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SECTION I. Physical sciences

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NONLINEAR-WAVE EFFECTS OF THE ENERGY EXTRACTION OF THE QUANTUM VACUUM

Physical effects related to zero-point energy of the quantum vacuum is well known. They are discussed in many research papers, reviews and patents [1-3].

In 1911 Planck introduced his famous equation for the energy E of radiation of absolutely black body

$$E = h\nu / (e^{h\nu/kT} - 1) + h\nu/2. \quad (1)$$

It includes the additional term $h\nu/2$. When the temperature T becomes zero, the indicative member becomes infinite, and the first term becomes zero, but there is still residual energy in the form of the second term, which is a product of the Planck constant h on the frequency ν . Depending on the value of ν this energy can be quite high.

The energy density of the vacuum fluctuations of zero-point fluctuations of ρ is given by the relation

$$\rho = 8 \pi \nu^2 E / c^3. \quad (2)$$

In 1947, Lamb found changes in the fine structure of the hydrogen atom, which became known as the Lamb shift [4]. In 1948 was

inaugurated the Casimir effect [5], consisting in a forceful interaction of two closely spaced neutral metal plates, caused by the energy fluctuations of the quantum vacuum. In 1951 Dirac [6] introduced the concept of the ether, saying: "With the new theory of electrodynamics we are rather forced to have an ether". In 1967, Sakharov [7] suggested that the force of gravity is not fundamental, but is the result of fluctuations of the energy of the zero-point. The first patent [8] with the idea of extracting energy from the quantum vacuum appeared in 1996. Then followed by other patents and publications on this subject.

In particular, serious attention was paid to the creation of space engines based research program for NASA's physics of engines. In 1998 published the article with the suggestion that the electromagnetic force of interaction of energy zero-point with particle can be a source of inertia [9].

The paper discusses the possibilities of extracting energy from the vacuum associated with the use of nonlinear interference effects of resonance spectroscopy [10-13]. For example, to achieve this you can use the scheme of resonant photoionization of atoms near a metal surface [14].

The zero-point energy of the vacuum can be turned into electric current, i.e. the electric field energy, through the non-activated charge exchange between the atoms, resonance radiation interacting with the vacuum, and the metal surface. The resonances of the photoabsorption and surface photoionization depend on nonlinear interference effects of the interaction of the discrete levels of the atom and the continuum formed by quasi-continuous electronic spectrum of the normal metal. In this case, the asymmetry of the spectrum of the resonant surface photoionization is manifested in the form of a typical autoionization of Fano resonances [15].

The degree of asymmetry of the resonance absorption and photoionization is given by the probability of transition in a discrete excited state of the atom to the transition probabilities induced in a metal surface is a continuum of energetic states. Similar nonlinear interference effects appear in resonance Raman scattering of laser radiation [10-12].

In this case, nonlinear interference effects in the resonance ionization of surface depend on the distance between the metal surface and the atom. Note that when you delete an atom from the surface of the photoabsorption resonance becomes symmetric, and the probability of the photoionization decreases dramatically. Due to this reduced the

efficiency of energy conversion electromagnetic oscillations of vacuum in the electric field energy.

Quantum description of the photoionization process surface by the absorption of radiation at the transition between the primary state atom n and excited m , located, in the main, above the Fermi level, is responsible of the full Hamiltonian

$$H = H_a + H_M + h(U+V), \quad (3)$$

where the sum of three terms, $H_{a,M}$ and hU represented by a model Hamiltonian of Anderson [16], which defines the electronic state of the metal and interacting with him the two-level atom. Operators the Hamiltonian of the free atom

$$H_a = \sum_{j=m,n} E_j c_j^+ c_j \quad (4)$$

and the unperturbed metal

$$H_M = \sum_p E_p c_p^+ c_p \quad (5)$$

are expressed in terms of the Fermi operators the birth of c_j^+ , c_p^+ , and destruction c_j , c_p of electrons in the atom and the metal; E_j , E_p – energy of electrons in the atom and semi-infinite metal, respectively.

The operator

$$U = \sum_{p,j} U_{pj} c_p^+ c_j + \text{h.c.} \quad (6)$$

describes the tunneling interaction between metal p and atomic states $j=m,n$. It is similar to the configuration interaction the Fano between continuum and the autoionization state. It is assumed that electromagnetic radiation interacts only with atoms. This interaction allows for the operator V .

When you remove the atom from the metal surface the reducing of values of the relaxation constants and energy shifts of the resonance levels is approximated by the exponential model [14]. In this situation, the asymptotic behavior of the drop surface photoionization cross section at $z \rightarrow \infty$ is also represented by exponent

$$\sigma(z) \sim \exp(-\alpha z) \quad (7)$$

in the scheme non-inversion amplification of electromagnetic vacuum fluctuations, where z is the distance between the atom and the metal surface.

The efficiency of the process extraction of the zero-point energy of quantum vacuum may increase significantly when using multi-level atomic systems including the metal-dielectric-semiconductor structures the proposed nonlinear resonance technologies.

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SECTION II. Information Technology

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Elicitation of Criteria Weights for the Web Quality Evaluation Method Universal Star: by using different ranking methods

Abstract. The main objective of this paper is to prioritize 5 top criteria and 28 sub-criteria of the Web Quality Evaluation Method Universal Star (WQEMUS) effectively and make them explicit. Accordingly, research procedure consists of several stages that starts with data collection from 171 questionnaire participants and ends with an analysis of data with rank ordering weighting methods. The rank sum, rank order centroid, rank reciprocal, equal weights and rank exponential as the most effective, simple and used methods to elicit criteria weights on the basis of individual ordinal rankings are applied in this study.

Keywords: Website quality, multi-criteria decision making, ranking methods, criteria and sub-criteria weights, rank sum, rank order centroid, rank reciprocal, equal weights and rank exponential.

1. Introduction

It is determined that the main factor of success is not the presence of the just website or low price but providing the website of a high quality. Price and promotion are not a key that leads to the decision of customers. More experienced online clients ready even to donate a high price for the use of high-quality services [1].

Because of the rapid development of web technologies and an increase of websites in numbers [2], the modern websites are no longer static or document oriented, but very dynamic and complex systems [3] with punchy software applications. Especially, the success of Web 2.0 websites depends deeply not only on the developers and managers but

also on the big and unmanageable community of users. Consequently, evaluating the quality of websites becomes a double work and remains a difficult area of research. Thus, there is a need to systematically examine the quality of websites and a “proper” quality evaluation model for inspection of dynamic websites is required.

The goal of the current research is to put weights for the quality characteristics of the developed WQUEMUS (See Figure 1) for the evaluation of the quality of any kind of websites. To achieve this goal popular family of the ranking methods such as the rank sum, rank reciprocal, rank exponential, equal weight method, and rank order centroid as the most widely used decision methodologies in science, business and governments are utilized.

2. Methodology

Before proceeding, the terms evaluation criteria, objectives, attributes and evaluation criteria hierarchy are specified as demonstrated in Figure 1. Then, a survey was conducted from 01.02.2015 to 27.03.2015 in Austria, city of Linz. To get the data for this research, ranking questions which cover all the criteria of the WQUEMUS shown in figure 1 was distributed among 193 survey respondents. However, the reported results evaluate the data received from 171 respondents. Twenty-two assessments were rejected because the values of the criteria were negative, missing or non-numeric during the ranking process.



Figure 1. The hierarchical structure of the WQUEMUS with its criteria and sub-criteria

As a starting point in deriving weights, the criteria are ranked in a proper way from the most important to least important in ascending order, which means that the most important criterion is given rank 1, the second criterion rank 2 and etc. A detailed description of the rank-ordering method can be found in [4]. Each criterion of the WQWEMUS was ranked by integer values and considered to have a unique rank, as well as the same rank in the calculation. On average, about 25 minutes was required for each participant to rank criterion and sub-criterion. Revising assessments were permitted, but not exchanging any information among respondents. Besides, each time, the order of criteria and sub-criteria were changed to avoid order bias and investigate differentiation of a final assessment. Finally, all the considered criteria and sub-criteria were ordered based on their importance.

2.1 Popular Subjective Weighting Methods

A variety of ranking approaches ranks the entire set of alternatives in order to determine the best alternatives or relative importance of different attributes are often described in the literature. Usually, determination of the weights assigned to the criteria follows the two steps. In the first step, the decision makers assign direct ranks to the criteria [5]. Using ranks to establish weights by using corresponding formula is more reliable than the direct appointment of weights to the criteria. As respondents may not be able to ensure exact estimations of some criteria and are more confident to rank them than elicit weights. More importantly, several decision makers can reach agreement on a number of exact ranks.

The second step is eliciting more precise numerical weights to the criteria from their rank orders using ranking functions [6, 7]. Here, a sorted list of data is needed. As a result, the best criteria obtain the highest weights. Hence, it is concluded that ranking algorithms are easy to use and simple to understand than weighting algorithms for non-expert or even experts. On the other hand, Alwin & Krosnick (1985) confirm that ranking methods usually requires more attention since it is necessary first to consider all alternatives then make a choice. Thence, it leads to achieving a more accurate data assessment [8, 9].

Matthes and Schröder (2004) indicated that that the choice of a ranking method is essential for the overall ranking outcome [10]. Five of the most popular and different ranking methods for deriving relative criteria weights [11,12], relative levels of importance [13] or influence of criteria [14] have been selected for this study, because of their

effectiveness and simplicity, especially regarding the decision makers' preferences. These five following ranking techniques are the rank sum (linear), rank reciprocal (inverse) and rank exponent, which were proposed by Stillwell et al. [1981] (also see, [11,12]) and considered as tangible ways of transforming ordinal preference information into representative rank based weights for the criteria.

2.1.1. Rank Sum Weight Method

The process of the origin of weights in the rank sum (RS) function is the separate ranks subsequently normalized by dividing the sum of all rank values. The formula for eliciting the weights from ranks by RS is counted as proportional to the opposite number of the ranks [6], [11, 12, 13], [15, 16].

$$w_j(RS) = \frac{n - r_j + 1}{\sum_{k=1}^n n - r_k + 1} = \frac{2(n + 1 - r_j)}{n(n + 1)} \quad \text{or } w_i \propto (n - R_i + 1)$$

where w_j is normalized weight, r_j is the rank position of the j -th criterion, n = number of criteria ($j = 1, 2, \dots, n$)

2.1.2. Rank Reciprocal Or Inverse Weights

The inverse or reciprocal weights technique (RR) relies on the reciprocal of the criterion's ranks which are calculated through dividing individual terms by the sum of the reciprocals [6], [11,12,13], [15,16]. The equation for the reciprocal weights method is considered as proportional to the inverse of the ranks:

$$w_j(RR) = \frac{1/r_j}{\sum_{k=1}^n (1/r_k)} \quad \text{or } w_i \propto \frac{1}{R_i}$$

where w_j is normalized weight, r_j is the rank position of the j -th criterion, n = number of criteria ($j = 1, 2, \dots, n$)

2.1.3. Rank Exponent Weight Method

The rank exponent approach (RE) is a generalization of the RS function with the numerator and denominator raised to a power between 0 and 1 scale, thus thereby reducing the weights as a result of differences [6],[11,12,13], [15,16]. The value is then used to solve for

the exponent in the numerical formula which is shown below: The following formula reflects the essence of the method:

$$w_j(RE) = \frac{(n - r_j + 1)^p}{\sum_{k=1}^n (n - r_k + 1)^p},$$

where w_j is normalized weight, r_j is the rank position of the j -th criterion, p -parameter describing the weights, n = number of criteria ($j = 1, 2, \dots, n$)

The argument p may be evaluated by a decision maker using the weight of the most important alternative to control the distribution of the weights. When $p = 0$, all the criteria will receive the same or equal weight if $p=1$, then the weighting is aligned like „rank sum weight“. If $p > 1$ ($p < 1$), the power increases or decreases the weights distribution of the most important criteria compared to RS method. Particularly, when p increases, the weights distribution will be steeper.

2.1.4. Equal Weights (EW) Method

EW is the simplest of approximate weights to assign weights to the set of criteria in the case of insufficient or absence of information about weights or, inconsequent of rank information [16]. Thus, it requires minimal knowledge of the decision maker's priorities. In the EW function, the weights are distributed equally among all the criteria and defined as: $W_i=1/S$ where $i=1, 2, \dots, s$.

EW has successfully been applied in many decision-making approaches [17] and becomes increasingly popular after Dawes and Corrigan proved that this method is in its promises effective as well as can be almost compared to those optimal weighting methods in 1974 [18]. Yet, the method has been criticized due to the fact that it ignores the relative superiority among criteria.

