Decision-making in the context of IT projects often takes place under conditions of insufficient information and ambiguous specifications, complicating the achievement of a high-quality information product. Additionally, project managers should consider the human factor, as the quality of the information product, its cost, and even the profit of the IT company depend on the experience and knowledge of developers. This makes the task of duty and resource allocation one of the most pivotal in a project manager's work.

This challenge belongs to the class of multicriteria tasks, where criteria aren't always quantitatively expressed. Hence, employing traditional mathematical methods might be ineffective. Enhancing the efficiency of task assignments to developers can be achieved using tools grounded on fuzzy systems methods. In this regard, in IT project management, it's pertinent to devise methods for the optimal distribution of tasks among participants.

ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

Effective allocation and planning of tasks are key factors for the successful implementation of complex IT projects. Optimal utilization of available resources and rational planning of work allow for adherence to deadlines, budget, and quality requirements of the project. However, the task of allocating tasks and resources is extremely challenging due to the high dynamics and uncertainty in the conditions of IT project implementation.

In recent years, significant attention has been given to the application of fuzzy modeling methods to address planning and resource allocation tasks in IT project management. Fuzzy models allow for accounting inaccuracies in the initial data, probabilistic factors, and qualitative characteristics, which are crucial when modeling the behavior and interactions of human resources.

In the article by G. Antucheviciene et al. [2], a fuzzy stochastic optimization model is proposed to solve the problem of staff allocation in IT projects. This model takes into account uncertainties and probabilistic factors related to resource availability, productivity of

employees, etc. Experimental research confirmed the effectiveness of the proposed approach.

S. Chatterjee and S. Dey [3] explored the use of fuzzy hierarchy analysis for task distribution in software projects based on risk assessment. This approach allows for consideration of qualitative factors when determining the priorities for task distribution among team members.

H. Son et al. [4] proposed a fuzzy logic model for assigning tasks to multi-skilled team members in software development, allowing flexible task distribution taking into account the competencies of participants.

Research by X. Wang et al. [5] focuses on an optimization model based on fuzzy logic for collaborative product development, enabling effective task allocation under uncertain initial data conditions.

In the work of S.-J. Chen and J. Lin [6], the application of fuzzy set theory for modeling participant characteristics when forming multi-skilled teams in engineering projects is proposed. This approach allows for inaccuracies in evaluating the competencies of team members.

Research by A. Barreto et al. [7] addresses the resource allocation problem in IT projects using fuzzy multi-criteria optimization. Such an optimization model allows for both quantitative and qualitative factors to be taken into account when distributing resources.

The article by P. Saurav et al. [8] proposes a hybrid approach, combining particle swarm optimization with fuzzy logic for project planning with limited resources. This approach ensures effective search for optimal resource allocation.

K. Goyal et al. [9] explore the application of fuzzy K-means clustering and genetic algorithms for forming teams in IT projects based on participants' skills, optimizing team composition.

The discussed approaches to constructing fuzzy optimization models, methodologies for combining fuzzy logic with heuristic and evolutionary algorithms, have been reviewed. The analysis confirms the effectiveness and prospects of applying fuzzy modeling in IT project management, but the specific issue of applying fuzzy modeling to task allocation in IT project management requires more thorough analysis and research.

OBJECTIVES OF THE ARTICLE

The aim of this article is to develop a fuzzy model for task allocation in IT project management under conditions of uncertainty, which allows for optimal utilization of human resources considering their competencies and workload, to enhance the efficiency of management decision-making.

THE MAIN MATERIAL OF THE RESEARCH

In managing IT projects, there are key distinctions defined by the specifics of the information product creation process [1, 10]:

– the information product, as the final stage of the IT project, is intangible and cannot be measured in universally recognized units. Therefore, the preparation of tasks and work related to the IT project must be extremely accurate. Each IT project is unique, and unlike projects in construction or manufacturing, such projects don't have standard costs for typical actions. The project deadlines can only be estimated roughly based on the experience of implementing similar tasks in comparable projects;

– throughout the project lifecycle, requirements for the final information product frequently change, leading to a complex process of modification and requirement alignment;

– as a result of the previous point, most development processes are uncontrollable. This is because the client's vision of the end result is often rather general, and the process of creating a quality information product is hard to formalize. Thus, precise planning of the necessary work and tasks is nearly impossible;

– the efficiency of IT projects directly depends on the qualifications of the participants. There is often a lack of highly skilled professionals in the market;

– there is a wide variety of tools and platforms for development. The more modern and powerful the tool used, the fewer specialists who master it;

– there are many different models and methodologies for developing information products: standards, SW-CMM, Rational Unified Process, Microsoft Solutions Framework, Extreme Programming, Scrum, and others. Each has its pros and cons. Companies often have to adapt the best methods to fit their needs. Any attempts to implement solely one development methodology for information products proves futile, as the development process itself is unpredictable and non-formalized.

IT project managers must take into account the aspects that determine project complexity and respond to them using specific management techniques for such projects. The final list of these aspects, their significance, and criticality vary depending on the specific project.

In addition to characteristics directly related to project implementation, it is important to consider characteristics of the IT industry itself, which indirectly influence the success of IT projects.

Firstly, there is a high turnover rate of staff in the IT sector. To prevent the loss of skills acquired by experienced professionals and reduce the adaptation time of a newcomer to a project, it's essential to develop a knowledge management system.

Secondly, there's a lack of mechanisms to motivate work. While the IT industry offers relatively high salaries, there is a shortage of professionals. This results in a high staff turnover rate; it's easier to lure a specialist from a competitor than to upskill existing employees.

Thirdly, there are several external factors negatively impacting IT companies: a high level of cyber threats, imperfect legislation, and the absence of an effective system for training future IT professionals.

According to the PMBoK, a crucial aspect in the knowledge area is managing a company's human resources, specifically the effective management of the project team. Concerning the degree of participation in the development process of an information product, project participants can be classified into three categories: core team, auxiliary team, and stakeholders. The developed role model for information product development is presented in Table 1.

Table 1

Role Model for Information Product Development.

Role	Area of Responsibility
Project Manager	Team formation Creation of a communication environment Development of plans, including: – Estimation of task duration and labor intensity during planning; – Task distribution within the team Overseeing plan execution, which includes: – Monitoring plan progress; – Ensuring team activities align with the business process of development; – Organizational tasks (including interactions with the client); – Part of the analytical work
Analyst	Collecting client requirements Development of the project's technical specifications Refinement of specifications Creating test plans Conceptual testing of functionality Development of user documentation
Technical Leader	Development of the conceptual architecture of the solution Development of the working project design Quality control of code and ensuring its adherence to architectural designs Participation in planning and estimating task complexity and duration Participation in comprehensive testing
Developers	Developing functionality Code quality checks Debugging and error corrections Initial code testing Participation in comprehensive code testing
Tester	Functionality testing Writing unit-tests Participation in developing test plans

In the context of project management, a significant part of a project manager's work involves assigning tasks to the team as a whole and to each member individually, as well as subsequent monitoring of their execution. The structural model of the IT project task management business process is illustrated in Figure 1.

One of the common tools for defining roles and responsibilities among team members is the creation of the RACI matrix (Responsible, Accountable, Consult before doing, Inform after doing). The result is a table that describes the involvement of different roles in task execution. Unfortunately, there are no clear guidelines on what a project manager should base their decision on when assigning tasks to a specific executor.

A task management system is a set of tools for formulating tasks and monitoring their execution, offering a range of functional capabilities: creating a new task, assigning responsibilities, setting access rights, and defining the scope of work for the task.

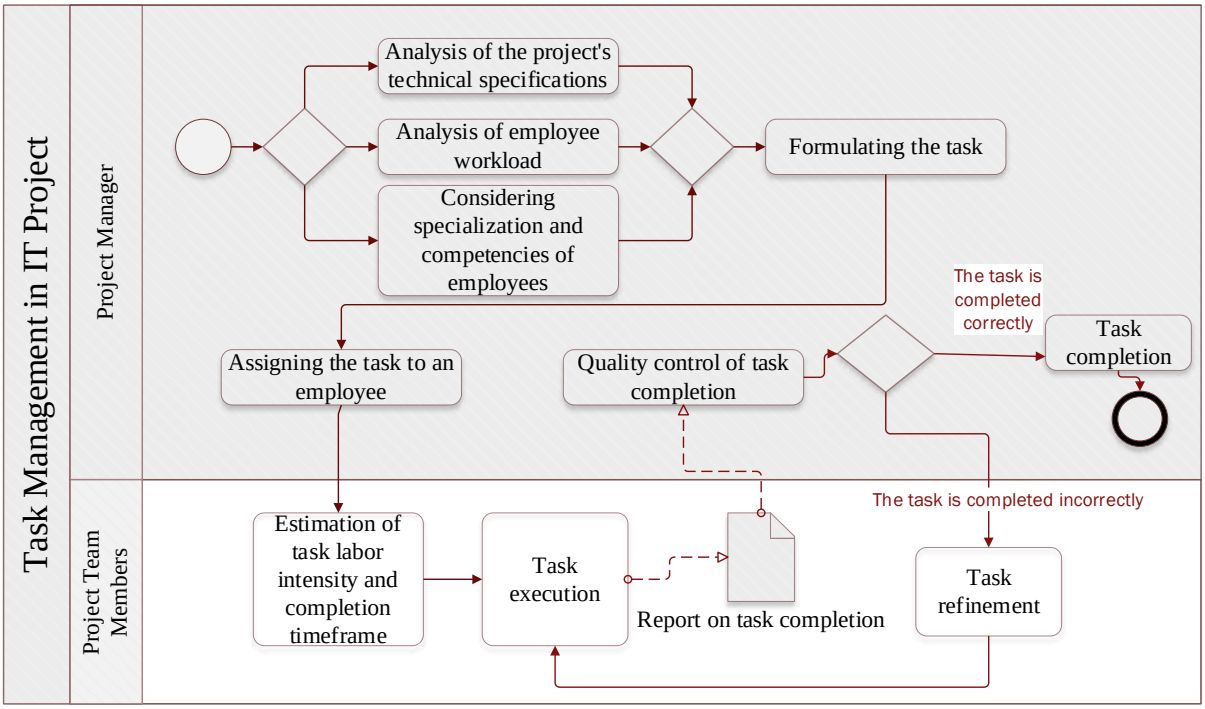

Fig. 1 – Structural model of the business process of task management in an IT project.

The operating procedure of the task management system is standard and includes the following stages:

– task formulation, i.e., defining its content, author, executor, and controller;

– determining the task completion deadline: the author can set a fixed deadline or give this option to the executor;

– task execution: the executor indicates the completion;

– performance check: the controller-tester analyzes the quality of the task's completion, after which the task can be finished or sent back for revisions;

– notifying the author about task completion.

Task management systems for projects are widely available in the market. There's a plethora of both commercial and free software. Some of the most renowned ones include Asana, Basecamp, JIRA, Redmine, Bitrix24, Trello, MS Project, and more. Analysis showed that software for task management primarily focuses on monitoring task execution. However, the question of why a particular task is assigned to a specific expert remains unanswered and is often intuitively decided by the project manager based on his experience.

From a technical standpoint, automating task management seems simple. The main challenge lies in accurately reflecting the management model and style adopted in the organization. Therefore, task management programs must be tailored to a specific approach to human resource management. It's crucial to remember that merely having a task management system doesn't guarantee increased productivity because the core issues of communication and task control persist.

The task distribution process is a complex task with many criteria, involving the allocation of resources by types of work and identifying executors, considering their workload, qualification, and specialization. Traditional methods such as game theory or the assignment problem, with its subsequent solution using the Hungarian algorithm, often don't apply in managerial practices. Conventional game theory methods in the specific conditions of IT projects are also not suitable since there's no opportunity to gather statistical data for each alternative task solution.

Tasks associated with project management are characterized by the manager's high responsibility, a variable project structure as a system with uncertainty and contradictory information. The project team needs to address undefined and poorly structured problems, for which it's challenging to apply standard methods and models. In such conditions, fuzzy logic becomes a tool to solve these issues.

The foundation for creating fuzzy systems is the fuzzy modeling toolkit, which relies on methods of formalization and analysis of poorly structured and incomplete information arising due to the inherent complexity of objects and processes. The uniqueness of fuzzy systems lies in the use of linguistic variables to describe the modeled system's activity, based either on expert conclusions in a particular field or on prior research of statistical data.

Based on the work of Kosko B. [11], specifically the theorem on fuzzy approximation, it states that any mathematical structure can be approximated using a system based on fuzzy logic. Thus, using "IF..., THEN..." rules and their further formalization through fuzzy logic, one can reproduce any "input-output" relationship without the use of complex differential and integral computations traditionally used in management. Nowadays, fuzzy logic is a well-studied and known tool for solving tasks in the fields of management and decision-making.

Distinct features of fuzzy systems [12, 13] include:

– the ability to work with vague input data, such as values that constantly change over time (dynamic tasks) or values that cannot be precisely defined numerically;

– the possibility to forgo complex management systems based on the solution of differential equations if it matches the required accuracy of calculations;

– describing the decision-making process in an understandable language, using subjective and human-familiar qualitative assessments, and linking these assessments with a clear mathematical system;

– the ability to make qualitative evaluations of input and output data.

Within the scope of task management, there is an issue of assessing the efficiency of tasks performed by developers. Other project participants are not taken into account since in every project, roles such as the project manager, analyst, technical writer, tester, typically have one individual assigned. Therefore, when a specific task arises (writing documentation, analytical task, testing, etc.), it can only be assigned to an employee with the necessary specialization. Within a project, tasks aimed at developing information products always outnumber the developers. Thus, one of the key problems facing a project manager is the proper assignment of tasks to them.

The following input linguistic variables and their sets were identified:– complexity {low, average, higt} – складність {низька, середня, висока};

– laborintensity {low, average, higt};

– novelty {new, rare, typical};

– priority {non-critical, urgent, critical};

– developer {Junior, Middle, Senior};

– employment {low, average, high, very high}.

The membership functions of input variables are shown in Figure 2.

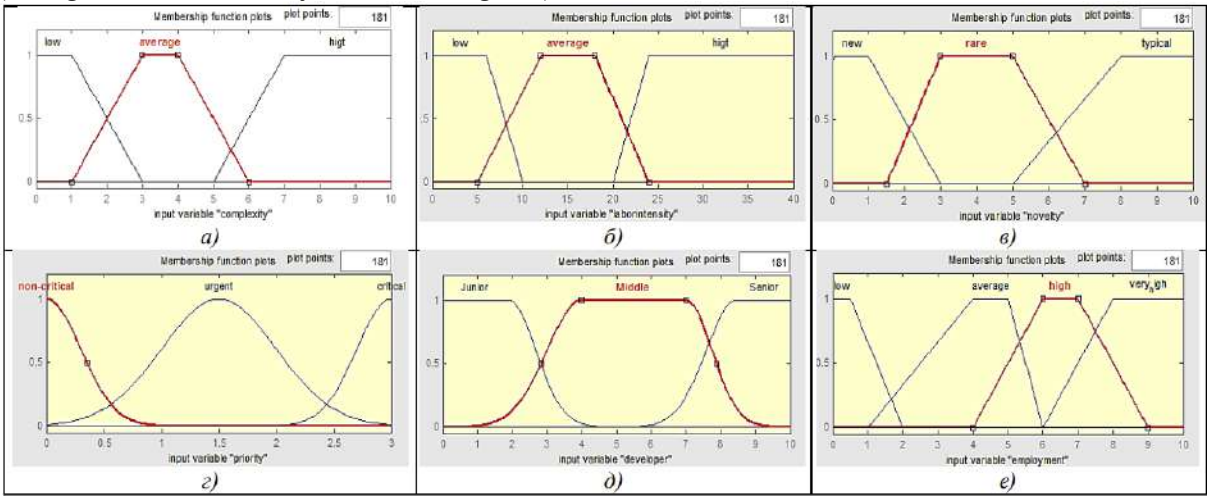

Fig. 2 – Membership functions of input variables: a) task complexity, b) task labor intensity, c) novelty of the task, d) task priority, e) developer's professionalism, f) project involvement.

The output variable used was the variable result {unsatisfactory, satisfactory, successful} which translates to "result" {unsatisfactory, satisfactory, successful} – the efficiency of task execution, the membership functions of which are shown in Figure 3.

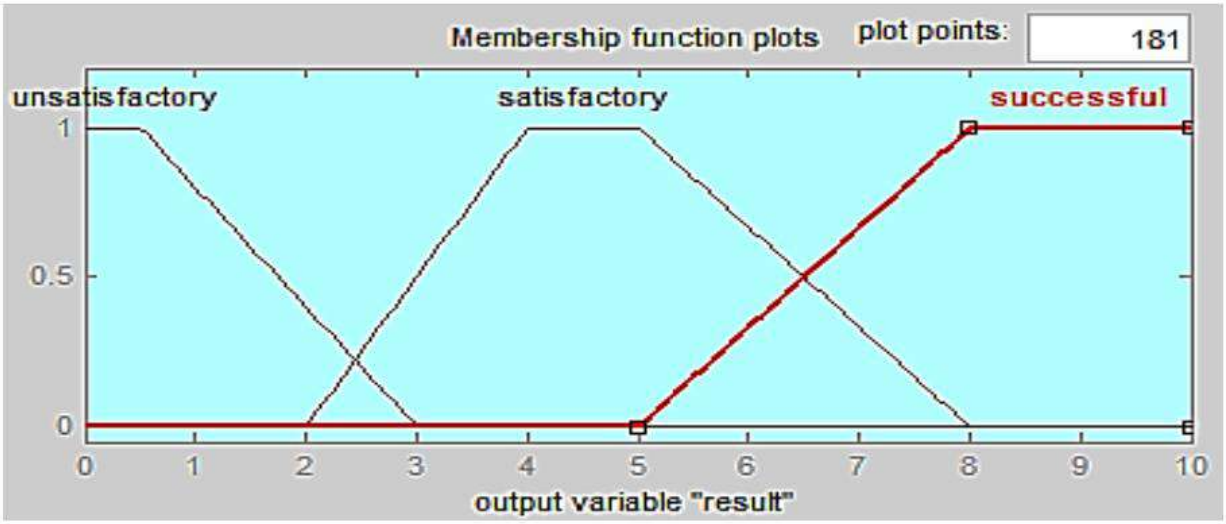

Fig. 3 – Membership functions of the output variable.

As a result of expert analysis, 81 most significant rules were formulated. Here are a few examples from them:1) IF complexity average AND laborintensity low AND novelty typical AND priority non-critical AND developer Junior AND employment low THEN result successful

2) IF complexity average AND laborintensity average AND novelty new AND priority non-critical AND developer Middle AND employment average THEN result successful

3) IF complexity average AND laborintensity average AND novelty new AND priority non-critical AND developer Middle AND employment higt THEN result satisfactory

4) IF complexity average AND laborintensity average AND novelty new AND priority AND developer Senior AND employment higt THEN result satisfactory

5) IF complexity average AND laborintensity average AND novelty new AND urgent priority AND developer Senior AND employment very high THEN result satisfactory

6) IF complexity average AND laborintensity average AND novelty new AND priority critical AND developer Middle AND employment average THEN result satisfactory

7) IF complexity average AND laborintensity average AND novelty new AND priority critical AND developer Middle AND employment higt THEN result unsatisfactory

8) IF complexity average AND laborintensity average AND novelty new AND priority critical AND developer Senior And employment big TO result satisfactory

9) IF complexity average AND laborintensity average AND novelty rare AND priority non-critical AND developer Middle AND employment low TO result successful

10) IF complexity average AND laborintensity average AND novelty rare AND priority non-critical AND developer Middle And employment high TO result satisfactory

To create the fuzzy inference system, the Fuzzy Logic Toolbox in Matlab was employed. In Matlab, there are five primary graphical interface tools available: editors for fuzzy inference, membership functions, inference rules, and tools for viewing rules and the inference surface. They interact with one another, so changes in one lead to changes in the others [14].

Using the FIS Editor utility, we set the following parameters for the fuzzy inference system: type - Mamdani, methods of aggregation, accumulation, and defuzzification, as well as all the inputs and outputs of the fuzzy system.

Membership functions for variables were established in the corresponding windows. For example, for the variable "Task Complexity," a trapezoidal membership function was chosen with specification for each member. Other variables were defined similarly.

The final step in creating the system was to determine a set of rules that establish the relationship between input variables and outputs (Figure 4).

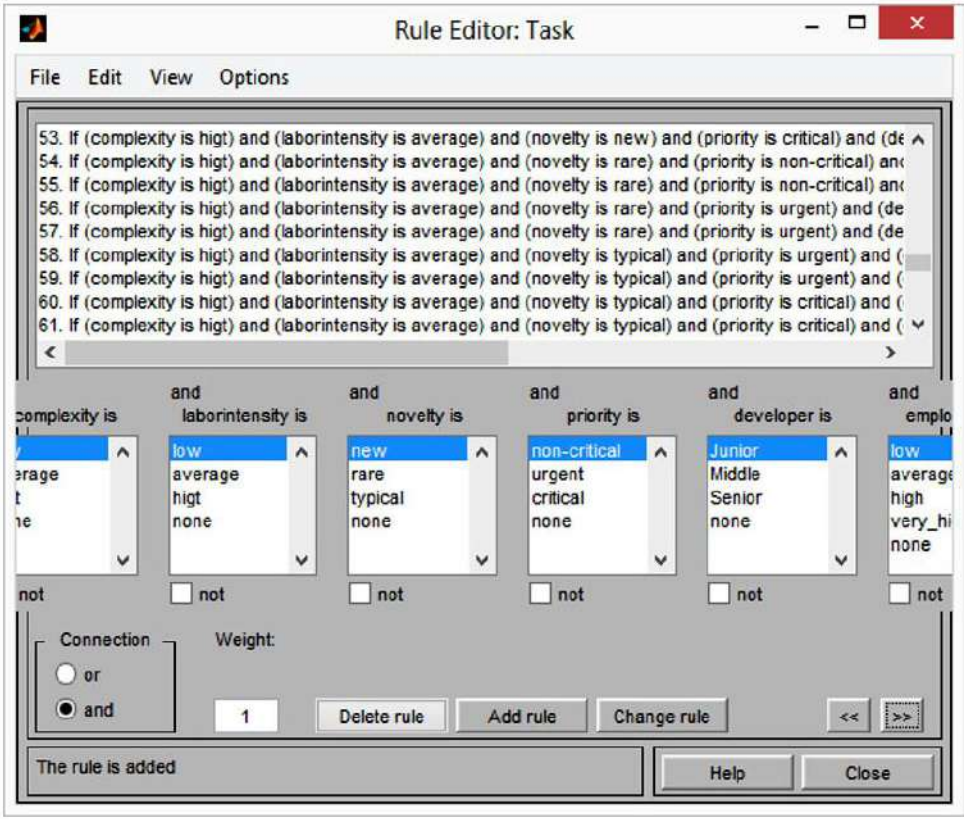

Fig. 4 – Expert rule base establishing the relationship between input variables and outputs.

The rule visualization tool allows showcasing the fuzzy inference process and obtaining the result (Figure 5).

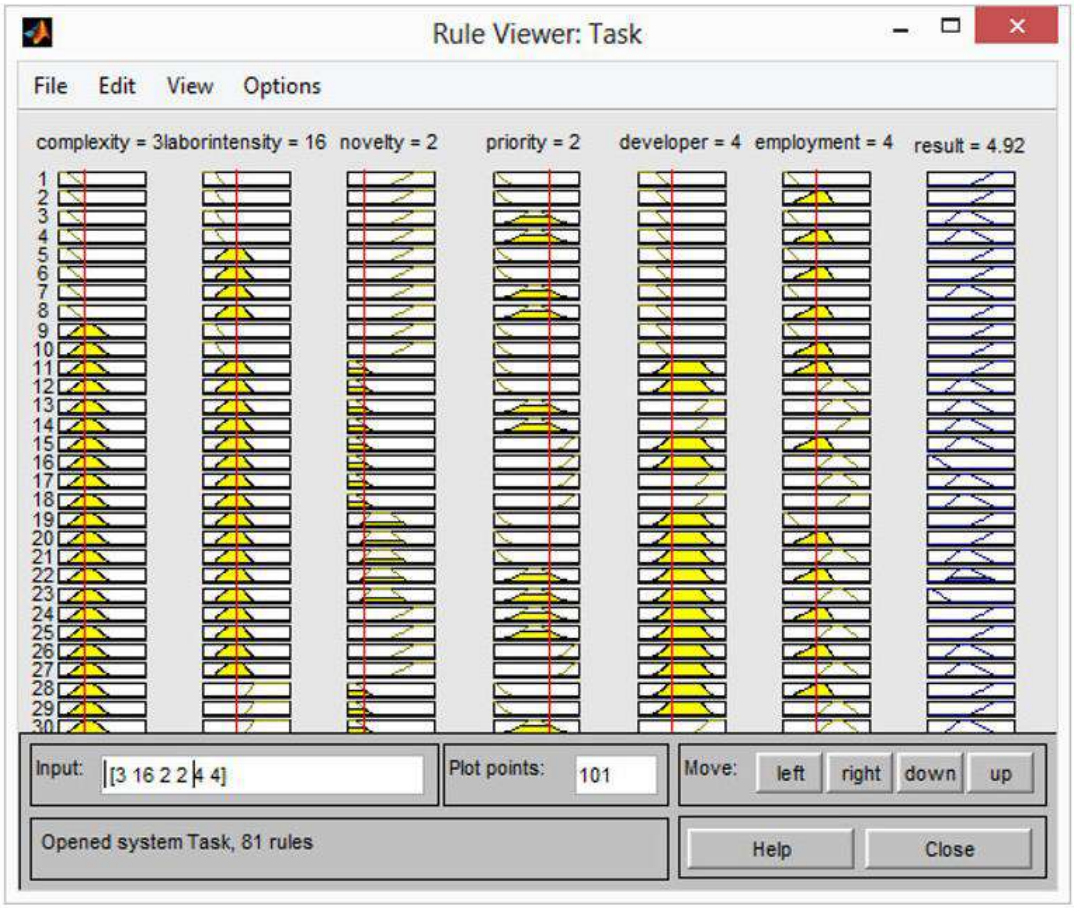

Fig. 5 – Rule visualization window.

The main window of this tool includes multiple smaller windows, arranged in a matrix format. The number of rows corresponds to the number of rules, and the columns correspond to the number of input and output variables. Each window displays the relevant membership function, its level, and contribution to the overall result [14]. To analyze the efficiency of task execution by developers, values of input variables are entered, and the result is displayed in the opposite corner. The system also offers the possibility to visualize the inference surface depending on two input parameters.

The assessment of the efficiency of executing each individual task is personal. The fuzzy modeling methodology will assist the project manager in identifying the positive and negative aspects of resolving a task when assigned to a specific performer and making necessary adjustments to their decision.

CONCLUSIONS

The analysis of the IT project management process overall, and the task execution process in particular, revealed the presence of uncertainties, poorly structured, and subjective data, hindering the achievement of the desired final result. The proposed fuzzy model for task management is flexible, meaning project managers can incorporate new input parameters specific to a certain IT project. This will only alter the number of rules while preserving the logic of the model.

The practical value of the obtained results lies in the fact that applying the mathematical tools of fuzzy logic will allow the project manager to work with parameters expressed in qualitative categories, without resorting to average indicators. This, in the end, will reduce the subjectivity of the decisions made.

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DIGITALIZATION AS THE BASIS OF THE DEVELOPMENT OF ENTERPRISES IN THE HOSPITALITY INDUSTRY

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ABSTRACT

The modern Ukrainian tourist market of services with its inherent unstable micro- and macro-environment forces the managers of enterprises of the hospitality industry to form real prospective opportunities of enterprises, that is, to determine the potential. For successful management, enterprises in the hospitality industry need to balance their capabilities and potential. This will improve competitors' positions on the market and increase the competitiveness of services.

It is worth noting that the level of development of the hospitality industry is an individual business card of any country in the international tourist space and is an indicator of the socio-economic and cultural development of the state. That is why the development of hospitality industry enterprises is an important component of the process of integration of the Ukrainian tourism business into the European market.

Keywords: hospitality industry enterprises, activity modelling, strategic modelling, tourist market, international tourism.

Formulation of the problem.

The current crisis conditions that have developed in Ukraine complicate the functioning of hospitality industry enterprises on the service market, create the need for the introduction of innovative approaches to the formation of a mechanism for managing the development of these enterprises. Such market conditions require modern models of planning and development of hospitality industry enterprises. The practical implementation of economic-mathematical modelling is able to ensure the stable development of the tourist market, the creation of favourable conditions for the formation of a high-quality tourist product.

Analysis of recent research and publications.

A. Chandler, K. Andrews, and V. Ansoff are world leaders in business planning. Some problems of the development of hospitality industry enterprises were analysed in the studies of G. Androschuk, G. Munin, J. Stanworth, T. Stepanova, and other scientists. Scientific studies show that the leaders of the global hospitality industry are the USA, France, Italy, Spain, and Germany.

Various aspects of the functioning and development of hospitality industry enterprises are considered in the works of G.O. Voroshilova, L. P. Dyadechko, O. M. Kalchenko, O. O. Lyubitseva, E. V. Pankova, V. I. Stafiychuk, M. P. Malska, N. V. Antonyuk, N. M. Ganych, I. V. Svida, Yu. A. Semenova, A. A. Demina, T. I. Tkachenko, A. M. Tramova, B. V. Shupik.

The purpose of the work.

The economic and mathematical modelling of the development of hospitality industry enterprises in modern conditions with the aim of increasing competitive advantages in the service market is considered.

Results.

The hospitality industry is one of the main components of the economy of Ukraine. In today's conditions, the service sector, like any other, is constantly transformed under the influence of globalization and integration of processes. Thus, the effective functioning of the hospitality industry is an indicator of positive changes in the state's economy, an important prerequisite for the intensification of international relations and the country's integration into the world community [1].

The modern informational development of society is undergoing innovation-technological, oriented transformations, in particular, this applies to the service sector. The main goal of these transformations is primarily convenience, accessibility, mobility, awareness and good relations with its customers.

Monitoring and analysis of the global experience of hospitality industry enterprises demonstrates a constant increase in the popularity of this business sector and causes an increase in the harshness of survival conditions. This situation forces institutions to constantly turn to innovative technological developments in order to maintain competitiveness in the market, fight for the loyalty of the guest, improve the quality of service, and also expand the range of services provided.

Constantly growing competition in the service market requires special uniqueness and individuality from service companies. It is the innovative approach to the introduction of the latest information developments in the activities of hospitality industry enterprises that is a necessary condition for their effective functioning. The introduction of new information services and products will contribute to the effective use of all opportunities for quality service and maximizing the potential of the hospitality industry.

The introduction of the latest information technologies in the development of production or in the management of enterprises of the hospitality industry makes it possible to significantly increase the efficiency and effectiveness of work, through best practices, management methods or scientific knowledge. The advantage in terms of relevance is given to information technologies, since their use is a necessary condition for the functioning of any modern means of accommodation or catering enterprise, ensuring accuracy, efficiency, high speed of processing and transmission of information [3].

To ensure leadership and obtain competitive advantages in the market of hotel and restaurant services, it is necessary to use computer networks, Internet technologies, end-to-end automation of all business processes [4].

Innovative activity is an important means of maintaining the level of competitiveness of any economic system [2, 4]. However, the implementation of information innovations in the practice of hospitality industry enterprises faces a number of factors, such as the risk of loss of capital investments, lack of experience with the introduction of innovations, lack of stimulation of innovations by the state, limited financial resources of entrepreneurs, high cost of innovative developments, etc. [5].

Online services are the main area where information technology advances are transforming the hospitality industry and bringing customer service to a qualitatively new level. The use of information technologies for processing and transmitting information at enterprises in the service sector allows creating an innovative and adapted to modern conditions tourism product, which aims to increase competitiveness and, accordingly, increase the rate of expected profitability.

Specialists of the modern information sphere are sure that no company in the hospitality industry can do without the use of computer systems in today's conditions. Increasing the value of information as a product determines the progressive development of the information services industry in the hotel and restaurant industry. Ensuring a high level of guest service at enterprises of the hospitality industry in modern conditions cannot be achieved without the use of innovative technologies that involve the automation of many processes, electronic reservation, and the introduction of technologies that improve the quality of service while reducing staff [3].

The constantly progressive development of modern information technologies led to the emergence of completely new integrated computer management systems for enterprises in the hospitality industry. Today, systems based on the application of networks of personal computers and mini-computers with a developed interface are widely used [2]. This information flow makes it possible to exchange information.

One of the newest information technologies of today is SMM - the most popular type of promotion and trade of tourist products through social networks. It does not require large costs, is effective in use and easy to master for the personnel of service enterprises. Its main goal is to create individuality, recognition, branding of the enterprise; increasing interest in the services provided, facilitating communication with clients, expanding the client base and potential opportunities of the enterprise.

Promotion of hotel and restaurant services in social networks is necessary in order to find potential guests and increase the loyalty of regular customers. In other words, a good service social media profile should attract guests visually: good photos of food, videos of events, photos of staff and guests. Also, social networks are the latest platform for advertising mailings and integrations. Such advertising activity allows you to significantly save the budget and get a more effective result.

Businesses in the hospitality industry need SMM for the following purposes:

- to form a brand image;
- attract new customers;
- inform and maintain communication with guests;
- collect reviews.

Today, many enterprises of the hospitality industry have their profiles on such social networks as "Instagram" and "Facebook". This requires constant efforts to maintain a correct profile, update information and promote on online platforms. Also, these profiles provide an opportunity to quickly react to market changes:

- brand promotion;
- increasing the loyalty and popularity of the product/service;
- order service online;
- responding to feedback and suggestions;
- conducting raffles or quizzes with the aim of attracting new users of services (giveaway);
- increase in website traffic;
- providing services in compliance with quarantine requirements (ordering food online, food boxes, booking tickets, reserving tables in a restaurant, etc.).

The goods of service enterprises in SMM are the same services and goods that are presented in ordinary marketing. But it is Internet marketing that helps promote products, analyse the demand and supply of competitors, and in some cases test the product [3]. This type of marketing is a modern and extremely effective communication tool of a hotel or restaurant because the page/site has an optimal structure, all sections contain only relevant information that is constantly updated [6].

This type of information innovation had no effect on the price change. And the choice of products or services has become easier and more accessible for consumers. Social Media Marketing makes it possible to choose the target audience in a more targeted manner, to choose relevant platforms where exactly this audience is represented to a greater extent. Due to high development rates, hospitality industry enterprises that have profiles in social networks are less sensitive to the crisis.

SMM first of all requires the latest knowledge and skills to work on online platforms. So, to promote a hotel or restaurant page in social networks, you need the following: determine the target audience, choose the appropriate social network, draw up a content plan, etc.

To draw up a content plan, you must first determine what potential consumers of hotel and restaurant services need to know, and then divide the content into categories and formats. After the rubrics are formed, it is worth starting to develop the content plan of the enterprise. It can be laid out in calendar format or as a table.

A restaurant's content plan shouldn't be limited to just posts about food: posts can include information about different types of food, ingredients, veganism, favourite foods, even the features and history of the building in which the restaurant is located.

It is worth noting that the ever-increasing digitalization of all processes, especially in the enterprises of the hospitality industry, is increasingly embracing the digital environment, forming new boundaries of customer experience. At the same time, the customer experience is understood as the whole set of emotions, impressions and knowledge of the customer, which he receives at various points of contact (touchpoint) with the enterprise of the hotel and restaurant business (both real and virtual) [4].

SMM technologies at enterprises in the service sector contribute to strengthening the emotional connection with the client, increasing client orientation and helping to overcome all modern crisis situations with less losses. Online booking is one of the latest information technologies that is being actively implemented in the activities of hospitality industry enterprises. Most service representatives now consider it necessary to have an online booking option for customers. This service requires qualitatively developed software: appropriate mobile applications and sites with a simple interface [6].

Modern enterprises of the hospitality industry are a complex of functional links. Taking into account the ever-growing competition and the latest directions in the field of service, the need to create conditions for prompt and efficient work of personnel increases. The solution to this problem is possible only through the implementation of hotel automation systems, that is, the introduction of Automated Management Systems (ACS) by the hotel (in the English version - Property Management System (PMS)) [3].

Automated management systems for hospitality industry enterprises are a complex of integrated subsystems that create an effective environment for the interaction of employees, clients and business partners - travel agencies, corporate clients and tour operators [2, 6].

Today, the most common automated hotel systems used in global practice are [1, 4]:

- Hotel management system (PMS - Property Management System);
- Restaurant management system (Point Of Sales);
- Event management system (Sales & Catering);
- Telephone service system (Telephone Management System);
- System of electronic keys (Key System);
- System of electronic minibars (Mini bar System);
- System of interactive television (Video Services System);
- Energy management system (Energy Management System);
- Credit Card Authorization System;
- Warehouse accounting and costing system (Food & Beverage);
- Financial accounting system (Accounting System);
- Central Reservation System (Central Reservation System);
- Internet reservation system (Web Reservation System);
- Personnel accounting system (Human Resource System);
- Security System (Security System).

Virtually all Western hotel software vendors have a version of their PMS specifically designed for remote use. These systems are developed using Internet technologies: ASP (Application Server Provider) and "client-server" based on SQL (Standard Query Language) [2].

One of the most common ACS todays is the Amadeus system. It was created in 1987 by the largest European airlines Air France, Iberia, Lufthansa, SAS and is one of the largest and most widespread reservation systems. The network center is located in Germany (near Munich) and is connected to users all over the world thanks to its own reliable, high-speed communication network. It allows travel agencies to offer a full set of programs and the possibility of booking hotel seats, which ensures that enterprises are more flexible and productive in the modern service market [3].