2.1.5. Rank-order centroid (ROC) weight method

Another weighting method ROC has been proposed by Barron and Barret (1996) [16]. It is called the centroid that is meant the center of mass weights, in an attempt to get a uniform sample of weights which in turn is the representative of all possible combinations that is valid within

the defined linear inequality constraints (S) shown below. These are generally interpreted as ‘Criterion 1 is more important than Criterion 2, which is more important than Criterion 3’ and etc.:

$$S = \left\{ w : w_1 \geq w_2 \geq \dots \geq w_n, \sum_{j=1}^n w_j = 1, w_j \geq 0, j=1, \dots, n \right\}$$

Here the top value points in S range are introduced by $ep^i = (\frac{1}{i}, \frac{1}{i}, \dots, \frac{1}{i}, 0, \dots, 0)$, $j=1, \dots, n$ where ep^i is the i^{th} top value point with an i positive units and $n- i$ zeros.

The idea is to take those n ranks as inputs and convert them into weights for each n criterion that are normalized between the intervals of 0.0 to 1.0. The expected subjective weight values for the criteria ranked in j^{th} position can be calculated using the following formula:

$$w_j = \frac{1}{n} \sum_{i=j}^n \frac{1}{i}, \quad j=1, 2, \dots, n, \quad 0 \leq \sum_{j=1}^n w_j \leq 1$$

where n is the number of alternatives and W_j is the weight for a j^{th} alternative. *In the case* when two or more criteria have the same *ranks* then the average weight values will be *provided* for *each of these* tied ranks.

3. Findings And Discussions

Penning-Rowell et al. (2003) identify groups of stakeholders or decision makers and describe the very important issue of their participation[19]. Participants who set rankings play a significant role to the total outcome of the decision-making process. In this regard, a *representative sample of respondents* from males, females, younger and highly educated individuals compared to the average population are provided in Table 1.

In addition, Figure 2 tracks the *country of birth and the number of respondents*. Consequently, the selection of respondents for conducting the study is one of the crucial points and is still subject to further research [20, 21, 22, 23, 24]

Table 1. Statistical data about the respondents' background characteristics

| Characteristics | Statistics |
|------------------------|--------------|
| Gender | |
| Male | 79 (46%) |
| Female | 92 (54%) |
| Age | |
| 15-22 | 54 (32%) |
| 23-30 | 91 (53%) |
| 31-40 | 18 (11%) |
| 41 or older | 8 (4,7%) |
| Age | |
| Average daily internet | |
| 15-22 | 4,8 hours |
| 23-30 | 5,4 hours |
| 31-40 | 4,7 hours |
| 41 or older | 3,2 hours |
| Educaion | |
| Secondary education | 19 (11,2%) |
| High | 152 (88,8 %) |

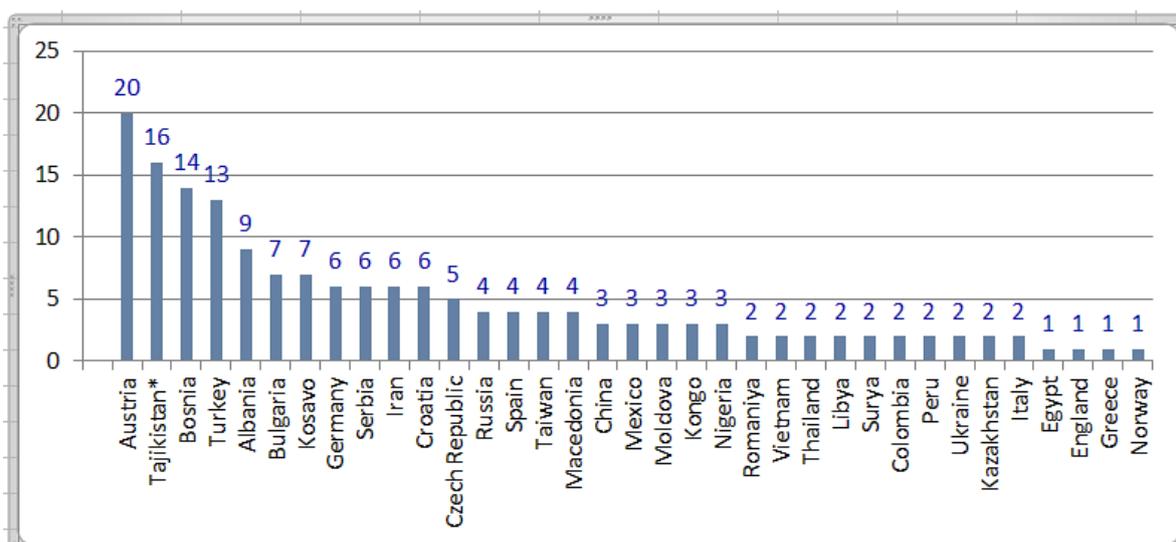


Figure 1. Statistical data about total numbers of the respondents by place of origin. (*) - Fourteen participants from Tajikistan were asked

to fill the questionnaires through an email.

Furthermore, there were a total of 4788 sub-criterion rank values (that is 28 X 171) and 855 criterion weight values (that is 5 X 171) for all data collection process. The data about respondents' preferences for criteria, sub-criteria, and overall judgments were collected using questionnaires and the elicitation of the weight values for each criterion was carried out using a spreadsheet program like Microsoft Excel. Once the significance of each criterion is determined with assigned ranks to them, the numerical weights corresponding to the ranks are revealed with the application of the most popular ranking methodology including rank sum, rank reciprocal, the rank exponent, equal weights and rank centroid which were evaluated, selected and used in this research. Furthermore, ranking techniques are the most frequently used for making decisions.

Fundamentally, prioritizing quality criteria and preference rankings were normalized in two levels. The normalized weights of the top criteria were obtained in accordance with perceived the overall objective of the website quality (See Table 2) while sub-criteria weight values were normalized towards the respective top criterions which are summarized in Table 2-7. Further, by considering the ranked data on the 171 respondents, Tables 2-7 report the calculated overall weight value statistics of 28 sub-criteria and the performed descriptive analysis – normalized average value across each different ranking method. The first columns contain the sub-criteria, which are involved in the selection process and are sorted in descending order (Z to A, 9 to 0). The second to the sixth columns display the sub-criteria weights calculated by ranking methods and the last column returns the arithmetic mean value of the second to the sixth columns, which adequately represents the final weights.

Table 2. The calculated weight scores for ranked top criteria

| Quality criteria | RS | RR | RE (p=0,5) | EW | ROC | Average values |
|------------------|------|------|---------------|------|------|----------------|
| 1 Content | 0,27 | 0,31 | 0,23 | 0,20 | 0,39 | 0,28 |
| 2 Design | 0,19 | 0,17 | 0,19 | 0,20 | 0,21 | 0,19 |
| 3 Usability | 0,24 | 0,22 | 0,22 | 0,20 | 0,28 | 0,23 |
| 4 Reliability | 0,19 | 0,17 | 0,19 | 0,20 | 0,20 | 0,19 |
| 5 Reputation | 0,11 | 0,11 | 0,15 | 0,20 | 0,11 | 0,14 |

Results of the received final scores for the top criteria are displayed in the last column of table N. Consequently, participants ranked content as the most important criterion, usability as second and preferred reliability to a third position. The design has almost the same weight with reliability and reputation was scored as a low value. In the next step, table 2-7 depicts final weight values for the sub-criteria, which are calculated in a similar manner. As a result, all the importance weights of the WQEMUS's hierarchy were obtained.

Table 3. The weights specified for ranked sub-criteria of «Content»

| | | Content | | | | | |
|----------------------|-----------------|---------|------|------------|-------|------|----------------|
| Quality sub criteria | | RS | RR | RE (p=0,5) | EW | ROC | Average values |
| 1 | Currency | 0,22 | 0,27 | 0,18 | 0,143 | 0,32 | 0,23 |
| 2 | Importance | 0,2 | 0,22 | 0,17 | 0,143 | 0,26 | 0,20 |
| 3 | Multimedia | 0,13 | 0,11 | 0,14 | 0,143 | 0,15 | 0,13 |
| 4 | Multilingualism | 0,12 | 0,12 | 0,13 | 0,143 | 0,14 | 0,13 |
| 5 | Accuracy | 0,12 | 0,1 | 0,13 | 0,143 | 0,13 | 0,12 |
| 6 | Authority | 0,11 | 0,1 | 0,12 | 0,143 | 0,11 | 0,12 |
| 7 | References | 0,1 | 0,09 | 0,12 | 0,143 | 0,10 | 0,11 |

Across sub-criteria of content, the utility of currency (0,20) of the total weight), achieved top ranking with importance (0,17) and multimedia (0,14) following. Thereafter, sub-criteria that support the three lowest values illustrated in Table 3 are accuracy (0,12), authority (0,12) and references (0,11) respectively.

Table 4. The spread of weights for ranked sub-criteria of «Design»

| | | Design | | | | | |
|-------------|---------------|--------|------|------------|-----|------|---------|
| Quality sub | | RS | RR | RE (p=0,5) | EW | ROC | Average |
| 1 | Aesthetics | 0,26 | 0,29 | 0,23 | 0,2 | 0,37 | 0,27 |
| 2 | Performance | 0,25 | 0,26 | 0,23 | 0,2 | 0,31 | 0,25 |
| 3 | Compatibility | 0,2 | 0,18 | 0,2 | 0,2 | 0,23 | 0,20 |
| 4 | Color | 0,17 | 0,16 | 0,19 | 0,2 | 0,2 | 0,18 |
| 5 | Advertisement | 0,11 | 0,11 | 0,15 | 0,2 | 0,09 | 0,13 |

Top three sub-criteria of design are aesthetics (0,25), performance (0,24) and compatibility (0,20). However, two sub-criteria such as color (0,18) and advertisement (0,14) out of the five sub-criteria figuring in Table 4 have lower weights.

Table 5. The resulting weights for ranked sub-criteria of «Usability»

| Usability | | | | | | | |
|-------------|-----------------|------|------------|------|-----|---------|------|
| Quality sub | RS | RR | RE (p=0,5) | EW | ROC | Average | |
| 1 | Consistency | 0,27 | 0,32 | 0,24 | 0,2 | 0,39 | 0,28 |
| 2 | Intelligability | 0,21 | 0,2 | 0,21 | 0,2 | 0,26 | 0,22 |
| 3 | Searchability | 0,18 | 0,17 | 0,19 | 0,2 | 0,21 | 0,19 |
| 4 | Navigability | 0,17 | 0,16 | 0,19 | 0,2 | 0,19 | 0,18 |
| 5 | Mapping | 0,16 | 0,15 | 0,18 | 0,2 | 0,18 | 0,17 |

Each of these three elements including consistency (0,26), intelligibility (0,21) and searchability (0,19) become high valued sub-criteria for usability. On the contrary, the low weight criteria are *considered* as Navigability (0,18) and Mapping(0,17).

Table 6. The corresponding spread of weights for ranked sub-criteria of «Reliability»

| Reliability | | | | | | | |
|-------------|-----------------|------|------------|------|------|---------|------|
| Quality sub | RS | RR | RE (p=0,5) | EW | ROC | Average | |
| 1 | Privacy | 0,25 | 0,27 | 0,22 | 0,17 | 0,42 | 0,27 |
| 2 | Security | 0,21 | 0,2 | 0,21 | 0,17 | 0,26 | 0,21 |
| 3 | Antispyware | 0,2 | 0,18 | 0,2 | 0,17 | 0,17 | 0,18 |
| 4 | Customization | 0,19 | 0,18 | 0,18 | 0,17 | 0,10 | 0,16 |
| 5 | Functionality | 0,18 | 0,17 | 0,19 | 0,17 | 0,10 | 0,16 |
| 6 | Maintainability | 0,15 | 0,15 | 0,17 | 0,17 | 0,03 | 0,13 |

Top three *sub-criteria* of reliability that were considered as relevantly the *best* values are privacy(0,23), security(0,20) and antispyware(0,19). Other *criteria* such as functionality (0,18) and maintainability (0,16) were low-ranked.

Table 7. The distribution of weights for ranked sub-criteria of «Reputation»

| Reputation | | | | | | | |
|-------------|----------------|------|------------|------|-----|---------|------|
| Quality sub | RS | RR | RE (p=0,5) | EW | ROC | Average | |
| 1 | Identification | 0,23 | 0,24 | 0,21 | 0,2 | 0,33 | 0,24 |
| 2 | URL | 0,22 | 0,22 | 0,21 | 0,2 | 0,29 | 0,23 |
| 3 | Supportability | 0,22 | 0,22 | 0,21 | 0,2 | 0,27 | 0,22 |
| 4 | Traffic | 0,18 | 0,17 | 0,19 | 0,2 | 0,23 | 0,19 |
| 5 | Interactivity | 0,16 | 0,15 | 0,18 | 0,2 | 0,18 | 0,17 |

The selected *top three* sub-criteria for reputation are identification(0,22), URL(0,21) and supportability(0,21). Besides, slightly *low weight* criteria were counted as traffic (0,19) and interactivity (0,17). In this manner, tables 2-7 help to determine the formation of highest and lowest values, the overlap, and gap, distribution and difference between the most and least important criteria generated by the respondents.

4. The Advantages And Disadvantages Of The Ranking Methods

It is not appropriate for ranking methods to elicit weights for a large number of criteria, because when the number of criteria increases, computing the weight of a criterion becomes very difficult. Malczewski (1999) pointed out that the lack of theoretical basis is another widespread problem for ranking approaches [11].

On the other hand, and perhaps more importantly, the great advantages of ranking techniques were found to be their less effort saving [25], useful in many areas, very simple to use individually or in group and allowance for decision makers to be vaguer. Another privilege is their capacity to use ordinal information about attribute importance, thus, they are less cognitively demanding and that respondents of our study are more likely to agree on ranks than on more precise weights as it was confirmed by [6,7], [16]. Moreover, based on findings of the earlier studies the use of ordinal ranking approaches is very effective in situations of time pressure, quality nature of criteria, lack of data and knowledge, the limited attention of decision maker and information processing capability.

5. Conclusions

The main objective of this paper was to prioritize criteria and sub-criteria of the WQEMUS effectively and make them explicit. Thus, the main challenge was how to determine the appropriate weights for each criterion. Accordingly, ranking methods to elicit criteria weights are presented in this study.

Basically, sub-criteria of the WQEMUS are grouped into five groups or top criteria and their number reaches from five to seven, each of which carries indicative weights. The calculated sub-criteria weights are normalized, that is the summation of their values is equal to the top criteria weights. Thereby, the sub-criteria are elements of their top criteria groups, which are demonstrated in Table 1.

This study as well as many other previous confirms the fact that the choice of methods has a considerable influence on the comparability of results of multiple-criteria decision-making methods and the criteria weights formed with different combination of weight elicitation methods have a significant impact on the final evaluation result of the analysis by increasing its reliability. Possible *combination* of methods not only generates much better weights and ensures more equitable preferences for the set of criteria but also makes uniformity in those methods. Therefore, based on these statements the identified weights for all criteria and sub-criteria of the WQEMUS through five ranking methods are considered reliable and by using the above-reported weights, the evaluator can implement the optimal scenario for evaluating sites.

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Simultaneous Freight Train Routing and Timetabling

The issues of freight train routing and timetabling fall into the class of the transport system operational tasks [1, 2]. “An important class of transport systems management tasks can be described in terms of a network” [1], with loading/unloading carried out in specific nodes

(rail yards) of this network. The network, as a rule, has a timetable of scheduled transport.

There are rigid constraints of track capacity and transportation, which makes routing and timetabling a complicated issue. The railway is an example of a transport system with fairly severe constraints, with its fixed seasonal schedule of passenger trains. According to the classification [3], the timetable of passenger rail transport refers to multi-period timetables and consists of subsets of periodically repeating action vectors. The article presents the findings on freight train routing and timetable integration in the timetable of passenger trains.

The developed test for passenger rail transport enabled us to carry out the validation of the proposed solutions. The railway network of the test (Fig. 1) includes all kinds of structures – network, spider web and main line fragments. The railway network has a number of rail yards located near junctions. In this paper we will not discuss moving the train from the yard to the nearest passenger station, so it is possible to combine the rail yards with nearby passenger stations. The “combined” rail yards are represented by circles of larger diameter than the circles of passenger stations. The timetables include a sequence of stations and hauls along the route, and the frequency of train departure. The test also considers daily routes as well as trains departing 1, 2, 3 or 4 times a week. Our research encompasses 100 stations, 128 hauls (of these 51 single-track), 100 routes, 471 train routes per week. In this test we used a special program to generate the weekly timetable of passenger trains in the network [4].

The freight train route is set by a list of rail yards pairs. Here we assume that there is non-stop movement of freight trains between rail yards. Routing for each pair of rail yards correlates with a route selection represented as a consistent set of intermediate depots in the network. Each starting rail yard in each pair is given a time range within which the train should depart from it.

In Figure 1 the arrows show three possible routes of a freight train between two rail yards. In this situation the software should select the route and departure time from the rail yard for the freight train.

We used special spiral diagrams to represent the timetables of train stops and hauls between them (Fig. 2) in which the spiral is a time axis, and its length equals the timetable interval. The marks on the spiral represent the train arrival and departure. The figure shows the optimized passenger transport timetable obtained by using special software for passing through the most loaded railway station in the test network [4], with a nearby rail yard. The presented timetable is a weekly one, and

each turn of the spiral sequentially demonstrates a daily timetable. The first inner turn is a timetable for Monday.

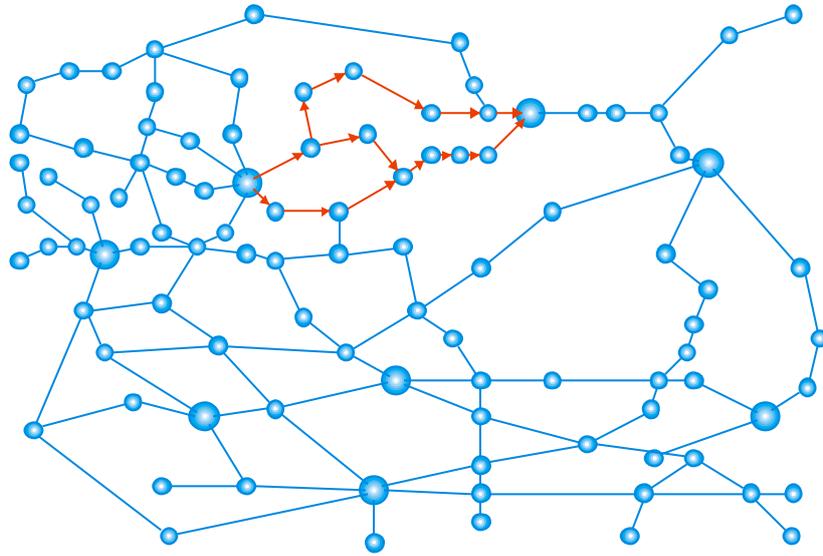


Fig. 1. The railway network of the test.

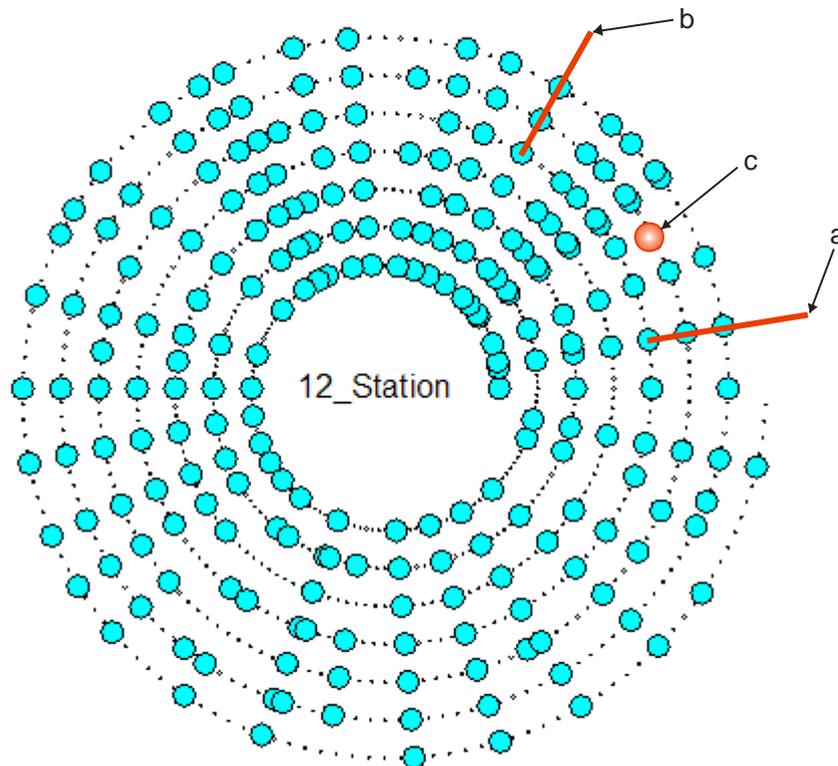


Fig. 2. Optimized station timetable: a, b – boundaries of the time interval of the freight train departure; c – the freight train departure time determined by the software Figure 3 shows the freight trains routing set by the software.

Figure 2 shows the time interval of the freight train departure from the first station. The problem of routing and timetabling is solved by ensuring even resource allocation of rail yards and hauls. This goal can be achieved by means of setting the equal intervals between train arrivals. The use of root-mean-square deviation from the mean interval to evaluate the uniformity of yards and hauls and the uniformity of criteria for the entire freight train route enable to select the departure time. For this purpose, let us define the uniformity criteria for all freight train departure times from the starting station within a predetermined interval with a spacing of 0.1 hour step. Then, using multi-vectorial ranking of uniformity criteria for all stations and hauls of three routes we determine the desired route and departure time. Figure 2 represents the freight train departure time obtained with the software.

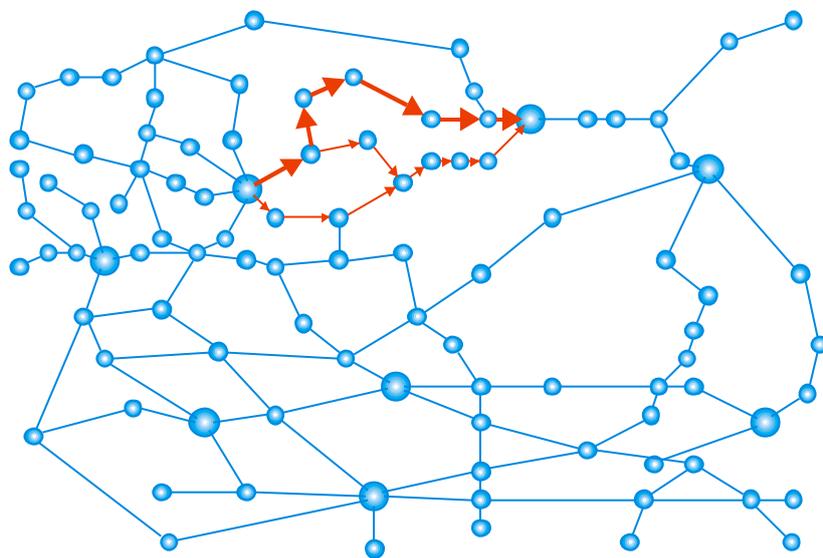


Fig. 3. The railway network with a selected route.

Solving the problem of freight trains routing and timetabling, from our perspective, has practical relevance only when these tasks are implemented as part of an integrated railway management system. In this case the input (passenger timetable) required for solving the problem will be right in the system, and will not be added separately as time intervals.

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SECTION III. Biological sciences

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AMPHIDIPOIDS - INTERSPECIFIS HYBRIDS FROM CROSSING NICOTIANA TABACUM LIN. WITH WILDLIFE SPECIES OF THE NICOTIANA GENUS

Genetics studying patterns of inheritance, variation and selection opens up new ways and mechanisms for linkages selection. All these laws are taken into account as two kinds of interaction carrying the continuity of generations that occur in nature. These are intraspecific and interspecific crosses, i.e. hybridization.

Interspecific hybridization is a crossing of forms of organisms belonging to different species, genera and species.

Interspecific hybridization in the genus *Nicotiana* was carried out by crossing cultural tobacco, maternal taken form the wild species of the genus *Nicotiana*, the representatives of *Suaveolentes* *Tomentosae* sections.

When using this method to create a new way for the genetic forms of the structure all the features were noted that were observed in the distant crosses in other species.

Interspecific hybridization occupied a significant place in tobacco breeding contributing to the creation of fundamentally new, valuable forms, as some signs of wild species of the genus *Nicotiana* can be used to improve the quality grades.