Amadeus is now the leading computer reservation system in Europe. As a result of the acquisition of the System One reservation system in 1995, it is actively advancing to the American market.

Amadeus provides a variety of services, including cooperation with airlines, railway and ferry transportation, car rental, hotels, and also provides additional services, such as tourist insurance, etc. Amadeus is used by more than 30,000 travel agencies (more than 100,000 terminals), more than 400 airlines (more than 60,000 terminals).

More and more companies in the hospitality industry are turning to Amadeus services. This system provides open access to online booking 24/7, 365 days a year. The basic advantages of the Amadeus system are:

- saving time due to the openness and availability of tourist, client and agency information;
- cost savings due to maximum efficiency as a result of stable operation and immediate confirmations;
- constant monitoring and control of the integrated flexible system meets all the needs of the agency in the work process;
- hourly updating of relevant information in real time;
- increase in income due to a wide range of opportunities that ensure the satisfaction of the entire range of customer orders [4].

Automated management systems of hospitality industry enterprises in today's conditions should not be products that are aimed exclusively at internal processes. It is important to ensure their relationship with external sources. Among the main ones [3]:

- payment systems - guests should be able to make payments using all available methods, for which it is necessary to install fiscal registers in the hotel;

- security and safety - we are talking about gaining access to certain premises, control of visits by outsiders;

- energy saving - hotel engineering systems and equipment are connected to the general automation program, this will save resources (for example, turning off power to unoccupied rooms, setting the desired temperature level depending on the presence or absence of a guest in the room);

- GDS systems - if the establishment is registered in them, then the internal automated hotel management systems must transfer the changed data about the room stock (occupied or free, price, etc.) to external global platforms, which will avoid overbooking (using the Channel Manager tool).

Modern service IT technologies are global reservation systems and CRM systems [9]. They allow the client to choose the most convenient accommodation option for himself, taking into account all the advantages. The basis of CRM technology is the accumulation of information about the client and the management of this data. Customer databases make it possible to study the hotel's target audience in detail, forecast the demand for services, and conduct an effective marketing policy.

Conclusions. Therefore, the key basis for ensuring competitiveness, constant development and increasing the efficiency of the functioning of enterprises of the hospitality industry in Ukraine is the introduction of information technologies. This is cost-effective and efficient, as they contribute to improving the service process, reducing costs and generating additional income.

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ECO-INNOVATION DEVELOPMENT OF ENTERPRISES IN THE HOSPITALITY INDUSTRY

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ABSTRACT

The article is devoted to the study of the development of eco-innovations in the hospitality industry. It is proved that the greening of production activities at hospitality industry enterprises will not only contribute to improving the quality of life of the population, effective integration into the local regional ecosystem, but also serve as a source of competitive advantage.

It is substantiated that in order to restore and build the economy of the future and integrate into the global political, economic and business community, Ukraine must already comply with the requirements of the «green economy», innovation, transparency and responsibility of business, and reduce the negative impact on the environment and society.

It is determined that the defining concept of greening the economy is the transition to an energy-efficient, resource-saving, innovative and socially inclusive development model based on an optimal balance between natural physical, and human capital, and involves the use of innovations, changing the value creation cycle through the use of digital technologies.

Keywords: hospitality industry, eco-innovations, hotel industry, restaurant industry, greening of hospitality enterprises, eco-trends.

Statement of the problem. The eco-innovative development of hospitality industry enterprises is the most popular direction for effective functioning at the present stage of management. After all, eco-innovations serve as a means of ensuring the efficient use of natural resources, reducing the environmental burden on the environment and a lever for the use of additional sources of value creation.

The introduction of environmental «green» innovations in accommodation and catering facilities helps to increase their competitiveness in the tourism market and demonstrates the existence of a socially responsible economic and production policy as part of a hotel or restaurant brand, which is an important factor in shaping consumer choice for the modern generation. In addition, the greening of production activities in the hospitality sector will not only contribute to improving the quality of life of the population, effective integration into the local regional ecosystem, but also serves as a source of competitive advantages for hotel and restaurant enterprises, which is extremely important in today's environment of instability.

Analysis of recent research and publications. Many foreign and domestic scientists have studied the development and implementation of innovations and eco-innovations. In particular, I. Ansoff, J. K. Galbraith, K. Oppenlander, B. Santo, P. Drucker, J. Schumpeter, N. Andreeva, I. Bystriakov, O. Veklych, V. Dzhindzhoyan, I. Sokyrnyk, I. Oshchypok, and many others.

However, further research is needed on the issues of effective and rational implementation of eco-innovations in the hospitality industry, which will be aimed at the economic growth of Ukraine, because today in Ukraine there is an increase in environmental threats, while the threats are systemic and should be considered, first of all, as a threat to national security in the environmental sphere.

Identification of previously unresolved parts of the overall problem. To date not enough attention has been paid to the study of the development of eco-innovations in the hospitality industry during crises caused by various situations, including pandemics, war, etc.

Formulation of the objectives of the article (statement of the task). The purpose of the article is to theoretically substantiate the main tools for introducing eco-innovations in the hospitality industry and their special role in providing a win-win solution to improve competitiveness, business sustainability and sustainable development of the country.

Summary of the main research material. According to certain approaches, eco-innovations serve as a means of ensuring the efficient use of natural resources, reducing the environmental burden on the environment and a lever for engaging additional sources of value creation, increasing business competitiveness,

and expanding productive employment. They provide win-win solutions for improving economic competitiveness and business sustainability, as they start at the level of business entities' strategy and have an impact beyond them in the supply chain and value chain.

The Organization for Economic Cooperation and Development (OECD) in Europe defines eco-innovation «as the creation or introduction of new or or significantly improved products (goods and services), processes, methods marketing methods, organizational structures and institutional arrangements that - with or without intentionally or unintentionally - lead to an improvement of the environment compared to relevant alternatives» [8].

The European Commission defines eco-innovation as any form of innovation that aims at or results in significant and demonstrable progress towards achieving sustainable development goals by reducing environmental impact, increasing resilience to environmental stress, or achieving more efficient and responsible use of natural resources [2].

The United Nations Environment Programme (UNEP) defines eco-innovations from the standpoint business, namely:... «is the development and application of a business model formed a new business strategy that incorporates sustainability into all business transactions that based on life cycle thinking and collaboration with partners value chain»[5].

With certain approaches, eco-innovations serve as a means of ensuring efficient use of natural resources, reduction of ecological environmental load and lever for use of additional sources value creation, business competitiveness enhancement, expansion productive employment.

Eco-innovations lead to complex solutions aimed at reducing expenditure of resources and energy, while improving the quality of products and services. However, in terms of load characteristics, they can to change quite significantly.

This is best reflected in the expected results impact of eco-innovations on the economy, natural environment, society and stages of value addition in global value chains.

Attracting eco-innovations increases the level of greening of business, which carries one of the main goals of the concept of sustainable development. Achieving mass implementation of environmentally oriented innovations requires real sources of funding.

So, for Ukraine to enter the sustainable path of economic development, it is necessary to critically analyze the backlog of policy gaps and clearly identify the activators of the movement towards the 2030 Sustainable Development Goals (SDGs).

One of the activators of the movement towards the SDGs is also the development of hotel and restaurant business. After all, we all know that the enterprises of the hospitality industry, namely the hotel and restaurant industries, are colossal consumers of energy and water on a global scale, and their impact on the environment is hidden due to the fact that it is usually perceived as a separate sector of the service sector, and not as interrelated components of a single complex, the main task of which is to meet the ever-growing needs of tourists.

In new tourist regions, projects are often implemented for the construction of large hotel and restaurant complexes that produce waste and pollution in volumes that local communities cannot cope with. Excessive consumption of energy, water, fuel by tourists often takes these resources from the local population (Table 1).

Table 1.

The main causes and consequences of the negative impact of the hotel and restaurant sector and tourism on the environment

Type of impact	Sources of pollution	Environmental impact
Water use	Household drains	Water pollution, reduction of water resources
Energy use	Imperfect heating systems	Air pollution, climate imbalance
Use of soils	Excessive building, trampling, unorganized rest near accommodation and catering	Changes in soil structure, increase in their density, soil degradation
Using the aesthetic value of landscapes	Spontaneous development of an overnight base in the private sector	Visual contamination, deterioration of aesthetic value
Clogging of the area around the accommodation and food facilities	Excessive number of visitors	Threat to living and inanimate nature

Therefore, today the greening of enterprises of the hospitality industry plays a key role in ensuring the sustainable development of the economy of the country and the region.

The essence of greening is to minimize the negative impact of tourism on the environment due to the consumption of a significant amount of traditional energy resources. In accordance with the concepts of sustainable development, it is worth highlighting the basic principles on the basis of which environmental activities in the hotel and restaurant business should be based:

1. Minimal environmental impact. Conservation and sustainable use of natural, social and cultural resources.

2. Minimal influence and respect for local cultures.

3. Increase of economic advantages and assistance for balanced economic development of the area.

4. Increased benefits for tourists.

5. Increasing environmental awareness in the population [4].

The greening of the hotel and restaurant business should concern absolutely all its spheres of activity. Today, the concept of so-called ecological hotels and restaurants is extremely popular in the world. Such institutions try to preserve the health of guests, rationally use natural resources and position themselves as responsible for the impact of the enterprise on the environment.

Leading experts in the hospitality industry note that, in accordance with global trends, preference will be given to environmental trends. Although now many of the world's famous hotel and restaurant chains have their own specialist in ecology.

Environmental issues are prominent in the activities of the International Hotel Association (IHA). Within the framework of the IGA, the IHEI Foundation (International Hotel Environmental Initiative) has been created, the main task of which is to collect and disseminate information on environmental issues related to the hotel industry.

The Foundation has prepared textbooks and CDs, training seminars on ecology are organized in the tourism industry, as well as annual competitions for the best management methods that are developed and used by the hotel and restaurant sector in order to improve the environmental situation.

Eleven major international hotel chains included in the fund have already saved significant funds as a result of the measures taken. For example, InterContinental has saved £10 million over the past 10 years, installed furniture and accessories from biological materials in rooms that can be recycled and used again.

In developed countries, the concept of an ecological hotel was formed, which is a qualitatively thought-out system of comfortable life in harmony with the outside world. It is a system of conceptually new view in the development of accommodation facilities, which allows both to take care of nature and significantly reduce production costs. Despite the fact that the concept is at the stage of formation, it is already possible to distinguish a number of features of an ecological hotel.

First of all, it is a well-thought-out system of resource and energy saving, including strict standards of resource saving and widespread use of alternative energy sources. This feature is primarily associated with the insufficient resource availability of developed countries and active policies aimed at stimulating energy conservation. Many hotels use solar energy both direct heating of water and obtaining electric energy. Studies have shown that thanks to the use of new environmental methods of work (for example, solar heating of water) and small investments in hotels and restaurants, it is possible to reduce electricity consumption by 10-25%, and water consumption by 30%.

«Green» hotels try to minimize chemicals, especially hard to clean. In cleaning and sewerage systems, priority is given to advanced methods using bacteria that decompose dirt and waste. In cleaning agents, chlorine-containing compounds are limited as allergenic and adversely affecting the environment. Detergents and washing powders are also chosen «most spared», but, of course, they can provide a «hotel» cleanliness class.

Competent disposal is one of the main priorities. Solid waste should not enter the surrounding nature, so the garbage is sorted, pressed and removed. Liquid waste is either placed in special containers and taken out, or cleaned. The most advanced eco-hotels are moving towards attempts to build completely closed systems where water and air could be regenerated, which would allow the construction of such hotels within specially protected natural areas.

Most eco-hotels are located in unique natural complexes - on the shores of the cleanest lakes, rivers, in reserves and protected areas. This, on the one hand, is due to the fact that such places attract people who care about the fate of nature. and, on the other hand, such a complex minimally harms the surrounding nature, which allows it to be preserved in pristine beauty. The construction of an ordinary non-ecological hotel is limited by the requirements for the preservation of the natural environment and is often prohibited.

High requirements in such hotels impose and catering. Most eco-hotels try to use organic food of organic standards. In the simplest case, these are environmentally friendly products of local manufacturers, in more advanced products that have passed special strict control of European or American certification organizations. Water quality is also important. A real hotel in the ideology of «eco» should carefully monitor the composition of the water it uses.

There are no special requirements for the internal design of such hotels, but they are usually made in natural materials and shades. The main colors are white, earth colors, green, gray, often red and orange are used as additional.

Bed linen uses pure cotton grown without the use of pesticides and herbicides. Another ultra-modern trend is the use of recycled materials in the design.

Many eco-friendly hotels in connection with energy savings, refuse computers and televisions. This is not only savings, but above all an attempt to distract guests from the hustle and bustle and bring them closer to a peaceful and relaxing holiday in the bosom of nature.

As for the enterprises of the restaurant industry, the ecological style fits perfectly into the restaurant in rooms of different shapes and sizes. It perfectly emphasizes any concepts - from healthy eating to sophisticated seafood dishes. This design allows you to create the most comfortable and very stylish atmosphere. It's nice to eat, relax, communicate.

In the restaurant space, eco-design has the following features:

1. The use of a large number of natural materials. Various breeds of natural wood, various types of stone, ceramics, etc. are actively used in eco-style. You can also attract materials created from recycled materials.
2. The color scheme is natural and calm. In such restaurants there are no acid-bright details. The main colors of the ecological style are different shades of brown, gray, natural green, blue. In general, everything that can be found in wildlife is suitable. But it is necessary to observe the measure.

3. Landscaping as the main decoration. Living plants in eco-style are an obligatory part of the interior. In restaurants it can be plants in pots, house trees, vertical gardening and even open green terraces. You can complement the picture with small flowers on each table.

4. Nice soft lighting. Ecological style does not withstand bright white all-encompassing light. Its option is soft yellow or natural light. Original lamps and sconces are used as lighting tools.

Modern technology also fits perfectly into the concept of eco. All energy-saving technologies become the decoration of the restaurant in this style. It is also allowed to combine features from other styles - loft, modernism, etc.

Thus, the main difference between eco-hotel and eco-restaurant is the ideology of proximity of man and nature, which is built on this basis, it is a complex system of measures aimed at reducing the impact of anthropogenic activity on the environment.

In accordance with international standards, the environmental impact of collective accommodation and catering facilities is assessed in the following areas:

1. Air: smell (production and consumption of electricity and heat, cooking, transport used by tourists and staff).

2. Water: water supply, water consumption (in the kitchen, when cleaning, in the sauna, rooms, when providing tourist services).

3. Soil and groundwater: protection of groundwater (in the provision of tourism services, waste disposal).

4. Noise: composition and noise level (in the place of rest, in the provision of tourist services).

5. Visual actions: territory; the surrounding area; landscape; buildings; marketing; waste; travel services.

6. Food and its quality.

The basis for creating an «ecological» hotel is the desire to make the most of natural resources and natural materials in order not to pollute the atmosphere.

Compliance of hotels with the requirements is confirmed by certification and assignment of certain characters. In 1991 The International Association for Standardization (ISO) has created the environmental management standard ISO 14001 (EMS).

In order to comply with it, the organization is obliged to confirm that it has a special environmental policy. The ISO 14001 standard is the minimum that every enterprise must adhere to in order to negate the harm to the environment. In a number of countries, in addition to ISO 14001, their own standards were created, for example, in the UK - BS 7750 Specification for Environmental Management Systems, in Canada - CAN/CSA Z750-94: Guidelines for an Environmental Management System, in European Union - EMAS.

For certification of eco-hotels there is also an authoritative system «Leadership in energy and environmental design». Only environmentally friendly buildings can receive LEED certification. The objective, well-known worldwide LEED rating relies on energy and water savings, as well as environmentally friendly raw materials. LEED - energy saving and environmental protection system using solar panels.

There are a number of organizations in the world that are engaged in the development and implementation of environmental management systems.

British Airways Holidays (BAH) is one of the largest air carriers and tour operators in the world. The company regularly monitors hotels in the Caribbean and provides all possible assistance to accommodation facilities with good environmental management. In addition, its employees observe how this management technology is suitable for the hotel industry. The work of the VAN related to the preparation of criteria for eco-management was the first attempt to create requirements common to all hotels so that the traveler could immediately understand the level of service and quality of services he could expect.

Certification for Sustainable Tourism (CST) is one of the leading and most successful ecotourism companies in the western hemisphere. She managed to create her own market by developing a state program of environmental management and its active dissemination. Despite the fact that it is focused on the tourism industry as a whole, mainly hotels are certified. In order to obtain an eco-quality mark, the hotel must minimize its environmental damage, and experts assess the socio-economic effect of the enterprise's work in a particular region, conduct interviews with guests and management. Each criterion defines a set of actions, and the system as a whole turns out to be comprehensive.

Green Globe is a British company that actively promotes and implements ecotourism, operates in more than 50 countries, a full member of the UN Tourism Organization and the World Tourism and Travel Council. The criteria for obtaining certification include basic standard requirements for reducing waste, saving electricity, introducing an environmental management system, social and cultural development, reducing risks, assessing the relationship between the geographical location of a hotel or resort and its impact on the environment.

Green Key (Denmark) develops certification programs for catering services of hotels, hostels, congress centers, rest houses. Eco-labeling of this company was awarded to 2700 hotels and other institutions in 56 countries. Before receiving the eco-sign, the company must establish standards for water consumption and saving, introduce a system for reusing resources, and begin to purchase environmentally friendly organic products.

Strict requirements are put forward for nutrition. The menu should have at least two organic products, at least one low-fat snack and one low-fat main dish. In addition, there are criteria for lighting, ventilation, work with the disabled, irrigation systems, garbage collection. The organisation now has 97 members, including the Radisson SAS network.

Touristik Union International (TUI) - leading tour operator in Germany with more than five million customer base, one of the first in the country began to promote the principles of environmental responsibility in the tourism industry. Among its members are more than 7,000 hotels worldwide.

BREEAM (Building Research Establishment Environmental Assessment Method) or «Environmental

Performance Assessment Method from the Building Research Institute», UK). BREEAM was the first standard for assessing the environmental friendliness of real estate.

The international ISO standard is 14001 quite strict, now a number of hotels in Western Europe are certified - in Germany, Portugal and Sweden, in particular, Forum Hotels, Intercontinental Hotels, Lusotur Golfes, Renaissance, Sanga Saby Kurs, Konference Cur enter, and in Southeast Asia (Hong Kong and Mauritius) it is Island Shangrila-La Hotel, Kowloon Shangrila-La Hotel, Labourdonnais Waterfront Hotel [12].

Ukrainian enterprises are just beginning to chase the ecological future and every day face a lot of obstacles: difficulties in legislation, high prices for imported green technologies, lack of mass sorting and corresponding waste processing plants. Of course, the situation is improving every year, more and more people and enterprises are beginning to take care of the state of the ecosystem, so it is very important to catch up every day and break down stereotypical thinking. Therefore, after analyzing the state of affairs in the hotel and restaurant industry, it is possible to determine the TOP of world eco-initiatives that Ukrainian hospitality industry enterprises can use today.

1. Solid waste recycling.

Incredibly, but true - sorting is the first step towards sustainability. In developed countries, this is already a normal practice not only in enterprises, but also in everyday life. The answer is that there are not enough enterprises in Ukraine where it is possible to recycle paper, plastic, glass, etc. However, the more high-quality sorted material, the sooner the corresponding enterprises appear that will not only take care of the environment, but also bring profit to the owners.

It is worth recalling shocking figures - ordinary office paper decomposes within two years, cans -10 years, foil and batteries - more than 100 years, plastic bottles - 180-200 years, aluminum cans - 500 years and glass for 1000 years. These figures are already a good reason for sorting, and hotels and restaurants as large complexes, through which thousands of people pass every year, have great leverage. Among the trending initiatives, we can note the replacement of plastic key cards from the numbers with paper and wooden counterparts, which in fact are not only «green», but also aesthetically pleasing.

2. Ecological cosmetic and chemical products. Many hotels in Ukraine equip rooms with cosmetics, and also use many chemicals for cleaning and washing clothes. Therefore, hotels have the right to choose high-quality eco-friendly cosmetic products for their guests. There are many brands that do not use sulfates, which not only pollute water, but also adversely affect the skin of people. Ideally, you should also pay attention to whether the products are tested on animals. To reduce the use of washing powders and water, many hotels in Ukraine already put information cards so that guests themselves regulate the need to change bed linen and towels. In this properly constructed communication with the guest is the real key to success.

3. Responsible attitude to the quality of food and its appropriate disposal. One element of sustainability is the support of local brands, which in the hotel and restaurant industry is reflected in collaboration with food and drink suppliers. In general, the food industry in Ukraine is developed and you can buy almost any product locally, except for certain delicacies (red and black caviar, seafood, some varieties of meat). But at this point it is worth emphasizing the correct disposal. Composting is not common in Ukraine, but in hotels and restaurants it is one of the best investments in the processing of organic waste. Compost tanks exist in different sizes, are sealed and provide processing of organic garbage of plant and animal origin. Also, together with organic matter, paper napkins can be recycled. The cost in Ukraine - from 2000 hryvnia and above, depending on the manufacturer and size.

4. Energy-saving technologies. They are also publicly available in Ukraine, so their implementation is quite acceptable. First, the automatic switching on of light in the premises not only reduces the electricity bill, but also is a manifestation of the careful use of resources. Also, the installation of solar panels, especially in the southern regions of the country, has long been an economically justified investment.

5. Attitude of guests to eco-initiatives. Without the support of guests, any enterprise of the hospitality industry will never be 100% environmentally friendly. Communication and interaction of staff is a key point in the work of any hotel. Nowadays, there is a widespread practice of «paperless guest» in the world - reducing the use of paper per guest by introducing electronic signatures on registration cards, sending invoices to e-mail instead of a printed copy and providing all the necessary information through mobile applications, sites and e-mail.

The attitude of guests to food consumption is changing - at the all-inclusive resorts they actively promote taking as much food as you can really eat. No, not because it's a pity or the hotel wants to save, it's just hard to imagine how much waste remains after the hotel for 200 rooms, working on a buffet system. Sometimes this figure reaches 500 kg of organic waste per day. In addition, hotels come up with new features with the provision of clean water to guests - coolers on the floors, glass bottles that are filled again, etc. The main thing is to have creativity and meet the requirements of your customers.

Thus, the inclusion of environmental aspects in the development of hotel and restaurant services is simultaneously associated with several trends. On the one hand, there is an increase in customer demand for service. This is manifested because the level of education has increased significantly, and tourists every year more and more enrich their knowledge about the environment, care, which has become a fashion trend.

The results of numerous studies and surveys have shown that residents of developed countries tend to prefer hotels that care about the environment and natural resources. Moreover, 70% of tourists are willing to pay $150 more for a two-week stay in a hotel where environmental standards are observed.

On the other hand, entrepreneurs are aware that environmental issues can provide a competitive ad-

vantage over the service market. The introduction of resource-saving technologies will reduce costs and, accordingly, increase the profit of enterprises.

The emergence of new accommodation facilities significantly increases the attractiveness of the tourist destination and increases the flow of tourists. The quality of service and additional services when placing depend on such aspects of tourism as a high score of the organization of recreation and leisure of tourists in a particular country, as well as overall satisfaction with the journey.

In Ukraine, there is a demand for ecological means of accommodation and maintenance, but there are different visions in the definitions of the concept of «collective means of placement of an ecological orientation». This is due to the lack of regulatory documents in this area. It is necessary to develop recommendations for improving the work of hotel and restaurant enterprises taking into account environmental factors and stimulate their implementation in practice.

The trend for environmental friendliness is one of the most popular today, and it penetrates deeper into all spheres of human life. Residents of cities learn to use less plastic, practice the principles of zero waste, without producing new garbage, using things again, practice the principle of ugly fruits, the trend to buy vegetables and fruits of different shapes, or even not by kilograms, but by the piece. Many, and not for vegetarian reasons, refuse products of animal origin, milk, meat, fish in favor of plant analogues based on various types of legumes, chickpeas, as well as other products of coconut, almond, soy and oat milk.

Among entrepreneurs, ecotrends are also becoming popular, as among city dwellers. The goals are common: firstly, to reduce the amount of waste, secondly, to use resources more efficiently, thirdly, to reduce the amount of plastic and its derivatives, and fourth, to follow the trend.

Also in the restaurant business rationally relate to the use of animal products, especially meat products. «Noise to tail» (using the entire carcass of the animal along with the insides, and not just a few fillet parts). In the Chicken Kyiv restaurant, most dishes are prepared from chicken, rationally using different parts for different dishes.

An equally popular trend is local food (local foods and -Delo.ua components), which means dishes prepared on the basis of local components - vegetables, fruits, fish and meat grown or caught within the same country.

The same applies to alcoholic and non-alcoholic beverages, the trend is to use local wine, beer, juices and other local products. This trend is due to the fact that less human resources, time, fuel are spent on the cultivation, production, delivery of these goods than on the delivery of goods from other countries or continents.

Now in fashion reusable dishes, its own containers, biodegradable tubes for drinks, as an alternative to plastic. All this is the response of restaurateurs to customer requests.

So many entrepreneurs offer a discount for a drink of about 10% when it is poured into the visitor's container. When it comes to disposable dishes, restaurateurs prefer containers made from recyclable materials.

Some establishments even serve dishes in edible dishes. According to this principle, the restaurant «Villa Alfold» in Uzhgorod works. Although to be quite precise, the idea itself is not new - back in the 90s, some Kyiv restaurants offered visitors borsch in a loaf of bread.

Increasingly, there are analogues to plastic tubes made of paper or other materials.

Another ecotrend, a proposal to sort garbage in fast food establishments. For example, in Lviv at Bubble Waffle, guests are offered to sort garbage for paper or plastic waste on their own. Thus, the institution not only pays attention to the problem of garbage, but also stimulates guests to think about this at home.

Towards recovery and building the economy of the future, integration into world political, economic and business community Ukraine already has comply with the requirements of the «green economy», innovation, transparency and business responsibility, reducing the negative impact on the environment and society etc.

The defining concept of greening the economy is the transition to energy-efficient, resource-saving, innovative and socially inclusive development model based on the optimal balance between natural, physical and human capital, and involves the use of innovation (information and communication, technological, environmental, social, etc.) and changing the value cycle through the application of digital technologies.

Modern business in the hospitality industry needs innovative ideas that can withstand the latest challenges of mankind (climate change; environmental pollution; exhaustion of valuable natural resources; degradation of ecosystems, etc.), and creates favorable conditions for entrepreneurs who are ready to produce new value through the implementation of eco-innovations. Now for business it is not enough to use environmental approaches only to develop a new product or reduction of production costs. It is also necessary to apply the latest methods and tools to win the prestige and trust of society.

The economic development of the country should ideally be accompanied by sustainable use of natural resources and waste management, support for biodiversity, conservation of natural ecosystems and economic use of natural resource potential. In these circumstances, state policy should be aimed at creating conditions for increasing the competitiveness of the national economy on the basis of eco-innovations as the basis of dynamic development and reducing significant imbalances between them in productivity and living standards.

Scaling of environmental innovations is not only a modern trend of innovation and investment stage for sustainable development of European countries, which requires an increased sense of environmental awareness of each subject of the market and normalized load on the environment. This is a necessary impetus to create conditions for effective stabilization of the level of development of the EU countries and Ukraine.

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MEDICAL SCIENCES

NEW HORIZONS IN THE TREATMENT OF ACUTE HEART FAILURE: AN EFFICACY STUDY OF LEVOSIMENDAN, EMPAGLIFLOZIN AND FUROSEMIDE

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ABSTRACT

This article analyses the impact of two pharmacological agents on the treatment of acute heart failure: levosimendan and empagliflozin. Levosimendan, which belongs to the group of "cardiac glycosides and non-glycoside cardiotonic agents", is discussed in the context of its mechanisms of action, including increased sensitivity of cardiomyocytes to calcium ions and effects on potassium channels. Empagliflozin, as an SGLT2 inhibitor, is reviewed in terms of its effects on metabolism and vascular function in patients with heart failure. In addition, the article evaluates two methods of furosemide administration, continuous infusion and intermittent injection, highlighting their advantages and disadvantages. The study demonstrates the benefits of continuous infusion of furosemide in improving weight loss and BNP levels. A comparative analysis of furosemide prescription methods provides information on how to choose the optimal method depending on the clinical context.

Keywords: acute heart failure, levosimendan, empagliflozin, furosemide, infusion methods.

Introduction:

Attention to the management of acute heart failure is extremely important as this condition remains one of the leading causes of hospitalisation and high mortality among patients with cardiovascular disease. Modern medical practice is actively researching and developing new approaches to the treatment of this condition in an effort to improve clinical outcomes and patient quality of life. One of the promising directions in the treatment of acute heart failure is the study of the effects of various drugs such as Levosimendan, Empagliflozin and Furosemide on this pathology. In this article, we review the results of recent studies and experiments evaluating the efficacy and safety of these agents in the context of acute heart failure. This article summarises the results of recent studies, analyses their clinical relevance and provides recommendations for clinicians, helping them to make informed decisions about the choice of treatments for acute heart failure. These studies raise important questions related to the efficacy and safety of drug therapy and contribute to improving treatment outcomes and quality of life in patients with heart failure.

Materials and Methods:

A search for scientific articles, reviews, and meta-analyses in medical databases such as PubMed, Lancet, and other relevant sources was conducted to perform a literature review and systematize the findings. The studies included in the review covered the period from 2015 to 2023 and were restricted by language of scientific publication (English). Key words and phrases such as Acute Heart Failure, Current Guidelines, Therapies, Outcomes were used to search and select eligible studies.

Results:

1. Effect of Levosimendan in the therapy of Acute Heart Failure:

Levosimendan is a calcium channel sensitizer and potassium channel opener belonging to the pharmacological group "Cardiac glycosides and non-glycoside cardiotonic agents".

The mechanisms of action of the drug are associated with the following effects: increases the sensitivity of troponin fibres of cardiomyocytes to calcium ions; opens adenosine ATP-dependent potassium channels on vascular smooth muscle cells; opens adenosine ATP-dependent potassium channels in mitochondria [1,2].

It is clinically proven that renal dysfunction often accompanies heart failure and contributes to worsening the prognosis of patients and reduces their quality of life, creating a new term "Cardiorenal Syndrome" [3]. There are five types of Cardiorenal Syndrome (CRS), which are described with different pathophysiologies and clinical manifestations [4]. Within heart failure, there are two common types of renal failure syndrome: the first type is characterised by deterioration of renal function during the treatment of heart failure, and the second type is associated with a decrease in the glomerular filtration rate (GFR) to less than 60 ml/min/1.73 m² body surface area [5]. In both cases, the prognosis is more unfavourable compared to heart failure in which renal function remains normal. Several factors contribute to renal damage in these types of syndrome, including lack of renal blood supply, venous congestion, changes in renal intercellular space, renal tubule damage and loss of functioning renal tissue units, which is associated with activation of neurohormonal systems.

Three studies, namely LEVO-Rep [6], LION-Heart [7] and LAICA [8], built on observations from earlier open-label studies that indicated potential benefits of levosimendan in heart failure. These benefits include improvement in symptoms, haemodynamics and left ventricular function, as well as regulation of neurohormonal and immune processes, and possibly even improved survival. The main inclusion criteria for these studies were similar, and the LEVO-Rep and LION-Heart protocols were also very similar. The single-cycle dose of levosimendan was identical in both studies. LEVO-Rep and LION-Heart did not achieve their primary objective of functional capacity and clinical status, but achieved secondary objectives by showing a reduction in NT-pro-BNP levels and improved safety.

LION-Heart was the only study to demonstrate positive results on the primary objective, but all three studies indicate that repeated use of levosimendan reduces NT-pro-BNP levels and outlines a trend towards reduced hospitalisations due to heart failure and mortality. These studies are encouraging and strongly suggest a clinical benefit from the repeated use of levosimendan in heart failure, but additional studies, perhaps with more severe patients, are needed to more fully explore the potential of levosimendan in this area.

According to expert recommendations, when using levosimendan to treat patients, initial dose loading should be avoided to reduce the risk of hypotension. Levosimendan infusion should be given continuously for 24 hours at a rate of 0.05-0.1 μg/kg/min. Some clinicians start the infusion at a higher rate (0.2 mcg/kg/min) for the first hour to achieve the desired effect more quickly and then reduce the dose to 0.1 mcg/kg/min. It is important to consider that levosimendan has a strong vasodilatory effect and therefore its use requires caution in patients with low blood pressure. Before and during levosimendan treatment, hypovolaemia should be avoided, fluids should be administered if necessary, and steps should be taken to prevent hypokalaemia by maintaining serum potassium levels of at least 4.0 mmol/L during levosimendan infusion [9, 10].

2. Effect of Empagliflozin in the therapy of Acute Heart Failure:

Empagliflozin is a hypoglycaemic agent, an inhibitor of sodium-dependent glucose transporter type 2 (SGLT2). Empagliflozin blocks the type 2 sodium-dependent glucose transporter in the kidneys. This transporter normally reabsorbs glucose from primary urine back into the bloodstream. By inhibiting SGLT2, empagliflozin prevents glucose reabsorption, resulting in the excretion of excess glucose through the urine.

Originally developed as blood sugar-lowering agents, SGLT2 inhibitors have demonstrated efficacy in the prevention of cardiovascular disease and in patients with chronic stable heart failure. Empagliflozin induces osmotic diuresis and natriuresis in addition to reducing urinary glucose levels [11]. Continuous use leads to a decrease in body weight and blood pressure, improvement of vascular elasticity and vascular resistance. In heart failure with contractile and preserved cardiac ventricular contractile function, SGLT2 inhibition prevents a decrease in the rate of glomerular filtration.

In a study [12], early administration of empagliflozin, in addition to standard decongestive therapy, was performed in patients with acute heart failure. This resulted in a 25% increase in cumulative urine volume within 5 days of treatment. Meanwhile, empagliflozin also increased the efficacy of diuretic therapy, decreased NT-proBNP levels and showed a trend towards a reduction in body weight. Importantly, these beneficial effects were not accompanied by a worsening of renal function. These results support the efficacy of the SGLT2 inhibitor empagliflozin in the treatment of patients with heart failure. The data on the effect of empagliflozin in patients with heart failure are supported by the results of previous studies in patients with impaired renal function and impaired ventricular contractile function of the heart regardless of the presence of diabetes [13 - 16].

This study [12] differs from previous clinical trials on the effect of SGLT2 inhibitors on heart failure in several aspects. For the first time, patients were included in the study in the early period after hospitalisation (less than 12 hours), without waiting for hemodynamic stabilisation. The focus was on the early effects of SGLT2 inhibitor administration, including an assessment of risks and benefits in the initial phase of decongestive treatment of acute heart failure. Patients were observed during the most vulnerable phase of acute heart failure treatment, from admission to clinical stabilisation (complete follow-up time was 5 days). A 25 mg dose of empagliflozin was chosen to maximise the diuretic effect in acute heart failure. The use of a higher dose at the beginning allows a greater urine output to be achieved. The study was conducted to evaluate the potential adverse effects of empagliflozin in combination with high dose diuretics and other medications for heart failure. This study demonstrates that early administration of an SGLT2 inhibitor to standard diuretic therapy is a promising strategy to improve early decongestion in patients with acute heart failure.

3. Impact of Furosemide prescribing modalities in the treatment of Acute Heart Failure:

The study [17] compares two methods of administration of furosemide in the treatment of heart failure - continuous infusion and intermittent injections. A comparative table of the two routes of administration is given below (Table 1):

Continuous infusion	Intermittent bolus injection
Advantages	
1. Continuous effect on diuresis: Suitable for critical cases where continuous diuresis control is required.	1. Convenience of intervals between doses: Patients may find it more convenient to receive furosemide at intervals between injections.
2. Minimise the risk of dehydration and restore hydration: Continuous infusion of furosemide reduces the risk of dehydration and helps to restore the patient's normal hydration level.	2. Reducing the risk of fluid overload: Intermittent injections may reduce the risk of fluid overload.
Disadvantages	
1. May require closer medical supervision and dose adjustment: This method requires closer medical supervision and dose adjustment to avoid potential fluid overload.	1. Less effective in some aspects such as weight loss and BNP reduction: In some cases, intermittent injections may be less effective in terms of weight loss and BNP reduction.
2. Greater risk of irregular prescribing: In some cases, patients may not follow a strict continuous infusion schedule.	2. Need for strict regulation and supervision: This method requires stricter regulation and supervision to ensure correct dose intervals and effective treatment.

Continuous infusion of furosemide showed higher efficacy compared to intermittent injections, manifested by greater patient weight loss, increased daily urinary output and decreased BNP levels. However, both methods showed no differences with respect to mortality, duration of hospitalisation, incident elevated creatinine levels and hypokalaemia [18,19]. On analysis of BNP levels, continuous infusion was found to reduce BNP levels more effectively, but these changes did not correlate with mortality and length of hospitalisation [20,21].

The table below (Table 2) shows in which cases it is necessary to prescribe the above two methods of drug administration:

Intermittent bolus injection	Continuous infusion
1. Moderate-to-severe heart failure: In patients with less severe heart failure who do not require continuous diuresis control, intermittent injections may be more convenient.	1. Severe heart failure: In critical cases of heart failure where continuous diuresis control is required and dehydration of the patient may be dangerous, continuous infusion may be preferred.
2. Patients able to follow the prescribing schedule: If patients can strictly adhere to the intermittent injection schedule and follow dosage recommendations, this method may be effective.	2. Patients requiring intensive medical supervision: Patients requiring closer medical supervision and dose adjustment may benefit from continuous furosemide infusion.
3. Patients requiring less intensive medical monitoring: If patients have no significant medical contraindications and their condition allows for less intensive medical monitoring, intermittent injections may be appropriate.	