To create amphidiploids, in the sterile conditions of boxes, ovules with placenta flower buds of tobacco varieties Immune 580 580 taken as the maternal form - ♀ were denuded with special operating techniques and pollinated with pollen types - ♂ *N. rosulata*, *N. debneyi*, *N. amplexicaulis* collected from field anther conditions subsequently sterilized under UV lamp box beams. After pollination, the pollen of wild tobacco varieties halves placenta immune 580 Djubek 44 ovules were planted in test tubes on certain specialized culture media that stimulate the process of fertilization, growth and development of embryos.

The tubes were subsequently placed in special climatic chambers, where 2 days after planting in the culture medium with the placenta and ovules grew greener. When viewed through a magnifying glass revealed that pollen tubes wild species *Nicotiana* - pollinators boomed across its surface in tobacco varieties immune Djubek 580 and 44, but only a small number of them penetrated into the ovule. On the 8th day after pollination of the ovules, in which fertilization has occurred, markedly grown. On the 30th day of their seeds formed in the alleged. The number of unfertilized ovules in interspecific crosses under in vitro was not significantly dependent on the number of crossing combination. After pollination of *N. tabacum* ♀ ♂ pollinators - wild species *Suaveolentes* section, in the natural in vivo conditions in the greenhouse and the field seeds were not fastened.

The results obtained in in vitro culture conditions differed in their seed viability. None of the used growing medium for fertilization made the seeds to germinate. In further work with the seeds Murashige and Skoog medium were used for the formation of callus. In this environment of the resulting seed varieties with immune and 580 wild species *N. amplexicaulis* and *N. debneyi* 70-90 days formed callus after 2 direct on the medium used. Hybrid seed obtained by crossing grade immune x 580 *N. rosulata*, did not germinate on any medium, callus was also not obtained. Experimentally re-under in vitro conditions pollination of tobacco varieties Djubek 44 (♀) pollen wild species *N. rosulata* (♂) was conducted, hybrid seeds (10 pieces) were found in the placenta. Seed obtained from these callus on Murashige and Skoog medium from which by organogenesis and rooting seedlings 20 plants were grown in the potted culture.

In the hybrid combination *N. tabacum* (Immune 580) x *N. amplexicaulis* in tubes 10 seeds at a specialized medium sprouted, but they are poorly developed. Next seedlings obtained from callus tissue, by organogenesis 60 shoots were allocated from it, which formed the root 20 seedlings on medium White system for rooting and shoots from 80 hybrid combinations of immune x 580 *N. debneyi* 25 formed root system, the other part of the plants died due to poor root development.

Table 1. The results of in vitro pollination pollen ovules *N. tabacum* wild species *Nicotiana* genus for the fertilization process

| Hybrid combination | | Number | | | |
|--------------------------------|-------------------------|--------------------|------------------------------------|--------------------|--------------------------|
| Female parent ♀ | pollinator ♂ | pollinated ovaries | unfertilized ovules on the 8th day | ovaries with seeds | hybrid seeds on 30th day |
| <i>N. tabacum</i> (Immune 580) | <i>N. rosulata</i> | 126 | 0 | 0 | 0 |
| <i>N. tabacum</i> (Dubek 44) | <i>N. rosulata</i> | 132 | 520 | 60 | 141 |
| <i>N. tabacum</i> (Immune 580) | <i>N. amplexicaulis</i> | 35 | 174 | 17 | 153 |
| <i>N. tabacum</i> (Immune 580) | <i>N. debneyi</i> | 100 | 54 | 21 | 38 |
| <i>N. tabacum</i> (Dubek 44) | <i>N. debneyi</i> | 106 | 48 | 18 | 30 |

In potted culture under artificial climate chamber and specialized greenhouses adult plants were grown. Flowering reached 10 hybrid plants produced with the participation of *N. rosulata*, 15 - *N. amplexicaulis* and 20 of pollination *N. debneyi*.

Counting of chromosomes in somatic cell hybrids roots showed that the hybrid combination Immune x 580 *N. amplexicaulis* set of chromosomes is 42, i.e. *N. tabacum* haploid set of chromosomes ($n = 24$) and *N. amplexicaulis* ($n = 18$); combined immune x 580 *N. debneyi* - 48 chromosomes, i. e. content haploid sets *N. tabacum* ($n = 24$) and *N. debneyi* ($n = 24$); and in combination Djubek 44 x *N. rosulata* - 44 chromosomes. Chromosome set this combination consisted of haploid sets - chromosomes 24 and 20 chromosomes *N. tabacum* *N. rosulata*.

Thus, using in vitro under sterile conditions box receiving pollination ovules in the placenta tobacco pollen several wild species *Nicotiana* and placing them in a test tube with a nutrient medium in a climatic chamber were first obtained on plasma cultural tobacco - grade Immune 580 Djubek 44 interspecies hybrids: immune x 580 *N.*

amplexicaulis, immune x 580 N. debneyi; Djubek 44 x N. debneyi; Djubek 44 x N. rosulata. Repeated pollination of ovules of tobacco varieties - Jubilee 8, 287 American, Trapezond 219, Coker 288, Hicks rezistan pollen species N. rosulata, N. debneyi, N. amplexicaulis the in vivo and in vitro studies have not yielded positive results, the ovules are not growing, and they dry out and die.

Under natural conditions in vivo with the participation of the parent in crosses ♀ form - sort of tobacco Immune and 580 wild species *Nicotiana otophora* and *Nicotiana setchellii* received a small number of seeds (153 pcs with *N. otophora* and 203 pcs c *N. setchellii*..). Among them are grown in conditions in vivo by 25 hybrid plants are characterized morphologically capacity. In somatic cells, the roots of germinated seeds in the study found 36 chromosomes, i.e. haploid sets - chromosomes 24 *Nicotiana tabacum* and *Nicotiana otophora* 12 chromosomes or *Nicotiana setchellii*. From the data obtained revealed interspecific hybrid origin of seeds. Then we have been grown *N. tabacum* x *N. setchellii* from the seeds of plants of interspecific hybrids *N. tabacum* x *N. otophora*.

By using a variety of methods of culture in vivo and in vitro at interspecific hybridization of all five types obtained interspecific hybrids - in the form of maternal plasma *N. tabacum* ♀ c kinds of pollinators ♂ - *N. rosulata*, *N. debneyi*, *N. amplexicaulis*, *N. otophora*, *N. setchellii*.

In the field, it was planted hybrids by using tissue culture techniques (in vitro) and grown in pot culture in climatic chambers and in the greenhouse:

The variety of tobacco Immune x 580 *N. debneyi* (Ar 1);

The variety of tobacco Djubek 44 x *N. debneyi* (Ar 2);

The variety of tobacco Djubek 44 x *N. rosulata* (Ar 3);

The variety of tobacco Immune x 580 *N. amplexicaulis* (Ar 4).

Interspecific hybrids grown under conditions (in vivo) the greenhouse and the field of hybrid seeds of the following:

The variety of tobacco Immune x 580 *N. setchellii* (Ar 5);

The variety of tobacco Immune x 580 *N. otophora* (Ar 6).

The biological and morphological characteristics of hybrids were studied that were previously unknown. Hybrids were brought to flowering, were sterile, the flowers fell off and the seeds were not formed.

The sterile interspecific hybrids by pollinating ♂ *N. debneyi*, *N. rosulata*, *N. amplexicaulis* resulted in a culture in vitro, smaller in size in comparison with the standards - Immune varieties 580 (I580) and

Djubek 44 (D44). While hybrids by pollination *N. setchellii* and *N. otophora* grown in the field (in vivo) were at standart- parent varieties, the part of the established plants exceeded them in some morphological characters.

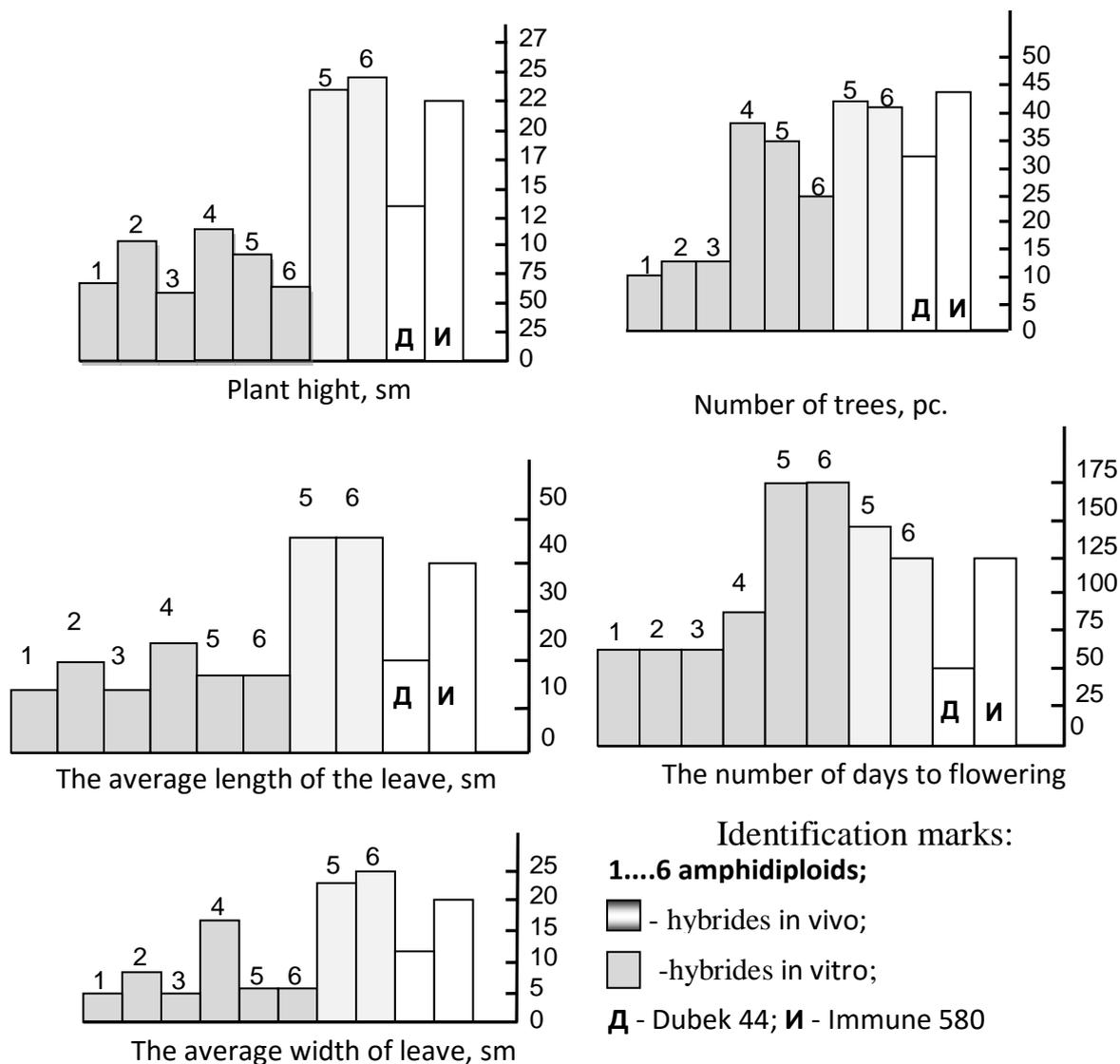


Fig. 1. Morphological features of interspecific hybrids - amphidiploids obtained in vitro and in vivo conditions

The results of studies on the morphological and biological features of hybrids with the chromosomal composition of species *Suaveolentes* Goodspeed section - *N. debneyi*, *N. rosulata*, *N. amplexicaulis* showed that plant height, number of leaves and their size in the hybrids average variation was noted, the growing season in these hybrids little changed. Hybrids with *N. setchellii* and *N. otophora* in a field characterized by a height of 250 sm and the number of sheets up to 45 pieces. The leaves

are large - length 45 cm, width 25 sm.

By growing season hybrids are divided into early-flowering - c *N. debneyi*, *N. rosulata*; srednetsvetuschie - with *N. amplexicaulis* and late- c *N. setchellii* and *N. otophora*.

According to other morphological features five types of hybrids are different.

Hybrids with *N. debneyi* dense leaves, sessile, oval, dark green, collected at the base of the stem; spreading inflorescence with small pink flowers, stamens shorter than the pistil; It appears at the end of the growing season a lot of side shoots.