Conclusion:

To conclude our study, we reviewed three important aspects of pharmacotherapy of acute heart failure: levosimendan, empagliflozin and furosemide. Our results emphasise the importance of these drugs and provide important practical guidance for clinicians and specialists involved in the management of patients with this condition.

Studies on levosimendan indicate its potential as an adjunctive agent to improve the clinical status of patients with acute heart failure. Although primary goals were not met in some studies, secondary outcomes such as reduction in NT-pro-BNP levels and improvement in safety were favourable. These data support the possibility of considering levosimendan as a valuable tool in the treatment of this condition.

Empagliflozin, an SGLT2 inhibitor, has shown potential in improving the clinical status of patients with heart failure, regardless of the presence of diabetes. Its effects on glucose and osmotic diuresis make it an important element in the pharmacotherapy of this disease. A detailed study of the early use of empagliflozin in addition to standard decongestive therapy allowed us to identify its positive effects on NT-pro-BNP levels and body weight of patients, while maintaining normal renal function.

Our results also allowed us to compare two methods of furosemide administration in the treatment of heart failure: continuous infusion and intermittent injections. Despite differences in efficacy, neither method showed significant differences in mortality and length of 29ndividualized29. This allows clinicians to base their choice of the optimal treatment method on the specific needs of their patients.

In summary, our work provides a broad insight into the pharmacotherapy of acute heart failure and 29ndividual the need for 29ndividualized treatment. Our results provide a rationale for further research and the development of the most effective treatment strategies for this serious condition.

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FROM PLAYGROUND TO PRECOCIOUS PUBERTY: HOW COVID-19 TURNED PUBERTY INTO A PANDEMIC, A MULTI-COUNTRY STUDY

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ABSTRACT

Puberty is a critical phase in human development, and its timing can be influenced by various factors. This meta-analysis aimed to investigate the impact of the COVID-19 pandemic on precocious puberty covers three studies from Italy, Brazil, and China. A statistically significant correlation was observed between the pandemic and a rise in the incidence of precocious puberty.

The COVID-19 pandemic and associated stress, lifestyle changes, and altered socioeconomic conditions may have contributed to the observed increase in precocious puberty. Further research is needed to better understand the mechanisms underlying these associations and to develop strategies for mitigating the impact on children's health and well-being.

Keywords: Covid-19, precocious puberty, lifestyle changes, obesity, menarche, screen time.

1. Introduction:

Puberty represents the dynamic phase when an individual transitions from childhood to adulthood, acquiring full reproductive capacity. In girls, puberty typically begins with the development of breasts (thelarche) and is later followed by the onset of the first menstrual period (menarche), occurring approximately three years later. The timing of puberty varies considerably among individuals, ranging from 8 to 13 years of age in girls and 9 to 14 years in boys.

During normal puberty, the hypothalamic-pituatary-gonadal (HPG) axis is activated, leading to the development of secondary sexual characteristics. Puberty begins with the release of gonadotropin-releasing hormone (GnRH) in a pulsatile pattern, mainly during sleep. This secretion stimulates the release of both follicle-stimulating hormone FSH and luteinizing hormone LH from the pituitary gland. In females, FSH promotes the maturation of ovarian follicles and the production of estrogen, while LH stimulates the production of androgens which triggers ovulation. In males, FSH affects spermatogenesis while LH helps with testosterone production.

a shift towards an earlier puberty onset has been observed for the last few decades. In 1973, the medium menarche age was 12.8 years in females [1] while in 2016/2017 it was 11.1 years [2]. this change was correlated with genetic factors, environmental changes, diet, body weight and endocrine disruptors. However the incidence of early puberty, also called precocious puberty has increased worldwide during the covid-19 pandemic.

Precocious puberty is a medical condition in which a child's body begins to develop and mature earlier than usual. This can include the development of breasts, pubic hair, and menstruation in girls, and the growth of facial and body hair, deepening of the voice, and enlargement of the testicles in boys.

Precocious puberty can be classified into two categories: central (true) precocious puberty and peripheral (incomplete) precocious puberty. Central precocious puberty (CPP) is characterized by its dependence on gonadotropin-releasing hormone (GnRH) and is frequently of idiopathic origin, accounting for approximately 75% of cases. Peripheral precocious puberty (PPP); also known as pseudo puberty is GnRH-independent and is caused by exogenous sex steroids secretion.

At the end of 2019, a novel coronavirus known as SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) was identified as the underlying cause of an outbreak of atypical pneumonia in China. This newly emerged disease, referred to as Covid-19, rapidly spread across the globe, ultimately resulting in a widespread pandemic.

In March of 2020, hospitals were completely saturated with maximum occupancy of beds in the intensive care units. In an attempt to limit the spread of Covid-19; global lockdown and strict quarantine measures were applied. As schools shifted to e-learning, and different job positions adapted to remote work regime using different digital platforms, lifestyle changes had to be applied.

During the lockdown and after the end of the strict quarantine measures, an increase in the outpatient consultations for suspected precocious puberty was recorded worldwide. In Italy consultation increased by 122% while Brazil reported 50%, china reported an increase from 0.4% in 2018 to 6.23% in 2020.

It was noted through all 3 studies that time spent on electronic devices increased during lockdown, while daily physical activity decreased. Eating habits changed and stress related symptoms were observed in children and adolescents throughout the pandemic.

2. Methods:

Subjects:

the Italian study covered 490 subjects above the age of 3 years, divided into 2019 and 2020 groups, and four subgroups based on their diagnosis including: transient thelarche (TT), non-progressive precocious puberty (NPP), central precocious puberty (CPP), and early puberty (EP) from March- September 2019 compared to March- September 2020.

The Brazilian study had the smaller sample size with 55 subjects divided into two groups; a convenience sample including 22 girls diagnosed with precocious puberty during Covid from July 2020 to June 2021 and a control group of 33 girls diagnosed with precocious puberty prior to covid from March 2019 to February 2020.

The Chinese study coved 240 subjects between the age of 5-9 years and were divided into two groups; a convenience group including 58 girls diagnosed with central precocious puberty, and 58 girls diagnosed with transient thelarche. And a control group including 124 healthy age matched girls. This investigation was between February and May 2020.

Exclusion / inclusion:

All three studies excluded boys as females are 5 times affected than males for the idiopathic variant of precocious puberty. the Italian study included 10 boys who were later excluded because there was no difference between the results of 2020 and 2019 with 10 vs 12 cases respectively.

Studies also excluded precocious puberty associated with hypothalamic-pituitary malformations, congenital adrenal hyperplasia, neurological and genetic diseases, psychomotor retardation and endocrine diseases that require hormonal treatment or caused by exogenous factors, different intracranial lesions and Silver Russell Syndrome.

Data collection:

Physical examination:

All three studies measured the pubertal age according to Marshall & Tanner's genital stage. Height, weight and BMI of the subjects was expressed as standard deviation score SDS according to World Health Organization (WHO) Graphs.

the Chinese paper included abdominal and hip circumference, a physical examination of the cardiopulmonary system, the liver and the spleen.

Laboratory measures:

The Italian study measured Estradiol, leuteinizing hormone (LH), follicle stimulating hormone (FSH) and testosterone levels. And Gonadotropin-releasing hormone (GnRH) stimulation test was performed.

The Brazilian study measured Estradiol, LH, and FSH.

While the Chinese study measured melatonin and serotonin levels, both leptin and kisspeptin levels, LH, FSH, E2 and vitamin D levels.Tests on the cardiovascular system, liver and kidney function, thyroid function and Insulin-like growth factor-1 were preformed.

Bone age assessment:

All three studies assessed the bone age through the Greulich and Pyle method.

The Chinese study included abdominal and hip circumference.

Imaging:

A pelvic ultrasound was performed on both the Italian and Brazilian studies and assessed the maturity of the reproductive system. The Italian paper focused on uterine longitudinal diameter (mm) and endometrium pattern, while the Brazil's paper focused on the ovarian volume (ml).

While the Chinese study performed a gonadal color doppler ultrasound and pituitary magnetic resonance imaging.

Questionnaire:

The Italian lifestyle questionnaire included physical activity, different eating habits, screen time and electronic use, and pandemic related stress.

The Brazilian questionnaire covered physical activity, eating habits and electronic use.

The Chinese study covered a wider range of potential factors including but not limited to: sex, age, place of residence, date of diagnosis. Parental information including career, educational background, and mother's monarch age, time spent with parents Physical activity, eating habits, electronic use, sleeping schedule, second hand smoke, exposure to hazardous substances, the use of adult cosmetics, use of plastic products, etc…

3. Results:

3.1 the Italian study results after analyzing 152 subjects between March - September 2019 compared to 338 subjects in 2020 of the same period showed a clean increase of +122%

This increase was strongly noted in girls compared to boys especially during the second half of the period, whereas the boys, showed no difference.

The family history was positive for early puberty in 30% of the total female subjects with no difference between 2019 and 2020.

Both the 2019 and 2020 subgroups were found to have a postnatal weight gained.

As for the percentage of girls diagnosed in 2020 and 2019 respectively with Central precocious puberty is 41% vs 26%. Early puberty at 10% vs 17%. Transient thelarche with no difference. Non progressive puberty with no difference.

Life style questionnaire revealed an increase in the use of electronic devices due to e-learning during quarantine while still maintaining the same 5-10h/week on online leisure activities. A noticeable decrease in physical activity in the majority of subjects was observed, from (1-2h/week) in 2019 vs (never to 1-2 h/week) in 2020 vs leading a sedentary lifestyle. Hello

47% of the subjects reported an increase in hunger and craving of sweets. While 59% of the subjects reported pandemic related stress.

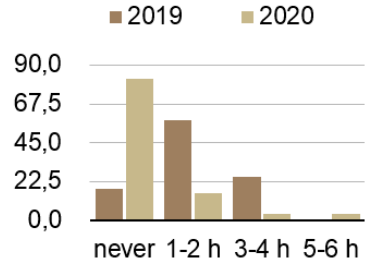

Figure 1: CPP physical activity (Italy)

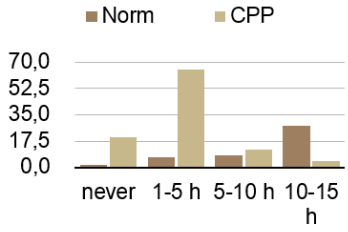

Figure 2: Weekly use of electronic devices in 2020 (Italy)

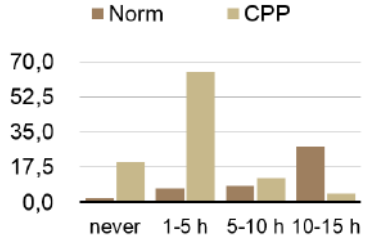

Figure 3: Weekly use of electronic devices in 2020 (Italy)

3.2. the Brazilian study analyzed 55 girls, divided into two groups, 22 girls diagnosed with precocious puberty during Covid-19 from July 2020 to June 2021, and 33 girls diagnosed prior to Covid from March 2019 to February 2020.

The clinical, laboratory and radiological data concluded that the subjects who developed PP during the pandemic were more advanced in age (7.15 vs 6.74 years; p = 0.10). However, according to the parents' perception of the breast to diagnosis was much lower (6.65 vs 12.15 month; p + 0.02). The girls were on average taller with a mean Z-score for height of (0.76 vs 0.22), and the weight was higher as obesity was more prevalent in the group that developed PP during the pandemic.

The bone age and chronological age were similar between the two groups. And the laboratory results did not indicate any difference. However, the pelvic ultrasound showed reduced pubertal ovary in girls diagnosed with PP during covid compared to the girls who were diagnosed prior to covid, and these results match with the ones of an Italian study done in 2019 on 39 female subjects diagnosed with CPP as shown in the ultrasound in figure 4. [3]

The lifestyle questionnaire revealed increased exposure to electronic devices due to e-learning., major dietary changes such as a higher consumption of carbohydrates and sugary drinks, and lower physical activity as a result of quarantine which eventually led to a higher BMI.

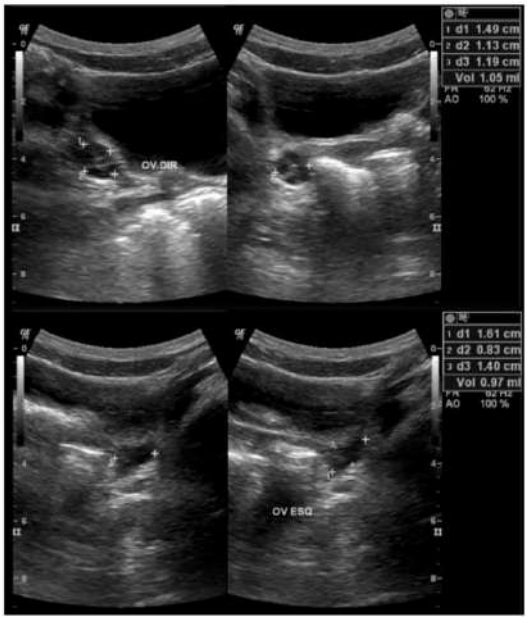

Figure 4: Ovarian ultrasound of a girl diagnosed with precocious puberty during the COVID-19 pandemic showing a reduced pubertal ovary. The patient started puberty at 7 years and 3 months (May 2020); August 2020: height 1.67 SDS, weight 1.53 SDS, BMI 1.1 SDS, Tanner stage 3.

3.3 the Chinese study stated that the number of female new onset of precocious puberty out-patient data collected from 22 medical institutes shows in increase from 4281 girls in February - may 2020 (5.01 times more) compared to 1346 girls in 2019 (3.14 time more) and 855 girls in 2018.

From February to May 2020, there were 2,141 consultations, which is 20.01 times higher than the number of consultations in the same period in 2018 (107 visits). It is also 6.21 times higher than the number of consultations in the same period in 2019 (345 visits). This increase represents a significant growth from 0.41% in 2018 to 9.88% in 2022. These results were constant throughout all multi-center study.

Analysis of the risk factors shows that girls who received a diagnosis of central precocious puberty (CPP) and PT were significantly taller and overweight in comparison to the group of individuals serving as controls.

The convenience group was exposed to many other risk factors including less physical activity, prolonged use of electronic devices, frequent use of night

light, a notable deficiency of vitamin D, younger age of mother's menarche, the use of adult cosmetics, residence in rural settings, expose to second hand smoke etc.

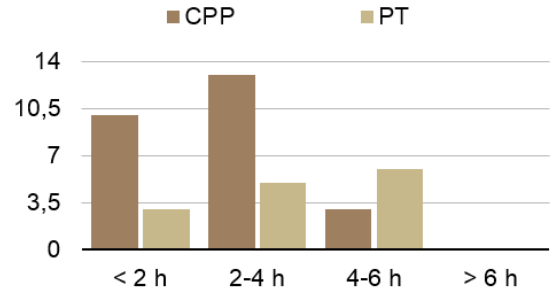

Figure 5: CPP vs PT physical activity (china)

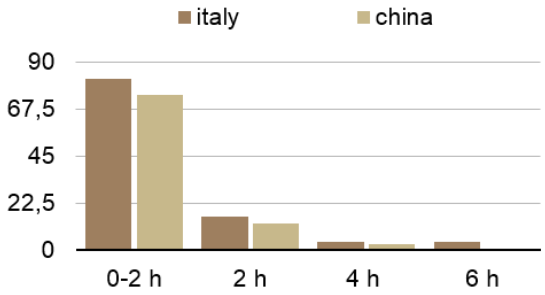

Figure 6: CPP italy vs CPP china physical activity.

The related hormone measurements showed a notable difference in serotonin, melatonin, leptin, and kisspeptin levels across all the three groups.

The CPP group had higher LH, FSH, E2 and leptin levels. Whereas the TT group had a higher MT, FSH, E2 and leptin levels.

Serotonin was higher in the control group, with CPP and TT groups being the same.

Kisspeptin was noticeably higher in CPP and TT groups than the control group in which CPP and TT groups being the same.

Melatonin levels were higher in PT groups than the control group, However, there were no significant differences observed in these levels between the CPP and TT groups, as well as between the CPP and control groups.

The data obtained from the questionnaire revealed several significant factors, including prolonged usage of electronic devices, reduced physical activity, unhealthy eating habits characterized by the consumption of processed and fried foods, elevated BMI, deficiency in vitamin D, and extensive exposure to secondhand smoke, the use of adult cosmetics, and living in rural areas.

Table 1

Anthropometric characteristics of patients with precocious puberty during the covid-19

	Italy	**Brazil**	**China SDS**	**China**
CA	7.39 ± 0.84	7.70 ± 0.62	7.31 ± 1.00	7.31 ± 1.00
BA	8.87 ± 1.22	9.55 ± 1.34	8.91 ± 1.32	8.91 ± 1.32
Height SDS	0.82 ± 1.01	0.76 ± 1.19	1.55 +- 2.3	132.76 ± 7.01
Weight SDS	0.52 ± 1.01	1.08 ± 1.29	1.66 +- 1.15	32.93 ± 6.57
BMI SDS	0.24 ± 1.54	0.96 ± 1.34	1.32 +- 0.16	18.02 ± 2.36
Overweight	-	22.73%	22.41%	22.41%
Obesity	-	36.36%	22.41%	22.41%

CPP, central precocious puberty; CA, chronological age; BA, bone age; BMI, body mass index.
Parameters are expressed as standard deviation score (SDS). mean ±.

Table 2

Laboratory parameters in patients with precocious puberty during the covid-19 pandemic.

	Italy	**Brazil**	**China**
LH (IU / L)	1.21 ± 1.72	1.28 ± 2.17	1.96 ± 2.50
FSH (IU / L)	3.95 ± 2.12	4.33 ± 3.05	3.48 ± 1.91
Estradiol (pg /ml)	12.13 ± 20.17	25.61 ± 15.97	
Ovarian volume (ml)	3.32 ± 0.42 cm3	1.88 ± 0.95	

4. Discussion:

All three studies show an increase in reported precocious puberty cases during the pandemic.

The Italian paper is the only one not to report a weight gain in its subjects, that could be due to many factors; including the Mediterranean diet that's rich in antioxidants or the active lifestyle. Some studies show that even when Italian children gain weight, the obesity is uncomplicated and rarely does it develop to something more serious with long term conditions [4].

The Covid-19 pandemic was a stressful period of time. schools switched to an online format and quarantine was implemented, preventing kids from socializing and being around friends. Masks were implemented and the news talked about Covid deaths and complications 24/7, millions of people lost their jobs, while kids were isolated home. The combination of inevitable exposure to the socioeconomic effect of covid with complete home isolation for months can have a psychoemotional effect on children. In china, 22.6% of primary school children reported depressive symptoms while 18.9% reported stress and anxiety [5].

Dietary changes were observed around the world with people reporting noticeable weight gain during the initial three-month period of quarantine. However this behavioral change in eating habits is unique to Covid quarantine. Quarantine allowed people to stay more at home, surrounded by their families which gives them more time to cook and prepare healthy meals. And grocery shopping became easier because stores don't struggle with rush-hour anymore and home delivery is readly available. Even with all these factors that are supposed to push for a healthier eating; snacks, sugary drinks and carbohydrates were the most consumed. This bing eating behavior can be traced back to the psycho-emotional state of the children. A study done in 2014 showed that people in a good mood tend to favor healthier food with a higher level of benefits and smaller portions, while subjects with neutral to negative moods chose unhealthy food and larger portions to consume [6]. Menarche is associated with height rather than age, and needs at least 22% body fat to be triggered, which is among the contributing factors why it occurs earlier in overweight girls [7].

An average 8 year old nowadays spends 6 hours in front of a screen, however this activity doubled during quarantine due to e-learning, and communicating with friends through different social media platforms, however, the average personal leisure time did not go down, resulting in kids spending 27% more time on electronic devices everyday [8].

The OSF healthcare recommends a maximum of 2 hours screen time per day for individuals aged 5 to 17 [9]. Children spending long hours in front of electronic devices exposes them to electromagnetic radiation.

Many studies show the negative effect of EMF on the human body, especially children. EMF are known to have a negative effect on the fetal development, neurological development, the reproduction system in both females and males, endocrine disturbances.

In 1950s, Soviet medical researchers identified "radiofrequency radiation sickness", and its symptoms observed encompassed headaches, fatigue, sleep disturbances, and other related effects that are typically reversible during the early stages. The study further determined that in the long term, these symptoms can potentially lead to the development of tumors, reproductive and cardiovascular abnormalities, as well as contribute to depression, irritability, and memory impairment. [10]

The reproductive system is highly susceptible to the effects and influences observed in various physiological and environmental factors. An experiment done on cows which were exposed to 60Hz EMF for 4 weeks (16 hours per day), showed an alteration in circulating melatonin and prolactin levels, as well as the estrous cycle [11] while another study showed that EMF exposure in female rats lead to a decrease in the number of their follicles. the follicles become defected after exposure but keep growing, resulting in later complications [12][13]. The effect of EMF on children is dependent on: frequency, duration and strength of the radiation.[13] but nonetheless, it can have a permanent effect on the body especially the reproductive system.

Not only does the long use of electronics exposes the children to EMF, the blue light from the screen has very serious effects on the body. Melatonin is hormone that's produced by the pineal gland, it has an antioxidant effect that lowers DNA damage. [10]. Inadequate sleep quality and heightened fatigue have been associated with decreased levels of nocturnal melatonin and increased levels of nocturnal norepinephrine [10]. melatonin regulates the pulse of LHRH in the hypothalamus, influencing gonadotropin FSH and LH. When melatonin is decreased, it alters The synthesis of sex hormones, resulting in changes in the reproductive cycle such as infertility [13]. Many studies have shown a direct relation between poor sleeping habits and weight gain, with obesity being more common in kids with irregular sleeping schedules [14]

Obesity in children is more dangerous than adults, an experiment done in 2021, showed that mice who had been subjected to a diet rich in fat at a young age developed precocious puberty and indulged in risky behaviors, the mice were later exposed to a healthier diet in adulthood and lost weight, however, the effect of PP had an irreversible neural damage like memory impairment and high anxiety [15], some other studies show that it's harder for obese kids to lose wight as adults due to their neurological and metabolic permanent changes that occurred during puberty. [14]

Genetics and maternal lifestyle play a big factor in the development of precocious puberty. Early menarche may be trans-generation, some studies have found that the mother of the child and the mother of the father's monarch age may predict the age of the child's first menstrual cycle [16]. An association was made between the onset of menarche and the risk of diabetes in adults, where it was revealed that a lower age of menarche in girls is associated with an increased likelihood of developing diabetes mellitus later in life due to increased adiposity [17] while girls with early menarche age tend to have rapid weight gain and growth during infancy, which leads to taller childhood status and earlier maturation, therefore shorter adult stature, which

explains the 95 percentile height in the girls compared to their peers. This growth pattern was shown to be increase adult obesity risks [16]

While a study done on treated and untreated women with idiopathic precocious puberty, found that the untreated women suffer long term outcomes, like neurological and endocrine dysfunction, hyperandrogenism, and higher infertility problems [18] while 15% of women who suffered ICPP had oligomenorrhea, 28% had clinical hyperandrogenism, 48% biochemical hyperandrogenism, and 37% PCOM. The study also found that patients with ICPP are prone to develop PCOS at least 3 years after menarche (18 years old / +- 3 years). A total of 32% of the patients had PCOS according to the Rotterdam definition and 30% had PCOS according to the Androgen Exess Society. [19]

Conclusion:

Our findings suggest a significant correlation between the incidence of precocious puberty cases during the COVID pandemic and an unhealthy lifestyle. Factors such as an imbalanced diet, limited physical activity, excessive screen time, genetic predisposition, and exposure to endocrine-disrupting chemicals have been shown to negatively impact the onset of precocious puberty. Therefore, we recommend the implementation of a healthy, well-rounded lifestyle, including a balanced diet rich in fruits and vegetables, regular exercise and outdoor activity, parental supervision of screen time, and increased attention to the child's mental and physical health, to facilitate early detection and diagnosis.

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АНАТОМО-КЛІНІЧНЕ ОБГРУНТУВАННЯ ХІРУРГІЧНОГО ДОСТУПУ ДО ПІДКЛЮЧИЧНОЇ АРТЕРІЇ

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ANATOMICAL AND CLINICAL JUSTIFICATION OF SURGICAL ACCESS TO THE SUBCLAVIAN ARTERY

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АННОТАЦІЯ

Різноманітність хірургічної патології, травми з ушкодженням стовбура та основних гілок різних відділів підключичної артерії обумовлюють необхідність оптимального обрання хірургічного доступу для виконання оперативного втручання з урахуванням даних клінічної анатомії. Метою дослідження було порівняти різні види оперативних доступів до підключичної артерії та надати топографо-анатомічне обґрунтування вибору оптимального доступу до різних відділів артерії залежно від патологічного стану. В роботі проаналізовані та порівняні основні доступи до різних відділів підключичної артерії в залежності від показань до оперативного втручання. В результаті аналізу встановлено, що вибір хірургічного доступу до підключичної артерії залежить від характеру патології, локалізації процесу, мети та обсягу втручання. Основним доступом є надключичний. Він дозволяє виконати переважну більшість операцій в зоні підключичної артерії (при атеросклерозі підключичної артерії, для усунення компресійних синдромів грудного виходу, корекції патологічної звивистості хребтових артерій, верхньогрудної симпатектомії); є малотравматичним, може виконуватися з обох боків та сполучатися з іншими доступами та іншими видами операцій. Перспективним напрямком є застосування новітніх мініінвазивних хірургічних технологій – ендоваскулярна балонна ангіопластика та стентування підключичних та хребтових артерій, відеоторакоскопічні операції та ін.

ABSTRACT

The diversity of surgical pathology, injuries with damage to the trunk and main branches of different departments of the subclavian artery determine the need for optimal selection of surgical access for surgical intervention taking into account the clinical anatomy. The aim of the study was to compare different types of surgical access to the subclavian artery and to provide a topographical and anatomical rationale for choosing the optimal access to different sections of the artery depending on the pathological condition. The paper analyzes and compares the main accesses to different departments of the subclavian artery, depending on the indications for surgical intervention. As a result, of the analysis, it was established that the choice of surgical access to the subclavian artery depends on the nature of the pathology, the localization of the process, the goal and scope of the intervention. The main access is supraclavicular. It allows performing the vast majority of operations in the area of the subclavian artery (with atherosclerosis of the subclavian artery, to eliminate compression syndromes of the thoracic outlet, correction of pathological tortuosity of the vertebral arteries, upper thoracic sympathectomy); is low-traumatic, can be performed from both sides and can be combined with other accesses and other types of operations. A promising direction is the use of the latest minimally invasive surgical technologies - endovascular balloon angioplasty and stenting of subclavian and spinal arteries, video - thoracoscopic operations, etc.

Ключові слова: підключична артерія, оперативний доступ.

Keywords: subclavian artery, operative access.

Вступ

Актуальність теми обумовлена різноманітністю хірургічної патології, при якій виникають показання до виконання оперативних втручань в зоні підключичної артерії та різноманітністю хірургічних доступів для виконання оперативних втручань: доступ за Джанелідзе, за Петровським, надключичний, підключичний, дельтоідео-пекторальний та комбіновані доступи.

Мета: порівняти різні види оперативних доступів до підключичної артерії та надати топографоанатомічне обґрунтування вибору оптимального доступу до різних відділів артерії залежно від патологічного стану.

Види оперативних доступів

Доступи за Джанелідзе (дугоподібний) та Петровським (Т-подібний) запропоновано для лікування травматичних ушкоджень підключичної артерії та її гілок (внутрішньої грудної та ін.) [1]. Вони передбачають перепилювання ключиці, або підокісну резекцію частини ключиці. Ця процедура суттєво збільшує операційну травму та час виконання доступу; не є простою та небезпечною, особливо за наявності значної гематоми. До того ж доступи можуть виявитися недостатніми для виконання основного етапу операції (судинного шва або виконання ангіопластики) та санації грудної порожнини при ушкодженні внутрішньогрудної частини артерії, що супроводжується масивною внутрішньогрудною кровотечою. Тому у випадках ушкоджень проксимальної частини підключичної артерії (справа) або брахіо-цефального стовбуру більш доцільно застосувати поздовжню стернотомію (можливе сполучення з надключичним доступом); верхню передньо-бічну торакотомію зліва у ІІІ міжребер`ї [11,12]. При пораненнях середньої та дистальної частини підключичної артерії виконують надключичний доступ можливе сполучення з підключичним.

Основним доступом до зони підключичної артерії для лікування судинних та нейросудинних захворювань таких як атеросклероз, нейро-васкулярний компресійний синдром грудного виходу, патологічна звивистість хребтових артерій, синдром Рейно є надключичний екстраплевральний доступ. Він є достатньо простим та малотравматичним, не викликає порушень кісткової основи та дихальної функції, при необхідності може комбінуватись з іншими доступами (підключичним, дельтоідео-пекторальним), та може виконуватися з обох боків. Залежно від довжини, цей доступ забезпечує достатню експозицію та вільні маніпуляції на позагрудній частині підключичної артерії. Дозволяє виконувати операції з приводу атеросклерозу підключичної артерії (ендартеректомія, сонно-підключичне шунтування та транспозицію підключичної артерії у загальну сонну), оперативну корекцію патологічної звивистості хребтової артерії [3], декомпресійні операції при нейро-васкулярному компресійному синдромі грудного виходу (скаленотомія, резекція шийного ребра та ін.), верхньогрудну симпатектомію [2].

Технологія надключичного доступу. Розріз виконують вище на 1 см та паралельно від ключиці. Довжина розрізу залежить від мети та плану основного етапу операції. Для ендартеректомії або шунтування підключичної артерії виконують розтин значних розмірів – від грудино-ключичного суглоба на протязі близько 3/4 ключиці. Якщо необхідно мобілізувати лише проксимальну частину підключичної артерії (І-ІІ порції) для операції на хребтовій артерії або для грудної симпатектомії достатнім є розріз довжиною 6 см. Розсікають шкіру, поверхневу фасцію та підшкірний м`яз (за допомогою електрокоагулятору), власну фасцію шиї. Якщо необхідно, перетинають ключичну ніжку m. sterno-cleido-mastoideus (у більшості випадків достатньо відтіснити її ранорозширювачем Фарабефа медіально). Пересікають проміж затискачами та лігують поперечну вену шиї або зовнішню яремну вену; у разі необхідності - m. omohyoideus. Розділяють клітковину у латеральному трикутнику шиї та в глибині його медіальної частини (позаду грудино-ключично-соскоподібного м`язу) знаходять передній драбинчастий м`яз; який вкритий передхребтовою (V) фасцією шиї. Згори його біля зовнішнього, а унизу – по медіальному краю спереду м`язу під фасцію його косо перетинає n. phrenicus, який треба обережно виділити та відвести гачком Фарабефа у медіальний бік від м`язу. Обережно перетинають по часткам за допомогою електрокоагулятора передній драбинчастий м`яз (скаленотомія) або виконують його резекцію. Перед перетином м`язу треба ретельно оглянути його співвідношення з розташованою позаду нього підключичною артерією (м`яз може викликати компресію артерії або тісно прилягати до неї). Ознаки компресії: перегин та звуження артерії, наявність аневризматичного розширення дистальніше від краю м`язу. Ножицями за допомогою електрокоагулятора починаючи з передньої поверхні м`язу до заднього апоневротичного листка м`яз перетинають по часткам біля місця його прикріплення до І ребра. Артерія може бути тісно зрощена з м`язом, тому треба обережно відділити від неї апоневротичний листок та пересікти його. Таким чином звільнюють та мобілізують підключичну артерію у межах операційної рани, відділяючи від тканин, що її оточують, з допомогою судинних інструментів. Якщо під час операції виявляють аномальне додаткове шийне ребро, його обережно мобілізують та резектують адже шийне ребро викликає компресію підключичної артерії та нервів плечового сплетення [2,9,10].

За відсутності компресійного синдрому, для корекції патологічної звивистості хребтової артерії або для виконання грудної симпатектомії, можливо відтіснити передній драбинчастий м`яз латерально (медіальний доступ), не перетинаючи його. Для корекції патологічної звивистості хребтову артерію відсікають від підключичної, резектують її надлишок (зазвичай, патологічно змінений проксимальний відрізок) та реплантують у старе гирло або у гирло щито-шийного стовбуру. Під час виконання симпатектомії мобілізують зірчастий вузол симпатичного стовбуру (що заходиться позаду та дещо

латеральніше від хребтової артерії біля її початку); резектують його нижню третину, а також II-III грудні ганглії [2].

Додатковий підключичний доступ застосовують для мобілізації та резекції патологічного I ребра (надмірно широке, високо розташоване ребро); якщо виконання скаленотомії виявляється недостатнім для звільнення від компресії підключичної артерії та нервів плечового сплетення (косто-ключичний компресійний синдром). Найчастіше скаленотомія є достатнім заходом для декомпресії що відбувається за рахунок опущення ребра після її виконання.

Дугоподібний дельтоідео-пекторальний доступ до дистальної частини підключичної артерії та переходу її у пахвову застосовують у разі гіперабдукційного (дзьобо-пекторального) компресійного синдрому – здавлення судинно-нервового пучка сухожилком малого грудного м`яза. Після розрізу поверхневих тканин у дельтоідео-пекторальній борозні мобілізують та перетинають (резектують) малий грудний м`яз; що дозволяє звільнити судинно-нервовий пучок. Операцію виконують зазвичай як додаток до скаленотомії та симпатектомії [2]. Доступ також може буте використаний для підключично-пахвової лімфодисекції.

Застосування інноваційних технологій.

Відеоторакоскопічну верхньогрудну симпатектомію виконують після накладання пневмотораксу, в умовах однолегеневої ШВЛ. Перший торакопорт для оптичної трубки торакоскопу вводять у четвертий міжреберний проміжок по середній пахвовій лінії. Після візуальної ревізії плевральної порожнини, вводять торакопорти для маніпуляторів у третій міжреберний проміжок по задній та передній пахвовим лініям. Легеню зміщують униз та медіально, після чого симпатичний стовбур видно крізь парієтальну плевру. Плевру розсікають, виділяють симпатичний стовбур та видаляють таким чином нижній полюс зірчастого ганглію, Th II-III ганглії. Метод застосовують у разі відсутності компресійних синдромів, при дистальних ураженнях артерій верхньої кінцівки, при синдромі Рейно, гіпергідрозі [2,7,8,14]. Даний метод може бути поєднаний із ендоваскулярними втручаннями на підключичній артерії.

Відеоторакоскопічну технологію застосовують також для операцій на внутрішній грудній артерії: лімфодисекція внутрішніх грудних судин при медіальній локалізації раку молочної залози та при кардіохірургічних операціях.

Ендоваскулярні операції застосовують у випадках обмеженого атеросклеротичного стенозу підключичної артерії, гирла хребтової артерії та брахіоцефального стовбура. Ендоваскулярний доступ виконують шляхом катетеризації (за Сельдингером) стегнової артерії. Після виконання ангіографії катетер зі спеціальним балоном вводять в уражену судину та роздимають (балонна ангіопластика). Після чого у судині залишають стент - ендоваскулярна балонна ангіопластика та стентування. Метод дозволяє відновити кровообіг у кінцівці та головному мозку, уникнувши у більшості випадків складних та травматичних відкритих втручань [4,5,6,13].

Висновки

1. Вибір хірургічного доступу до підключичної артерії залежить від характеру патології, локалізації процесу, мети та обсягу втручання.

2. Основним доступом є надключичний. Він дозволяє виконати переважну більшість операцій в зоні підключичної артерії (при атеросклерозі підключичної артерії, для усунення компресійних синдромів грудного виходу, корекції патологічної звивистості хребтових артерій, верхньогрудної симпатектомії); є малотравматичним, може виконуватися з обох боків та сполучатися з іншими доступами та іншими видами операцій.

3. Перспективним напрямком є застосування новітніх мініінвазивних хірургічних технологій – ендоваскулярна балонна ангіопластика та стентування підключичних та хребтових артерій, відеоторакоскопічні операції та ін.

Інформація про конфлікт інтересів

Потенційних або явних конфліктів інтересів, пов'язаних з цим рукописом, на момент публікації не існує і не передбачається.

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PEDAGOGICAL SCIENCES

АНАЛИЗ СТРУКТУРЫ ПРОФЕССИОНАЛЬНО-ПЕДАГОГИЧЕСКОЙ КОМПЕТЕНТНОСТИ УЧИТЕЛЯ ИНФОРМАТИКИ

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ANALYSIS OF THE STRUCTURE OF PROFESSIONAL AND PEDAGOGICAL COMPETENCE OF COMPUTER SCIENCE TEACHERS

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АННОТАЦИЯ

Статья посвящена анализу компонентов профессионально-педагогической компетентности учителя информатики в контексте быстро меняющегося информационного общества. Роль учителей информатики становится ключевой в подготовке учащихся к современным вызовам, и в этой связи выделяется восемь основных компетенций: предметная, методическая, социально-психологическая, коммуникативная, цифровая, компетенции саморазвития и профессионального роста, креативная и оценочная компетенции. Также подчеркивается важность развития всех этих компонентов для успешной педагогической деятельности и обеспечения качественного образования в цифровом обществе.

ABSTRACT

The article is devoted to the analysis of the components of the professional and pedagogical competence of a computer science teacher in the context of a rapidly changing information society. The role of computer science teachers is becoming key in preparing students for modern challenges, and in this regard, eight main competencies are identified: subject, methodological, socio-psychological, communicative, digital, self-development and professional growth competencies, creative and evaluative competencies. The importance of developing all these components for successful teaching activities and ensuring quality education in a digital society is also emphasized.

Ключевые слова: Профессионально-педагогическая компетентность, учитель информатики, компоненты профессиональной компетентности.

Keywords: Professional pedagogical competence, computer science teacher, components of professional competence.