Hybrids with *N. rosulata* leaves are not very dense, sessile, elliptic-oblong, green; spreading inflorescence with small pale pink and a small number of white flowers, the stamens are shorter than the pistils; a lot of side shoots at the end of the growing season.

Hybrids pollination *N. amplexicaulis* leaves are not very dense, sessile, oval, drooping, pale green with a bluish tinge; globular inflorescence, spreading, with small pale pink flowers, with stamens shorter than the pistils; a lot of side shoots at the end of the growing season.

Hybrids pollination species *N. setchellii* and *N. otophora* obtained in vivo, the leaves were dense, sessile, oval or ovate-oblong, dark-green, strongly drooping; spreading inflorescence with large pale carmine flowers, with stamens and pistil above the corolla hybrids with *N. otophora* and with large dark pink flowers, stamens and pistils on the pavilion level in hybrids with chromosome set *N. setchellii*.

The analysis of five types of interspecific hybrids created by morphological and biological signs, 2 groups allocated.

The first group of hybrids, characteristic *Suaveolentes* section, under the influence of pollinators of this section - early-flowering, plants, small height, small-leaved, with a spreading inflorescence, small, sterile flowers, stamens shorter than the pistil, that even without the study of pollen reveals the impossibility of passing the fertilization process.

The second group of hybrids, typical section *Tomentosae*, late-, plant tall, large-, multivalent, with large flowers on loose inflorescence, more consistent with cultural tobacco, which again could serve as probable evidence of origin of cultivated tobacco on the types *Tomentosae* section, and differed sharply on external featured by the first group of interspecific hybrids.

A common feature for the five types of hybrids was apogony, seeds were not obtained.

SECTION IV. Geographical sciences

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Cyclical Erosion. Internal and External Development Factors.

The study of cyclic natural processes is one of the most important areas of modern science.

In geographical and geological sciences the periods of high and low erosion activity are often related to the cyclical changes of the climate. Numerous research papers are devoted to the study of cycles in geomorphological systems development at different time scales. However, concluding on the increase of erosion activity over the specified time interval, we should at the same time consider the interrelated process of increasing accumulation.

In addition to the dynamics resulting from the climatic and tectonic processes, there is another side to this phenomenon, which is the cyclical nature driven by the internal self-development. In a situation when over a certain time interval all natural factors considered as reasons for changes in erosion activity do not demonstrate any significant changes, with a cyclical development taking place despite this, then it is possible to conclude on the internal self-development.

An important characteristic of the land erosion dynamics is its return to the state similar to the original, i.e. reciprocating landform development [1].

Erosion and accumulation create new landforms. However, the landform also influences the further dynamics of the process [2, 3]. The study of such linear erosion landforms as gullies was conducted by the author over different areas, in different geographical conditions: on the Central Russian Upland [4, 5] and the mountains of equatorial South America [6].

Definitely, characteristics of gully forms in different natural conditions vary in a number of ways. This primarily occurs due to various combinations of the prerequisites for water-erosion processes development. For example, long, steep slopes, typical of the equatorial Andes, lead to the formation of gully systems with a low number of such erosion forms as bottom gullies. However, the general laws of

cyclical development of erosion-accumulative processes work regardless of the geographical location of the linear erosion form.

Thus, we can define the general characteristics of cyclical self-development of erosion forms. Erosional downcutting leads not only to a cease of regressive erosion, but also to the stage of active accumulation. Further, as a rule, the same linear micro depressions develop the process of erosion activation. The newly formed erosions develop over the previous stages of gully deposits.

This process starts at relatively small changes in the external factors. In this case, climatic, tectonic and anthropogenic factors can be regarded as external ones to the internal cyclic self-development of gullies.

One can see this clearly when considering erosion forms in an extensive system of gullies. It should be noted that even a limited area can possess gully systems where different stages of self-development may be found.

However, the full cycle of a gully system appears to take first hundreds of years. At present, it is possible to study only a fragment of a full cycle. One of the objectives of this research area is to find methods which allow reconstructing the erosion landform for the time intervals measured in decades and centuries.

Transformation of such erosion forms as self-developing ravines, gullies and rain channels, occurring without major changes in climate or other factors, is a basic, qualitative characteristic of the process. Whereas the changes in the intensity of a self-development erosion cycle due to external factors can be seen as additional quantitative indicators. The study of the erosion landform evolution influenced by external factors should take into account the laws of self-development of geomorphological systems.

The measures for land erosion protection can be planned when one understands that the gullies not only stop their head growth, but are also filled with sediment till the negative landform completely disappears with no human intervention, after which they re-develop at the same place due to the cyclic self-development.

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SECTION V. Earth Science

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Development of ecological and protective geotechnology on the basis of ion-exchange sorption

Applying any scheme or technology of enrichment of precious metals, still it isn't possible to take a mineral completely without the rest, always his some part is lost with tails in the form of the recrushed joints with dead rock and gets to dumps. At the average content of gold in ore of 0,001% (10 g/t) more than 99,9% of the extracted rock [2] go to dump tails. It makes serious impact on surrounding environment, considering that according to 2015 in Transbaikalia 2,9 billion tons of waste of mining branch in dumps, tails of flotation and gravitational enrichment are saved already up. Now scientists and experts professionals are faced by a task: to develop such technology which would minimize quantity of waste and, as a result, I promoted decrease in anthropogenous impact on ecosystems.

For an assessment of opportunities when developing a way gold extraction process has been studied by the combined methods of ion-exchange sorption and cyanation. Results of research of process of transition of gold to solution at the different modes of processing have shown that it is expedient to carry out a extraction of metals from

solutions and pulps with the content of dispersed gold by method of two-phasic ion-exchange sorption for the purpose of increase of efficiency of decrease in accumulation of technogenic educations.

We have developed the elektrosorber for realization of this technology and extraction of precious metals from pulps containing the flowing case with the bottom, entrance and drain branch pipes the electrodes installed in the case and connected to a source of constant tension different from the available reactors [1] the fact that it is executed in the form of several sections located vertically the case of each section is executed in the form of two cylinders installed one in another and rigidly fastened among themselves, the internal cylinder is executed punched with a perforation cell size less than the size of granules of an ion-exchange sorbent, electrodes are installed in the external cylinder, at the same time the anode is established behind the cathode in the direction of a pulp, and the bottoms of each section are executed with an opening in the center of the internal cylinder and are supplied with the pipe connecting an opening to the external cylinder of the following section.

Electrodes are installed in the external cylinder, and the anode is installed behind the cathode in the direction of a pulp that provides decrease in the using-up impact on a protective anticorrosive surface of anodes. The potential difference created between cathodes and anodes was defined by concrete physical and chemical parameters of a pulp and the maintenance in her of an ionite and was sufficient for ensuring intensive course in an elektrosorber of electrochemical processes.

For office of a saturated ion-exchange sorbent and a conclusion of a pulp from section of an elektrosorber the internal cylinder with perforation is provided. The amount of perforation is chosen from a condition of free discharge of a pulp and separation of granules of a sorbent.

To an entrance in an elektrosorber the pulp passed on the slurry pipeline through the zavikhritel located in his expanded part before an entrance branch pipe, for additional crushing of mineral particles that allows to reduce wear of electrodes. Further the stream got to the external cylinder of an elektrosorber. Mixing up with a pulp at initial stages, the prepared ion-exchange sorbent in the form of CN^- , I interacted with a surface of the mineral particles which are in her extraction of metals the opened particles of gold and being sated with them. At the subsequent stages the pulp interacted with the ion-exchange sorbent prepared in shape OH^- where there was an additional recovery of cyanic complexes of gold and cyanides. After passing of a

closing stage of additional recovery of precious metals the ecological effect, at the expense of a interception of cyanides is reached.

The separation of granules of an ion-exchange sorbent from a pulp occurs at her passing through the punched surface of the internal cylinder. The pulp, after electroactivation and electrodeposition in the first section, freely passes through the punched surface of the internal cylinder of the first section in the subsequent through a branch pipe in the external cylinder of each following section and is finally brought out of the reactor through a drain branch pipe. Granules of an ion-exchange sorbent due to action of centrifugal force circulate in the reactor in space between internal and external cylinders and remain in him before saturation.

The pulp passes through section with a speed providing the set extent of extraction. In process of saturation, the ion-exchange sorbent is unloaded from the reactor and directed to the desorption which is carried out in the known way.

Additional recovery of gold from tails of enrichment was carried out for persistent ore of the Darasunsky field to Transbaikalia that has made 57,5 %.

Development of such technogenic educations promotes complex extraction of the accompanying minerals at the expense of what the profit of the enterprise which can be directed to ecological and protective actions increases. One of such actions - the recultivation including application of a fitoremediation for prevention of migration of chemical elements from technogenic educations. Though, of course, for increase of efficiency of additional recovery of elements, it is initially necessary to approach differentially warehousing of technogenic waste, increasing the maintenance of a useful component that is required for repeated processing of waste. Generally everywhere from such technogenic fields losses of disperse gold are observed, therefore, when developing new of ecological and protective geotechnology it is necessary to consider also this factor.

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SECTION VI. Medical sciences

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Development of technological scheme of obtaining bioactive peptides from milk proteins¹

Oncological diseases are currently a major public health problem in all developed and many developing countries and a major cause of death and disability in the population. The specific weight of oncologic pathology in the structure of causes of disability is 10%. The number of lost life years in active age as a result of tumor diseases is on average 7.5 for men, and for women is 10 years [2].

About one-third of cancer deaths are caused by 5 main risk factors that are associated with behavior and diet—such as high body mass index, insufficient consumption of fruits and vegetables, physical inactivity, tobacco use and alcohol consumption.

Nutrition is a very important component of human health and becomes even more significant if the person is sick. A patient with oncological disease has changes of metabolic processes in the body, and requires a special diet. In this regard, the development of functional food for nutritional support of cancer patients during rehabilitation is relevant [1].

One of the goals of nutritional support in cancer patients is the maintenance of visceral protein pool. In modern mixes for enteral support of cancer patients protein component can be represented in one of three types: native protein; peptides of serum/whole cow milk protein; amino acids [3].

The current data speak in favor of the fact that the peptide diet more effectively supports liver function and therefore helps the

¹ Work was performed within the Agreement No. 14.586.21.0002 from 17.09.2014 (unique identifier RFMEFI58614X0002).

synthesis of visceral proteins. It is known that the main route of peptides admission to the gut is through cellular absorption by the membranes of the villi or by molecules that transmit or diffuse through the lipid sites in membranes. In addition, it is noted that peptides have the ability to be absorbed, bypassing the villi of the intestine (including the defects of the mucous). Also the absorption of peptides does not require the enzymatic activity of the pancreas [4].

Production process of obtaining of biologically active peptides from milk proteins is carried out according to the scheme presented in figure 1, comprising the following operations: receiving, quality assessment, raw material preparation, introducing of phosphate, dissolution of the casein, adjusting pH to 7.5; pasteurization at a temperature of 74 ± 2 ° C with endurance of 15-20 with the aim of destroying microorganisms contained in the casein; cooling to a temperature of 37 ± 2 ° C, introduction of the enzyme systems including trypsin, chymotrypsin, and thermolysin.

The enzymatic hydrolysis is carried out at the following parameters: the temperature is 37 ± 2 ° C, duration is 8.00 ± 0.05 h, pH is 7.5 ± 0.1 h, and the enzyme-substrate ratio is 1:50. To avoid the development of foreign microflora and odor before the start of the fermentation process 05% of toluene is administered, which is then in the process of inactivation evaporates completely. For the purpose of inactivation of the enzyme complex and removal of pathogenic microorganisms, the resulting hydrolysate was heated to 95 ± 2 ° C for 30 sec.

Next, successive stages of extraction and purification of biologically active peptides by ultrafiltration, preparative electrophoresis and reverse-phase high-performance liquid chromatography are performing. At the first stage of purification the enzymatic hydrolysates of casein is subjected to ultrafiltration installation of the MFP-R-45-300 (Russia) using membranes with a pore diameter of 10 and 15 kDa at pH of 6.0-6.5.

The resulting material containing peptides and low molecular weight proteins with molecular weights of 10-12 kDa, is applied to the electrophoretic column (after adding to the sample urea concentration to 3 M) for separation of proteins by preparative electrophoresis.