Introduction

Modern education is at the center of rapid technological and sociocultural development, which gives particular importance to the role of computer science teachers. These teachers are responsible for developing not only technical skills, but also a whole range of competencies necessary for successful adaptation to modern digital society. The professional and pedagogical competence of a computer science teacher is becoming a key factor in ensuring effective learning and successfully preparing students for the future.

The ICT sector plays a vital role in various aspects of public life. In a world where digital technologies such as artificial intelligence, big data, the Internet of Things and the cloud are rapidly changing our reality, computer science teachers are becoming key agents in preparing younger generations for the modern digital age. Their role is not limited to simply transferring knowledge; they are also responsible for developing their students' skills in analysis, critical thinking, problem solving, communication and creativity.

Today's computer science teachers must address the diverse needs and abilities of their students, provide personalized learning experiences, and promote digital literacy and ethical use of information and digital technologies. All this requires them to possess a wide range of professional and pedagogical competencies.

The purpose of the article is to analyze the components of the professional and pedagogical competence of a computer science teacher, to determine their role and importance in the educational process. This research is aimed at identifying and describing the key competencies required for a computer science teacher in the context of modern education.

Literature review

2.1. Concept of competence and competency

Interest in the problem of competencies arose in the late 1960s due to the fact that assessing students' performance only by the amount of reproducible

knowledge did not allow them to fully determine their readiness to work independently and apply this knowledge in practice. Therefore, the issue of competencies has become relevant in the field of education.

An analysis of works on the issue of competence and competency allows us to conditionally identify three stages in the development of competency-based education:

The first stage (1960-1970) is characterized by the introduction of the concepts of "competence" and "competence". During this period, attention to competence and competency in education began to grow. Assessing students' performance solely on the basis of knowledge turned out to be insufficient to determine their readiness to solve practical problems and perform independent activities. The concepts of "competence" and "competence" have become important for identifying not only knowledge, but also skills and abilities.

The second stage (1970-1990) represents a deeper introduction of the competency-based approach into educational programs, where competencies become central elements of learning. Educational programs began to focus on the development of student competencies, and not just on the transfer of factual knowledge. This reorientation of education was a response to changing needs in the labor market and society as a whole.

The third stage is characterized by the introduction of the concept of "professional competence". At this stage, attention was paid to a narrower aspect of competence - professional competence. This concept reflects the specific skills and knowledge required in a particular professional field. The introduction of the concept of "professional competence" was an important step in the development of education, as it emphasizes not only general competencies, but also specialized skills necessary for successful professional activity.

These stages in the development of competency-based education emphasize the importance of developing student competencies in the context of modern challenges and needs of society.

2.2. The concept and structural components of professional and pedagogical competence of a computer science teacher

The professional and pedagogical competence of a teacher is a key aspect of his professional training and successful activities in the educational field. It is a set of knowledge, skills, beliefs and values that enable a teacher to interact effectively with students and provide quality education.

The concept of "professional competence of a teacher" has become the object of research in many scientific studies. Researchers such as Zimnyaya I.A. [7] and Tatur Yu.G. [4], consider the professional competence of a teacher as the most important characteristic that determines his readiness to teach and includes a variety of competencies

Professional competence of a teacher is the knowledge, ability and readiness to professionally solve practical problems in teaching and developing the student's personality and developing his practical skills [1].

The monograph "Development of Professional Competence of a Teacher" reveals the theoretical and practical aspects of the development of professional competence of a teacher [3].

In the research by Zakirova M.R. [8,9] emphasize that for a competent teacher it is not enough just to have information literacy and the ability to develop appropriate information skills in his students. It is important that a competent teacher promotes the use of information and communication technologies among students for the purpose of successful cooperation, solving current problems, and developing self-learning skills.

In the research by Kruchinina G.A. and Akimova I.V. The professional competence of future computer science teachers is considered as a generalized characteristic that is formed on the basis of practical experience in this field. This competence reflects a set of knowledge and skills, as well as the ability for self-development and solving new professional problems. Researchers identify three components in the structure of a computer science teacher's professional competence: subject-matter, methodological, and components related to information and communication technologies (ICT) [2].

From March 1, 2021, in the Republic of Uzbekistan, in order to improve the system of retraining and advanced training for managers, specialists and teaching staff operating in the field of public education, a new system of retraining and advanced training has been introduced based on a study of the needs of public education workers for advanced training and through the introduction of special electronic platform [5]. To ensure a more effective and convenient learning process and advanced training, a special electronic platform "Continuing Professional Education" has been introduced, which provides the opportunity for public education workers to study the necessary courses online.

To improve the qualifications of teachers, specific competencies necessary for the effective performance of professional duties have been identified:

– Communicative competence;
– Information and communication technologies and media literacy;
– Self-development and professional development competencies;
– Responsibility and flexibility;
– Issues on the implementation of inclusive education;
– Knowledge of regulatory legal acts and issues of using their professional activities;
– Science news and current issues in science teaching;
– Methods and means of assessing student competencies.

Based on an analysis of research in the field of professional pedagogical competence of a teacher, it can be argued that this concept is a complex and multifaceted characteristic that includes many aspects.

Modern education requires teachers not only to effectively transfer knowledge, but also to develop students as competent and independent individuals. There-

fore, the development of teacher professional competence remains a relevant and important task for educational institutions, teachers and researchers

3. 3. Research methodology

The research of the structural components of the professional and pedagogical competence of a computer science teacher is based on an analysis of literary sources. This research method allows you to systematize and generalize knowledge and previous research in this area. As part of the research methodology, scientific publications, articles, monographs, and researches on the professional and pedagogical competence of computer science teachers were analyzed.

The literature analysis included the study of various points of view and approaches to determining the competence of a computer science teacher, highlighting the key components of this competence, as well as consideration of current research results and practical aspects of professional training of computer science teachers..

4. Results and discussion

Based on the results of the study of professional and pedagogical competencies of teachers, it was revealed that they include the following basic competencies:

- Subject competence;
- Methodological competence;
- Socio-psychological competence;
- Communicative competence;
- Digital competence;
- Self-development and professional development competencies;
- Creative competence;
- Evaluation competence.

These competencies form an important basis for teacher development and improving the quality of education in general. Subject knowledge, for example, plays a key role in effectively communicating information to students, but it cannot be isolated from the teaching skills that help teachers structure the learning process. Social-psychological skills, including the ability to interact with a diverse student population, are also critical to successful teaching.

Digital literacy and the ability to adapt to change are becoming increasingly relevant in today's world, where information technology plays an important role in education. These competencies allow teachers to effectively use modern educational technologies and provide quality teaching.

Research also highlights the importance of self-development and learning abilities. The rapidly changing educational environment requires teachers to constantly update their knowledge and skills, as well as the ability to adapt to new requirements.

Creative competence and evaluative competence allow computer science teachers to attract students' attention and evaluate their progress. Effective assessment of students' knowledge and skills is an integral part of the educational process. Computer science teachers need to know how to properly assess students' progress and provide feedback to them.

This analysis highlights the versatility and importance of computer science teacher competencies. Today's educational demands and the impact of digital technologies make these competencies essential to delivering quality learning and preparing students for a digital future. Educational institutions and teacher preparation programs must actively work to develop and strengthen these competencies in education and training.

5. Conclusions

This article analyzed the components of the professional and pedagogical competence of a computer science teacher. The results of the analysis allow us to draw the following conclusions:

- The professional and pedagogical competence of a computer science teacher is a complex and multifaceted set of competencies necessary for the successful education of students in a modern digital society.
- The concept of professional pedagogical competence has evolved over time, starting with a narrower understanding as a set of subject knowledge and methodological skills, and expanding to include socio-psychological aspects, creative competencies, etc. In addition, the modern understanding of teacher competence takes into account the importance of meta-competencies.
- Each of the eight identified competencies (subject-specific, methodological, socio-psychological, communicative, digital, self-development and professional growth competencies, creative and evaluative competencies) plays an important role in the formation of the professional readiness of a computer science teacher.
- Subject competence requires deep knowledge of computer science, methodological competence includes the ability to teach the subject effectively, socio-psychological competence helps in managing the classroom and maintaining psychological comfort, and communicative competence contributes to effective communication. Digital competence and abilities for self-development and professional growth are especially important in the context of an ever-changing information environment.
- Creative competence and evaluative competence allow computer science teachers to attract the attention of students and evaluate their progress.

Based on the results of the analysis, we can conclude that the training of computer science teachers should pay special attention to the development and strengthening of these competencies. This will help ensure high quality education and student readiness for a digital future. Competent computer science teachers play an important role in creating an educated and technologically literate generation that can successfully adapt to a rapidly changing world.

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РОЛЬ АКАДЕМІЧНИХ МЕРЕЖ НАУКОВЦІВ У РОЗВИТКУ ЇХ ІНФОРМАЦІЙНО-ДОСЛІДНИЦЬКОЇ КОМПЕТЕНТНОСТІ

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THE ROLE OF ACADEMIC NETWORKS OF SCIENTISTS IN THE DEVELOPMENT OF THEIR INFORMATION AND RESEARCH COMPETENCE

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АНОТАЦІЯ

У статті здійснено теоретичний аналіз проблеми розвитку інформаційно-дослідницької компетентності науковців як важливої складової професійної діяльності. З'ясовано, що академічні мережі для науковців є потужним джерелом розвитку їх інформаційно-дослідницької компетентності. Завдяки цим мережам науковці можуть представляти та поширювати результати власних досліджень, відстежувати цитування своїх праць, отримувати актуальну інформацію про наукові дослідження колег, підтримувати власну наукову репутацію й налагоджувати співпрацю з іншими вченими. Усе це потребує розвиток певних знань, умінь і навичок науковців, що є компонентами їх інформаційно-дослідницької компетентності.

ABSTRACT

The article provides a theoretical analysis of the problem of development of information and research competence of scientists as an important component of professional activity. It is found that academic networks for scientists are a powerful source of development of their information and research competence. With the help of these networks, scientists can present and disseminate the results of their own research, track citations of their works, receive up-to-date information about the research of colleagues, maintain their own scientific reputation and establish cooperation with other scientists. All this requires the development of certain knowledge, skills and abilities of scientists, which are components of their information and research competence.

Ключові слова: компетентність, інформаційно-дослідницька компетентність, науковці, академічні мережі науковців.

Keywords: competence, information and research competence, scientists, academic networks of scientists.

Постановка проблеми. На сучасному етапі розвитку інформаційного простору зростають вимоги до якості та результативності наукових досліджень, які покликані сприяти розробці й впровадженню в освітній простір інформаційно-комунікаційних технологій, широкому використанню відкритих електронних систем для підтримки наукової та освітньої діяльності, модернізації вітчизняної освіти і науки відповідно до світових тенденцій.

Інтернет є потужним ресурсом і унікальним способом комунікації дослідників, а інтернет-простір розвивається як особлива сфера віртуальної науки. Ефективність інтернету як інструменту в науці обумовлена ще й ступенем розвитку інформаційно-пошукових і аналітичних систем, методів контент-аналізу тощо. З огляду на це, оприлюднення результатів досліджень науковцями в інтернеті на сучасному етапі має розглядатися як невід'ємна складова їхньої професійної діяльності.

Важливим завданням сьогодення є розвиток знань, умінь і навичок у науковців та науково-педагогічних працівників щодо роботи з відкритими інтернет-джерелами, бібліометричними і наукометричними базами даних, академічними мережами. А це, в свою чергу, вимагає володіння ними високим рівнем інформаційно-дослідницької компетентності.

Аналіз останніх досліджень і публікацій. Проблемі розвитку дослідницької компетентності наукових і науково-педагогічних працівників присвячені праці вітчизняних (М. Архипової, С. Іванової, Т. Кристопчук, С. Сисоєвої) та зарубіжних (Ch. Amundsen, J. Byrne, D. Jackson, L. McAlpine, C. Pickering) вчених.

Особливості використання соціальних мереж для науковців щодо розвитку їх професійної компетентності розглянуті в дослідженнях О. Василенко, Л. Костенко, С. Назаровця, Т. Новицької, Л. Романовської, Т. Семигіної.

Виділення невирішених раніше частин загальної проблеми. На сьогоднішній день в Україні все більше уваги приділяється впровадженню компетентнісного підходу в освіті та науці. При цьому постає необхідність у розвитку інформаційно-дослідницької компетентності науковців і науково-педагогічних працівників. Вони повинні вміти користуватися академічними мережами в інтернеті щоб здійснювати пошук, опрацьовувати, аналізувати праці вітчизняних і зарубіжних авторів, представляти результати своїх наукових досліджень, налагоджувати співробітництво з іншими науковцями. Тому існує потреба у більш широкому розгляді можливостей академічних мереж науковців у розвитку їх інформаційно-дослідницької компетентності.

Метою статті є здійснення теоретичного аналізу проблеми розвитку інформаційно-дослідницької компетентності науковців та з'ясування ролі академічних мереж у цьому процесі.

Виклад основного матеріалу. У сучасному тлумачному психологічному словнику поняття «компетентність» визначається як «… психосоціальна якість, яка означає силу і впевненість, що виходять із почуття власної успішності й корисності, що дають людині усвідомлення своєї спроможності ефективно взаємодіяти з оточенням» [12, с. 203].

На думку О. Затворнюк, компетентність характеризує якість і рівень підготовки до професійної діяльності, що проявляється в характері праці людини, у її уміннні в різних ситуаціях знаходити раціональне вирішення проблеми. Формування компетентності, на думку автора, поєднане із самооцінкою та самоаналізом особистості, що є внутрішньою мотивацією професійного самовдосконалення [2].

М. Архипова вважає, що згідно з вимогами до професійної компетентності педагога важливою є його дослідницька компетентність як основна характеристика його особистості, що вказує на володіння уміннями і засобами дослідницької діяльності на рівні технології з метою пошуку знань для професійної діяльності, вирішення освітніх проблем та побудови освітнього процесу. Також вона виділяє такі компоненти дослідницької компетентності, як планування, організацію та здійснення пошуково-перетворювальної діяльності, об'єктом якої виступають психолого-педагогічна і галузева складові [1].

У свою чергу, науковці С. Сисоєва та Т. Кристопчук охарактеризували структуру дослідницької компетентності викладача закладу вищої освіти (далі – ЗВО) та виокремили такі її компоненти:

- мотиваційно-ціннісний;
- когнітивний;
- процесуально-діяльнісний;
- інформаційно-комунікаційний;
- комунікативний;
- особистісно-творчий;
- професійно-рефлексивний.

Найважливішим компонентом вони визначають інформаційно-комунікаційний, який передбачає володіння викладачем методами збору інформації, створення масивів емпіричних даних, опрацювання різноманітних інформаційних джерел тощо [11].

Зарубіжні вчені L. McAlpine та Ch. Amundsen зазначають, що дослідницька компетентність науковців має включати три основних компоненти:

1) знання, що полягає в уміннні науковця виокремлювати факти, розширювати та уточнювати поняття, визначати основні питання дослідження та надавати на них аргументовані відповіді;

2) дослідження – це уміння здійснювати пошук схем і моделей об'єктів дослідження, аналізувати та пояснювати їх, створювати оновлені або нові схеми і моделі об'єктів дослідження на базі аналізу теоретико-методичних досліджень із наукової проблеми;

3) викладання – уміння передавати свої знання іншим, вчити їх креативно мислити, організовувати групове та колективне навчання студентів [6].

Дослідниця С. Іванова у своїх наукових працях звертає увагу на таке поняття, як «інформаційно-дослідницька компетентність» наукових та науково-педагогічних працівників, яке вона пов'язує з їхніми знаннями, вміннями та навичками, тобто здатністю здійснювати наукову діяльність відповідно до основних нормативних документів, які регулюють форми неперервної освіти особистості (післядипломна педагогічна освіта, освіта впродовж життя, неперервна освіта тощо) [3].

На думку зарубіжних вчених C. Pickering, J. Byrne, D. Jackson головною компетенцією викладачів ЗВО є уміння писати наукові статті, які свідчать про рівень їх дослідницької компетентності, допомагають їм оприлюднювати свої наукові результати та отримувати зворотній зв'язок від рецензентів, інших науковців про їх стиль написання, методи, аналіз результатів, що значно впливає на якість їхніх подальших досліджень [9; 4].

З огляду на це варто зауважити, що в останні роки зростає актуальність використання відкритих електронних науково-освітніх систем та академічних мереж науковців у розвитку їх інформаційно-дослідницької компетентності. Так, Т. Семигіна стверджує, що академічні наукові мережі набувають все більшого поширення, адже дозволяють рейтингувати науковців та ЗВО за рівнем цитованості наукових праць науково-педагогічних працівників цих закладів [10].

На підтвердження думок Т. Семигіної, дослідник С. Назаровець вважає, що в сучасному світі важливим є представлення результатів наукових досліджень вчених на їхніх персональних веб-сторінках, веб-сайтах наукових установ та груп, інституційних і тематичних репозитаріях, сайтах видавництв, конференцій, журналів та інших спеціалізованих веб-ресурсах. Звичайно, наповнення відкритих сервісів залежить від активності самих науковців, але це стає вимогою сьогодення, коли створюються рейтинги як самих науковців, так і закладів, в яких вони працюють [7].

Академічні мережі науковців розраховані на те, щоб дослідники змогли створити власні авторські профілі. В окремих базах даних ці профілі формуються автоматично при опублікуванні автором навіть однієї статті (Author ID в Scopus), в інших базах даних створені спеціальні інструменти об'єднання і коригування даних автора (ResearcherID в WoS, авторський профіль в Google Академія) тощо.

Розглянемо найбільш поширені на сьогоднішній день академічні мережі науковців.

Сервіс Google Scholar «Бібліографічні посилання» дозволяє вченим оприлюднювати результати своїх інтелектуальних напрацювань у вигляді так званих бібліометричних портретів, де представлена сфера їхньої наукової діяльності, впорядковані списки публікацій, індекси та діаграма цитувань, коло наукових інтересів тощо [5].

Профіль ученого у Google Scholar надає можливість авторам відстежувати бібліографічні посилання на свої статті. Можна переглядати, хто цитує публікації, переглядати графіки цитувань у часі та розраховувати декілька наукометричних показників [8].

Publons – це веб-сайт та безкоштовна служба для вчених для відстеження, перевірки та демонстрації своїх публікацій через Scholarly peer review та редакційних матеріалів для академічних журналів. Вона була запущена в 2012 році, а до 2017 року до цього сайту приєдналося більше 200 000 дослідників, що додало більше одного мільйона відгуків у 25 000 журналів [5].

ResearchGate (в перекладі означає «дослідницька брама») – науковий портал та соціальна мережа, засіб співробітництва між вченими з будь-яких наукових дисциплін. ResearchGate містить веб-застосунки, включаючи семантичний пошук (пошук по резюме), обмін файлами, спільне користування базою публікацій, форуми, методологічні дискусії, групи тощо. Члени можуть створювати свій персональний блог у межах мережі [5].

Academia – наукова мережа, що дозволяє викладати будь-які опубліковані та неопубліковані праці, презентації, тексти лекцій, стежити за певними авторами чи конкретними науковими темами. Важливою функцією цієї наукової мережі є обговорення чернетки рукопису із закритою групою або певними особами [10].

Figshare – це платформа, що створена для накопичення наукових, академічних текстів. На ній можуть зберігатись як чернетки та робочі матеріали (у закритому, доступному лише власнику форматі), так і опубліковані праці у відкритому доступі. Також автор може побачити, скільки читачів було у його публікації [10].

Але, як зауважує Т. Семигіна, ведення науковцями і науково-педагогічними працівниками власних профілів в академічних мережах потребує часових ресурсів і певних навичок, а в деяких випадках ще й хорошого рівня знань англійської мови. На її думку, науково-педагогічні працівники ЗВО повинні бути зацікавлені у веденні наукових профілів, адже це дає їм такі можливості, як: поширення власних досліджень і матеріалів; відстеження цитування наукових праць; отримання актуальної інформації стосовно досліджень колег; створення власної наукової репутації; налагодження зв’язків та співпраці; покращення рейтингів закладів, в яких вони працюють [10].

На наш погляд, оприлюднення науково-педагогічними працівниками результатів своїх досліджень у вигляді авторських профілів в інтернеті – це своєрідний звіт викладачів суспільству за надану можливість займатися науковою діяльністю. Створення таких профілів слід розглядати як обов'язок кожного науково-педагогічного працівника.

Для розвитку інформаційно-дослідницької компетентності академічні мережі науковців відіграють одну з найважливіших ролей, адже саме завдяки цим мережам вони можуть: здійснювати пошук, збирати, аналізувати та представляти свої наукові праці; спілкуватися з іншими науковцями; використовувати сервіси електронних науково-освітніх систем для моніторингу та оцінювання наукових результатів; продукувати нові суспільно-значущі знання з метою впровадження їх у практику [3].

Висновки та пропозиції. Отже, академічні мережі для науковців є потужним джерелом розвитку їх інформаційно-дослідницької компетентності. Завдяки цим мережам вони можуть не лише представляти та поширювати результати власних досліджень, але й відстежувати цитування своїх праць, отримувати актуальну інформацію щодо наукових досліджень колег, підтримувати власну наукову репутацію й налагоджувати співпрацю з іншими вченими. Усе це вимагає витрат часових ресурсів, розвитку певних умінь (застосовувати методи збору інформації, створювати масиви емпіричних даних, опрацьовувати інформаційні джерела), знань (наприклад, англійської мови), навичок тощо. Тому володіння інформаційно-дослідницькою компетентністю для науковців є важливою умовою їхньої успішної професійної діяльності.

Перспективними напрямками для подальших досліджень даної проблеми є розвиток компетентності науково-педагогічних працівників щодо роботи з інформаційними ресурсами в міжнародних наукометричних базах даних Web of Science і Scopus.

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PHILOLOGICAL SCIENCES

IMPACT OF SOCIO-LINGUISTIC AND SOCIO-CULTURAL FACTORS ON TRANSLATION PROCESS

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ABSTRACT

The article scrutinizes translation or interpretation process in terms of socio-linguistics and socio-cultural factors. As mentioned in the study technology also builds up a bridge between the translator and the speaker. The translator/interpreter should have some qualities such as professionalism, cognitive skills, language skills, ability of using cutting-edge technological devices. Moreover, the translator should own cultural awareness about both source language and the target language in order to translate or interpret the information properly. The translator should be knowledgeable about the information in advance. Apart from linguistic skills, a professional translator or interpreter should have supernatural skills such as the ability of approximating what could be told in advance.

Keywords: interpretation, translation, cognitive skills, socio-linguistic factor, cultural awareness.

INTRODUCTION

The professional people are prone to be obstinate in terms of personality showing a behavioral role model for others. In spite of contradictory opinions, everybody is treated equally and avoid segregation [2]. The major professional principles that the interpreters should follow are impartiality, planning, punctual delivery, patience, confidentiality and discipline. Furthermore, the interpreter or translator must be objective. So that he/she should be fair and free from personal views, beliefs, weakness and feelings. "He/she should be humble and willing to learn, develop, change, know himself/herself" [13, p.97].

Obviously, Nida showed that an interpreter or a translator owns a deeper comprehension of the bonds between their work and various human characters- one more time stressing a distinctive character needed for the profession. Perfectionism or completeness should be regarded as a form of professionalism. Interpreters/translators should be attentive and precise in their jobs focusing on acknowledging and details which are the most complicated elements behind perfection in the maintenance of comprehensibility.

They know that misuse or omission of a word, wrong sentence pattern, a punctuation mark used in a flat or semiotic meaning may influence the content and ongoing process. In this regard, an interpreter or a translator evaluates the situation and tries to avoid translation mistakes encountered in technical and ethical principles to gain a more comprehensively acceptable and professional version of the work which is in progress.

Moreover, Rudvin claims that "professionalism is far from being a universal corporate value, but rather a culture-bound social practice and that this culture boundedness affects interpreters' codes of ethics, their understanding of their own role, recruitment and quality factors and consequently their interpreting strategies" [14, p.49]. Rudvin's view is a reality. Since interpreters/translators determine common comprehensive standards for professionalism. They could underestimate the cost of such context. Hence, professionalism should be handled in translator's own socio-cultural atmosphere to provide them with the chance to better realize the ethical values and standards in a smaller community. Hence next professional purposes might be determined for a world market. For this reason, professionalism is associated with local requirements and reality in a particular profession.

Ethics are related to professionalism, too. They are interrelated, but not identical completely. First of all, an interpreter's ethical values are for himself/herself. Such values have the common beliefs and comprehension of the interpreter's family background and atmosphere surrounded with the pragmatic understanding of socio-cultural realty. The translator/interpreter, in this regard, should be personally ethically-oriented primarily. This notion shows itself in a broader sense because ethical values can't be universalizes and the concept of professionalism differs from subject to subject.

In the meanwhile, it is vital to mention the interpreter's/translator's socio-cultural schemata. From linguistic point of view, this schemata reflects his/her intercultural and communicative skills. Because they are in a an ongoing attempt to develop their pragmatic skills under natural and conscientious conditions through taking on communicative and cultural experiences as parts of everyday life. Canale stressed the importance of socio-linguistic skill in her model of communicative competence. As to Canale "Socio-linguistic competence is concerned with human interaction in natural contexts; utterances, as they are produced and meant in various socio-cultural contexts. The socio-linguistic competence is quite important since it is genuine for real communication" [4, p.7].

The translator/interpreter must develop communicative skills, first of all, in native context and he/she should watch, stress and learn the ethics of life in natural context. Hence by means of effective communication skills, the ethics of professionalism would be improved via socio-cultural practice.

MAIN PART

Cognitive skills

Although interpretation has been explored from a number of perspectives, there is no doubt that achievement of cognitive skills and their representations in the interpretation/translation process is very crucial which is a cognitive and communicative activity went on textual operation. When we say a text, it does not mean that it is absolutely in written form. The material that we also call a text may be in spoken form as well. So, irrespective of the spoken and written form, the cognitive activity is in progress. Dechert and Sandrock carried out an empirical experiment on the psycho-cognitive aspects of interpretation/translation [6]. Similarly, Gerloff [9,p.135], Krings [11,p.263] and Lorscher [12,p.26] focused on how verbal process occurs during the interpretation/translation. Cognitive studies led to a better comprehension of creative and critical thinking, problem solution, strategy development, perception, acquisition and memory processing. A number of various cognitive skills or types of attention are enumerated below;

1. Attention: In spite of distractions from various sources, the skill to concentrate and maintain it

2. Sustained attention: Focusing on the assignment effectively for longer period of time even if there are other existing distracting factors.

3. Selective attention: The ability to deny inappropriate stimuli and increase the awareness on what should be done foe a certain period of time.

4. Split attention: The ability to implement multitasking assignments. In this respect, a synchronous interpreter must be able to use her/his long-term and short-term memory simultaneously. In this regard, cognitive skills such as auditory intelligence, focus, speed, attention, visual intelligence and perception are used wholly. In the meanwhile cognitive load increases on the necessity to integrate the different sources of stimuli mentally.

The irrelevant cognitive load appears to have a negative influence on the mental integration of input data as translator/interpreter reads, listens, perceives, observes, evaluates and relates both the assignment in progress and ahead.

To be knowledgeable

Interpreters know about cultural, social, political, economic and scientific progress happening both at local and universal levels. They are active readers and know about the agenda that they follow, semantic and grammatical structures used there, the further tasks and language requirements. We may say that the interpreter's desire to read and supply himself/herself with current information turns into a way of life which can' be given up. It is considered to be more than a personal hobby. In this respect, translator's or interpreter's mental activities should be taken into consideration. Gile is the first well-known linguist to introduce the thought of extra-linguistic knowledge in this profession. As to Gile, comprehension should be developed in order to process the outcomes of interpretation/translation assignment [10]. The relevant form of extra-linguistic input gained in the collection of data also identifies the quality of the work implemented. Such extra-linguistic knowledge would include worldwide issues, socio-cultural practice, communicative practice in various target and local contexts, anthropological and humanistic disciplines, personal code of conduct and no doubt, willingness to move beyond one's comfort area for more experience, data processing, observation, functionality and thinking.

Mastery of grammar

Interpreter's knowledge of both native language and target language should be detailed and perfect. They should be able to express themselves in different social and professional platforms. Arslan said: " An individual who does not have any knowledge of language, even attempting to get into the translation process would be a wise one. He should be able to use both languages verbally and in writing, so that he can be in the field" [1]. Though this feature makes difference in interpretation/translation from practical and theoretical points of view, the diversity sources from the fact that they should be proficient listeners and readers irrespective of the subject. Eradam claims: "The person who will become a translator should be aware of semantics, sociolinguistics and stylistics and ought to be able to apply this information on the texts" [7, p.70]. Briefly saying, the interpreter is a facilitator that provides interdisciplinary interaction. They are those who view language professionally, they are aware how to employ various verbal and written styles, use them in their job.

To carry out communicative practice in different socio-cultural contexts more efficiently and effectively, formation of a relevant grammatical skill is one of the most essential requirements. It represents the theoretical-structural aspects of language. Grammatical competence is an ability to grasp and interpret the sense by means of production of syntactically and morphologically constructions. The formation of grammatical competence needs control over structured words, sentences and phrases. The ability to control linguistic structures during interpretation will end in more efficient communicative practice which will help the development of communicative skills, too.

Grammar rules implemented by the interpreter ought not to be regarded as the end, but ought to be a tool helping to effective interaction. There is not any time to focus on the grammar in the process of an interpretation assignment. Grammar knowledge allows relevant and strategic language use in specific communicative contexts as a computer system which operates in the background. In its turn, it helps the interpreter to focus on other functional aspects of work rather than grammatical constructions only. Babayev Javid underlines the significance of grammatical and lexical structures in translation process; "For a high quality translation, a translator should have a good memory(receptor) in order to receive and retain the information in mind respectively, a strong attention or focus on the grammatical and lexical structure of both languages, high language proficiency in native and target languages, fluency in speech and the ability to approximate what can be told next" [3, p. 118].

Cultural awareness

An interpreter is a professional person that must be able to balance social life and job. Simultaneous

translation is a problem in this meaning since interpreters work within geopolitical, social and economic momentum as the changing world forces them to go where they should without any hesitation. In this regard, interpreters are not just workers following some definite rules. Besides the native language, they should get acquainted with the customs and traditions of the target language knowing that a language is a cultural reflection and it is impossible to do proficient translation without perception, awareness and comprehension of cultural elements in both native and foreign languages. Therefore, the cultures of which they interpret from the people who form those customs and traditions and the Sapir Whoorf hypothesis set forth in the middle of XX century on the way of thinking about people using language and style-all play an indispensable role in successful interpretation. Interpretation does not only affects the way we exchange the customs and traditions and knowledge among various communities, current universal conditions require that the interpreters take it one step further. For this reason, the formation of cultural competence emerged in social experience play a major role to carry out better. As to Choban, culture and subject area "Knowledge constitutes one of the basic elements of translation competence. A translator understands and creates a target text based upon previously obtained culture and subject area knowledge" [5, p.172]. So it is obvious that those who fail to improve a relevant cultural competence are also likely to fail in perception of the pragmatic comprehension of the spoken and written material.

Mey thinks that Linguistic behavior is social. People converse since they are eager to socialize in a broader sense of the word, either for entertainment to introduce themselves to other men or for some serious aims. Identification of the interpreter's linguistic behavior with social behavior demonstrates that proficient language knowledge is also consolidated by means of socio-cultural experience and gathering of such attempts are shown in the performance.

In any way, interpreter develops her/his pragmatic ability as her/his socio-cultural communication occurs in various contexts. Chin Lin adds: "learners can understand the meanings of language from a broader intercultural feature. As the students have a basic concept of pragmatic organization they will be more responsive to people's intended meanings implanted in worldwide communication" [5, p. 56]. In the meanwhile, like students, the interpreters' pragmatic ability assists them to obtain an outlook toward addressing their own professions in a broader sense.

In short, developing the cultural competence according to social experience assists the formation of pragmatic competence. This increases both the awareness of cross-cultural disciplines and gives a rise to the development of communicative skills as the attention changes from local to global views.

Being able to use modern technology

Interpreters should use technology and be in contact with other colleagues in the world as a consequence of the interpretation programs that they use. In the past nobody believed that such interrelation might be a reality. Actually, they were right to think so, to some extent. However, lots of things have changed since 1940. Turker claims " Science has changed, technology has changed, people's value judgements have changed and above all computers have changed" [15, p.138]. In the mean, the interpreter should be an independent researcher. In some cases, some words which are difficult to find encourage further researches into various sources for hours, days, weeks even months and years. This attempt sharpens the interpreter's sense of systematic research as they delve into other related words. This quality sources from the attentiveness of their work and the comprehension of perfection. In this way, they achieve more discipline and be more target-oriented.

As the interpreter uses modern technology and carries out research, strategic and semiotic competences work simultaneously. Data evaluation, planning what should or have to be done, the way the interpreter reacts to a particular matter, creative and critical thinking for problem solution are possible with the development of strategic competence. Strategic competence is considered to be a meta-cognition of an interpreter's work. Similarly, meta-cognitive competence is also bred by semiotics since it deals with the ability to know the signs and symbols to interact data. Erton writes: "The semiotic capacity of an individual reflects the effective and efficient usage of pragmatic competence in which the language user has the awareness of socio-cultural and anthropological conventions processed and produced in the course of communication. Such a capacity also enables a systematic usage of cognitive skills, thereby developing the value of the communicative contexts and the individuals in various discourses" [8, p.266].

In the example shown above, it is necessary to stress that the semiotic and strategic competences function as operational means to link important knowledge, capabilities and skills for an effective performance. Since the interpreter uses information technology devices , carries out research on the internet. He/she uses practical conclusions of semiotics and logical thinking skills to save time, be more fluent and implement more simultaneous assignments.

Interpretation is a communication activity and in this regard, the principles of data processing in human interaction. It is a comprehension of an integration of psychological, biological and social sciences and their representations in communication experience. As the interpreter carries out research and makes use of information technology tools or translation means, the biosemiotic atmosphere of human character determines the essence of their work and the quality of the product.

Fluent speech

Besides the skills shown above, an interpreter is a skilled speaker and interacts correctly and fluently in both the native and foreign languages. Undoubtedly, interpretation is an ability which requires more than linguistic-translation skills. It is important to elaborate the discourse and to possess pragmatics for successful simultaneous interpretation since the translator must be able to realize the impact of the information on the target audience, as well as the speaker intends to deliver

so as to generate an identical effect with interpretation during the process. To obtain it, it is essential for everyone to inherit the interpreted language, as well as its grammar, to focus and to own a potent memory and practical skills without being exhausted or bored for a long time. Obler carried out a research on the cognitive features of simultaneous translators and their language use during the interpretation. He analyzed the outcomes of his own research with those of similar researches and he revealed that cognitive features of a person who is busy with simultaneous interpretation were very diverse and skilled in comparison with those who deal with other forms of interpretation. With these peculiarities, simultaneous interpreters know how to affect and control the audience effectively.

Moreover, phonological and phonetic features of the language should be encompassed properly by the translator. The research of both sub-disciplines of structural linguistics supplies the translator with the chance to encompass a big deal of utterance in the communication activities and increase the awareness of the translator to acquire these fields to take fluent and relevant action.

Phonetics is concerned with the biological features of speech articulation. For example, the place of articulatory organs makes a major distinction in the physical production of sounds. Tone, juncture, intonation, stress as the key components covered in diction a considerable field to be concentrated on by the translators. In the meantime, acoustic features of speech sounds and their auditory perception are also explored in phonetics. The neuro-physiological status of sounds are also researched to comprehend the neurological features behind the perception and production of speech sounds. The translator, in this regard, should know about the fact that mastery in phonological and phonetic features of target and source languages will cause success in many cases as the translation is conducted. Thus, the following considerations must be taken into account:

1) The translator is understood by the audience well because her/his correct pronunciation makes the understanding easy for the audience.

2) The translator may differentiate target sounds easily since she/he acquired the physical features of sounds in the target contexts.

3) The translator can manage the speed and the clarity of her/his speech for the better understanding by the audience.

4) The exploration of tone, stress, juncture and intonation provide the translation with the chance to identify and stress definite features in the sentence of speech production so that the audience are able to differentiate more or less vital features or matters to focus on.

5) The translator's perception is developed in a way to acquire sounds and systems of sounds in TL free from dialect, accents and idiolects

6) The translator's knowledge of phonology and phonetics allow audience to control and stimulate them to follow the event carefully and willingly. So, the audience is not left alone and becomes an active part during the whole event.

Conclusion

Consequently, we can claim that a person who got training in interpretation and translation must add, improve and employ a lot of various skills. Furthermore, the interpreter should always remember that interpretation is a language-oriented action and requires the formation of interpretation competence. This competence represents approximately all aspects of multidisciplinary character of interpretation. Language competence allows well-structured sentences and phrases to form the basis of more meaningful communicative activity both in spoken and written forms. Well-structured communicative skills lead to the establishment of an efficient socio-cultural competence that assists the interpreter to comprehend the world free from native practice and norms. This will allow interpreter to research the physiological and psychological aspects of human character and to realize their reactions in the work process better.

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FEATURES OF THE COMMUNICATIVE CATEGORY OF EXPRESSION IN TED TALK LECTURES

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ABSTRACT

The article is devoted to identifying the ways of expressing the communicative category of expressiveness in TED talk lectures. The following groups of ways of expressing the studied category were identified: lexical, syntactic, stylistic, non-verbal. All of the stated ways contribute to increasing the success of the TED talk lecture on the conference.

Keywords: communicative category, expressiveness, TED talk lectures.

In modern communicative linguistics, the term "*expressiveness*" implies the expression of emotions in speech through various emotional-evaluative linguistic means, reflecting the speaker's attitude to what is being communicated. Expressiveness as a constant characteristic of discourse forms the communicative category of expressiveness (or the category of emotionality, emotiveness or intensity), which is expressed using various language means that reflect the presence of emotions in the text.

In this work, we regard the categories of expressiveness, emotionality and intensity as synonyms, however, some authors separate these concepts. In particular, V. L. Kudashina believes that the categories of expressiveness and emotionality are correlated according to the "*general - particular*" scheme and differ in their purpose: according to the author, emotions are spontaneous, since they are based on the involuntary reaction of the speaker, and expression is deliberate, since it is aimed at having the greatest possible impact on addressee [1, p. 117]. Regarding the category of intensity, which, according to N. V. Sokolova, is expressed in the widespread use by the authors of texts of intensifiers (for example, "most", "very", "enough", etc.) [2, p. 70], some authors also distinguish it as a separate category. However, N. F. Khasanova in her work argues that expressiveness itself is a property of the text that conveys meaning with increased intensity and results in emotional enhancement [3, p. 107]. Thus, intensity is one of the characteristics of expressiveness.

The communicative category of expressiveness is, to one degree or another, inherent in all types of discourse and largely depends on the communicative situation: on the intentions of the addresser, his background knowledge, as well as on the linguistic and extralinguistic context of the communicative act [4, p. 162]. This category can be expressed by various linguistic means, such as expressive nouns, adjectives and verbs; intensifiers; phraseological units; interjections; as well as non-linguistic means, such as the use of italics and capital letters (written text); gestures; laughter; raising the tone/volume of the voice etc.

Thus, in each type of discourse, the communicative category of expressiveness manifests itself with the help of units of different levels of language, forming a system for expressing expressiveness in speech. This system, according to I. A. Skripak, includes expressive elements, that is, lexical means that form the basis of this system, as well as syntactic means related to its periphery [5, p. 253]. Thus, in different types of discourse this category will manifest itself with varying degrees of expression, using certain lexical and syntactic means. For example, in conversational discourse, lexical means of expressing the category of expressiveness include the use of interjections and profanity (curse words), and syntactic means include repetitions and changes in word order; in scientific discourse, lexical and syntactic (used more often in this type of discourse) means of expressing the category of expressiveness can include the use of intensifiers, intensifying adverbs and exclamatory constructions, rhetorical questions.

However, despite the representation of the communicative category of expressiveness in all types of discourse, recently this topic has attracted much attention from researchers of media discourse. According to O. Yu. Sergeeva and N. V. Savartseva, this attention is associated with the increased interest of linguists in "the emotional sphere of personality, the problem of the influencing power of words and the possibility of studying a person's personal qualities through his speech activity" [4, p. 162]. In other words, in the media discourse the category of expressiveness is especially prominent, in connection with the genre characteristics of media texts, and also performs not only the function of expressing emotions, but also expressing personal qualities of a person, the function of influencing the addressee through emotional influence on him. Consequently, the category of expressiveness is especially important for media discourse, since it increases the overall emotionality of the text, reflects the personality of the author, which helps create a trusting "author-addressee" relationship. In addition, with the help of means of expressing the category of expressiveness, the author of a media text draws attention to certain parts of it, which affects the overall perception of the text and the impression of his work.

Thus, **the purpose of this work** is to determine ways of expressing the category of expressiveness in TED talk lectures, which are a separate genre of media discourse [6, 7]. Despite the fact that at the moment there are a number of sources devoted to the category of expressiveness in media discourse, we have not identified any works describing the ways of expressing this

category in lectures of the TED talk format, which determines the scientific novelty and relevance of this article.

A TED talk is a presentation by speakers on a small stage in the United States on relevant topics, with the goal of attracting public attention to a particular social or scientific problem and encouraging the audience to take certain actions, for example, to participate in environmental protection movement [6, p. 140]. Video recordings of the presentations are posted on the corresponding website of the private non-profit TED foundation, that is the initiator and founder of these lectures, and are available for free. The TED lecture genre not only informs and explains information based on scientific research and evaluations, but also entertains the viewer due to its features, such as a relatively free style of speech, clear and accessible presentation of scientific ideas, close connection with the audience, and the use of visual materials and convenient video format [7, p. 76]. Thus, such a public lecture turns into a discourse-generating media genre of a special type [8, p. 258], and represents a separate speech genre of media discourse, different from other popular science genres and types of lectures.

The expressiveness of TED talk lectures is determined by the following factors: the artistry of the speakers; a format similar to a performance; the need to constantly attract the attention of the audience and entertain them; the emotionality of the speaker due to the fact that the topic of the lecture is always especially important and close to him or her. All this determines the frequent use of means of expressing the communicative category of expressiveness in the process of the TED talk speeches.

Based on the analysis of texts and video recordings of lectures from 2021-2023, we have identified the following ways of expressing the category of expressiveness in TED talk lectures, which were divided into four categories: *lexical, syntactic, stylistic* and *non-verbal*.

1. Lexical ways of expressing

1) the use of interjections (*oh, ah, hey, well, dear* etc.).

With the help of interjections, the lecturer not only expresses his or her own emotions, but also attracts the attention of the audience, and also reduces the formality of the lecture, simplifying its perception by listeners: "*I remember thinking in that moment "**Oh**, I finally got a seat at the table*" <...> *I remember thinking, "**Oh**, I'm going to talk at this table*" (Lilly Singh – "A seat at the table" isn't the solution for gender equity"); "***God**, I felt like I had just been inducted into the coolest club possible*" (Christina Tosi – "My secret to creating real magic"); "***Well**, for starters, we know that the ocean is already doing a lot for us*" (Susan Ruffo – "The ocean's ingenious climate solutions").

2) the use of intensifiers and intensifying adverbs (very, extremely, deeply, highly, strongly, absolutely и etc.).

The use of intensifiers increases the overall emotionality of speech and the author's personal attitude to what was said: "*Today their incomes are in and out of poverty, which is **extremely** painful*" (Sathya Raghu Mokkapati – "The "Greenhouse-in-a-box" empowering farmers in India"); "*The way it infiltrated society is a clear example of how **deeply** ingrained racism in this country*" (Dwan Reece "The origins of blackface and Black stereotypes"; "*One thing is **absolutely** clear: we cannot keep rescuing people from prison and restoring them to poverty*" (Brittany K. Barnett – "The creativity, innovation and ingenuity languishing in US prisons").

3) the use of slang and informal language.

In the analyzed lectures, we noted the widespread use of informal language and profanity, for example slang, curses, hybrid words (words consisting of several parts belonging to different languages), which is unacceptable in many types of discourse: "*I found the "**queenas**"* ["Queena" from the English word "Queen" and the Spanish word "Reina" (queen)] *tucked in a dingy bar on 16th street*" (Julian Delgado Ropera – "The poetry of everyday language"); *"My caseload **ballooned** from 30 to over 100"* (Rebecca Darwent – "How to fund the real change in your community"); "She <...> ***whipped up a hell of** a cranberry sauce from assorted jelly packets*" (Brittany K. Barnett – "The creativity, innovation and ingenuity languishing in US prisons"); "*It's the patriarchy that's so **damn** difficult*" (Kaz – "Sex education should start with consent"); "*It's what every motivational poster, Tumblr post, Instragram account you follow, business card tells us: success is a seat at the table. And if they want to be extra spicy* [spicy, used as "sassy" (slang)], *they say "if there is no seat, drag your own seat*" (Lilly Singh – "A seat at the table" isn't the solution for gender equity"); "*You know, the digital space had always been a place that I thought was without **gatekeepers***" [gatekeeper – a modern concept emerging from social media. Denotes a person who devalues the opinions of others about something by claiming that they have no right to that opinion because they are not qualified/are not legitimate decision makers/are not part of a particular social group, etc.] (Lilly Singh – "A seat at the table" isn't the solution for gender equity").

The methods of expressing the category of expressiveness in TED talk lectures mentioned above imply the use of certain words or expressions that have a pronounced emotional connotation, raising the overall level of expressiveness of the lecture. Despite the fact that lexical ways of expressing the category of expressiveness are not characteristic of scientific and popular science texts due to certain limitations of the norms of scientific discourse [5, p. 253], they are widely used in the lectures we analyzed, which emphasizes the uniqueness of TED talk lectures as a genre and their belonging to media discourse.

2. Syntactic ways of expressing

1) the use of inversion and emphatic constructions.

The use of stylistic inversion and emphatic constructions in English is often determined by the speaker's desire to attract the listeners' attention to a certain part of the utterance. In TED talk lectures, sentences with inversion are pronounced by speakers with great emotion, which reflects not only the need to emphasize certain words and phrases in the text, but also emphasizes the personal interest of the speaker: "*Not*

only is spirit found within us, it's in all things" (Sasha Sarago – "The (de)colonizing of beauty"); "*Not only do we not get to hear his point of view, we don't get to share ours"* (Betty Hart – "How compassion could save your strained relationships"); "*And have we ever decided to use that tool of empathy, of walking a mile or so in someone else's shoes*" (Betty Hart – "How compassion could save your strained relationships"); "*Now power-to-X is not a new technology, nor did we invent it*" (Jim Hagemann Snabe – "Dreams and details for a decarbonized future").

The use of emphatic constructions by lecturers is also due to the need to highlight a certain part of the sentence. For example, the emphatic verb "do" to emphasize the predicate: "*I know that donors have good intentions.* ***I really do***" (Rebecca Darwent – "How to fund the real change in your community"); "*Now I don't have the full equation cracked, but* ***I do know*** *that it starts with the decision to act*" (Christina Tosi – "My Secret to Creating Real Magic"); Identification of circumstances and adverbial subordinate clauses: "***It was at "Esta Noche" that I learned*** *about the long history <…>* ***It was here*** *that my passion for language bloomed again*" (Julian Delgado Ropera – "The poetry of everyday language") etc.

2) The use of exclamatory sentences.

In exclamatory sentences, expressiveness is reflected graphically, using the "*!*" sign, or orally, using word order as well as intonation and pitch of the voice, and is expressed most clearly. According to A. V. Kerova, exclamatory sentences most often have an emotive-evaluative communicative attitude, [9, p. 180], which allows them to stand out especially against the general background of a popular science TED lecture: "*I know you are gluten-free, so here are some almonds for the road! Thank you for your kindness! It goes a long way!*" (Ashley M. Grice – "The Power of Purpose in Business"); "*We will be able to cross the digital divide, and we will have more jobs, and we will all get that great "Yes! I fixed it!" feeling*" (Gay Gordan-Byrne – "You Deserve the Right to Repair Your Stuff); "*Breathe life! Clean air is our right!*" (Rosamund Adoo-Kissi-Debrah – "The Tragedy of Air Pollution – and an Urgent Demand for Clean Air"). Such sentences stimulate the attention of listeners, enhance the categorical nature of speech and express the emotions of the author.

3) The use of questions.

Most TED talks use rhetorical questions that do not require a spoken answer from the listener, but require the answer to be thought through. Typically, the author of a lecture asks a rhetorical question related directly to the topic of his lecture, thus drawing attention to it, as well as expressing his special interest. He encourages listeners to answer the question silently, thereby wondering how important it really is to find the answer. Furthermore, in many cases, the answer to the question is given by the speakers themselves during the lecture.: "*Isn't it a nice escape from reality and a fun way to think about the world?* ***It's not***" (Sarah Kurnick – "Aliens build the pyramids" and other absurdities of pseudo-archaeology"); "*How do we put the environment at the top of that list? My answer is… we don't*" (Angela Francis – "How to get everyone to care about a green economy"). In addition, using a question helps the speaker not only express his emotions, but also create the impression of spontaneity and flow of the conversation, bringing it closer to dialogue: "*So what do you think of when you think of the ocean*?" (Susan Ruffo – "The ocean's ingenious climate solutions"); "*Would you like to play with me*?" Audience: "*Yes!*" Martin Reeves: "*Good. I'm glad you said that*" (Martin Reeves – "Why play is essential for business"); Speaker (Ermias Kebreab): "*Why not stop eating beef and drinking milk?*" Audience member: "*Yeah*!" (Martin Reeves – "Why play is essential for business").

Thus, it can be noted that syntactic ways of expressing the category of expressiveness, which more typical for popular science lectures, in a TED talk are expressed primarily by the lecturer changing the order of words in a sentence.

3. Stylistic ways of expressing

Stylistic (that is, using stylistic language means) ways of expressing the category of expressiveness are used by lecturers to make the presentation more emotional, thereby distinguishing it from many other lectures at the conference. Due to the nature of the TED conference, where many lectures follow one another, it is important for speakers not only to successfully convey their message to the audience, but also to draw attention to their research or the topic of their talk in general in order to make the most favorable impression on the audience. Thus, with the help of stylistic ways of expressing, the author contributes to the individualization of his lecture, giving it creativity and emotionality. In the analyzed lectures, we identified the following stylistic ways of expressing the studied category:

1) The use of emotionally colored epithets.

"*The way we do philanthropy right now, the way we've done it for decades is* ***broken***" (Rebecca Darwent – "How to fund the real change in your community"); "*This is* ***amazing****. And I'm hopeful that private foundations and donors will follow this* ***powerful*** *example*" (Rebecca Darwent – "How to fund the real change in your community"); "*And I noticed how* ***weather-worn*** *and* ***brittle*** *and* ***fragile*** *they were*" (Machine Dazzle – "How to unleash your inner maximalist through costume")

2) The use of phraseological units and set phrases.

" *<...>* ***the silver lining*** *is that we'll finally get a different perspective in late-night*" (Lilly Singh – "A seat at the table" isn't the solution for gender equity"); " *<…> filling out paperwork and* ***competing over scraps***" (Rebecca Darwent – "How to fund the real change in your community"); "*The light of hope emerges from the depths of darkness*" (Sahar Zand – "Why Iranians are cutting their hair for "Woman, life, freedom"); "*Communities are left behind and we are* ***running out of time***" (Rebecca Darwent – "How to fund the real change in your community")

3) The use se of metaphor and metonymy.

"*That "different"* ***way of speaking is a secret door*** *only some of us have access to*" (Julian Delgado Ropera – "The poetry of everyday language")

4) The use of simile.

"*It becomes its own story that you can almost read **like a book***" (Machine Dazzle – "How to unleash your inner maximalist through costume"); "*Every day it felt **as though I was going through the same experience***" (Sahar Zand – "Why Iranians are cutting their hair for "Woman, life, freedom")

5) The use of personification.

"*Again, **trillions of dollars are sitting just waiting** to be put to work*" (Rebecca Darwent – "How to fund the real change in your community"); "***My heart sank***" (Julian Delgado Ropera – "The poetry of everyday language"): "*This costume wants to tell a story <…> The costume can be so much more that the costume: it can be the props, it can be the set, it can tell its own stories, it can even be its own character. It can be all of it at the same time*" (Machine Dazzle – "How to unleash your inner maximalist through costume").

4. Non-verbal ways of expressing

This group of ways of expressing the category of expressiveness is connected with the fact that any TED talk is initially a public speech at a conference, where the speaker needs to present his lecture to the audience from the stage. That is why lecturers try to diversify their presentation and make it more "life-like" and less formal, which helps to establish a connection with the audience and make the lecture easier to perceive.

1) gestures, moves.

Such movements and gestures are often unplanned and spontaneous, and also receive positive reactions from listeners: "*I've always taken pride in being the kind of artist that's always making moves*" (Daniel J. Watts – "To accomplish great things, you need to "let the paint dry") – While pronouncing this phrase, the speaker is dancing.

2) expression of emotions (laughter, tears, etc.).

"*So now, why am I telling you all this? Well, because my therapist costs 200 dollars an hour, and this* [TED talk] *is way cheaper*" (Lilly Singh – "A seat at the table" isn't the solution for gender equity") – After this phrase, the speaker is laughing with the audience.

Conclusions. Thus, the category of expressiveness, which is inherent in any TED talk and expressed in the ways listed above is largely determined by the emotional involvement of the speaker. This involvement evokes the same emotional response in the audience and helps create the trusting relationship between the speaker and the audience, which is an important feature of TED talks and distinguishes them from other scientific and popular science lectures. Using the expressiveness category, lecturers not only show their emotions, but also personalize their lecture, which increases its memorability and competitiveness with other presentations at the conference. In addition, expressiveness helps lecturers draw attention to their topic and individual parts of the speech, placing emphasis in such a way as to facilitate the understanding of the lecture. Based on this, we can say that in the case of TED talk lectures, the communicative category of expressiveness performs the following functions: expressing the lecturer's emotions, accentuation (attracting attention and placing emphasis), individualization, establishing a connection with the audience and simplifying the process of understanding the lecture – all of this contributes to increasing the success of TED lecturer.

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DIRECTIONS OF PHRASEOLOGICAL STUDIES OF RUSSIAN LINGUISTS

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ABSTRACT

The article elaborates different linguists' assumptions about phraseology. Despite the fact that numerous valuable research works and studies have been conducted on phraseology in Russian linguistics, the language examples we present under the name of the term syntactic phraseological construction have not been combined and studied under the name of a single term. The term syntactic phraseological construction itself can be considered new for Russian linguistics. Thus, phraseology with a sentence structure usually means clichés, sayings, proverbs, and phraseological sentences. However, there is also a group of expressions within phraseological sentences, which play an important role in grouping, studying them according to their composition, scope in the text, expression possibilities, and stylistic features. In general, defining syntactic phraseological constructions, determining their categorical qualities, and investigating the characteristics of these language units can be considered appropriate from the point of view of studying modern phraseology.

Keywords: phraseology, phraseological units, language units, typological relevance, main concept.

Introduction

In our opinion, the main factor of mastering any language perfectly is the deep knowledge of the phraseology of that language. Phraseology is the most difficult layer to master in the language. Since the phraseological units in the language are an expression of the history, customs, psychology and way of thinking of the people who are the bearers of the language, the linguistic research of the phraseological units in the language of any people, as a result, the history and ethnography of that people.The study of phraseological studies will help to clarify the historical development of that language, on the one hand, and the people who are the bearers of this language, on the other hand [1].

As we mentioned, although phraseology is a relatively young science, it has taken its place in the world of linguistics and has become the object of attention of many scientists - lexicologists, lexicographers, stylists, grammarians, literary scholars, ethnologists, folklorists. Undoubtedly, this interest is related to the wide character of phraseological units and the richness of their features.The rich nature of phraseological units provides ample opportunities to explore them in different directions [2].

Main part

Phraseology at the initial stage of its development is naturally separated from other scientific fields, trying to establish itself as an independent branch of linguistics.Nevertheless, any specific description of a phraseological phenomenon inevitably goes beyond the boundaries of one language and inevitably includes all existing languages practically available for observation at a given time. Kolshansky wrote: "it is necessary to build on the basis of the main dialectical contradiction, which consists in the fact that the description of a specific language is also the description of a general language" [5].Having gained some experience in the phraseological analysis of stable and repeatable language units characterized by the presence of semantic transformation, phraseology rises to a new qualitative stage of its development.

Until recently, phraseology was poorly developed and began to emerge only in the 50s and 60s of XX century.The development of this branch of linguistics in Russian linguistics is associated with the name of Academician V. Vinogradov [3].He dedicated a number of works to this problem.The abundance and diversity of phraseological units in the Russian language forces linguists to distinguish phraseology as a special branch of linguistics. Phraseological expressions, being indivisible and semantically whole, usually serve as a member of a sentence and are equivalent to a word, because they express one concept.

Only in the late 70s and early 80s, indicators of the potential universality of this or that phraseological phenomenon in the linguistic literature of XX century are, first of all, E.M.Malt-ho (1977) and Yu.P.Maltub (1982).The first attempts to form phraseological universals date back to the early 1980s and first of all V.D.is presented in the works of the linguists of the school on comparative and typological phraseology.The development of the science of linguistics itself requires the joint efforts of specialists in logical phraseology and typology.The typological relevance of phraseology can no longer be overshadowed. In the fundamental work of Dobrovolski , special attention is paid to the development of issues related to the problem of typological research of phraseology. For the first time in linguistics, Dobrovolski took decisive steps in forming the foundations of the structural and typological analysis of the phraseology of modern Germanic languages [4].

Based on the theoretical generalization of language problems related to the phenomenon of discreteness/connectedness of the formal-semantic structure of phraseological units and the linguistic-statistical analysis of the phraseological systems of German, English and Dutch languages, the direct dependence of the measure of regularity of the phraseological system on the degree of analyticity of the linguistic system has been fully confirmed.

The current state of linguistics allows us to express the existence of comparative phraseology as an independent and rapidly developing linguistic direction, where specific aspects of research, such as comparative-historical, comparative, structural-typological, intensive-typological, contrasting, have their own methods and tasks.

V.V.in Vinogradov's work "The Russian Language", published in 1947, the scientist identified three types of phraseological units: phraseological compounds, phraseological associations, phraseological adhesions.

The fourth group of expressions is emphasized - phraseological expressions. Phraseological expressions do not differ from free expressions in terms of the nature of the general meaning connection with words.

The analysis of phraseological units, their semantics, the connection of their semantics with the semantics of individual words shows that these units are directly related to the lexical system, organically enter it and complete it. Most of the Russian phraseological units belong to one or another word class.

In the development of the phraseological theory of Russian linguistics at the end of XX and XXI centuries, first of all, it should be noted that in local linguistics the language itself has changed to describe phraseological units, which are now more often called phrasemes.

In the theory of Russian phraseology, the least studied at present are phraseological units or plural expressions with a sentence structure. It is generally accepted that "set sentences are equivalent to ordinary sentences due to their semantic and grammatical nature,as a result, they are opposed to phraseological units, i.e. phrasemes, by the structure of phrases and word combinations along the line of communicative (non-nominative) - non-communicative (nominative)".Such a view seems overly categorical and requires significant scrutiny and clarification regarding all types and types of UV.Currently, the postulate about the relationship between language and culture has become an axiom.The most important task at the current stage of the development of linguistics is to understand this interaction aimed at defining culture, based on the determination of the components reflected in the semantics of linguistic units and conveying knowledge about the world broken from the prism of the national language, as well as the methods of such scientific research.

The attention of modern linguistics is focused on man as his mother tongue, that is, a direction such as anthropocentrism comes to the fore.The relationship between the components of the "Man - language" dyad is considered in two aspects: man as a subject who understands and evaluates the world through language, and man as an object of description and evaluation through language units. In recent years, more works dedicated to the description of the human image in language appear.

Phraseology began to be associated more and more with linguocognitology, linguoculturology.This Alefirenko, O.A.Voronkova, L.G.It is proved by the works of Zolotyx and others. However, a number of questions remain that have not been fully studied by modern linguists. Phraseology still remains as a complex science and a linguistic science that requires extensive knowledge from the researcher.

It can be considered a generally accepted opinion that phraseological units are organized according to phrase and sentence models, but differ from the latter either by the "integrity of nominations" or by the special nature of the meanings of lexical components.

Such a lexical-semantic approach to the problems of distinguishing phraseological expressions and variable combinations of words can be explained by the fact that their external similarity (formed separately) is obvious, and the differences do not seem to allow distinguishing purely structural regularities. between phraseological expressions and combinations of words, for example, when distinguishing between a phrase and a complex word, certain structural regularities can be relied on. But despite the relationship between the syntactic and lexical levels of the language, each of them has its own elements and rules for their organization. Undoubtedly, all phraseological units were created on the basis of specific phrases and sentences. However, most phraseological units coincide in form with the types of existing word combinations. The difference is that variable combinations of words are organized according to structural models at the syntactic level of the language, while phraseological combinations have lost the ability of syntactic modeling to one degree or another.

Phraseology as a linguistic science attracts the attention of more researchers. If in the twenties the question of separating phraseology into a special field of linguistics was raised for the first time.

The classification analysis of the modern development of phraseology allows to identify clearly formed areas of research in this linguistic discipline, namely:

1. Morphological and grammatical features of phraseological units;
2. Structural types of phraseological units;
3. Semantics of phraseological units;
4. phraseological nomination;
5. The specificity of the relationship of phraseological units with their components and complex words;
6. Cognitive approach to the study of phraseological meaning;
7. Stylistic function of phraseological units;
8. Sources of phraseological units and ways and methods of phraseologicalization;
9. Phraseology of different regional variants of the language;
10. Phraseography;
11. Phraseological derivation;
12. Author's phraseological idiocy;
13. Functional-communicative features of phraseological units;
14. Linguistic aspect of phraseology and national-cultural specificity of phraseological units;
15. phraseological terminology;
16. Sociolinguistic aspect of pragmatic functions of phraseological units;
17. Genre, style, artistic and other problems of phraseological translation;

18. Phraseology in the context of subculture;

19. The linguodidactic aspect of phraseology;

20. Modeling problem in the field of phraseology;

21. The problem of system relations of phraseological units

It is necessary to add a point to the above list about the comparative study of phraseological units of different languages as the most intensively developing direction in phraseology, because in the late 60s, work on the aspect of comparative phraseological studies had just begun. Among them M.A. Pekler (1967) A.S. Rahimov (1968), L. Ya. Orlovskaya (1968) studies phraseology and their work in some aspects has not lost its relevance even today [6].

The aim of this article is a global description of Russian phraseology (idioms) in communicative and pragmatic aspects. This goal is defined and solved in the following main tasks:

1. To justify the need to analyze Russian idioms in the communicative-pragmatic aspect as concrete units designed to serve the communicative sphere of language and speech.

2. To determine the linguistic functions of phraseological units.

3. To characterize the features and structure of phraseology.

4. To characterize the main semantic-grammatical (partial) categories of phraseological units in the communicative aspect.

5. To characterize the semantics of idioms in the onomasiological aspect.

6. To give an ideographic description of idioms: a) to define the subject and tasks of phraseological ideography, b) to characterize and structure the main phraseological fields.

These studies differ in that, when conducting a comparative analysis of linguistic phenomena, the authors consider the mother tongue as the value by which the phraseological facts of the foreign language are determined or described.

Phraseology at the initial stage of its development is naturally separated from other scientific fields, trying to establish itself as an independent branch of linguistics. However, any specific description of a phraseological phenomenon inevitably goes beyond the boundaries of one language and inevitably includes all existing languages that are practically available for observation at a given time. As Kolshansky points out, "The study of a separate language system" "needs to be built on the basic dialectical contradiction that the description of a particular language is also the description of a general language. Having gained some experience in the phraseological analysis of stable and repeatable language units characterized by the presence of semantic transformation, phraseology rises to a new qualitative stage of its development.

The time has come when, on the one hand, descriptive linguistics, in this case both classical and field phraseology, finds its way in typological generalizations. And on the other hand, as the history of the development of linguistic typology shows, there is an increasing need to use phraseological materials to create the most complete typological model of the language possible.

There are three main types of phraseological units: idioms, phraseological units and phraseological units.

Phraseological units (idioms) are stable expressions that have meaning only in their unchanging form. When you replace or rearrange the words, the meaning of the idiom will be lost.

Phraseological combinations are fixed but flexible expressions, the meaning of which is determined by separate keywords. In this case, non-key words can be replaced by synonyms. Example: you can "die of love" or "you can die of pleasure" - the meaning of both expressions is clear.

Two directions of research in modern linguistics

Summarizing the broad ideas about phraseology, we can note the following. Two directions of research in modern linguistics have clearly emerged.

The first direction is based on the recognition that the phraseological unit is a linguistic unit consisting of words, that is, by its nature, a word combination. At the same time, some scholars express the opinion that the object of phraseology is all concrete expressions that are actually possible in a given language, regardless of the qualitative differences between them. So, for example, Kopylenko says: "Phraseology covers all ... lexeme combinations, including "free" word combinations, that exist in a given language [7].

On the other hand, within the limits of this direction, the object of phraseology is recognized only by certain categories and groups of word combinations that stand out from all possible ones in speech with their special originality. The composition of such units in the language is determined depending on what features are taken into account when defining such expressions. Only these "special" phrases can be called phraseological units. Despite the conventionality of concepts and related differences, phraseology is usually said to represent:

1. As the phraseology of the language in the "broad" sense of the word, including completely rethought phrases with unreinterpreted component words. An example of such a "broad" understanding of the scope and composition of phraseology is the point of view of V.L. Arkhangelsky, O.S. Akhmanova, N.M. Shansky.

2. As phraseology of the Russian language in the "narrow" sense of the word, including only completely rethought expressions. Among the works that reflect this understanding of the scope and composition of the phraseology of the Russian language, there are, for example, articles by V. P. Zhukov.

In both cases, the verbal nature of the phraseological unit, as well as the lexeme character of its components, are not questioned by these scholars. It is recommended to consider the phraseological unit as a contamination of the features of the word and phrase, emphasizing the homonymy of the phraseological unit and the phrase structurally related to it.

Phraseologies of New Testament origin, with their figurative system, lively expressiveness and deep spiritual content, are never a frozen mass of obsolete words. In our work, we tried to lift the veil of traditional views

on this layer of the Russian vocabulary, to at least give an overview of its current state against the background of general theoretical information on phraseology. Certain conclusions can be drawn as a result of the analysis of a number of scientific-journalistic works and lexicographic sources.

Conclusion

Despite the fact that numerous valuable research works and studies have been conducted on phraseology in Russian linguistics, the language examples we present under the name of the term syntactic phraseological construction have not been combined and studied under the name of a single term. Note that the term syntactic phraseological construction itself can be considered new for Russian linguistics. Thus, phraseology with a sentence structure usually means clichés, proverbs, sayings, and phraseological sentences. However, there is also a group of expressions within phraseological sentences, which play an important role in grouping, studying them according to their composition, scope in the text, expression possibilities, and stylistic features. In general, defining syntactic phraseological constructions, determining their categorical qualities, and investigating the characteristics of these language units can be considered appropriate from the point of view of studying modern phraseology.

In the development of phraseology, as we have seen, great prospects are opening up, focusing on the extensive study of functional language in interaction with it, recently intensified research in the field of onomasiology, nomination theory, linguistic pragmatics, functional grammar and wider communicative linguistics.

As for Russian phraseology (idioms), it has not yet been the object of comprehensive research in the communicative aspect. This determines the relevance of the topic of this work. The scientific topic we advance is dictated by the logic of the development of linguistics itself, which has become a comprehensive analysis of language as the main means of communication of people today.

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PHYSICS AND MATHEMATICS

ALTERNATIVE VERSION OF THE SPECIAL THEORY OF RELATIVITY[1]

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ABSTRACT

This article shows that the version of the special theory of relativity (STR) presented in all physics textbooks is incorrect, since relativistic formulas obtained therein are incorrect. They are incorrectly explained using the wrong principle of non-exceeding the speed of light and have led to incorrect conclusions about the physical unreality of imaginary numbers and the existence in nature of only our visible universe. This version of the STR proved to be in demand only because its authors were not able to explain physical sense of imaginary numbers. The article provides three proofs of physical reality of imaginary numbers and explains their physical sense in the theory of linear electric circuits, relativistic physics and astrophysics. This made it possible to obtain corrected relativistic formulas, from which appropriate conclusions were drawn.

Keywords: special theory of relativity, relativistic formulas, imaginary numbers, Multiverse, parallel universes, portals, dark matter, dark energy.

1. Introduction

The special theory of relativity (STR) [1]-[3] created in the 20th century has been deservedly considered one of the most significant achievements of modern physics, since it introduced the principle of relativism into science. This is why STR is now taught in all university physics textbooks. However, the relativistic formulas obtained in this theory turned out to be incorrect due to the lack of experimental knowledge in physics of the 20th century necessary to complete their derivation. What is the physical meaning of named imaginary numbers and now is not explained in any textbook. Therefore, a postulate was introduced in STR, called the principle of not exceeding the speed of light, which allowed the physical meaning of imaginary numbers not to be explained, since nothing supposedly corresponds to them in nature.

This is how the STR has still been studied in physics textbooks.

2. The version of the special theory of relativity presented for study in physics textbooks is incorrect

For a newly created scientific theory, this is pardonable, since such a theory must be developed. Therefore, over time, something in it must be refuted. The author of the concept of an open society, Sir Karl Raimund Popper, argued [4] that *"... the struggle of opinions in scientific theories is inevitable and is a prerequisite for the development of science"*.

And in STR there are already a lot of such denials [5]-[54]. This is the existence of shock oscillations - tsunamis, music of pianos and other musical instruments, bell ringing in Christian churches and even swinging swings in playgrounds. This is the modern theory of resonance under the influence of not only sinusoidal oscillations of constant amplitude, but also damped sinusoidal oscillations, and even under the influence of exponential pulses. And this is even radio engineering created earlier by STR, since STR and radio engineering mutually refute each other.

But the authors of physics textbooks, not being able to challenge these refutations, nevertheless, still do not take them into account [55]-[63].

3. The alternative version of the special theory of relativity

Therefore, the alternative version of the STR [64] is in demand. In it incorrect principle of light speed non-exceedance STR denying physical reality of imaginary numbers is replaced by the principle of physical reality of imaginary numbers proven experimentally.

Let us show how, for example, this can be done by correcting the Lorentz-Einstein's formula

$$m = \frac{m_0}{\sqrt{1-(v/c)^2}} \qquad (1)$$

where m_0 is the rest mass of a moving body (for example, an elementary particle);

m is the relativistic mass of a moving body;

v is the velocity of a body;

c is the speed of light.

It can be seen from the graph (see Fig. 1a) that the function $m(v)$ has a discontinuity at $v = c$. It corresponds to real numbers for argument values $v < c$, while for argument values $v > c$ it corresponds to imaginary numbers that were discovered in the 16th century and whose physical sense remained unexplained until the 20th century. And since we have proved the physical reality of imaginary numbers, in this situation it is necessary to explain their physical meaning. But on the graph of the function $m(v)$, its branch at the values of the argument $v > c$ corresponds to a physically unstable process that cannot exist in nature. Therefore, the Lorentz-Einstein formula cannot be explained. Hence, it is incorrect.

1 This is reprint of the paper "Antonov A. A. The Corrected Version of the Special Theory of Relativity. European Journal of Applied Sciences. Services for Science and Education. United Kingdom. 11 (5). 68-83. 2023. DOI:10.14738/aivp.115.15474

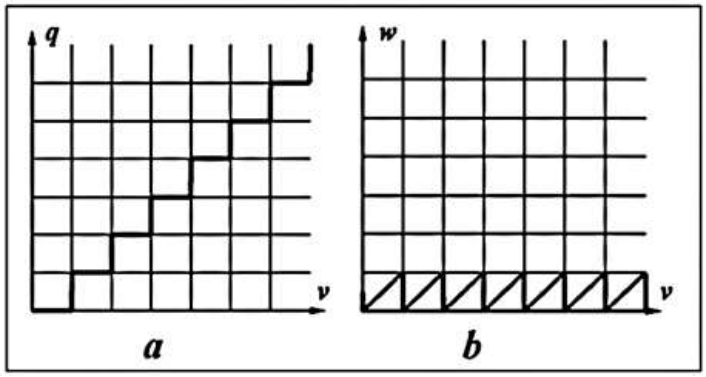

Fig. 1. Graphs of the function $m(v)$ *corresponding to the generally recognized but incorrect and alternative versions of STR in the subluminal* $v < c$ *and hyperluminal* $v > c$ *range*

And the graph of the Lorentz-Einstein formula, which can be explained (see Fig. 1b), on the range $v > c$ should be similar to the graph of this function (see Fig. 1a) on the range $v < c$. Thus, the corrected Lorentz-Einstein's formula can be written as follows

$$m(v) = \frac{m_0(i)^q}{\sqrt{1-(v/c-q)^2}} = \frac{m_0(i)^q}{\sqrt{1-(w/c)^2}} \quad (2)$$

where $q = \lfloor v/c \rfloor$ is the 'floor' discrete function of the argument v/c (see Fig. 2a);

$w = v - qc$ is the local velocity that in each universe takes values in the range $0 \le w < c$ (see Fig. 2b).

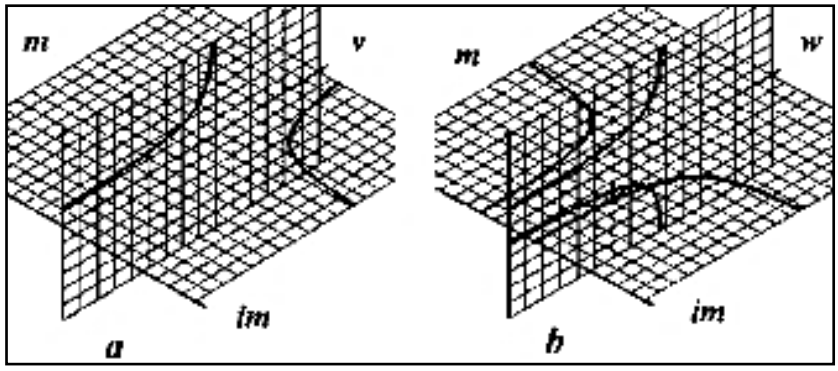

Fig. 2.

Graphs of functions $q(v)$ *and* $w(v)$ *illustrating the meaning of the 'floor' function of discrete mathematics*

Therefore, at $q = 0$ the formula (2) should be written as (1), and at $v > c$ it should be written as follows

$$m(v) = \frac{im_0}{\sqrt{1-(v/c-1)^2}} = \frac{im_0}{\sqrt{1-(w/c)^2}} \quad (3)$$

The graph of the function $m(v)$ in Fig. 1b shows that the value $q = 1$ corresponds to a fragment of this function on the interval $c \le v < 2c$. Those on this interval $c \le v < 2c$ it corresponds to universe adjacent to our universe. And this other universe is already invisible to us, as it is located beyond the event horizon. Therefore, for definiteness, we call it tachyon universe. Our visible universe will then be called tardion universe. The value $q = 2$ corresponds to an invisible tardyon antiverse, for which $2c \le v < 3c$. The value $q = 3$ corresponds to an invisible tachyon antiverse, for which $3c \le v < 4c$. Etc.