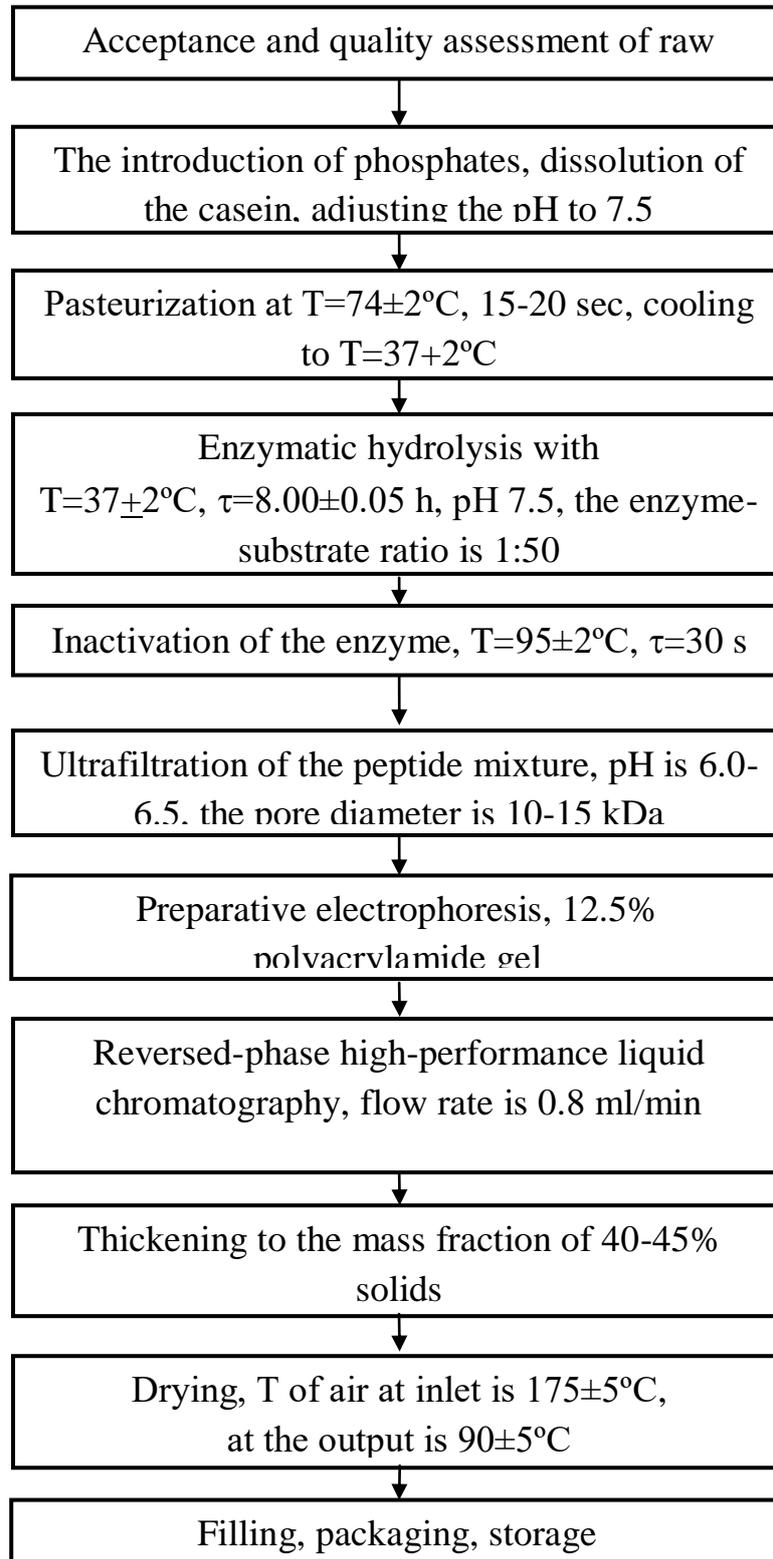


Figure 1 – The technological scheme of obtaining bioactive peptides from milk proteins

Preparative electrophoresis with continuous elution of proteins is carried out in a 12.5% polyacrylamide gel in an acidic buffer system in the presence of urea in the Bio-Rad (USA) cell chamber. Protein fractions, eluted from the column are analyzed by analytical electrophoresis in the presence of sodium dodecyl sulfate. Further, peptides, contained in protein fractions, are divided with a few consecutive cycles of reversed-phase high-performance liquid chromatography (reverse phase HPLC) on a LC-20 chromatograph (Shimadzu, Japan), eluting peptides in the concentration gradient of acetonitrile using different counterions, the flow rate is 0.8 ml/min.

To achieve the desired consistency of biologically active peptides they are thickened on vacuum evaporation up to a mass fraction of solids from 40 to 45%. With increasing mass fraction of solids to 50% the formation of poorly soluble agglomerates occurs. The final stage of the process is spray drying with air temperature at the inlet of 175 ± 5 °C, the output is 90 ± 5 °C.

The regularities of extraction of biologically active peptides from milk proteins received during the experimental researches, as well as creation of symbiotic consortia on the basis of representatives of normal microflora of the gastrointestinal tract formed the basis of the developed recipes and technological schemes of production of functional foods for the rehabilitation of cancer patients.

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**POST-RESECTION PROSTHESIS FOR A HALF UPPER JAW –
THE ROLE OF THE DENTAL TECHNICIAN
IN ELABORATION AND RENDERING OF HEALTH CARE
(A practical case)**

Summary: The most extensively studied group of defects from the beginning of the last century are those resulting from the treatment of benign and malignant tumors of the upper jaw. Functional disorders cover three main functions of the oral and nasal cavity - nutrition, breathing and speech. The study subject is A.M., 35 years old, with an established malignant neoplasm. Our objective was to render qualitative healthcare by working a functionally fit and esthetic post-resection prosthesis for a half upper jaw that will restore the affected functions and allow for patient's re-socialization. The prosthetic restoration went through two clinical stages, two laboratory stages and one surgical stage. During the laboratory stages, the technicians alone but yet guided by the maxillofacial surgeon, worked out a post-resection prosthesis for a half upper jaw. We can share that individual approach and knowing the problem in depth enabled the members of the team to work out a functional and aesthetically fit denture construction and thus, to render quality healthcare to the patient.

Keywords: tumour neoplasm, resection of half upper jaw, post-resection prosthesis, healthcare, a practical case

INTRODUCTION: There are four different methods to treat maxillofacial injuries: only orthopedic, combined (orthopedic treatment was preceded by surgical), only surgical, and only therapeutic treatment. The most common diseases that cause injuries in the maxilla-facial region involve the malignant and benign tumours, the cysts of dental origin, several articulations of the articular jaw, etc [2, 12].

The most extensively studied group of defects from the beginning of the last century are those resulting from the treatment of benign and malignant neoplasms of the upper jaw. The functional disorders cover three main functions of the oral and nasal cavity - nutrition, breathing and speech. The severity of those disorders depends on the localization and volume of the defect, on its combination with defects in the dentitions, on the communication between both cavities. Moreover, the normal esthetic type of the face is also affected. In a large part of the injured people, the whole complex of such somatic disorders causes development of a chronic depressive syndrome, and usually the recovery after that syndrome is achieved after a reliable prosthetic treatment [3, 6, 9,12].

According to M.A. and her publication (in 1951), the upper jaw neoplasms that were treated in Russian hospitals were 3.4 up to 6.4 per cent out of all patients, in Vienna – 1,4 per cent, in Sweden – 1.1 per cent, and in Switzerland – 2 per cent. The most affected age ranges between 30 and 60 years, and men were more often treated [3].

The more recent statistics showed that malignant neoplasms of the jaws are 6.6 per cent out of all neoplasms, and 60-70 per cent out of them was in the upper jaw. The establishment of an optimal treatment plan for prosthetic recovery should be based not only on deep knowledge about the specific case and of its comprehensive treatment but also on the good knowledge about the trends in the development of the methods and means for that recovery.

The global theory and practice form two main statements about the optimal approach for placing of dentures in resections of upper jaw – the statement of Claude Martin about immediate placement of prosthesis after the operation, and the statement of G. Hahl for subsequent placement of a denture [3,5,12].

The significant anatomic changes and functional disorders which occur after upper jaw operations with appearance of through defects require the earliest possible replacement of the post-operative defects with prosthetic means. The main attention of the patient is directed to the abrupt disorder of swallowing and speech, independent of the difficult chewing. This imposes the main care to divide the nasal and

oral cavities. The support, stability and retention of the post-resection prosthesis are especially important for its functional and esthetic sufficiency. Achieving them affects also the bone absorption to an optimum degree. The support, retention and stability of the post-resection prosthesis are damaged proportionally to the size and volume of the occurred defect. The use of skilled modification of different types of clasps, bumpers along with the use of contemporary attachments can reach results that satisfy the condition of the defect [3].

Implantation in the upper jaw is very difficult that is why the application of the post-resection prosthesis in this case sometimes appears to be the only possible method [7,12].

The dental technician works alone in an independent medical and technical laboratory but works out the denture designs under the direction of the dental physician. In this capacity, the dental technician is a member of the dental team.

The team formation is done by its members. Each participant has specific activities which makes them irreplaceable. The close cooperation among them is a base for good knowledge and satisfaction of the customers. The successful teamwork is not based only on the mutual consent to work together. According to Varneva and authors who quoted her (Borisov, Toncheva, Shipkovenska, Jolleys), they pointed out that knowing and respecting the role of the other members of the team creates a different approach besides the traditional approach in their mutual relationships. The differences in the statute of the health team members and the generally acknowledged importance of any of the participants reflect on the multi-disciplinary team, on the group taking of decisions and work effectiveness [1,8,10, 11].

The complete care about the patient and the complete impression kept by the patient after the treatment depend not only on the dentist, but also on the work and participation of any of the team members [4,11]. The work of the dental technicians is especially important during restoration of defects of the dental crowns and dentitions. The expertise and skills of the dental technician facilitate both their work and improve the final product. This allows providing quality health care to the patient.

Objective: To render quality health care through working out a functionally fit and esthetic post-resection denture design which provides the patient with the opportunity to improve their speech, nutrition, breathing, consumption of liquids and successful re-socialization.

Material and Methods: To fulfill the objective, we formed a multi-disciplinary team. The manager of the team who carried out the prosthetic restoration is Assoc. Prof., PhD, Dr. Tsvetan Tonchev – Dean of the Dental medicine faculty at the Medical University – Varna and the maxillofacial surgeon who carried out the operative intervention. The members of the team for prosthetic recovery included: Assoc. Prof., PhD M. Varneva – lecturer in orthodontics and maxillofacial prosthetics, M. Milev – lecturer who carries out practical training in denture technologies and A. Atanasova – lecturer who carries out practical training in orthodontics and maxillofacial prosthetics at the Medical College within the structure of the Medical University – Varna.

Subject of the examination is the patient A. M., 35 y.o. male.

The treatment of the patient passed through four stages:

I stage – collection of an impression

II stage – formation of a multi-disciplinary team before the surgical intervention. Consideration of the case and directions by the surgeon to the members of the team for elaboration of the post-resection prosthesis.

III stage – working out of a post-resection prosthesis for one half of the upper jaw.

IV stage – surgical treatment and placement of the ready post-resection

prosthesis by the Assoc. Prof. Dr. Tsv. Tonchev.

The elaboration of the post-resection prosthesis during the III stage passed through four stages – two clinical and two laboratory stages.

I clinical stage – meeting of Assoc. Prof. Dr. Donchev with the patient and collection of impressions from the upper and lower jaw that were sent to the dental laboratory.

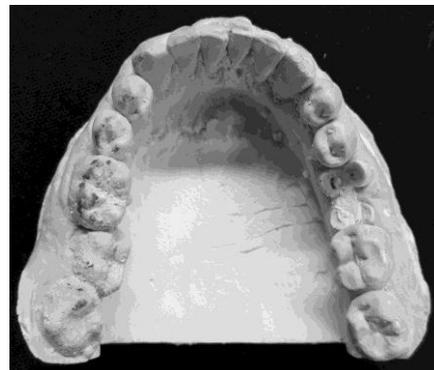
I laboratory stage – casting of tentative and working patterns of hard gypsum.

II clinical stage – meeting of the multi-disciplinary team aimed at consideration of the case – specification of the attachments of the partial denture and the margins of resection.

II laboratory stage:

- Cutting out of the teeth and formation of an edentulous alveolar arch;
- Fixation of the patterns in an occluder according to registration data of the patient;
- Bending of retaining clasps;
- Working out of a pattern from shellac plaque and wax biting edge;
- Fixation of the bent clasps on the pattern;
- Arrangement of artificial teeth;

- Packing in a cuvette;
- Filing and cleaning of the shellac plaque and the wax;
- Isolation of the gypsum surface with an isolator for gypsum/plastics;
- Replacement with plastics;
- Polymerization;
- Release from the cuvette;
- Cleaning and polishing of the ready partial denture;
- Preparation of a working pattern for elaboration of the replacing part; following the borders specified by the surgeon;
- Elaboration of a hollow replacing part and its fixation to the partial denture.