Therefore, it follows from the corrected Lorentz-Einstein formula that the statement contained in physics textbooks about the existence in nature of our only visible universe is incorrect. In fact, we are in the Multiverse, which, due to the mutual invisibility of the universes in it, we will call the hidden Multiverse. But to make sure that the invisible universes really exist, we need an appropriate experiment that made it possible to see them.

4. Corollaries of the alternative version of the STR

4.1.How to see invisible universes

In order to understand what this experiment can be, first of all, it is necessary to understand that in Formula (2) the parameter q is an additional spatial dimension in which mutually invisible parallel universes2 somehow drift relative to each other. They

2 Since, despite their infinity, they do not intersect

touch each other and even slightly penetrate into each other generating respective passages through which their matter content is exchanged. These passages are commonly referred to as portals [65], [66] or stargates [67]. And the entrances to them are presumably at least some of the anomalous zones, of which there are a lot on Earth [68]-[71].

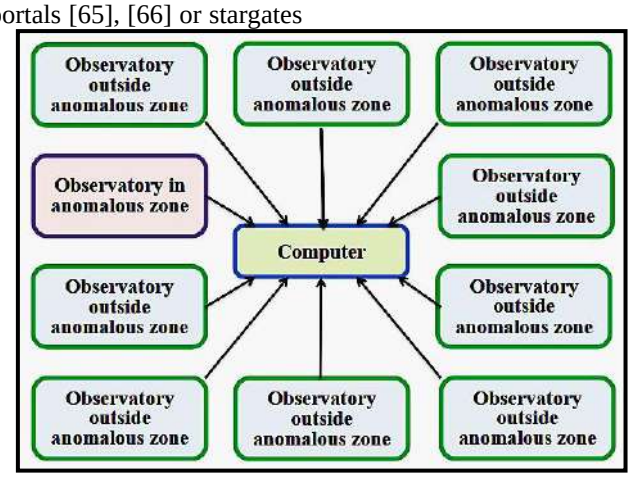

Fig. 3. Scheme of an astronomical complex for the detection of invisible universe

And since in other universes the constellations in the sky inevitably differ from the constellations in our earthly sky, then when moving through the portals from the Earth to any neighboring universe, the map of our starry sky will gradually be transformed into a map of the starry sky of the neighboring universe. And if a telescope is placed in such a portal, then by comparing the position of the stars in the sky in the portal and outside the portal (see Fig. 3), changes in the position of the stars can be detected. These other constellations in the starry sky in the portals will be the desired experimental evidence [72]-[77]. The corresponding experiments[3] is very low cost and easily implemented. Moreover, some observatories are already in anomalous zones. As, for example, the Main Astronomical Observatory of the National Academy of Sciences of Ukraine, which is located 12 km from the center of its capital, Kiev, in the Goloseyevsky forest.

4.2. The need geophysical research of portals

Naturally, the farther the telescope is placed in the portal, the more the constellations in its starry sky will differ from the constellations observed outside the portals. And the more convincing will be such astronomical observations. In addition, as a result of such astronomical observations, it will be possible to determine how many different neighboring invisible universes are located next to our visible universe [78]-[88].

But the great value of such observations lies not only in this. And also in the fact that the study of the geophysical characteristics of portals will make it possible to create artificial portals, with the help of which it will be possible to move from our universe to other currently invisible to us, and therefore unknown universes. That will accelerate the transformation of human civilization into a super-civilization.

However, people now avoid any visit to the portals, as the portals are invisible labyrinths in which it is impossible not to get lost. Therefore, in order to make visiting portals safe, it is necessary to create means of portal orientation that will allow invisible portals to be seen in the same way that a compass allows navigators to see the invisible magnetic field of the Earth. And this is quite possible to do if we use the fact that the intensity of the electromagnetic radiation of terrestrial radio stations decreases as we dive into the portals. And when it reaches the neighboring universe, this radiation will disappear completely. After all, on Earth there is no such electromagnetic radiation from neighboring universes.

4.3. Dark matter, dark energy

Having proved the existence of mutually invisible parallel universes, we need to find out their location in the hidden Multiverse, or, in other words, the structure of the hidden Multiverse.

We also need to understand the meaning of dark matter and dark energy called as such because of their incomprehensibility and because no chemical elements have been found therein, as well as because they neither absorb nor emit nor reflect nor refract electromagnetic radiation. However, they account for more than 95% of the whole mass-energy in space. More precisely, according to the data obtained by the WMAP spacecraft [89], the mass-energy of our visible universe (actually, the hidden Multiverse) consists of 4.6% of baryonic matter, 22.4% of dark matter and 73.0% of dark energy. And according to more recent data obtained by the Planck spacecraft [90], the entire universe (actually, again, the entire hidden Multiverse) consists of 4.9% of baryonic matter, 26.8% of dark matter and 68.3% of dark energy.

Therefore, the truth and completeness of knowledge in modern physics, which cannot explain the phenomena of dark matter and dark energy, raises serious doubts. And since it was proved above in the most indisputable way that in nature there is not the Monoverse, but the Multiverse, then in addition to searching for the clues to the nature of the phenomena of dark matter and dark energy at the Large Hadron Collider in the microcosm, it is also necessary to search

3 They are analogous to the experiment of Sir Arthur Stanley Eddington in 1919.

for their clues in the macrocosm of our hidden Multiverse. After all, Albert Einstein himself said: *"Insanity: doing the same thing over and over again and expecting different results".*

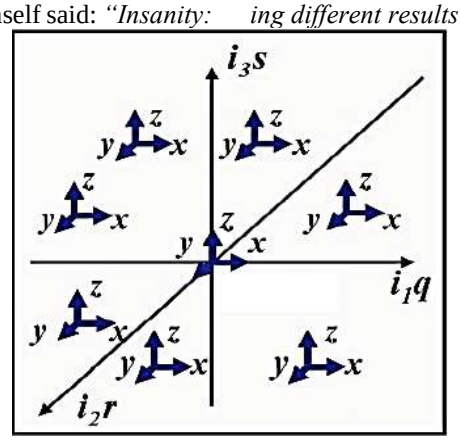

Fig. 4. The six-dimensional space of the hidden Multiverse, in which $\boldsymbol{q,r,s}$ *are the coordinates of invisible parallel universes, and* $\boldsymbol{x,y,z}$ *are the coordinates of the material content in each such parallel universe*

The search for a solution to this problem in the hidden Multiverse allows us to assume that [91], [92]:

- dark matter and dark energy are evoked by invisible parallel universes of the hidden Multiverse, creating a kind of its own gravitational shadow in our visible universe;
- dark matter is evoked by invisible universes of the hidden Multiverse adjacent to our visible universe;
- dark energy is evoked by the rest of the universes of the hidden Multiverse, except for our visible and adjacent invisible universes;
- chemical composition of dark matter and dark energy cannot be determined because they are just images.

Thus:

- the whole hidden Multiverse should consist of 100% / 4.6% = 21.8 parallel universes according to the experimental data obtained by the WMAP spacecraft, and of 100% / 4.9% = 20.4 parallel universes according to the data obtained by the Planck spacecraft;
- the whole hidden Multiverse should consist of 100% / 4.6% = 21.8 parallel universes according to the experimental data obtained by the WMAP spacecraft, and of 100% / 4.9% = 20.4 parallel universes according to the data obtained by the Planck spacecraft;
- dark matter should consist of 22.4% / 4.6% = 4.9 parallel universes according to the experimental data obtained by the WMAP spacecraft, and of 26.8% / 4.9% = 5,5 parallel universes according to the data obtained by the Planck spacecraft;
- dark energy should consist of 73.0% / 4.6% = 15.9 parallel universes according to the experimental data obtained by the WMAP spacecraft, and of 8.3% / 4.9% = 13.9 parallel universes according to the data obtained by the Planck spacecraft.

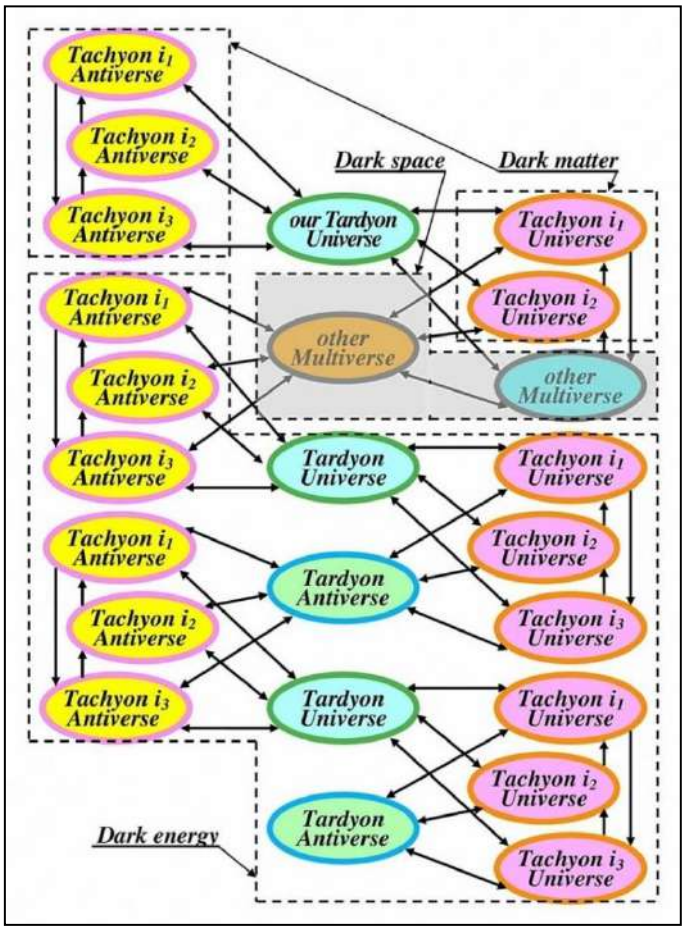

Fig. 5. Possible structure of the hidden Multiverse

Such an explanation of the phenomena of dark matter and dark energy provides important information about the structure of the hidden Multiverse. Indeed, given that mutually invisible universes of the hidden Multiverse are interconnected by numerous portals through which they exchange their matter content it can be argued that their mass-energy has significantly averaged over billions of years of their existence.

However… these results are inconsistent with the formula (2), since according to the WMAP and Planck spacecraft data, five-six rather than two invisible universes should be adjacent to our visible universe. Therefore, the relativistic formula (2) must be corrected again as follows:

$$m(q,r,s) = \frac{m_0 (i_1)^q (i_2)^r (i_3)^s}{\sqrt{1-[v/c-(q+r+s)]^2}} \quad (4)$$

where v is the velocity measured from our tardyon universe;

c is the speed of light;

i_1, i_2, i_3 are the related imaginary units [51], wherein

$$i_1^2 = i_2^2 = i_3^2 = -1 \quad (5)$$

$$i_1 i_2 i_3 = i_2 i_3 i_1 = i_3 i_1 i_2 = -1 \quad (6)$$

$$i_1 i_3 i_2 = i_2 i_1 i_3 = i_3 i_2 i_1 = 1 \quad (7)$$

4.4. Antimatter, anti-time, anti-space

Therefore, the hidden Multiverse has a quaternion structure in six-dimensional space (Fig. 4). For example, shown in Fig. 5, a helical structure in which adjacent to our visible tardyon universe is five invisible tachyon universes and antiuniverses that evoking phenomenon of dark matter, as well as sixteen other invisible universes evoking phenomenon of dark energy. Thus, such a hidden Multiverse contains twenty-two invisible universes, which is consistent with the mathematically analyzed data obtained by the WMAP and Planck spacecraft. In addition, this structure is connected to two other universes that are outside the hidden Multiverse and form, together with the hidden Multiverse, the Hyperverse. And some invisible universes located in the Hyperverse outside the hidden Multiverse, as shown in Fig. 5 could presumably be adjacent to our visible universe. And then they can be discovered and studied by astronomical and geophysical research in portals.

From such a structure of the hidden Multiverse it also follows that in its cosmic antipodes of universes/antiuniverses there are matter/anti-matter, as well as time/anti-time and space/anti-space [93]-[103].

4.5. Deja vu phenomenon

The alternative version of STR allows explaining another unusual phenomenon – deja vu. It is so unusual that until now only medical scientists have tried to explain it. Translated from the French 'déjà vu', it means 'already seen'. And this term describes an allegedly psycho-emotional phenomenon corresponding to the state of a person in which it seems to him that he had already

been in exactly the same situation. Moreover, psychologists say that up to 97% of all people were in this state at least once in their lives.

And although a large number of hypotheses have been proposed to date to explain the phenomenon of deja vu, it's all not clear here. As in the phenomena of dark matter and dark energy. And all the deja vu hypotheses are not very convincing. They do not explain why almost all people sooner or later find themselves in this state, regardless of place of residence, age, gender and other factors. If it is an infection, how is it spread? Why, in spite of everything, almost all of humanity is infected? And if it is an infection, then why without any consequences and complications? And if not an infection, then why did the phenomenon of deja vu hit so many people? But why not everyone?

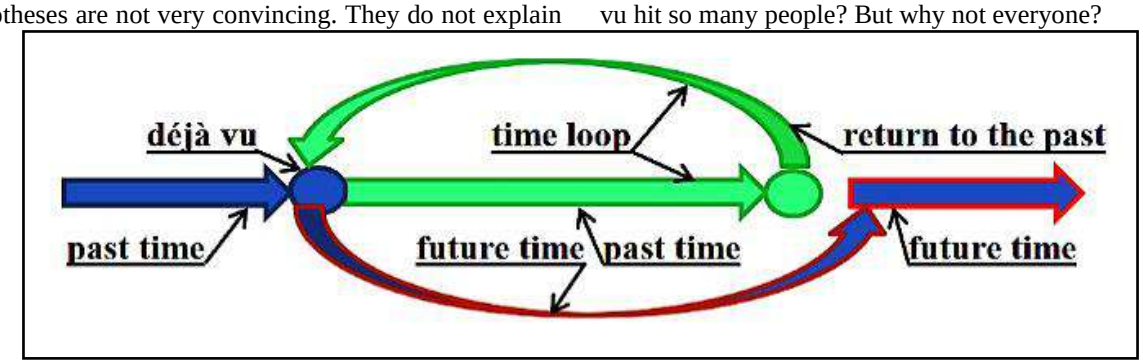

Fig. 6. Explanation of the 'déjà vu' phenomenon, which is created as a result of the intersection of the time branch 'return to the past' and the time branch 'past time' with the formation of a 'time loop'

Therefore, we propose another hypothesis - a physical one. Very unusual, but explaining everything. However, explaining in a different way than it is now customary in science to explain, using only the knowledge gained in the past. And we will explain using knowledge that is expected to be obtained in the future. Those suppose that in the future a highly developed human civilization, possessing extremely perfect computers, will be able to calculate any hypothetical situations in its development both in the past and in the future. Let's also assume that the inhabitants of these super-civilizations will be able to travel to their past. Then, the inhabitants of these super-civilizations, traveling into the past and making some changes to it, will be able to correct their future as well (see Fig. 6). And people who are exposed to such an impact, being in a time loop, from some point in time in their past further in the future will live in a different branch of time. And they will forget their previous life in the time loop, as the memories of everything that happened to them from their memory will somehow be erased. So this hypothesis really explains everything.

But a very important circumstance follows from it – the whole life of all people on Earth is currently under the control of aliens from the future and is recorded in the memory of their supercomputers. Therefore, they know everything about us. And they try not to interfere in our lives because it can change their future. And then they will not be able to return to their future to their relatives and friends. Nevertheless, sometimes they still find such situations in the past on their supercomputers, which correct their future in a favorable way, not excluding the possibility of returning to their relatives and friends. And these options are being implemented.

5. Conclusion

Thus, the article proves that the version of the special theory of relativity studied in the educational process of all universities - even the most prestigious ones - is incorrect. And the alternative version presented in the article has convincing experimental evidence and allows many inexplicable things to be explained. Therefore, in the existing physics textbooks, the presentation of the special theory of relativity must be corrected.

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Conflict of Interest

Nobody has anything to do with this research.

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OBSERVATION OF TWEEK-ATMOSPHERICS AFTER SOLAR FLARES AT THE "AKADEMIK VERNADSKY" UKRAINIAN ANTARCTIC STATION

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ABSTRACT

Tweek-atmospherics (tweeks), along with radio transmission by VLF radio stations, are used to study the lower ionosphere. Electromagnetic pulse radiation, which has been excited by the lightning discharges, has a maximum spectral density at extra low frequencies range (ELF, 300...3000 Hz) and very low frequencies (VLF, 3...30 kHz). The Earth-ionosphere cavity serves as a waveguide for electromagnetic waves in these frequency ranges. On the spectrogram of the tweek, the initial part is a linearly polarized broadband signal, and then a number of individual harmonics are observed. Their instantaneous frequencies decrease, asymptotically approaching approximately multiples of the cutoff frequencies of the waveguide. The single position method for lightning location and estimation of the ELF wave's reflection heights in the lower ionosphere by tweeks has been implemented into the computational algorithm. The clusters with approximately the same azimuths and distances to sources which have been obtained during the same night have been identified upon the ensemble of tweek-atmospheric records. The data were accumulated at the Akademik Vernadsky Ukrainian Antarctic Station in 2021. These data were selected for 6 nights of summer, autumn and winter of the southern hemisphere, during periods of disturbed magnetosphere after solar flares. The location of the receiving complex in the near-polar region makes it possible to register tweek sources in two world thunderstorm centers with geographic azimuths from –60° to 130°. By experimental results it has been shown that, under conditions the three-hour planetary index K_p = 4...6, the measuring complex at the Akademik Vernadsky Ukrainian Antarctic Station stably detects ELF – VLF atmospherics propagating at night in the near-Earth waveguide. Processing records of such signals using the same algorithm as for tweek-atmospherics under normal conditions of an undisturbed magnetosphere demonstrates the coordinates of the sources of atmospherics. This also applies to the area of the Southern Magnetic Anomaly in the Brazilian region, where satellite observation of lightning discharges is nearly impossible after solar flares. The vast majority of thunderstorm centers for period studied were confined to continental regions, also tweek sources have been observed with coordinates associated with a latitude band around 40 S of the Atlantic and Indian Oceans. Data on the location of tweek sources (lightning discharges) coincide quite closely with predictions according to climate patterns. By studying the spectra of tweeks, there has also been detected an effect of non-reciprocity of the propagation in the East – West and West – East directions. The mechanism of this phenomenon should probably be close to the same mechanism during the reflection of ELF – VLF radiation in the undisturbed ionosphere. A sharp maximum in the average number of harmonics (that is, a minimum of attenuation coefficients) was observed when tweek atmospherics arrived from a geographic azimuth of 110°. This feature can be explained by the joint manifestation of the non-reciprocity effect and the specific layout of the Southern Magnetic Anomaly relative to the receiving point at the Akademik Vernadsky Ukrainian Antarctic Station.

Keywords: lower ionosphere diagnostic, ELF – VLF radiowaves, tweek-atmospherics, lightning location.

1. Introduction.

Electromagnetic pulse radiation which has been excited by the lightning strokes has a maximum spectral density at the frequency band embraced by extra low frequencies range (ELF, 300...3000 Hz) and very low frequencies range (VLF, 3...30 kHz). The Earth-ionosphere cavity serves as a waveguide for electromagnetic waves in these frequency ranges. The radiation generated at the lightning discharge sites creates atmospheric signals inside the near-Earth waveguide. At night, so-called tweek-atmospherics, or tweeks, are often observed. They are characterized by a longer duration than that of daytime atmospherics, up to 10…100 ms. In the spectrogram of the tweek, the initial part is a linearly polarized broadband signal, then a number of individual harmonics are observed, and their instantaneous frequencies decrease, asymptotically approaching approximately multiples of the cutoff frequencies of the waveguide. Along with radio transmission by VLF radio stations, the use of these natural signals allows to study a layer of ionosphere at altitudes of 60...90 km with a low electron concentration (10^6…10^9 m^{-3}).

Tweek atmospherics have been singled out as a special subspecies of atmospherics due to their extremely long duration [1, p. 1476]. The use of a waveguide model with isotropic conducting boundaries made it possible to satisfactorily explain the dispersion properties of tweeks [2, p. 58]. A number of tweek peculiarities were discovered later, namely: tweeks are recorded when the signal source and receiver are at night conditions, or even during a solar eclipse [3, p. 667], the polarization of the tweek signal in the final, so-called tail part is typically close to left-circular polarization. Extra long tweek tails are also poorly explained by isotropic waveguide model. These facts can be explained using theory from [4, p. 151], [5, p. 60].

An improved modification of the single-position (so-called "Kharkiv") method for lightning location and estimation of the lower ionosphere height by tweek-atmospherics is described in detail in [6, p. 53], [7, p. 40]. The stages of the modified technique are as follows: calculation of the dynamic spectra (sonograms) of a

signal based on its parts of variable length, which is determined by preliminary estimations of the path parameters of a given tweek; isolation of signal harmonics in the sonogram and automatic selection of tweek parameters that give satisfactory approximations of the observed tweek harmonics for one of the three signal components. Algorithm [6, p. 53], [7, p. 40] was tested on model tweek signals. It was shown that, up to 8 Mm source distances, good agreement is achieved between the model and calculated parameters of the tweek path [7, p. 40], [8, p. 289]. The estimations of reflection heights in the ionosphere for the first (fundamental) and higher harmonics, and the estimations of polarization parameters of the tweek signal by this method were made in a number of works on an ensemble of experimental tweek records [9, p. 98], [10, p. 27], [11, p. 20], obtained in tropical regions during the voyage of the research vessel (R/V) "*Akademik Vernadsky*" in 1991. The paths to lightning sites that serve as sources of tweeks were from 0.5 Mm to 4.5 Mm long according to estimations based on this ensemble.

The East – West asymmetry of first quasi-transverse electric (QTE) mode propagation with frequencies ~2…3 kHz in the Earth-ionosphere wavequide is known from observations of atmospherics [12, p. 1491], [13, p. 101]. The azimuthal dependence was revealed ([10, p. 27], [11, p. 20], [14, p. 461]) in the tweek polarization at the first harmonic, where it manifested itself at source distances of 1.5...4.5 Mm as non-reciprocity of East – West propagation.

In later works [15, p. 44], [16, p. 18] an azimuthal dependence in the tweek spectra was observed by the calculated mean number of tweek harmonics at source distances of 8…10 Mm, according to the experimental records database accumulated at the Ukrainian Antarctic Station "Akademik Vernadsky" in 2019 – 2021. Tweek-atmospherics in this database have source at the distances of 1.5…10 Mm or more.

The correlation matrix upon this database was calculated for three parameters, and partial correlation coefficients were obtained in [17, p. 4]. The cause-and-effect relationship was studied between the average azimuth of the arrival of tweeks in regard to the magnetic meridian, the average distance to the center of the cluster of tweek sources (lightning discharges), and the average number of tweek harmonics. It is shown that the partial correlation coefficients between the number of tweek harmonics and the difference of the magnetic azimuth from the direction to the magnetic east exceed the 0.1% significance level for the entire range of distances. It is shown that the effect of the distance to the tweek source on its spectrum in the range of 2…8 Mm is comparable in magnitude or exceeds the effect of the magnetic azimuth in the case of propagation in a region outside the geomagnetic equator.

The increased probability of detecting tweeks with higher harmonics if their directions of arrival are close to the geomagnetic east is explained as the effect of non-reciprocity of East – West and West – East propagation of ELF – VLF waves in regard to the magnetic meridian upon the spectra of tweek-atmospherics.

Within the frequency range of 1.6…20 kHz, up to 9 harmonics are revealed in the experimental recordings of tweek atmospherics. Current surveys near the world's thunderstorm centers are detecting broadband tweeks, with instances of tweeks that include higher harmonics up to the 6th [18], but generally do not determine signal arrival directions. Using experimental material, it was previously shown that at source distances of more than 1.5 Mm, tweeks have 2...4 harmonics in the spectrum [9, p. 98]. The ratios of the reflection and attenuation parameters in the lower ionosphere, as well as the background noise level, lead to the fact that, for source distances to the receiver about 10 Mm, tweek harmonics are usually not observed, except for the fundamental one.

The homogeneity of the ionosphere is a rather serious confinement for the tweek propagation model [5, p. 60], [19, p. 1185]. These theoretic results are acceptable only for a non-disturbed nighttime ionosphere with a drastic increase of electron density in the *E*-layer. During periods of time when conditions in the Earth's magnetosphere are disturbed as a result of solar flares, observations of experimentally recorded tweeks must be compared with the pattern observed under normal conditions.

The purpose of this work is to study the implementation of observations of tweek-atmospheric signals in the circumpolar conditions of the Ukrainian Antarctic "Akademik Vernadsky" Station during periods of disturbed magnetosphere in different seasons of the year.

2. Data and processing methods.

Through three orthogonal components of the tweek recording one can determine the arrival azimuth of tweeks. The dynamic spectrum (sonogram) of the tweek-atmospheric for frequencies ≤25 kHz by sectors of variable length is obtained, and than the computational algorithm (with a probability less than 1) detects in sonogram the first (fundamental) harmonic and harmonics of a higher order, if they are present in the signal. For each tweek-atmospheric, a pair of values [*h*, *D*] is calculated based on all harmonics available for processing, where *h* is the average effective height of the reflecting layer in the lower ionosphere along the tweek path, and *D* is the distance to the tweek source. Automatic selection of tweek parameters that give satisfactory approximations of the tweek harmonics is performed in such a way as to achieve the best fit for all harmonics taken into account simultaneously. The algorithm, which is currently used by the measuring complex since the fall of 2020, also determines the effective reflection heights for the three lower harmonics of the tweek.

The Akademik Vernadsky Ukrainian Antarctic Station (UAS) is located near the polar circle, at 65°14′44" S, 64°15′28" W, geomagnetic coordinates at 2019 are 55.7°S and 6.3°E. The receiving unit and the details of its operation were described in [20, p. 116]. Tweeks are observed when the receiving station is in the night hemisphere, e.i. during the local nighttime.

The reception point on UAS "Akademik Vernadsky" can record tweeks generated by two world thunderstorm centers in the tropics of the Americas and Af-

rica. The work [21] reported that about 78% of lightning on Earth occurs around ±30° of the geographic equator. So, tweek observations in the polar Arctic and Antarctic regions usually reveal distances to the atmospheric sources of 4...6 Mm [22] or 0.7…7 Mm [23, p. 2502]. Current records of tweeks in our database are very numerous, however they have a range of azimuths from 290° to 130°.That means their bulk arrived from the northern and eastern sectors relatively to the observation site. Tweeks with western azimuths are rare (no more than 2% per night). Single observed tweeks from western sector have the first harmonic only and path lengths of 2.5...5 Mm.

In the ensemble of tweek records for the first six months of 2021, data were selected for periods of disturbed magnetosphere, when after solar flares the three-hour planetary index $K_p \geq 4$. These data have been collected on nights during the southern hemisphere summer (February 7, March 3), equinox season (from 0 to 9 a.m. UTC at March 14 and March 25) and southern hemisphere autumn (night from April 16 to April 17) and winter (June 15 from 18 to 24 p.m. UTC).

It was shown (see in [18], [24, p. 20]) that through the effective heights of the reflecting layer determined from tweeks, the daily and seasonal regular changes in the lower ionosphere heights are displayed and can be traced. There are also demonstrated the presence of a selected range of reflection heights of 87…89 km, in which tweeks with a high number of harmonics are observed more often in any range of D, and for heights ≥ 90 km, the harmonic's number was 2…4 [24, p. 20]. Since the reflection heights, as shown in [25, p. 34], do not correlate with the distances to the tweek source and the azimuths of its arrival, we can use data on thunderstorms regardless of local time at the place of tweek-atmospherics excitation, as well as to use data on thunderstorms accumulated during the entire night or any part of it.

We separated groups of tweeks generated by a common thunderstorm cell that were close in range and azimuth.

Group-average values of geographic azimuth, distance D to tweek sources, and the average number of harmonics in the tweek spectrum $\langle N \rangle$ were calculated for several dozen of thunderstorm cells. The number of tweeks in a group averaged about a hundred, varying from 30 to 700. About 10 tweek groups with 10...30 records were also received from low-power thunderstorm cells. Such obtained data are plotted on a map (see Fig. 1). Cases where the number of tweeks in a group was less than 30 are highlighted with gray icons.

Excitation of tweek-atmospherics is possible when radiation is reflected from the layers of the night ionosphere. At the early evening at the receiving point of the "Akademik Vernadsky" station, tweeks with sources up to more than 11 Mm are recorded at azimuths of about 120 degrees. The average number $\langle N \rangle$ was 1.12, when the significant thunderstorm center was observed near the Seychelles Islands at June 15 (it is not shown in Fig. 1).

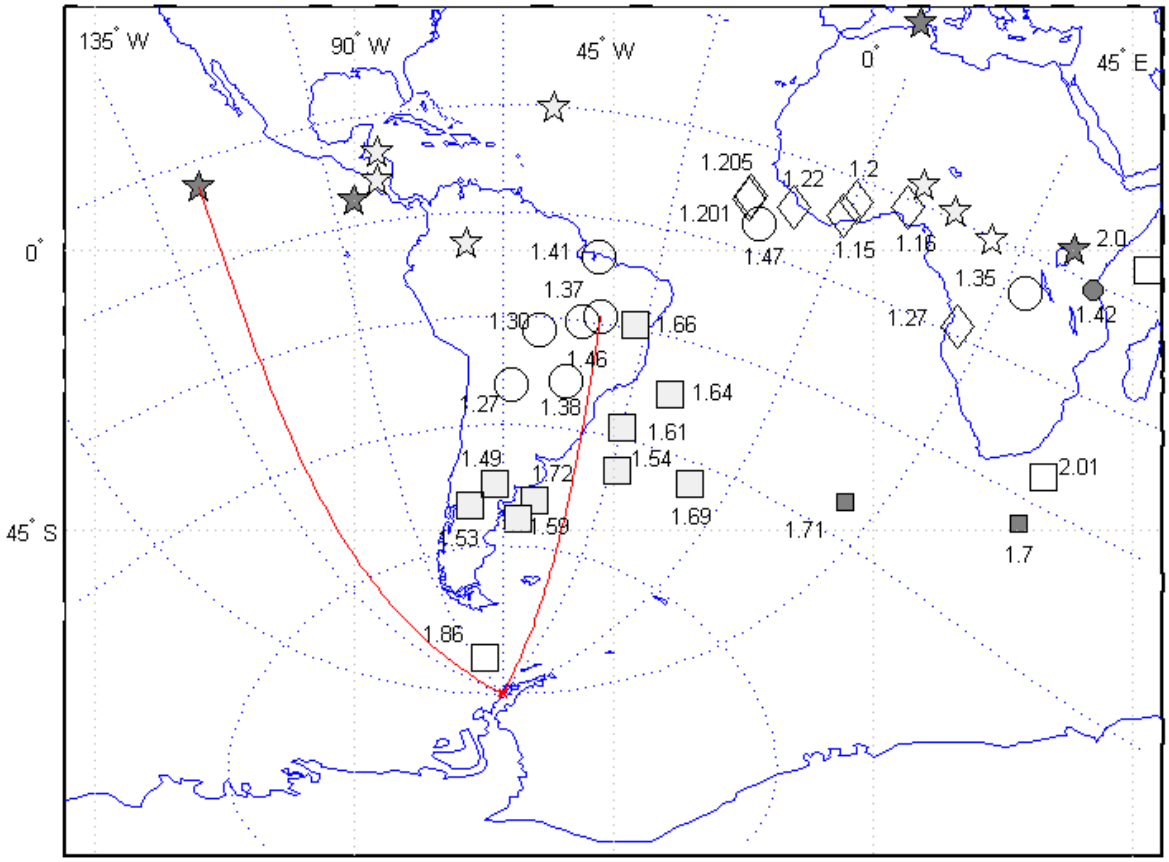

Figure 1. The average number of harmonics in a thunderstorm cluster and the geographic location of recorded thunderstorm cells during magnetic storms.

The dotted lines in Fig. 1 show circles of equal distance from the receiving point (2 Mm, 4 Mm, 6 Mm, 8 Mm and 10 Mm) and azimuths with an interval of 30 degrees. Groups of tweeks with a strong participation of high-frequency harmonics (<*N*> over 1.5) are displayed in Fig. 1 by squares, those where <*N*> = 0.27...0.5 are shown by circles, and diamonds show groups with a small but significant presence of records with the second and higher harmonics in the spectrum (<*N*> = 0.15...0.27). The numbers next to the icons indicate the number <*N*>. The stars show groups of tweeks with a predominance of the fundamental harmonic (<*N*> < 0.12). Examples of great circle lines corresponding to tweek's routes are given.

3. Comparison with propagation under normal conditions and discussion of results.

It has been established that after solar flares there is an increased precipitation of charged particles into the *E*-layer of the ionosphere (90...130 km) in the polar regions of the Earth [26, p. 807], which includes the area where the receiving station of the UAS "Akademik Vernadsky" equipment is located. Nevertheless, according to our experiments, under conditions K_p = 4...6, the measuring complex at the "Akademik Vernadsky" station stably detects atmospherics propagating at night in the near-Earth waveguide.

Processing records of such signals using the same algorithm as for tweek-atmospherics under normal conditions of an undisturbed magnetosphere demonstrates the coordinates of the sources of atmospherics.

The mean annual land to ocean flash ratio is 10:1 [21]. The average global annual flash rate for the oceanic regions was found to be 5 fl/s, while continental regions ranged from 31 to 49 fl/s during the year [21].

The vast majority of thunderstorm centers for these nights (see Fig. 1) were confined to continental regions. Also clearly visible are data with coordinates associated with a latitude band around 40 S of the Atlantic and Indian Oceans.

Observations of tweek-atmospherics under normal night conditions and calculations of their cluster-average spectral composition were carried out previously (see in [17, p. 4]). For comparison, we have shown in Fig. 2 data for 66 clusters of tweek sources for 2019 which correspond to thunderstorm cells. Their geographical azimuths differ and cover the northern and eastern sectors of directions, from 305° to 120°.

As indicated above, the specific reflection mechanism of ELF – VLF tweek radiation from the lower ionosphere at night, in contrast to daytime conditions, depends on the electron gyrofrequency, and, therefore, on the geomagnetic field at the reflection height in the lower ionosphere. This manifests itself as dependences of the tweek attenuation parameters on the angle of their propagation vector with the horizontal component of the magnetic field at this height. For the first few harmonics of the tweek, the least attenuation is theoretically predicted when coming from the geomagnetic east. Figure 2 shows the average number of tweek harmonics in a cluster as a function of the modulus of the difference between its magnetic azimuth and 90°. Data on thunderstorm cells with tweek path lengths from 7.6 Mm to 9.5 Mm are shown as rhombs. Data on tweeks whose source's distances corresponded to 2.2...4.5 Mm and 4.6...7.5 Mm are depicted with crosses and stars, respectively.

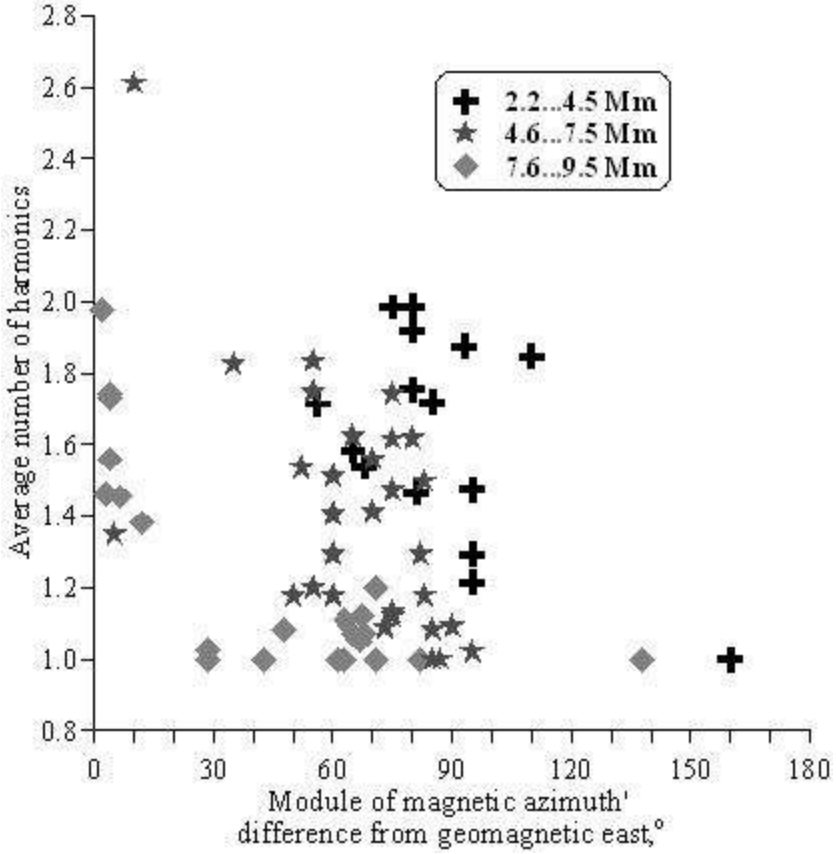

Figure 2. The average number of harmonics in a thunderstorm cluster as a function of the modulus of the magnetic bearing difference with geomagnetic east.

The significant difference in the spectra is shown on Fig.2. During the late summer season, at such long distances the thunderstorm cells were observed in Mexico, in the equatorial Atlantic, and along the African coast of the Gulf of Guinea. Less than 10% of the tweeks with the sources localized in these areas had the 2nd harmonic, and the 3rd and higher ones were not observed at all. However, in addition to these two global thunderstorm centers in the tropics, climatic patterns lead to heavy thunderstorms during the rainy season in southern Africa and over Madagascar. The movement of the geomagnetic poles has led to the fact that in the 2019 epoch the direction of the arrival of tweeks from such sources to the "Akademik Vernadsky" station almost exactly coincided with the geomagnetic east. As a result, the probability of observing higher harmonics of the tweek, except for the fundamental one, from these thunderstorm sources increased sharply.

For the data in Fig. 1, only 2 nights were included in the summer season. Thunderstorm cells in southern Africa were not recorded by tweeks at that time. Thunderstorm days (more precisely, nights with thunderstorms) in this region during this season account for approximately 50% of the total. Thus, the absence of thunderstorms on these nights does not indicate anything significant.

Data on the location of tweek sources (lightning discharges) coincide quite closely with predictions according to climate patterns. By studying the spectra of tweeks, one can also detect the effect of non-reciprocity of the propagation in the East – West and West – East directions. The mechanism of this phenomenon should probably be close to the same mechanism during the reflection of ELF – VLF radiation in the undisturbed ionosphere.

Certain differences in the manifestation of such an effect can be indicated. A sharp maximum in the average number of harmonics (that is, a minimum of attenuation coefficients) was observed when tweek atmospherics arrived from a geographic azimuth of 110°. For geographic azimuths 40...80° (which corresponds to a magnetic azimuth 25...65°), the probability of detecting higher harmonics in a tweek with a large path length turned out to be greater: the average number of harmonics ranged from 1.15 to even 1.47 at distances of 8...10 Mm. Only for path lengths of 10 Mm and more $\langle N \rangle \leq 0.1$ (stars in Fig. 1). For similar arrival azimuths under standard ionosphere, the data demonstrated that $\langle N \rangle$ is less than 1.1 for tweek path lengths greater than 7.5 Mm.

In addition to the above, one should consider the features of the geomagnetic situation in the studied region. Close from the reception station is the largest anomaly of the geomagnetic field. This is the so-called Southern-Atlantic Magnetic Anomaly (or Southern Magnetic Anomaly, SMA), which many researchers consider as a composition of two anomalies – the Brazilian anomaly and the Cape Town anomaly. It has increased significantly in recent decades, and has a strong influence on the work of satellites in near-Earth orbit and geophysical equipment. Its existence is due to the asymmetric position of the earth's magnetic dipole, which does not pass through the center of the Earth and the Earth's axis.

We consider the geomagnetic field according to the International Geomagnetic Reference Field model IGRF-13 released in 2020. Regarding the SMA, two main features can be indicated. The total intensity of the magnetic field at the ground level is much lower. To the north of the "Akademik Vernadsky" station, on geographical azimuths from –5° to 20° and distances of 4...5 Mm there is a minimum of total intensity. Because of this, the boundary of the inner Van Allen radiation belt is located only 500 km from the Earth surface under normal conditions and can decrease up to 200 km as a result of geomagnetic storms. Such a fossa leads to the rapid emptying of the drift particles and the lack of protection against galactic rays.

This brings significant difficulties in the work of satellites carrying out optical observation of lightning. In fact, after solar flares, for several days their work becomes impossible with the orbital flight over the Brazilian coast (area of the Brazilian anomaly).

Secondly, on geographical azimuths 80° and 110° from the reception point on "Akademik Vernadsky" station (at distances of 6 and 4 Mm) there are extremums of magnetic inclination. Together with a decrease in total intensity, they create extremums of the vertical intensity of the geomagnetic field.

For the purposes of this work, this layout of the geomagnetic field's anomalies means that the tweeks with arrival azimuth of 80° pass through the area with a minimum of magnetic inclination –68°, where the angle θ (which is the deviation of the magnetic field from the vertical in the plane of geomagnetic meridian) is only 22°. This is approximately the same with the geomagnetic field of the same latitudes of other regions: Australia or Pacific Ocean. The influence on the attenuation coefficients, which leads to the effect of non-reciprocity of the propagation in the East – West and West – East directions, is approximately the same. In contrast, tweeks with azimuths of 110° and paths more than 4 Mm propagate through the area with a more inclined magnetic field, the magnetic inclination is up to –58°, that is, the angle $\theta = 32°$. The absolute value of the attenuation coefficients depends on the angle θ, and as a result, this effect is approximately equal to such that it would be at the latitudes of 30° S. It manifests itself brighter, although the tweek's routes lie closer to the pole, south of Africa.

These details can explain some asymmetry of data processed in our work (see Fig. 1) regarding the direction of strictly to the geomagnetic east, and the local maximum of $\langle N \rangle$ (that is, the minima of the attenuation coefficients) for tweeks with geographical azimuth 110°.

4. Conclusions.

By experimental results it has been shown that, under conditions $K_p = 4...6$, the measuring complex at the Akademik Vernadsky Ukrainian Antarctic Station stably detects ELF – VLF atmospherics propagating at night in the near-Earth waveguide. Processing records of such signals using the same algorithm as for tweek-atmospherics under normal conditions of an undisturbed magnetosphere demonstrates the coordinates of

the sources of atmospherics. This also applies to the area of the Southern Magnetic Anomaly in the Brazilian region, where satellite observation of lightning discharges is nearly impossible after solar flares. The vast majority of thunderstorm centers for period studied were confined to continental regions, also tweek sources have been observed with coordinates associated with a latitude band around 40 S of the Atlantic and Indian Oceans. Data on the location of tweek sources (lightning discharges) coincide quite closely with predictions according to climate patterns. By studying the spectra of tweeks, there has also been detected an effect of non-reciprocity of the propagation in the East – West and West – East directions. The mechanism of this phenomenon should probably be close to the same mechanism during the reflection of ELF – VLF radiation in the undisturbed ionosphere. A sharp maximum in the average number of harmonics (that is, a minimum of attenuation coefficients) was observed when tweek atmospherics arrived from a geographic azimuth of 110°. This feature can be explained by the joint manifestation of the non-reciprocity effect and the specific layout of the Southern Magnetic Anomaly relative to the receiving point at the Akademik Vernadsky Ukrainian Antarctic Station.

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POLITICAL SCIENCES

СОХРАНЕНИЕ КУЛЬТУРНОГО НАСЛЕДИЯ И ПРАВА ЭТНИЧЕСКИХ ГРУПП, ПРОЖИВАЮЩИХ В РЕСПУБЛИКЕ КАЗАХСТАН

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PRESERVATION OF CULTURAL HERITAGE AND RIGHTS OF ETHNIC GROUPS LIVING IN THE REPUBLIC OF KAZAKHSTAN

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АННОТАЦИЯ

Целью данной статьи является исследование мер и стратегий, принимаемых в Республике Казахстан, с целью обеспечения сохранения культурного наследия и прав этнических групп. В статье рассмотрены роль государства, общественных организаций и международных инициатив в поддержании этнической и культурной гармонии, а также выявим вызовы, с которыми сталкиваются этнические группы в Казахстане и возможные пути их решения. Для достижения данной цели рассмотрены обзор этнического состава, культурное разнообразие и его ценность, образовательные программы и языковая политика.

ABSTRACT

The purpose of this article is to study the measures and strategies taken in the Republic of Kazakhstan to ensure the preservation of cultural heritage and the rights of ethnic groups. The article examines the role of the state, public organizations and international initiatives in maintaining ethnic and cultural harmony, and also identifies the challenges faced by ethnic groups in Kazakhstan and possible ways to solve them. To achieve this goal, an overview of ethnic composition, cultural diversity and its value, educational programs and language policy are considered.

Ключевые слова: многонациональное общество, этнополитика, социокультурная интеграция, межэтническое взаимодействие, международные обязательства, равенство и социальное неравенство, государственная политика.

Keywords: multinational society, ethnopolitics, socio-cultural integration, interethnic interaction, international obligations, equality and social inequality, state policy.

Республика Казахстан – это, многонациональное и полиэтническое государство, в котором проживают более 126 этнических групп, уважая свои традиции, языки и культурные особенности. Этот уникальный мозаичный характер этнического состава создает великое культурное богатство, но также вносит определенные вызовы в области управления этнополитическими процессами и правами этнических групп. В свете этих особенностей актуальность темы сохранения культурного наследия и прав этнических групп, проживающих в Республике Казахстан невозможно переоценить.

Казахстан – это, уникальная модель мирного сосуществования различных этнических групп и религий, где права и интересы каждой этнической группы имеют неоспоримое значение. Этносохранение и защита культурного наследия этнических меньшинств важны не только для поддержания социокультурной гармонии в стране, но и для обогащения культурного пейзажа Республики Казахстан. Взаимопонимание и уважение между этническими группами являются фундаментальными принципами, которые способствуют укреплению национальной безопасности и устойчивости в стране.[1]

Этническая многонациональность Казахстана

Этнический состав Республики Казахстан является одним из самых разнообразных среди бывших советских республик и стран Средней Азии. Казахстан придерживается политики многонациональности и мультикультурного общества, что создает уникальное культурное богатство и разнообразие национальных групп. Ниже представлен обзор наиболее крупных этнических групп, проживающих в Казахстане:

1. **Казахи:** Казахи являются наибольшей этнической группой и составляют большинство населения Республики Казахстан. Официальным государственным языком является казахский, и казахская культура играет важную роль в обществе.

2. **Русские:** Русские - вторая по численности этническая группа в Казахстане. Они составляют значительное меньшинство и проживают преимущественно в городах и горнодобывающих регионах. Русский язык традиционно использовался как язык межэтнического общения.

3. **Узбеки:** Узбеки - третья по численности этническая группа в Казахстане. Они обычно сосредоточены в южных регионах страны и занимаются сельским хозяйством.

4. **Уйгуры:** Уйгуры проживают в южных регионах Казахстана, в основном вблизи границы с Киргизией и Китаем. Они обладают собственной культурой и традициями.

5. **Татары:** Татары - крупное этническое сообщество в Казахстане, преимущественно концентрирующееся в южных и восточных областях. Татарский язык и культура имеют долгую историю в регионе.

6. **Украинцы:** Украинцы также являются значительной этнической группой, особенно в северных регионах Казахстана. Они сосредоточены в городах и занимаются различными видами деятельности.

7. **Корейцы:** Корейцы в Казахстане имеют собственную культуру и обычаи, и они проживают в различных областях страны, включая Алматы и Караганда.

8. **Немцы:** Немцы были исторически значительной этнической группой в Казахстане, и их наследие остается в различных аспектах культурной жизни страны.

9. **Другие этнические группы:** Кроме перечисленных, в Казахстане проживает множество других этнических групп, включая киргизов, дунган, таджиков, башкир, караимов и др.[2]

Этническое разнообразие Казахстана создает многообразие культурных традиций, языков и обычаев, что делает страну уникальной и интересной для исследования в контексте многонационального сосуществования и управления этнополитическими процессами. Важность защиты прав и культурного наследия этнических групп в Казахстане является ключевой составляющей общей политики и национальной гармонии в стране.

Культурное разнообразие в Республике Казахстан играет ключевую роль в формировании богатой и уникальной культурной ткани этой страны. С различными этническими группами, каждая из которых приносит с собой свои традиции, языки, обычаи и искусство, Казахстан обогащается множеством культурных элементов. Многонациональное общество Казахстана способствует интенсивному взаимодействию между различными этническими группами. Это взаимодействие способствует обмену культурными ценностями, знаниями и опытом, что в конечном итоге укрепляет социокультурную интеграцию. Каждая этническая группа приносит с собой свои уникальные культурные традиции. Это включает в себя музыку, танцы, кулинарные блюда, национальные праздники, религиозные обряды и другие аспекты культуры. Богатство таких традиций создает культурное богатство и разнообразие, которое может быть источником гордости для национального сообщества.

Казахстан является многоязычной страной, где сосуществуют различные языки, включая казахский, русский, узбекский, уйгурский, татарский и многие другие. Это создает языковой плавильный котел, где люди могут общаться и обмениваться идеями на разных языках, что способствует лингвистическому разнообразию.

Культурное разнообразие привлекает внимание туристов и исследователей со всего мира. Туризм и культурный обмен способствуют обогащению экономики и образовательной сферы страны. Защита и поощрение культурного разнообразия способствует социокультурной гармонии и укреплению мирного сосуществования различных этнических групп. Это важно для обеспечения стабильности и развития страны.

Культурное разнообразие в Казахстане является национальным богатством, которое формирует уникальный культурный ландшафт и способствует разностороннему развитию страны. Этнические группы в Казахстане продолжают сохранять свои традиции и одновременно участвуют в создании мозаики культурного разнообразия, что является важной частью казахстанской национальной идентичности.

Правовая основа и международные обязательства

Правовая основа и международные обязательства играют важную роль в обеспечении прав этнических групп и сохранении культурного наследия в Республике Казахстан. Законы и международные соглашения обеспечивают рамки и структуры для защиты и содействия правам этнических групп. В Казахстане, как и во многих других странах, право является основой для поддержания гармоничных этнических отношений и соблюдения культурного разнообразия. В этой связи, ниже представлены основополагающие документы гарантирующие права и свободы этнических культур:[3]

- **Конституция Республики Казахстан:** Конституция Казахстана является основным правовым документом, который определяет принципы равенства и недискриминации всех граждан Республики Казахстан, независимо от их этнической принадлежности. Это важное положение гарантирует защиту прав этнических меньшинств.[4]
- **Законодательство**: Казахстан имеет законы, которые регулируют вопросы, связанные с правами этнических групп. Например, Закон "О языках в Республике Казахстан" и Закон "О миграции" предоставляют правовую основу для соблюдения языковых прав и статуса мигрантов.
- **План национальных действий:** Казахстан разработал Национальный план действий по

правам человека, который включает в себя меры по защите прав этнических групп и содействию многонациональному сосуществованию.

- **Международные обязательства:** Казахстан является участником различных международных соглашений и конвенций, направленных на защиту прав этнических меньшинств и поддержание культурного разнообразия. К примеру, Казахстан является членом Конвенции ООН о ликвидации всех форм расовой дискриминации и Европейской хартии региональных или меньшинственных языков.[5]
- **Национальные институты и омбудсмены:** Казахстан создал национальные институты, такие как уполномоченный по правам человека и Комитет по межнациональным отношениям, которые занимаются вопросами прав этнических групп.

Право играет фундаментальную роль в обеспечении соблюдения прав этнических меньшинств и защите культурного разнообразия. Важность правовой основы и соблюдения международных обязательств не может быть недооценена, так как они являются ключевыми факторами для обеспечения мира, стабильности и уважения культурных прав всех этнических групп в Казахстане.

Меры и стратегии сохранения культурного наследия и прав этнических групп

Образовательные программы играют важную роль в сохранении культурного наследия этнических групп в Республике Казахстан. Они способствуют сохранению традиций, языков, истории и культурных ценностей, а также обеспечивают интеграцию этнических меньшинств в образовательную систему. Образовательные программы могут включать языковое обучение, что позволяет сохранять и передавать родные языки этнических меньшинств. Наличие качественных учебных программ на родных языках помогает детям сохранять и развивать свой язык и культурные идентичности. Школы и учебные заведения могут включать в свои программы культурные мероприятия, уроки и курсы по изучению культуры, искусства и истории этнических меньшинств. Это помогает детям узнавать о своих традициях и ценностях.

Разработка и распространение образовательных ресурсов, таких как учебники, учебные материалы и онлайн-курсы, способствует доступу к информации о культурном наследии этнических групп. Эти ресурсы помогают не только этническим меньшинствам, но и всем учащимся узнавать и понимать разнообразие культур. Образовательные учреждения могут сотрудничать с музеями и культурными центрами, чтобы обогатить образовательный процесс и предоставить студентам возможность познакомиться с выставками, лекциями и исследованиями, связанными с культурным наследием. Образовательные институты могут предоставлять учебные программы и курсы для будущих учителей, чтобы подготовить их к работе с многонациональными классами. Обучение учителей о культурных различиях и методах преподавания культурного наследия также является важной частью данной стратегии. Поддержка инклюзивного образования, которое включает учащихся с различными культурными и языковыми фонами, способствует созданию более разнообразной и инклюзивной образовательной среды.[7]

Образовательные программы представляют собой ключевой механизм для передачи и сохранения культурного наследия, а также способствуют обогащению культурного разнообразия. Они поддерживают сознание собственной идентичности, сохранение языков и традиций, а также способствуют мирному сосуществованию различных этнических групп в Казахстане.

Программы межэтнического взаимодействия в Казахстане имеют ключевое значение для обеспечения гармоничных отношений между различными этническими группами, укрепления социокультурной интеграции и поддержания мира и стабильности в стране. Казахстан разработал разнообразные программы и стратегии, направленные на содействие межэтническому взаимодействию и укреплению общественного согласия. Вот несколько ключевых программ и мер, связанных с межэтническим взаимодействием.

Казахстан активно разрабатывает и внедряет государственные политики и стратегии, направленные на укрепление межэтнических отношений. Эти политики включают в себя меры по защите прав этнических меньшинств и обеспечению их участия в общественной и политической жизни. В различных регионах Казахстана функционируют центры межнационального взаимодействия, которые способствуют обмену опытом, проведению образовательных мероприятий и культурных программ, а также оказывают консультации в вопросах межэтнических отношений. Программы образования включают в себя обучение межэтническому взаимодействию и культурному разнообразию. Школы и университеты предоставляют уроки и курсы, которые помогают студентам лучше понимать и уважать культуры различных этнических групп.

Государство поддерживает разнообразные медийные программы, направленные на популяризацию межэтнического взаимодействия и воспитание толерантности. Это может включать в себя телепередачи, радиопрограммы и интернет-ресурсы. Различные программы и мероприятия для молодежи способствуют взаимопониманию и дружбе между представителями различных этнических групп. Молодежные обмены, форумы и лагеря способствуют формированию толерантного поколения. Организация совместных культурных и спортивных мероприятий способствует укреплению межэтнических отношений и обогащению культурного опыта.

Государство и общественные организации активно проводят диалог и консультации с представителями этнических меньшинств, чтобы выявить и решить проблемы и вызовы, с которыми они сталкиваются.

Меры межэтнического взаимодействия в Казахстане способствуют обеспечению социокультурной гармонии и развитию разнообразия в

стране. Эти программы и стратегии играют важную роль в поддержании мира, стабильности и уважения между различными этническими группами в Республике Казахстан.[8]

Заключение

Управление этнополитическими процессами в Республике Казахстан представляет собой важную задачу, учитывая многонациональный характер общества и богатство культурного наследия. Несмотря на множество вызовов, с которыми сталкивается страна, Казахстан активно разрабатывает и реализует стратегии и программы, направленные на поддержание мира, стабильности и уважения культурных прав всех этнических групп.

Защита прав этнических групп, сохранение культурного наследия, образовательные программы, межэтническое взаимодействие и соблюдение международных обязательств играют важную роль в этом процессе. Усилия по обеспечению мира и гармонии в многонациональном обществе являются приоритетными задачами и важными для создания благоприятной среды для разнообразия культур, традиций и языков.

Важно подчеркнуть, что Казахстан продолжает развивать свою политику и стратегии для управления этнополитическими процессами, а также адаптироваться к новым вызовам и изменяющимся обстоятельствам. Такие усилия способствуют укреплению социокультурной интеграции и обеспечивают устойчивость в этнически разнообразном обществе Республики Казахстан.

Вызовы и перспективы

Управление этнополитическими процессами в Республике Казахстан сталкивается с несколькими вызовами и сложностями, несмотря на уникальное культурное разнообразие и стремление к многонациональному сосуществованию. Несмотря на усилия введения языковых программ, смена поколений и глобализация могут угрожать сохранению родных языков и традиций. Казахстан привлекает мигрантов из разных стран, что создает вызовы в области интеграции и адаптации этой популяции. Обеспечение социальной интеграции мигрантов и уважение их прав - важная задача.Также могут быть возможные неравенства между этническими группами которые создают напряженные отношения. Важно снизить экономические и социальные различия и обеспечить равенство возможностей для всех граждан.

В условиях многонационального общества возникают вопросы связанные с политической идентичностью различных этнических групп. Развитие политической системы, способствующей равенству и участию всех граждан, является вызовом. Несмотря на усилия по укреплению межэтнической гармонии, в обществе могут возникать конфликты, особенно в условиях городской индустриализации и роста этнически смешанных общин.

Также одной из немаловажных проблем, на данный момент могут выступить региональные конфликты и неблагоприятные условия в некоторых соседних странах могут приводить к миграции и беженству. Казахстан сталкивается с вызовами в области приема и интеграции беженцев и мигрантов.

Казахстан является частью глобального сообщества, и международные события могут оказывать воздействие на этнополитические процессы в стране. Важно балансировать национальные интересы с международными обязательствами. Управление этнополитическими процессами в Казахстане требует усилий по поддержанию равенства, многонационального согласия и межэтнической гармонии, а также адаптации к изменяющимся обстоятельствам [9]

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PSYCHOLOGICAL SCIENCES

ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В КАЗАХСТАНЕ: ПЕРЕОСМЫСЛЕНИЕ ПЕДАГОГИЧЕСКИХ ПОДХОДОВ В ВЫСШЕМ ОБРАЗОВАНИИ

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THE ARTIFICIAL INTELLIGENCE IN KAZAKHSTAN: RESHAPING PEDAGOGICAL STRATEGIES IN HIGHER EDUCATION

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АННОТАЦИЯ

Появление возможности использовать преимущества генеративного искусственного интеллекта (ИИ) произвело революцию в нескольких сферах, передав рутинные задачи в компетенцию машины и предоставив уникальную возможность человеку направить повышенное внимание на решение проблем. Сегодня такие передовые технологии широко используются в качестве утилиты для создания контента, где человек несет исключительную ответственность за формулирование тщательно разработанных задач, которые должны выполнять машины. Сообщества из различных сфер эффективно используют реализации ИИ (ChatGPT, Google Bard, Microsoft Copilot, Microsoft Bing AI, Perplexity) для своих повседневных рабочих задач, что дает явное преимущество, начиная от составления электронного письма и заканчивая созданием целой презентации. Используя возможности ИИ, академическое сообщество Казахстана может разрабатывать более динамичные и персонализированные схемы обучения и программы, чтобы обеспечить учащимся расширенный опыт приобретения знаний. В данной статье исследуется возможная синергия между казахстанским высшим образованием и искусственным интеллектом, подчеркивается его преобразующий потенциал. Дополнительно обсуждаются педагогические подходы для увеличения вовлеченности студентов в получении и понимании учебного материала. Исследование также содержит краткий обзор трансформации современной системы образования с точки зрения приведения в соответствие с динамично развивающимися технологиями. В конечном счете, это проливает свет на многообещающие возможности, которые вытекают из этого союза, начиная от индивидуальной разработки учебных программ и эффективной оценки и заканчивая расширенным вовлечением студентов. На стыке технологии и психологии в этой статье также рассматриваются ее глубокие последствия для тонких аспектов взаимоотношений учителя и ученика с психологической точки зрения.

ABSTRACT

The emergence of the possibility of using all the advantages of generative artificial intelligence (AI) has produced a revolution in several spheres, delegating mundane tasks to the machine’s purview and giving an unique opportunity for a person to direct an increased attention on problem-solving. Today such cutting-edge technologies are extensively consumed as a content creation utility where a person is exclusively responsible for formulating elaborately designed tasks for machines to perform. Communities from various spheres have effectively utilized AI instances (ChatGPT, Google Bard, Microsoft Copilot, Microsoft Bing AI, Perplexity) for their daily work tasks, resulting in a clear advantage, ranging from composing an email to creating an entire presentation. Leveraging AI's capabilities, the academics community of Kazakhstan can design more dynamic and personalized learning curves and programmes to provide enhanced experience of knowledge acquisition by students. This paper investigates the possible synergy between Kazakhstani higher education and AI, highlighting its transformative potential. Additionally, pedagogical approaches are discussed to increase students' engagement in obtaining and understanding educational material. The investigation also provides a brief overview of the transformation of the modern education system in terms of alignment with dynamically evolving technologies. Ultimately, it illuminates the promising possibilities that arise from this union, ranging from customized curriculum development and efficient assessment to expanded student engagement. In the intersection of technology and psychology, this paper also considers its profound implications for the nuanced aspects of teacher-learner relationships from a psychological perspective.

Ключевые слова: педагогика, психология, искусственный интеллект, технологии.

Keywords: pedagogy, psychology, artificial intelligence, technology.

Introduction

Reflecting on the Past

Higher education in Kazakhstan originates from the moment of formation of the Kazakh Socialist Soviet Republic. It had undergone multiple changes and reforms, which were dictated by the highest leadership of the Union. Like many countries of the former Soviet Union, Kazakhstan, being a country that was practically isolated from the outside world as part of the Soviet Union and whose fate strictly depended on the centralized apparatus in the form of the Supreme Party [9], after gaining independence in 1991 had no other choice but to inherit and adapt the outdated system of higher education in the contemporary that moment world. Kazakhstan's higher education faced great challenges in transforming the higher education paradigm that is founded on a deprecated ideology of the socialistic future.

In recent years, the landscape of higher education in Kazakhstan has witnessed a profound transformation, driven by the recognition that the conventional model, which prioritizes knowledge acquisition alone, is no longer sufficient. The rapid obsolescence of the typical knowledge model has outpaced the traditional educational cycle [15]. Consequently, the conventional approach of transferring knowledge from instructor to learner, though a cornerstone of education, has become increasingly disconnected from the dynamic realities of contemporary life.

The fundamental issue within the early republic's educational system was the insufficient comprehension of how to effectively align educational processes to ensure the acquisition of vital knowledge, which could be of great value in the post-Soviet labor market [12]. To keep the relevance of higher education for the evolving demands of the real world, a paradigm modernization became a necessity. This shift involves redefining the fundamental purpose of education, moving beyond the mere acquisition of knowledge, abilities, and skills towards the development of competencies and integral abilities for practical application. It is no longer just knowledge in isolation that holds value in the modern labor market, but rather the capacity of specialists to effectively apply their knowledge, abilities, and skills to fulfill specific functional responsibilities.

Literature review

Generative Trend

The rise in popularity of generative pre-trained transformer (GPT) AI models coincided with OpenAI's decision to make its language models (ChatGPT) and user interfaces accessible to the public [1]. While these platforms continue to undergo evolution, discussions about their reliability have become commonplace across social networks, and they have also attracted the attention of academic research studies [2].

To begin with, a quick task was given to OpenAI's ChatGPT *"Give a short definition for GPT"*. The AI returned with the following response:

"Generative Pre-trained Transformer (GPT) is an artificial intelligence model that is pre-trained on large datasets of text and designed for natural language understanding and generation tasks. It uses deep learning techniques to generate human-like text based on the input it receives. GPT models have been used for various language-related applications, including text generation, language translation, and question-answering." (ChatGPT, 2023).

GPT models possess a remarkable contextual understanding of language, allowing them to infer meaning from the context of the text and produce highly contextually relevant outputs. Their flexibility and adaptability have been leveraged in academic research to automate tasks such as data summarization, content generation, and language-based analysis, making them invaluable tools in various scholarly domains. The ongoing advancements in GPT models continue to refine their proficiency, opening up new possibilities for enhancing academic research and discourse [2; 4].

Methods and Materials

In this section, a comprehensive overview of the methodology employed for conducting a systematic review of the most recent literature on the intersection of artificial intelligence and higher education, with a specific emphasis on psychological aspects, is presented. The study in this scope represents a dynamic and evolving field at the forefront of contemporary educational discourse. Prioritizing recent publications guarantees that this review encompasses the most current advancements and understandings in the domain of artificial intelligence applications in higher education, particularly those associated with psychological aspects.

Augmented Workforce

The report titled "Augmented Work for an Automated, AI-driven World" by IBM presents a comprehensive exploration of the concept of the augmented workforce, emphasizing the era in which human-machine partnerships are leveraged to enhance productivity and deliver substantial business value [6]. A significant finding of the report underscores the transformative potential of operating model prioritization, indicating that organizations prioritizing their operational models as catalysts for enterprise transformation exhibit superior performance in terms of profitability, revenue growth, innovation, and employee engagement. Furthermore, the report provides valuable guidelines for selecting appropriate AI technologies, such as augmented reality (AR) or virtual reality (VR), for distinct training purposes and application domains. As a result, the report promotes the use of technology to improve the employee experience, thereby encouraging a culture of experimentation and innovation. This comprehensive report serves as a valuable resource in understanding the evolving dynamics of work, the pivotal role of technology, and the paramount significance of talent management in the contemporary, AI-driven business landscape.

The workforce augmented with artificial intelligence reinforcement is a concept that refers to the use of AI technologies to enhance the capabilities and performance of human workers. AI can augment the workforce in various ways, such as automating tasks that are time-consuming, tedious, or repetitive, and freeing up human workers to focus on more creative, complex, or strategic work; providing insights, guidance, or feedback to human workers based on data analysis, machine

learning, or natural language processing; or enhancing the skills, knowledge, or abilities of human workers through interactive learning, adaptive interfaces, or augmented reality. Harborth and Kümpers [8] explores the concept of intelligence augmentation (IA), which refers to the use of user-oriented technologies, such as AR to enhance human performance and abilities in the context of workforce training. The authors analyze the current and future situation of the German labor market, which is affected by digitalization, automation, and demographic changes. They conduct a systematic literature review of 150 papers and a practical search of 33 use cases of AR and VR applications in various occupational segments. Based on their findings, they propose a framework that provides guidelines for choosing the appropriate IA technology (AR or VR) for different training purposes and application areas.

The adoption of AI in the workplace may have positive implications for workers' transition into new roles and employability in the changing labor market. The article by Braganza et al. [3] suggests that a sophisticated AI tool that measured workers' skills and matched them to potential job roles was able to identify workers' hidden talents and suggest new career pathways that they had not considered before. The authors report that the AI tool helped workers enhance their self-efficacy, confidence and motivation, which are important factors for career development. The research paper implies that AI can support workers' decent work and well-being by providing them with personalized and tailored guidance and opportunities. Thus, the adoption of AI within the workforce carries far-reaching implications that extend beyond mere automation and have the potential to transform the nature of work, training, and career development in a rapidly evolving employment landscape.

As the study explored the profound impact of AI on workforce augmentation, it becomes evident that the evolving landscape of employment and skill development is intimately linked to the transformation of learning approaches. The following chapter introspects deeper into the educational paradigms and methodologies that are adapting to meet the challenges and opportunities presented by AI in the workplace. This transition not only signifies a shift in how individuals acquire and develop skills but also a pivotal moment in the synergy between AI technology and lifelong learning, where innovation is poised to shape the future of workforce readiness.

Shifting Learning Approaches

According to Magnusson et al. students should actively construct their own knowledge by engaging in activities that enhance their understanding or skills [14], following one of the principles of Biggs' "Constructive Alignment" model. This principle implies that learning is not a passive process of receiving information, but an active one of constructing meaning and applying knowledge. Thus, the role of the teacher is not to transmit information, but to design and facilitate learning activities that align with the intended learning outcomes. Improvement of learner's engagement into the education process requires an application of various techniques and a reconsideration of actual. The post-soviet education model contradicts the idea that learning should not be a passive reception of information, but rather an active construction of knowledge.

Several researchers have found that learner engagement is enhanced when the learning environment presents the learning experience as an interactive "story" or "narrative" that it tells to the learner [5; 1]. Taking that findings into account, authors propose several solutions addressing the student engagement issue: 1) creation of interactive learning curves; 2) designing a curriculum in a storytelling context following a common narrative approach. Towards described proposals, the idea is to design "a suite of AI-based approaches to automatically generate learning content and add the auto-generated learning content to the learning programmes at appropriate positions" [5; 2]. It is important to note that creating content for a curriculum based on narrative approach requires a lot of time. To back this up, Kurdi et al. conducted a systematic review of several publications on common test banks and how well they work [13]. According to publications' conclusions, it was discovered that most of the questions in real exams were not good at measuring gained knowledge clearly. Diwan et al. suggest that AI could be a useful tool [5; 3]. This approach not only lowers the costs of manual creation, but also meets the demand for a constant flow of new learning materials. The narrative learning approach employs storytelling and narrations to facilitate learning across a spectrum of subjects and skills [4]. This approach is clearly delineated into various segments, within which artificial intelligence plays a pivotal role [4; 59]. Challenges confronting NLE encompass facets such as story generation, interactivity, assessment methodologies, learning outcomes, and the requisite preparation of educators. These challenges can be effectively mitigated through the integration of AI technologies. Artificial intelligence serves to enhance the narrative learning approach by furnishing interactive, technology-mediated environments where stories are collaboratively crafted by both users and the system, thereby augmenting the pedagogical utility of this approach.

Zawacki-Richter et al. present a comprehensive examination of the burgeoning landscape of AI applications within higher education [16]. This investigation involves a thorough review of 146 academic articles, elucidating AI's diverse role in higher education. Using the student life-cycle as a foundational framework, the authors outline four specific domains where AI applications demonstrate their potential: profiling and prediction, intelligent tutoring systems, assessment and evaluation, and adaptive systems and personalization. Intelligent tutoring systems (ITS) are typically crafted for individual use since "students differ on many dimensions and the goal is to be sensitive to the idiosyncrasies of individual learners" [7]. Drawing from learner models, algorithms, and neural networks, these systems have the capacity to determine the optimal learning trajectory for an individual student, select appropriate content, offer cognitive support, and facilitate meaningful dialogues to actively involve the student [16; 4]. Intelligent tutoring systems (ITS) hold significant promise, particularly within the context of large-

scale distance education institutions that administer courses with substantial enrollments, rendering one-on-one human tutoring infeasible.

In the rapidly transforming environment, it is apparent that pedagogical methodologies must urgently consider the comprehensive incorporation of technological advancements into educational schemes. Educators have to accumulate the appropriate expertise in the application of digital tools to meet the preferences of the upcoming generation of learners [10]. As a result, proposed pedagogical shifts might enhance instructors' creativity in designing discipline curriculum, thereby enhancing the appeal of the learning process.

Challenges and Future Opportunities

The infusion of AI into Kazakhstan's educational sphere presents a dual-faced challenge and opportunity. AI's introduction heralds the prospect of significantly bolstering learning outcomes. It has the potential to encourage learners to consider alternative perspectives and strategies in relation to their vocational and life paths, emphasizing its multifaceted role as a catalyst for educational and professional development [11]. This is to be achieved through the delivery of personalized, adaptive, interactive, and engaging learning experiences tailored to each learner's unique profile, encompassing needs, preferences, goals, and capabilities. In tandem with elevating learning, AI has the potential to empower educators, acting as an ally in enhancing their capabilities and performance. Teachers can expect to see a lightening of their workloads and the alleviation of professional stress. Therefore, AI aids in fostering ongoing professional development and nurturing collaboration among educators while enhancing their decision-making processes and feedback provision. The adoption of AI brings about the transformation of the educational landscape within Kazakhstan. This transformation reimagines the traditional facets of learning delivery, assessment, accreditation, quality assurance, governance, and management. The burgeoning domain of research in Artificial Intelligence in Education (AIEd) promises to provide educators with a more extensive array of practical guidelines and examples, while simultaneously introducing innovative pedagogical approaches. Despite prevalent skepticism, uncertainty, or concerns, AIEd perseveres in presenting novel avenues for educational advancements and enhancements [17]. AI has the potential to encourage learners to consider alternative perspectives and strategies in relation to their vocational and life paths, emphasizing its multifaceted role as a catalyst for educational and professional development.

Conclusion

The rise of AI sparks a revolution across multiple sectors, automating repetitive tasks and freeing individuals to concentrate on problem-solving. Beyond educational boundaries, the introduction of AI technology carries the promise of catalyzing societal development. In the realm of higher education in Kazakhstan, AI offers the potential to craft more personalized learning programs, enhancing the student's knowledge acquisition experience. This can be witnessed through the augmentation of human capital, the strengthening of economic competitiveness, the cultivation of social cohesion, the enrichment of cultural diversity, and the nurturing of global citizenship within the burgeoning AI-driven global landscape. The integration of AI into the education sector, therefore, emerges as a pivotal driver poised to propel both the nation and its citizens toward transformative progress.

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SOCIAL SCIENCES

CAUSES OF LANDSLIDES AND EROSIONS OCCURRING ON MOUNTAIN AND FOOTHILL SLOPES

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ABSTRACT

Analysis of the mechanism of landslide process should include the study of objective regularities of manifestation of a set of events leading to a decrease in slope stability and the occurrence of movement under the action of internal and external forces. It is rational to distinguish the stages of preparation, direct displacement and stability of landslides. Such a complex and multifactorial phenomenon as a landslide can be studied only if there is a detailed quantitative assessment of successive changes in the natural environment. In some cases, plastic landslides are the initial stage of landslides. They form on slopes or slopes composed of oily clays with a high colloidal content. These clays usually have a specific chemical and mineralogical composition (predominance of secondary mica and montmorillonite group minerals over other minerals). They are intensively weathered and become unstable with fluctuations in humidity and temperature

Keywords: landslide, erosion, slopes, soil.

Mountain and foothill landscapes are complex modified geosystems consisting of subsystems. One of the subsystems is the slope subsystem, where all erosion and landslide processes begin. In river subsystems, lateral and bottom erosion is a big disaster, which is accompanied by strong collapse of slopes and banks at scouring [1].

Due to their prevalence in Azerbaijan, landslide and erosion processes cause significant damage to the country's economy.

Landslide phenomena on slope lands of Azerbaijan are confined to clayey rocks of certain strategic horizons - from loess-like loams of Quaternary age to lithified clays of Middle Jurassic age. Landslides are most common in clayey rocks containing gypsum (swelling soils).

Analysis of the mechanism of landslide process should include the study of objective regularities of manifestation of a set of events leading to a decrease in slope stability and the occurrence of movement under the action of internal and external forces. It is rational to distinguish the stages of preparation, direct displacement and stability of landslides. Such a complex and multifactorial phenomenon as a landslide can be studied only if there is a detailed quantitative assessment of successive changes in the natural environment.