Photos 1 and 2. Working patterns of hard gypsum – before the surgical intervention with outlined margins for resection for the upper model

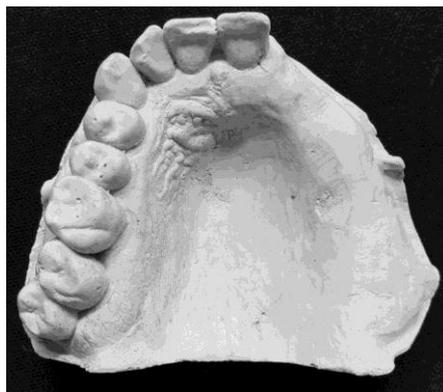


Photo 3. Prepared upper pattern for elaboration of the partial denture



Photo 4. Partial denture worked out for a half upper jaw

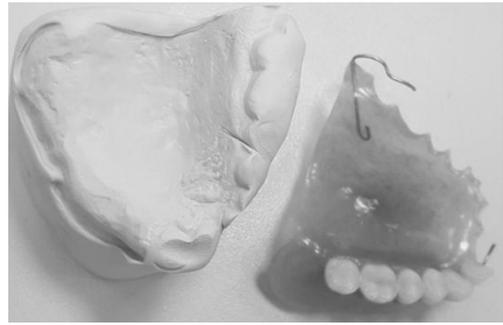


Photo 5. Prepared working pattern made from laboratory silicone (95 Shore class A) for elaboration of the replacing part of the post-resection prosthesis

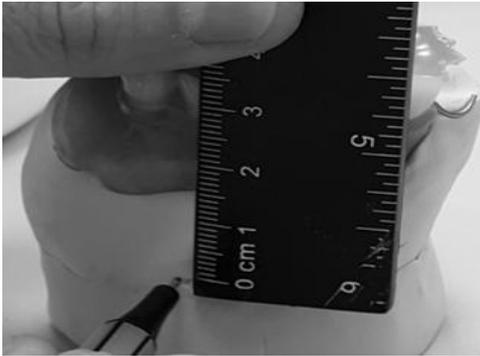
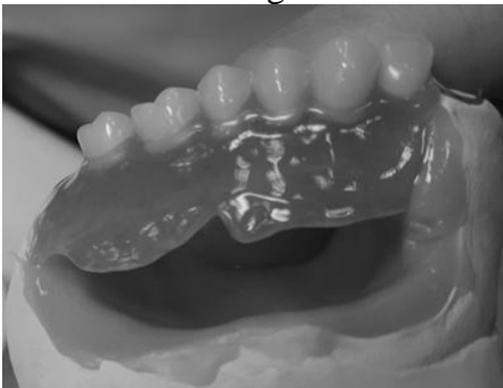


Photo 6. Determination and delineation of the margins of the replacing part under the directions of the surgeon



Photo 7. Cut out and formed margins and depth of the replacing part. Preparation to apply plastics on the pattern



Photos 8 and 9. Stages of working out of the hollow replacing part of the post-resection prosthesis



Photo 10. Post- resection prosthesis worked out for half upper jaw

I surgical stage – rejection of half of the upper jaw and adjustment of the ready post-resection prosthesis.

Results and consideration: The reported and available reference sources specified that the post-resection prostheses are made in two or one laboratory stage. The elaboration can begin before or after the surgical intervention for excision of the tumour neoplasm. The replacing part is made out after healing of the surgical field when the collection of a correct impression from the defect is possible. The ready partial denture can be used as an individual impression tray. To make the replacing part and connect it with the partial denture, we need to cast a working pattern according to the impression collected from the defect. Due to the size of the defect, the replacing part needs to be done hollow so as to make the post-resection prosthesis lighter and for better establishment in the oral cavity.

In the practical case described by us herein, the partial denture and its replacing part were prepared in two laboratory stages but before the surgical intervention. The working pattern for elaboration of the replacing part was formed and cut out by the dental technique team under the directions of the surgeon. For attachments we bent a single-arm clasp at 11 and a single-arm clasp with an extended arm for 28 and 27. The existing dentition is a decisive factor for selection of the clasps. After elaboration of the partial denture, we made out a model of laboratory silicone (95 Shore class A). There, following the directions of the maxillofacial surgeon, we formed the defect upon which a hollow replacing part of plastics is made. The attached plastics was directly connected to the partial denture

The ready post-resection prosthesis was appropriately packed and handed over to the patient on the day before the operation. He was

instructed by the team members about the careful carrying and storage until its handing over to the surgeon.

The patient, being apparently worried because of the forthcoming surgical intervention, showed his gratitude to the team members.

The prosthesis was placed in the mouth immediately after the resection of half of the upper jaw. The surgeon shared that the denture design lies well and is well kept in the oral cavity.

To sum up, we can share that the knowledge of the problem and the individual approach to the problem allowed the multi-disciplinary team to work out a functionally fit and esthetic post-resection denture design for half upper jaw.

Thanks to the expertise and skills of the team members who made out the post-resection prosthesis, we managed to provide quality health care to the patient. We confirmed the established fact that the work of the dental technicians is of special importance within the system of the dental treatment.

The patient shared his experienced feeling of gratitude to the members of the multi-disciplinary team for the treatment and for their professionalism.

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SECTION VII. Agricultural science

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Influence of agroclimatic factors on beetroot yield in Western Siberia

Introduction. Over many decades, vegetable farms in Western Siberia got relatively poor yields of the beetroot. The yield of Bordo 237 variety averaged 8.1-19.0 ton/ha. Due to economic instability and the European Union economic sanctions, such yields cannot solve the problem of supplying the vegetable market with the country’s own products. Over the last decade the situation in the vegetable industry has improved due to the most advanced farms of the region, and the beetroot yield has slightly increased, reaching as much as 26 ton/ha; however, even higher figures are possible.

To enhance the crop capacity of the beetroot it is necessary to consider a certain optimal complex of natural factors that will

significantly increase its yield.

Over the 20 years from 1995 to 2015, we had been investigating this problem carefully. In this research we set the following goal: to establish a certain optimal complex of natural factors and define the agroclimatic potential of the beetroot yield.

Natural and climatic conditions of Western Siberia are unpredictable. Inability to clearly determine the length of the growing season as well as sharp temperature fluctuations occurring over this time lead to unpredictable results. Addressing this issue, it is equally important to consider the quality of soil resources. Only knowing all of these details one can determine the agroclimatic potential of the beetroot yield.

Findings and discussion. The study of plants development based on consideration of climatic and weather conditions and cultivation methods provides a significant amount data for understanding the biological characteristics of the studied organisms. It is no coincidence that the basis for Charles Darwin's studies was formed by observation of plants and animals development in different conditions [7]. A classic example of research in horticulture is the studies by academician D.D. Brezhnev which consider tomato growing [2].

In view of this, we believed it viable to examine how the following factors change: the development pace of the external parameters of the beetroot plants and the seeds ability to germinate, depending on the complex of natural factors.

In the regional centers of Western Siberia the sum variation of effective temperatures ($>10^{\circ}\text{C}$) for long-term data on average ranges from 400° to 2600° . This is an important indicator for the beetroot cultivation, since it is a semi-hardy vegetable and grows at a temperature greater than 10°C . At the beginning of the growing season, when the temperature can drop below 10°C , the growth and development slow down, while the percentage of flowering plants increases.

With the effective temperature sum of 400° it is possible to obtain herbage yielding of only 0.6 ton/ha (Figure 1). At the greatest sum (2600°), in the Barnaul area the yield of beetroot can reach up to 47.7 ton/ha (Table 1).

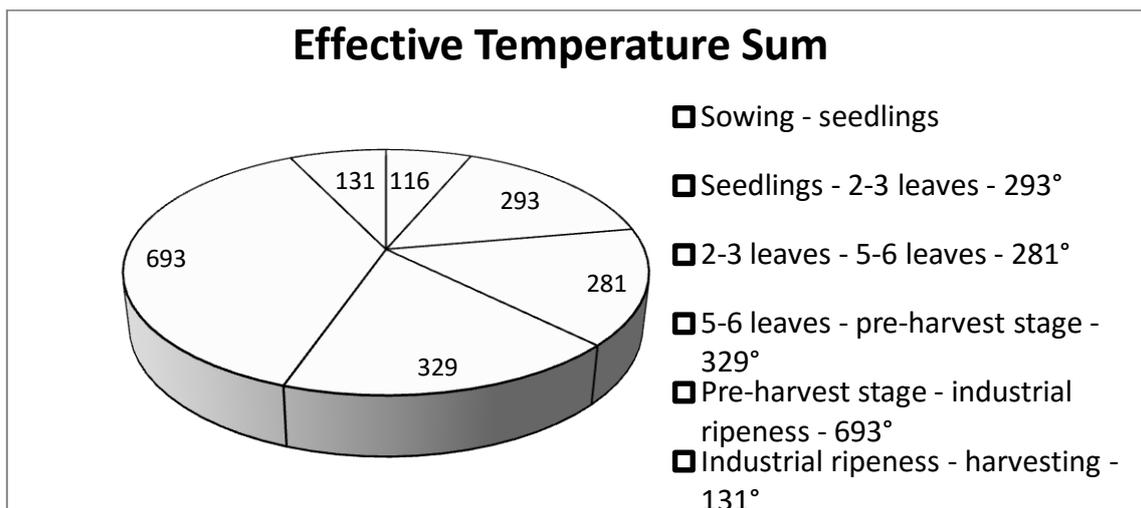


Fig. 1. The required sum of effective temperatures in the interstage periods of the beetroot Bordo 237 development.

Table 1. Potential yield of the beetroot Bordo 237 variety in the regions of Western Siberia.

| Regions | Estimated crop yield, ton/ha | | Potential yield from the proposed technology [3], ton/ha | |
|--|------------------------------|-------------------|--|-------------------|
| | Depleted soil | Average fertility | Depleted soil | Average fertility |
| Altai Territory (Barnaul) | 23.2 | 33.6 | 26.3 | 47.7 |
| Kemerovo region (Kemerovo) | 20.4 | 29.5 | 23.1 | 41.9 |
| Novosibirsk region (Novosibirsk) | 22.2 | 32.1 | 25.1 | 45.5 |
| Omsk region (Omsk) | 22.0 | 31.8 | 24.9 | 45.1 |
| Tomsk region (Tomsk) | 17.9 | 25.7 | 20.3 | 36.7 |
| Tyumen region (Tyumen) | 18.8 | 27.2 | 21.3 | 38.6 |
| Khanty-Mansiysk Autonomous Okrug (Khanty-Mansiysk) | 17.7 | 25.7 | 20.1 | 36.4 |
| Yamalo-Nenetsky Autonomous Okrug (Salekhard) * | 3.9 | 5.7 | 4.4 | 8.1 |

Symbol * refers to the potential root crops yield per plant with the effective temperature sum of 914° (2007).

The analysis of the data presented on the chart demonstrates the required sum of effective temperatures in the interstage periods for the optimal development of the beetroot and the yield of standard root crops. In this regard, the temperature sum required in the period from sowing to the 2-3 leaf formation is 409°.

The following table demonstrates the data on the estimated yield of the beetroot in two types of soil. Depleted soils are mainly represented by light gray and podzolic soils. Their yield varies from 3.9 to 47.7 ton/ha, depending on the region and soil fertility. Columns 4 and 5 represent the data of the potential yield with the application of the technology which we developed as early as the 1990s. When calculating the potential yield of beetroot crops, it is possible to obtain the figures presented in the table with the use of the seeds reproduced in Western Siberia. Thus, our developments can be applied in the local seed reproduction of the beetroot [4, 5].

In order to calculate the estimated yield, we used the formula developed by us. According to these formulas, knowing the average efficient temperature sum, one can calculate the yield of the beetroot in any region of Western Siberia [6].

In addition to that, to determine the beetroot yield depending on the length of the growing season, in 2013 we started a special micro experiment on the experimental plot with application of suitable techniques [Dospekhov, 1985] and [Belik, 1970]. The area of experimental plots was 1 m², repeated fourfold.