In some cases, plastic landslides are the initial stage of landslides. They form on slopes or slopes composed of oily clays with a high colloidal content. These clays usually have a specific chemical and mineralogical composition (predominance of secondary mica and montmorillonite group minerals over other minerals). They are intensively weathered and become unstable with fluctuations in humidity and temperature [11].

When exposed as a result of natural processes or human activity, Lower Cretaceous and especially Jurassic mudstones and mudstone-like clays are subjected to active weathering. A thickness of loosened rock appears, in which changes in mineralogical composition occur with a noticeable increase in the amount of swelling minerals. The processes of swelling and shrinkage are much more intensive. Shrinkage, flowing unevenly in the soil thickness, causes the appearance of a system of cracks with a specific orientation on slopes. They develop normal to the slope, but at some depth, depending on water yield of the soil and intensity of drying, they bend almost parallel to the surface. Repeated volumetric deformations during swelling-shrinkage may be the cause of slow sliding of the cover layers of clayey soils over the underlying rocks. However, the main role of these processes is to weaken the integrity of the massif by the fracture system and to separate the zone where significant moisture fluctuations occur. When the soil of the near-wall fracture zones is moistened, it soaks away, filling them with an unstructured liquefied mass. The rate of soaking depends on the initial moisture content, with a value found that is optimal for the process. As a rule, the fastest soaking occurs in the subsurface. Here, in an over-wetted soil, the strength drops particularly severely [3;5].

The impulse to initiate movement may be the occurrence of static water pressure that fills shrinkage and tension cracks. Usually a layer in which the moisture content, and consequently the soil viscosity and the rate of movement, is variable in depth and time, slides. Sometimes a zone at some depth moves faster. At the head and at the sides, areas of increased energy appear, and also here weathering begins to erode the exposed rocks. The local depression - the landslide bed - becomes an accumulator of groundwater and atmospheric water. Assuming that, all other things being equal, the first slope movement is due to a series of coincidences, the subsequent development of the landslide is naturally confined to the weakened area. Successive deformations lead to the formation of a bed, along which all new masses of soil moving from the head and side parts, as well as due to the capture of deeper layers by the weathering process, while the thickness of loosened masses covering them decreases. Significantly, the surface layer is usually passively entrained by the underlying, more mobile layer. As the landslide velocity varies from section to section and depends on the slope of

the bed, the relatively rigid surface crust undergoes failure and shifts, overturning [2;10].

The main signs of recognising landslides are the following: their shape (considerably elongated, pear-shaped), the state of soil in the gradient layer (the layer where the velocity changes from zero to maximum value is represented by overmoistened liquid-like soil), the nature and speed of movement (flow with velocities from millimetres to metres, sometimes tens and rarely hundreds of metres per day), direct dependence of activity and displacement rate on the amount of precipitation (displacement rates are especially high after heavy rains following a drought, or during thaws that replace severe frosts).

Landslide - sliding displacement of rocks down a slope either under the influence of gravity or under the influence of additional forces on these rocks. Violations of stability of slopes and slopes - a consequence of natural conditions: weather conditions, topographic and geological features of the slope, engineering and geological properties of rocks composing the thickness, groundwater regime, hydrological features of surface runoff on the slope, seismicity of the area, as well as human activity: watering of strata with leaks from utilities, undercutting the base of slopes during excavations, loading the top of the slope massive structures, embankments, vibration effects due to transport, hammering of the slope. The landslide can be triggered by studying the forms of landslide occurrence and knowing the natural environment. [6;8].

By investigating the forms of landslide occurrence and knowing the natural environment, it is possible to determine the cause of the landslide, and then provide the most effective landslide control measures.

As a result of movement of the landslide body, landslide steps, cracks, bulges, scarping and deformations of the base are formed on its surface.

The set of visual signs of landslide phenomena assessment can be divided into general, inherent in all types of slope stability disturbance, and partial, inherent in certain types of slope deformations. The general visual signs of assessment of landslide phenomena on slopes (slopes) include: significant steepness of the slope slope, the angle of inclination of which approaches or exceeds the critical angle of the soils composing the slope; appearance and development of cracks ("zakol") on the slope and its edge; characteristic washouts of the slope foot from the bank side; presence of landslide "circles", cracks, breaks, scarps, ledges and dumps on the slope; curvature of roads, paths, fences in the plan; cracks in buildings and structures standing near the slope edge; presence of filtration water outlets on the slope and formation of waterlogged areas in the slope depressions[7]. .

Private visual signs of landslide occurrences are usually characteristic of certain types of stability failures. Future landslides, i.e. sudden collapses of slopes and slopes in rocky and semi-rocky rocks and slumps, i.e. falling of individual stones and blocks of rock from a height, are usually indicated by: significant weathering and separation of rocks into blocks; presence of clay interlayers and their wetting; height, steepness and bareness of the slope; presence of rock piles from past deformations. Scree movement will be indicated by the accumulation of fragmentary weathering products at the foot of steep slopes [12]..

Cover slides, i.e. displacement of Quaternary sediments over bedrock, are indicated by tilted trees ("drunken forest"), telegraph poles, and skewed buildings. Splashing (local plate displacements of sandy and loamy soils) is characteristic of overwatered slopes in the places of filtration water outlet, at rapid lowering of water level in the reservoir, at dynamic impact on the moistened slope.

In assessing the stability of slopes composed of lithified clays, the behaviour of different weathered rock strata can be schematised by three computational models of discrete media mechanics:

1) a model of blocky structure (a fractureless medium, fracture-cracked rocks in isolation);

2) a model of a granular medium (crumbled material of fine crushed material, creating a strut when transferring loads, including from its own weight);

3) an elasto-viscous model capable of absorbing tensile forces (soil in which physical and chemical weathering has created cohesive forces, it is in such clay soils that landslides are formed).

Analysis of the mechanism of landslide development shows that at different stages of the process clayey soils in a landslide can be considered as bodies in calculation schemes: elastic - initial phase, formation of shrinkage and tension cracks; viscoplastic - initial stage of movement, when structural strength and initial shear resistance have a very significant effect; viscous - in formed flows at sufficiently large gradients, when the value of initial shear resistance can be neglected. Quite often within one landslide in different parts of the landslide (head, middle part and tongue, or in different layers in depth) soils behave as elastic, viscoplastic and viscous bodies.

The following landslide control measures are considered on landslide slopes [4;9].

1. Protection measures restricting human activity in the slope area: green belt - prohibition of forest cutting, uprooting and development of areas for vegetable gardens, destruction of shrubbery, grass cover; construction - establishment of the limit building boundary, type and weight of structures, demolition of existing structures, slowing down the pace of construction; earthworks - prohibition of any soil development in the passive zone - at the foot, loading of the slope in the active zone at the edge, increasing the slope steepness, opening unstable horizons of floating consistency; water management - prohibition of surface water drainage and irrigation, maintenance of drainage and drying devices, water supply and sewerage networks, patching of holes, cracks, establishment of safe levels and rates of water discharges washing the slopes; dynamic impacts - prohibition of blasting, pile driving, operation of vehicles.

2. Water drainage, drainage and drainage measures and devices are divided into surface devices and measures (terrain planning, crack sealing, pavements, bunding dams, upland and drainage channels, flumes, dripping springs); drainage devices (longitudinal and transverse cuts and galleries, drainage shafts,

absorbing wells and boreholes); isolation measures (various injection curtains, claying, freezing of soils).

3. Land management measures are aimed at unloading works in the active zone - complete removal of landslide masses, shearing of the active part of the landslide, cleaning of rock slopes, terracing and slope stabilisation, general slope leveling; loading in the passive zone - backfill and dumps; covering of rock slopes with nets; arrangement of stone traps.

4. Mechanical fixing of slopes consists in the arrangement of single anchoring elements in the form of piles of various types, passing through the landslide into the bedrock, or a series in the form of sheet pile walls, injection and permafrost curtains, etc. The mechanical fixing of slopes consists in the arrangement of single anchoring elements in the form of piles of various types, passing through the landslide into the bedrock.

5. The retaining structures are erected in the form of sheet pile walls (metal, reinforced concrete, wooden), retaining walls (stone, concrete, reinforced concrete), walls made of large diameter shell piles, as well as in the form of thrust shafts made of soil, rock piling.

6. Various types of injections (cementation, silicification, bituminisation, claying) are carried out to artificially compact and consolidate soils on the slope.

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TECHNICAL SCIENCES

PRODUCTION TECHNOLOGY OF CRAFT CANDY FOR FUNCTIONAL PURPOSES FOR RESTAURANT INSTITUTIONS

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ABSTRACT
The article describes the technology of making functional candies for restaurants. Non-traditional fruit and berry raw materials are used for production.
Keywords: candies, technology, restaurants, physalis.

Formulation of the problem. Many (several thousand) natural and artificial food products are used in the structure of modern human nutrition, and a huge number of different diets are known. But in recent years, the so-called functional products (FP) - Food for Specific Health Use - have increasingly confidently invaded this food diversity. The difference between these products and traditional ones is that they have not only nutritional properties, but also have a targeted effect on the functional activity of individual organs and systems of the body with preventive and therapeutic purposes.

Now many countries have programs to create functional food products. The first project to create functional products was developed in Japan in 1984. In 1987, about 100 functional products were created. In Japan, the direction of development of functional products has found wide government support. In 1991, the concept of "Foshu" - "Foods for Specified Health Use" - products for special health nutrition was developed in Japan. In Ukraine, the concept of creating and introducing functional health products has not yet been approved by the government, despite the fact that the problem of improving the nation's health is the most acute.

Analysis of recent research and publications.

Functional products include products that have a positive effect on human health when used regularly in effective doses. In addition to nutritional ingredients, they contain functional ingredients that have a positive effect on the human body, which helps to adapt to the effects of the external environment, prevent the occurrence of diseases and prevent premature aging [1-3].

Functional products are considered not only as a source of plastic substances and energy, but also as a complex non-medicinal complex that provides a reliable therapeutic and preventive effect. The place of functional food products is defined as intermediate between products of general use and medical food products. Functional products differ from traditional products primarily in the absence of antinutrients and a balanced amount of macro and micronutrients.

The direction of creation of therapeutic and preventive preparations and complexes from natural plant raw materials is actively developing [4–6]. Of all the variety of known plant species, people use only those that are available and familiar to them. This situation is explained by low information about the nutritional and biological value of many types of plant raw materials, conditions of growth, storage and processing, as well as the complexity of technologies for processing raw materials and obtaining functional food products [7].

The analysis of literary sources on the research of physilysis and its processing showed that the range of presented products is quite narrow and does not have a functional orientation. There are no studies in the direction of the technology of complex processing of physalis fruits into functional products [8].

Physalis belongs to the nightshade family. It is an annual or perennial herbaceous plant with a creeping rhizome, angular-curved stems 0.4 — 3 m high. The round, cherry-sized fruits of physalis, the weight of which does not exceed 5 g, are surrounded by a thin parchment-like ribbed envelope of flower leaves (a distinctive feature physalis is the presence of a film shell, which shows the fruit in the form of a cover). The structure of the physalis fruit is a berry. Its skin is thin, oily, shiny, yellow-burnt in color. The pulp of the fruit is jelly-like, transparent, light yellow or yellow-hot in color. Numerous small, soft white seeds are located in the pulp and are eaten together with it. The taste of the fruit is refreshingly sweet, sweet-sour or sweet-tart, reminiscent of pineapple and passion fruit. Physalis is used fresh as a dessert fruit. The storage temperature is 0-1.5°C. The storage period is 30-60 days.

According to the joint online project of the Royal Botanic Gardens at Kew and the Missouri Botanical Garden "The Plant List", the genus has 124 species (for details, see List of species of the genus Physalis) [9, 10].

There are several varieties of physalis: garden, strawberry and vegetable. On the basis of Mexican physalis, domestic varieties were obtained, such as Moscow early (early), soil Gribovsky (mid-early), confectionary (mid-late) and large-fruited (mid-late).

Garden physalis is a perennial ornamental plant with bright orange bell-shaped calyxes that is grown as a flower crop.

Physalis garden

Strawberry physalis is an annual fruit group, it can be grown in the middle lane. The fruits of strawberry physalis are amber-colored, sour-sweet, weighing from 7 to 12 g. They are used mainly in the production of compotes and jam.

Physalis alkekengi (Physalis alkekengi) — (baboshtan, field cherry, pods, pods, pods, pods, puffballs, core, ball cherry) [11].

A biennial or perennial sparsely pubescent plant of the nightshade family. The stem is erect, up to 60 cm tall, blunt-edged, simple or branched. The leaves are alternate, petiolate, entire, egg-shaped, rounded at the base, pointed at the top. The flowers are bisexual, regular, single, on drooping peduncles, the corolla is wheel-shaped, whitish. Blooms in June - July. The fruit is a rounded orange berry, hidden in a red overgrown cup, ripens in August - September. Grows in forests, among shrubs.

Ripe fruits are harvested. They are used fresh or dried after removing the calyx (the calyx is poisonous). This species is not used for food [12].

Vegetable or Mexican physalis is biologically close to tomatoes, so it is also called Mexican tomato. In terms of biochemical composition, the fruits are not only not inferior to tomatoes, but also superior in some indicators. They have a high pectin content and an optimal ratio of sugar and organic acids. It is an annual plant that can be both short and up to 1 m tall or more. Fruits of vegetable physalis are yellow, green and purple in color, weighing from 30 to 70 g, placed in yellow cups that protect them not only from diseases and pests, but also from low temperatures [13].

The value of the plant is that its fruits contain vitamin C, tannins, caffeic acid, pectin, sugars, carotene.

Physalis fruits are very pleasant to the taste, they are used both raw and processed. In its raw form, it is used in salads, vinaigrettes, soups, and for cooking vegetable caviar. Compotes, jams, jams, marmalade, jelly candies, candies, pie fillings, pickles, mashed potatoes are made from physalis, salted and pickled like tomatoes, sauces, and dried like raisins. Dried physalis has a sweet taste, reminiscent of the taste of raisins, can be used for compotes [14].

It is also very important that physalis fruits have valuable medicinal properties. Ripe fruits without cups are used in food as a dietary product, they are used to prepare confectionery products. Green fruits together with cups are salted and marinated. Red food coloring is obtained from the fruits, which is used to tint butter [15].

The purpose of the work is the development of a technology for the production of functional candies for restaurants by adding physalis fruits to the recipe.

Results.

Physalis is considered an excellent source of carbohydrates, fructose and glucose, the content of the latter can reach 6%. It contains many active substances, such as polyphenols, tannin, physalin, cryptoxanthin, flavonoids, saponins, citric acid. Physalis fruit can replace multivitamin preparations, it contains vitamins A, B1, B2, B6, B12, minerals magnesium, phosphorus, calcium, sodium, iron, zinc, but most of all potassium.

Berries contain many organic acids: malic, tartaric, citric, amber, caffeic, ferulic and mustard. Physalis contains lycopene, a natural substance that gives the fruits a bright color. Lycopene has a pronounced antioxidant effect and can be used to prevent cancer. Physalis also contains the alkaloid physalin. It is bitter, there is not much of it in the fruits, but because of this, the plant was popularly called the sleepy grass. And also pectin, which removes toxins, decay products, heavy metals, radionuclides and cholesterol from the body.

Nutritional value of physalis per 100 g of product: 6.3 g of fats, 1.9 g of proteins, 11.2 g of carbohydrates, 0.8 g of ash, 85.4 g of water.

The energy value of the product is 53 kcal per 100 g of berries. This is an excellent dietary product that can maximally diversify the menu of people who want to lose weight.

Candy production technology. The incoming raw material must be prepared accordingly. The physalis is separated from the fruit stalk by hand or using branch cutting machines, then it is inspected to remove damaged, dried berries and impurities. Fruits are thoroughly washed with running water on vibrating washing machines or under a shower on sieves.

Apples and apples used in the production of candies are sorted by quality, washed with cold running water in washing machines of various types or manually under a shower on sieves, then cut and puree is prepared from them.

Sugar-sand undergoes cleaning on sieves with a hole diameter of up to 2.5 mm using a magnetic catcher. The hot mixture of fruit and syrup is filtered on mesh filters of various designs to separate the syrup from the berries.

The obtained mass is rubbed to separate the seeds and the skin on an anti-aging machine. The resulting workpiece contains up to 30% residual moisture, a significant part of which is then removed in an infrared dryer. At this stage, it is possible to introduce various additives to obtain different types of candies, in particular, it is possible to add both fruit purees and syrups with spicy and aromatic herbs. The finished candied mass with a residual moisture content of 19-20% is formed by a die in the form of a rectangular bundle measuring 20x30 mm and cut into bars 100 mm long and dried to a final moisture content of 10-12%, followed by sprinkling them with a mixture of viburnum powder, physalis and starch.

Powder from crushed viburnum seeds and physalis can also be used as a sprinkle, which additionally gives the received candies therapeutic and preventive properties.

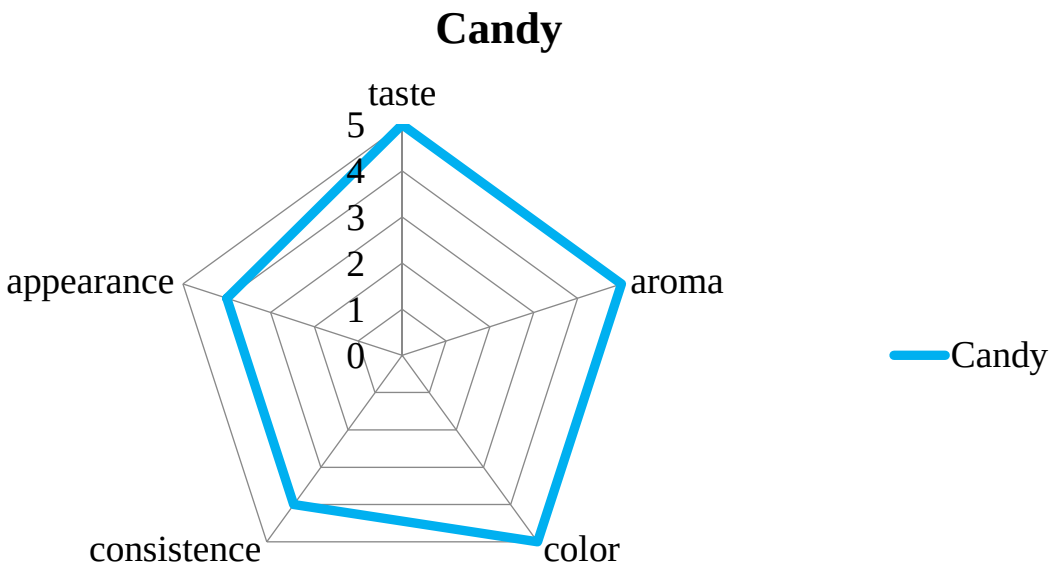

Fig. 1. Organoleptic assessment of Candy

Organoleptic evaluation of the quality of finished products was carried out in accordance with DSTU 9799-74. The quality of the finished products was evaluated by the tasting committee on a five-point scale. The selection of samples for research was carried out in accordance with DSTU 5904 - "Confectionery products. Acceptance rules, methods of sample selection and preparation".

According to the organoleptic indicators, it was established that functional candies with physalis had excellent taste, aroma and color indicators.

Conclusions. The conducted analytical and experimental studies allow us to draw conclusions that the biological features and main advantages of physalis fruits indicate the possibility of its use in the food industry to obtain functional food products, in particular candies, as well as to be used for therapeutic and preventive purposes. According to the organoleptic indicators, it was established that functional candies with physalis had excellent taste, aroma and color indicators.

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ДОСЛІДЖЕННЯ МОЖЛИВОСТІ ВПРОВАДЖЕННЯ КОМПЛЕКСНИХ ЗАХОДІВ ЕНЕРГОЗБЕРЕЖЕННЯ ПРИ РОБОТІ РУДНОТЕРМІЧНОЇ ПЕЧІ

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STUDY OF THE POSSIBILITY OF IMPLEMENTING COMPLEX ENERGY SAVING MEASURES DURING THE OPERATION OF THE ORE-THERMAL FURNACE

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АНОТАЦІЯ

Метою досліджень є пошук можливостей застосування комплексних підходів щодо підвищення енергоефективності роботи круглої трьохелектродної руднотермічної печі на основі коригування технологічного процесу задля зменшення обсягів споживання електричної енергії впродовж кожної плавки. Проведено аналіз існуючих методів та моделей роботи феросплавної печі. Запропоновано з'ясувати можливості додаткових заходів задля підвищення її енергоефективності. На реалізованій за допомогою програмних засобів зазначеній моделі проведені розрахункові дослідження роботи печі для виплавки селікомарганцю. Результати показали, що можна скорегувати технологічний процес з метою зменшення обсягів споживання електричної енергії. Отримані результати можуть бути застосовані практично на реальному феросплавному підприємстві з використанням печі типу РКЗ-2,5 та вказаним складом шихти, що призведе до зниження собівартості готової продукції за рахунок запропонованого заходу енергозбереження.

ABSTRACT

The purpose of the research is to find the possibilities of applying complex approaches to increase the energy efficiency of the circular three-electrode ore thermal furnace based on the adjustment of the technological process in order to reduce the amount of electrical energy consumption during each smelting. An analysis of existing methods and models of operation of the ferroalloy furnace was carried out. It is proposed to find out the possibilities of additional measures to increase its energy efficiency. Calculated studies of the operation of the furnace for smelting silicon-manganese were carried out on the model implemented with the help of software tools. The results showed that it is possible to adjust the technological process in order to reduce the amount of electricity consumption. The obtained results can be applied practically at a real ferroalloy enterprise using a furnace of the RKZ-2.5 type and the specified composition of the charge, which will lead to a decrease in the cost of finished products due to the proposed energy saving measure.

Ключові слова: руднотермічна піч, електрична енергія, енергоефективність, феросплави, діаметр розпаду електродів.

Keywords: ore-thermal furnace, electric energy, energy efficiency, ferroalloys, electrode breakdown diameter.

Постановка проблеми. Сучасний розвиток та модернізація металургійної галузі України передбачає підвищення конкурентоспроможності товарної продукції шляхом зменшення собівартості й покращення її якості. Як відомо, дане виробництво енергоємне, тому пошук можливостей зниження частки енергоресурсів у вартості готової продукції є один із пріоритетних для всіх металургійних підприємств. У феросплавному ж виробництві використовують руднотермічні печі різної потужності, які для своєї роботи потребують великих обсягів електричної енергії. Метою досліджень на основі наявних та нових розроблених методів та засобів аналізу процесу отримання феросплавів є пошук можливостей щодо підвищення енергоефективності роботи круглої трьохелектродної руднотермічної печі за допомогою коригування технологічного процесу задля зменшення обсягів споживання електричної енергії впродовж кожної плавки.

Аналіз останніх досліджень та публікацій. В умовах підвищення цін на енергоресурси все актуальнішим постає питання вдосконалення, реконструкції та підвищення енергоефективності роботи руднотермічної печі зі збереженням вимоги до технологічного процесу та зниженням витрат електричної енергії на тону готової продукції. Вирішенню цієї проблеми присвячено багато наукових праць. Розглянемо деякі з них.

Так в роботі [1] проаналізована можливість підвищення енергоефектривності феросплавної електропечі за рахунок використання установок продольно-ємнісної компенсації (УПК) реактивної потужності Q, які зменшують її дефіцит та підвищують активну потужність P печі. Ці дослідження проводилися при стабільних режимах роботи на двох печах типу РКЗ-16,5, що виплавляли 65% феросиліція. Вимірювання електричних та технологічних параметрів здійснювалися за вимкнених

та включених УПК. Спостереження за роботою печей у першому випадку проводили протягом 27 діб, а у другому – 14 діб.

Аналіз отриманих результатів показує, що збільшити активну потужність печі таким чином можливо тільки у випадку коли вона працює не на граничній потужності і є достатня пропускна спроможність короткої мережі на некомпенсованій ділянці. Потужність, що споживається піччю при виплавці феросиліцію, може без порушення технологічного процесу досягати номінального значення. Це можна отримати, збільшуючи робочий струм та напругу при збереженні їх раціонального співвідношення за високого коефіцієнта потужності, якщо при цьому частка активної, перетвореної на тепло, потужності досягає максимуму. Такий режим роботи печі можливий за умови, що вона обладнана зазначеною установкою компенсації реактивної потужності.

Останнє дозволяє підвищити активну потужність електропечі на 6,58% при зменшенні її реактивної на 41,16%. В результаті коефіцієнт потужності збільшився на 17,49%, добова продуктивність печі зросла на 12%, питомі витрати електроенергії зменшились на 4,63%. І це є значним досягненням щодо енергоефективності.

В роботі [2] розглянуто також питання впливу величини напруги та несинусоїдальності струму на режими роботи феросплавних печей. Електричні процеси, що відбуваються в них, мають низку особливостей та вимагають у деяких випадках застосовувати специфічні способи їх дослідження. Це визначається в першу чергу і різкими та частими коливаннями навантаження цих агрегатів, великими значеннями й несинусоїдальністю їх фазних струмів і відповідних напруг, складністю щодо приєднання вимірювальних приладів. Крім того, коливання струмів печі несприятливо впливають на роботу сусідніх з нею споживачів. Тож виникає потреба дослідження впливу і цих коливань.

Струми потужних електропічних установок досить великі (тисячі ампер), а це призводить до виникнення значних магнітних полів та паразитних ЕРС в зазначеній електричній мережі й у вимірювальних приладах. У той же час, струми та напруги печі несинусоїдальні і містять гармонійні складові найвищих порядків. За деяких умов у них з'являється і постійна складова, що також збільшує втрати електроенергії. Все це викликає необхідність застосування якогось нового комплексного підходу щодо вирішення цих, зазначених вище проблем, електротехнічних перехідних процесів у печі.

В роботі [3] автором запропонована методика та проведені промислові дослідження [4,5] на печах малої потужності щодо пошуку доцільних значень діаметру зазначеного розпаду та піделектродного простору з метою зниження обсягів споживання електричної енергії.

Були проведені плавки з відмінними, ніж звичайні, значеннями міжелектродного проміжку та відстані між електродами. Оскільки це супроводжується поступовим зростанням додаткового перерізу провідника у ванні печі (електрод-подина) і його встановленого діаметра, то для нормальної роботи печі (при збережені відсотка міжелектродного струму) необхідно або збільшити діаметр розпаду, або відстань між електродами та ванною. Для підтвердження цього були проведені пробні серії щодо виробництва силікомарганцю зі стандартним і збільшеним діаметром розпаду. При цьому розміри останнього становили 2,18, 3,0, 4,5 і 6,0 одиниць відносно діаметрів електродів. Випробування були проведені на печах малої потужності (138–329 кВА), розміри топки яких змінені відповідно до величини зазору.

Результати експериментів показали, що при виготовленні силікомарганцю з різними діаметрами розпаду електродів та проміжку між ними та при збільшенні цих параметрів одночасно істотно збільшується опір ванни і потужність, що виділяється в ній так як корисна напруга зростає без будь-якої зміни величини струму в електродах. Тобто автором доведено, що обсяг споживання електричної енергії піччю при цьому зменшується.

Отже існує багато шляхів підвищення енергоефективності роботи руднотермічної печі, однак всі вони мають уособлений характер для конкретного її типу та виду феросплаву, що виплавляється, і не зовсім враховують реальні умови плавки на підприємстві. Тому пропонується додатково дослідити деякі технологічні аспекти роботи РТП з врахуванням існуючих реальних умов плавки шляхом реалізації відповідних розрахункових експериментів на її моделі.

Мета досліджень. Провести розрахункові дослідження для конкретної руднотермічної печі щодо зниження тривалості плавки за рахунок визначення критичної межі зміни діаметру розпаду електродів, з врахуванням заданої кількості утвореного розплаву для різного складу завантажувальної шихти з метою пошуку енергоефективного режиму її роботи.

Викладення основного матеріалу. В даний час на підприємствах при виплавки селікомарганцю згідно технологічного процесу, що відбувається на стаціонарному значенні діаметру розпаду електродів в 1,1м, злив розплаву здійснюється за нормованою кількістю спожитої електричної енергії, яка складає 5000 кВт·год на одну плавку, а її час – 255 хвилин. Зважаючи на те, що описані вище заходи енергозбереження в руднотермічній печі, не враховують реальні умови плавки і не дають змоги оцінити кількість утвореного розплаву в динаміці та визначити вплив зміни діаметру розпаду електродів на її енергоефективність пропонується провести більш детальні і комплексні дослідження роботи РТП в динаміці на розробленій авторами [6-9] математичній моделі.

Запропоновано провести розрахункові дослідження зміни діаметру розпаду електродів на комплексній моделі роботи круглої трьохелектродної руднотермічної печі, встановивши для кожного виду шихти бажану кількість утвореного розплаву (табл.2). Вхідними даними якої є геометричні, електричні та технологічні параметри діючої печі типу РКЗ-2,5 для отримання селікомарганцю, що представлені в таблиці 1 та 2.

Таблиця 1

Електричні та геометричні параметри печі РКЗ-2,5.

Параметр	Од.виміру	Значення
Геометричні		
Зовнішній діаметр корпусу, $D_з$	мм	3700
Зовнішня висота печі, $H_з$	мм	2730
Внутрішній діаметр ванни, $D_в$	мм	2100
Внутрішня висота ванни, $H_в$	мм	1550
Діаметр електрода, $d_е$	мм	350
Діаметр розпаду електродів, $d_р$	мм	1100
Глибина занурення електродів у шихту	мм	1000
Електричні		
Потужність печі	МВА	2,5
Потужність пічного трансформатора	МВА	5,0
Електродний струм	кА	12
Напруга на електродах	В	89-178

Таблиця 2

Компонентний та кількісний склад шихт, що використовуються при одержані селікомарганцю.

Назва компоненту	Од. вимір	Склад шихти			
		Шихта-1	Шихта-2	Шихта-3	Шихта-4
Марганцева руда	кг	2 600	2 600	2 600	2 600
Кокс W-14,0%	кг	700	800	880	980
Вапняк	кг	450	500	500	500
Кварцит Васильківский	кг	400	400	400	400
Скрап власного виробництва ~ 25% мет.фази	кг	400	400	400	400
Техногенний матеріал фр.0-30мм	кг	1400	1 400	1 400	1 400
Техногенний матеріал фр.0-300мм	кг	200	200	200	200
Загальна маса шихти	т	6,15	6,30	6,38	6,48
Кількість утвореного розплаву	т	2,10	2,20	2,32	2,40

Під час досліджень зроблено по шість експериментів для кожного, приведеного в (таблиці 2), складу шихти: спочатку з існуючим розпадом електродів в 1,1 м, а потім з 1,2м, 1,3м, 1,4м, 1,5м та 1,6м відповідно. Якщо ж розглядати зазначені значення у відносних одиницях до діаметру електродів, то вони складатимуть 3,14; 3,43; 3,71; 4,00; 4,29 та 4,57. Подальше збільшення цього показника було не можливим, через геометричні розміри ванни. Умовою завершення плавки є досягнення необхідної кількості утвореного розплаву для кожного виду шихти. Також проводиться контроль за температурою футерування в районі електродів. Інші параметри печі не змінювались.

Результати проведених розрахункових досліджень, з описаними вище обмеженнями, представлені в таблиці 3.

Таблиця 3

Результати розрахункових досліджень.

Склад шихти	Час плавки, хв	Тем-ра футерування, ^{0}C	Витрата електричної енергії, кВт·год
$d_р$=1,1м			
Шихта 1	240	1450	4665
Шихта 2	245	1460	4785
Шихта 3	245	1450	4815
Шихта 4	247	1455	4868
$d_р$=1,2м			
Шихта 1	235	1480	4605
Шихта 2	240	1490	4670
Шихта 3	237	1485	4585
Шихта 4	227	1480	4495
$d_р$=1,3м			
Шихта 1	235	1510	4455
Шихта 2	230	1520	4390
Шихта 3	229	1510	4305
Шихта 4	221	1510	4215
$d_р$=1,4м			
Шихта 1	229	1560	4105
Шихта 2	223	1570	4045
Шихта 3	219	1550	3985
Шихта 4	215	1570	3880
$d_р$=1,5м			
Шихта 1	224	1640	3895
Шихта 2	220	1650	3860
Шихта 3	212	1650	3790
Шихта 4	209	1660	3705
$d_р$=1,6м			
Шихта 1	218	1710	3805
Шихта 2	212	1700	3720
Шихта 3	207	1700	3630
Шихта 4	201	1720	3585

За результатами розрахунків видно, що навіть при існуючому діаметрі розведенні електродів розплав утворюється швидше при нижчому рівні споживанні електричної енергії ніж за існуючою технологією плавки. Це вказує на те, що зараз розплав необґрунтовано перегрівають. Тому для різних видів шихти перед кожною плавкою рекомендовано прораховувати на моделі час утворення необхідної кількості розплаву, щоб уникнути його перегріву і вчасно почати процес зливу. Це в свою чергу скоротить тривалість технологічного процесу і знизить обсяг витрати електроенергії.

Як зазначалось вище чим більший розпад електродів тим менше споживання електричної енергії, однак обмежуючим фактором є те, що футеровка реальних печей виконується з вогнетривких матеріалів, нижній шар якої є шамотна цегла, а верхній – високоглинозесті вироби, які мають максимально допустиму температура в 1600^{0}C [10-12]. Тому необхідно контролювати величину останнього і в кожному конкретному випадку розраховувати максимально допустиму величину діаметру розпаду електродів в залежності від компонентно-кількісного складу шихти. Отже, виходячи з цього крайня межа зміни діаметру розпаду для даної руднотермічної печі та для всіх видів шихт в нашому випадку склала 1,4м. Подальше розведення електродів призведе до швидкого зношування, а в деяких випадках, і до непередбачуваного руйнування футерування, що небезпечно для нормального функціонування всієї РТП.

Якщо ж розглядати такий показник економічної доцільності виробництва селікомарганця як питома витрата електричної енергії на 1т готового сплаву при різному діаметрі розпаду електродів то має наступні розрахунки, що представлені в таблиці 4.

Таблиця 4

Питома витрати електроенергії на тону отриманого феросплаву в залежності від складу шихти та необхідної кількості селікомарганця.

Склад шихти	Питома витрата електричної енергії, кВт·год/т			
	$d_р$=1,1м	*$d_р$=1,2м*	*$d_р$=1,3м*	*$d_р$=1,4м*
Шихта 1	2221,4	2192,9	2121,4	1954,8
Шихта 2	2175,0	2122,7	1995,5	1838,6
Шихта 3	2075,4	1976,3	1855,6	1717,7
Шихта 4	2028,3	1872,9	1756,3	1616,7

За результатами розрахункових досліджень зі збільшенням діаметру розпаду електродів зменшується питома витрата електричної енергії та час плавки. Це пояснюється тим, що: по-перше – за рахунок розведення електродів змінюється електричний опір ванни печі; по-друге – склад шихти відрізняється кількістю засипаного коксу, який є добрим електропровідником та додатковим джерелом виділення енергії.

Отже при гранично допустимому розведенні електродів, з точки зору допустимої температури футерування, в 1,4м для печі РКЗ-2,5 найкращим варіантом вибору компонентно-кількісного складу є «Шихта-4», що має найнижчий показник питомої витрати електроенергії. Якщо ж розглядати натуральні показники, то економія складе 1120 кВт·год або 22,4% та 40 хв за одну плавку при найбільш можливій кількості утвореного розплаву в 2,4т, що є суттєвим показником енергозбереження та економії експлуатаційного часу печі, що може бути використаний для технічного обслуговування РТП або для інтенсифікації виробництва.

То ж запропоновано для впровадження в залежності від того на якому шляху йде удосконалення вітчизняних РТП й при можливості або у відповідності до складу шихти перед початком кожної серії плавок одноразово налаштовувати діаметр розпаду електродів або мати можливість робити це для кожної плавки чи, навіть, в процесі її проведення.

Слід також зазначити, що представлена в роботі методика та використаний інструментарій дозволяють проводити подальші подібні дослідження для будь-яких печей такого типу та різного компонентно-кількісного складу шихти і, зменшуючи дискретність діаметру розпаду електродів, точніше визначити бажану його величину з врахуванням допустимої температури футерування. Також, прораховуючи час плавки на основі необхідної кількості утвореного розплаву, додатково знизити обсяги споживання електричної енергії.

Висновки. Результати розрахункових дослідження роботи круглої трьохелектродної руднотермічної печі типу РКЗ-2,5 для виплавки селікомарганцю за допомогою її комплексної математичної моделі, яка реалізована сучасними програмними засобами, показали, що існуючий показник закінчення плавки, а саме кількість спожитої електричної енергії, є не енергоефективним. Отримані дані показують, що в залежності від кількісного та компонентного складу шихти та при максимально допустимому діаметрі розпаду електродів суттєво зменшуються час плавки та обсяги споживання електроенергії.

Якщо в реальній руднотермічній печі не має механізму зміни діаметру розпаду електродів, то необхідно встановити його одноразово безпосередньо на підприємстві в процесі реконструкції, у відповідності до того які шихтові матеріали здебільшого використовуються на ньому. Тому пропонується на даній печі РКЗ-2,5 при реконструкції встановити електроди на відстані 1,4м та по всяк час використовувати кількісно-компонентний склад «Шихта-4», який має найбільший вміст коксу та при цьому найменшу питому витрату електричної енергії, що призведе до 22% економії енергоресурсів.

Крім зменшення кількості спожитої електричної енергії на одну плавку за рахунок доцільного розведення електродів в печі, спостерігається ще і скорочення її проведення, а це підвищує продуктивність обладнання та ефективність використання футеровки і електродів.

Література

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