Exploring the impact of the beetroot harvest time enables us not only to establish the optimal period and scale of crop losses which may occur if this work is not done over that most suitable period, but also find out optimal or extreme conditions of the environment for plants at different stages of development. A more in-depth research in this area will allow us to develop techniques which can be used to assess the meteorological factors in various regions and to determine whether these areas are suitable for beetroot growing or not. We have been doing this research for three years.

Conducting the biometric measurements, we studied the dynamics of plants height, number of leaves, length and width of the leaf blade. These allowed us to determine certain differences according to the variants. In the last variant all indicators demonstrated some decline caused by the natural withering of old leaves which were stronger than those appearing later.

The data about the parameters of root crops depending on the harvest date indicate a gradual increase in the diameter of the root, especially during the period from 31 July to 10 August.

The main indicators of the micro experiment are shown in Table 2.

Table 2. Beetroot crop yield depending on the growing season length.

| Harvest date | Yield per plot, kg. | | Daily gain from 1 m ² , gr. | | Effective temperature sum, ° | Temperatures total, ° | Daily gain of a root, gr. | |
|--------------|---------------------|--------------|--|--------------|------------------------------|-----------------------|---------------------------|--------------|
| | with tops | without tops | with tops | without tops | | | with tops | without tops |
| 1 July | 0.608 | - | 21.72 | - | 532.1 | 547.5 | 0.776 | - |
| 10 July | 1.953 | 0.419 | 147.43 | 41.86 | 731.6 | 729.0 | 5.337 | 1.495 |
| 20 July | 3.568 | 1.020 | 161.48 | 60.13 | 813.7 | 847.6 | 5.767 | 2.148 |
| 31 July | 4.041 | 1.256 | 42.97 | 21.50 | 963.6 | 997.5 | 1.535 | 0.768 |
| 10 August | 7.618 | 3.272 | 357.70 | 201.56 | 1161.6 | 1195.5 | 12.775 | 7.198 |
| 20 August | 9.055 | 4.142 | 143.76 | 87.04 | 1339.6 | 1373.5 | 5.134 | 3.108 |
| 31 August | 11.452 | 4.697 | 217.86 | 50.39 | 1513.1 | 1556.0 | 7.781 | 1.800 |
| 10 September | 11.822 | 5.648 | 37.04 | 95.14 | 1573.8 | 1650.7 | 1.323 | 3.398 |
| 20 September | 11.735 | 6.359 | - 8.69 | 71.11 | 1605.8 | 1712.9 | - 0.869 | 2.540 |
| 30 September | 14.010 | 7.700 | 227.48 | 134.08 | 1650.1 | 1794.9 | 8.749 | 5.157 |

The table data illustrate how the beetroot yield indicators change depending on the length of the growing season and the temperature sums over the periods of 10-11 days.

Soil moisture is one of the most important indicators when determining the yield potential. Identifying the soil moisture by thermostatic-weight method is relatively simple. When the moisture level is less than 12% it is necessary to start irrigation. Optimal figures for the beetroot growth are 18-22%. In case of a drought, Western Siberia farms may lose up to 50% of the crop, and even more.

Another equally significant factor is photosynthetically active radiation (PAR) and the amount of sunshine calculated in hours. When calculating the area of the leaf blade of growing plants at the pre-harvest stage, we found that the formation and gain of the root are directly dependent on this indicator, and the greater the area of plants leaves of a particular variety, the higher is the yield; however, later this correlation cannot be traced (Table 3).

Table 3. Average data of the root and leaf area measurements of the beetroot, depending on the harvest dates, the period of 2013-2015.

| Variants | Yield per plot, kg. | | Root diameter, cm | Root mass to leaf mass ration | Leaf area thousand m ² /ha. |
|--------------|---------------------|--------------|-------------------|-------------------------------|--|
| | with tops | without tops | | | |
| 1 July | 0.608 | - | 1.8 | - | 10.1 |
| 10 July | 1.953 | 0.419 | 2.8 | 0.27 | 25.4 |
| 20 July | 3.568 | 1.020 | 4.3 | 0.40 | 42.2 |
| 31 July | 4.041 | 1.256 | 4.4 | 0.45 | 46.2 |
| 10 August | 7.618 | 3.272 | 6.1 | 0.75 | 72.1 |
| 20 August | 9.055 | 4.142 | 6.5 | 0.84 | 81.5 |
| 31 August | 11.452 | 4.697 | 6.9 | 0.70 | 112.0 |
| 10 September | 11.822 | 5.648 | 7.6 | 0.91 | 102.4 |
| 20 September | 11.735 | 6.359 | 8.1 | 1.18 | 89.2 |
| 30 September | 14.010 | 7.700 | 8.4 | 1.22 | 104.6 |
| HCP0.05 | | 0.62 | 0.9 | | |

The most interesting results are presented in columns 5 and 6 of the table. Depending on the length of the growing season, there is a pattern of increasing the ratio of the root and leaf mass, except for the variant when the harvest date fell on 31 August. During this period, there is a sharp increase in the leaf mass and area (112 thousand m²/ha). In fact, the data in the last column are quite predictable. First, there is an increase in this indicator before the end of summer, and later in autumn there is a significant outflow of organic substances from the leaves to the roots parallel to withering of the lower leaves. The obtained results were processed by mathematical methods which confirmed reliability of the experiment.

Conclusion. The findings of the research carried out by us allowed making the following conclusions:

1. To increase the beetroot yield it is necessary to take into account a certain optimum complex of natural factors that will significantly improve its capacity.
2. When the effective temperature sum equals 400°, it is possible to obtain only green mass yield – 0.6 ton/ha, while at the highest temperature, the beetroot yield in the Barnaul region can reach up to 47.7 ton/ha.
3. The estimated yield can be established by means of the formulas proposed by us, when knowing the average effective temperature sum

one can calculate the yield of the beetroot in any territory of Western Siberia.

4. The optimum soil moisture figures for the beetroot growth are 18-22%. With moisture level less than 12% it is necessary to start irrigation.

5. When calculating the leaf area, we have established a pattern, according to which the root formation and its gain are directly dependent on this indicator before the pre-harvest stage, when a bundle is formed. However, in the future, this pattern does not work.

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PROTEIN COMPOSITION AND ENZYME SPECTRUM SERUM BLOOD OF THE COARSE-WOOLED FAT-TAILED SHEEP OF DIFFERENT GENOTYPES

Biochemical studies in animal breeding are of great theoretical and practical importance and they currently occupy attention of many stock-breeders. In the recent years due to application of new effective research methods such as isotope technique, ultracentrifugation, ultraphoresis, adsorption chromatography, isoelectric focusing and more major advances in the study of morphological composition of animal blood have been made. These interior indexes may play the key role of genetic markers in early prediction of productive abilities of animals thus considerably accelerating the process of selection.

Blood as the internal milieu, constantly contacting all the organs and tissues, reflects in its composition and physicochemical properties the changes that occur in an organism during its life-sustaining activity. Blood biochemistry analysis gives an idea of biological peculiarities of animals, changes of their physiological state at different stages of ontogenesis, the resistance of an organism and the metabolic rate. Consequently, thorough study of the essence and mechanism of processes, occurring in the organism, opens up new possible approaches to any problem connected with improvement of productive and breeding qualities.

The subjects of the research were sheeps of different age-sex groups of Zhanaarka type of the Saryarka breed and their crossbreeds, breeding in "Zhenis" pedigree farm, situated in Karaganda region. The biochemistry analyses of blood serum values of experimental sheep were carried out in the scientific-diagnostic laboratory of the Kazakhstan-Japan Innovation Centre of Kazakh National Agrarian University.

The research using the method of polyacrylamide gel electrophoresis resulted in obtaining the evaluation of the level of quantitative relation of protein fractions, showing the disorders of protein metabolism in the body. The crude protein consists of the mixture of proteins with different composition and functions.

Fractionation is based on the different mobility of proteins under the effect of electric field.

The proteinogram displays 20-25 fractions which were divided into 10 zones: prealbumin (PreAlb); albumin (Alb); fast (PostAlb₁) and slow (PostAlb₂) postalbumins; transferrin (Tf); post-transferrin (PostTf); ceruloplasmin (Cp); beta₂-globulin (β₂-G1); gamma-globulin (γ-G1) and beta-lipoprotein (β-Lp):

KGAKK – Akkarabas type of Kazakh coarse-wooled fat-tailed sheep breed;
SGK-Zh – Zhanaarka type Saryarka coarse-wooled fat-tailed sheep breed.

Table 1 – Protein fractions of blood serum of sheeps of different genotypes

| Sex | Groups | Crude protein, g/L | Zones of protein fractions, % | | | | | | | | | |
|-----------|-----------------------|--------------------|-------------------------------|-------------------|-----------------------|-----------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|
| | | | Pre Alb | Alb | Post Alb ₁ | Post Alb ₂ | Tf | Post Tf | Cp | β ₂ G1 | γ G1 | β Lp |
| Rams | KGAKK | 100,7 ± 2,14 | 6,2 ± 0,20 | 45,0 ± 0,16 | 4,5 ± 0,12 | 4,3 ± 0,09 | 5,8 ± 0,35 | 4,0 ± 0,31 | 6,3 ± 0,15 | 8,4 ± 0,17 | 10,0 ± 0,19 | 5,5 ± 0,12 |
| | SGK-Zh | 82,9 ± 1,81 | 6,6 ± 0,12 | 43,8 ± 0,24 | 4,0 ± 0,15 | 5,4 ± 0,11 | 5,0 ± 0,17 | 4,9 ± 0,08 | 5,5 ± 0,10 | 8,6 ± 0,23 | 9,9 ± 0,27 | 6,2 ± 0,08 |
| Ewes | SGK-Zh | 69,5 ± 1,03 | 5,9 ± 0,26 | 34,3 ± 1,41 | 7,7 ± 0,22 | 6,3 ± 0,20 | 9,2 ± 0,41 | 4,4 ± 0,23 | 10,0 ± 0,58 | 9,1 ± 0,22 | 5,3 ± 0,76 | 7,8 ± 0,23 |
| Ram lambs | SGK-Zh x KGAKK | 76,1 ± 7,87 | 5,7 ± 0,11 | 39,9 ± 0,45 | 7,0 ± 0,24 | 9,0 ± 0,06 | 6,8 ± 0,34 | 5,0 ± 0,16 | 6,9 ± 0,23 | 5,5 ± 0,26 | 8,6 ± 0,14 | 5,7 ± 0,52 |
| | SGK-Zh x SGK-Zh | 70,0 ± 8,15 | 6,5 ± 0,23 | 38,6 ± 0,22 | 8,5 ± 0,21 | 7,7 ± 0,12 | 6,4 ± 0,56 | 5,8 ± 0,71 | 6,3 ± 0,09 | 5,0 ± 0,13 | 8,6 ± 0,11 | 6,4 ± 0,09 |
| | SGK-Zh x KGAKK | 64,3 ± 6,68 | 6,2 ± 0,37 | 35,6 ± 0,54 | 6,9 ± 0,17 | 8,8 ± 0,61 | 8,4 ± 0,29 | 4,9 ± 0,22 | 9,1 ± 0,04 | 6,0 ± 0,11 | 5,7 ± 0,19 | 8,5 ± 0,21 |
| | SGK-Zh x SGK-Zh | 68,5 ± 7,04 | 7,8 ± 0,22 | 34,5 ± 0,38 | 8,6 ± 0,33 | 10,9 ± 0,20 | 8,7 ± 0,02 | 6,8 ± 0,37 | 9,4 ± 0,18 | 5,5 ± 0,46 | – | 7,8 ± 0,17 |

The concentration of crude protein in blood of Akkarabas stud rams is 17.8 g/L or 21.5% more than its concentration in blood of Zhanaarka rams. Inconsiderable preponderance trend is observed in the offspring as well. The crude protein indexes of mongrel ram lambs are 6.1 g/L or 8.7% more than those of pure-bred ram lambs; in ewe lambs, on the opposite, the indexes are 4.2 g/L or 6.5% less. Sharp increase of crude protein coincides with the intensive growth period together with protein metabolism, which is typical for the property of earliness.

The data of protein spectrum of serum proteins show that the sheep under research have peculiarities depending on sex, age and

genotype. The least concentration of Tf, Cp, β_2 -G1 and β -Lp is found in rams while ewes' fractions, on the opposite, are greater. It appears that such peculiarity of ewes and ewe lambs is explained by milk synthesis in their body [1, p. 718] since all of its components forming biocomplexes transfer with β -Lp at the elevated concentration of Tf.

The level of Alb and γ -G1 protein fractions estimates the extent of adjustment and economic value of animals. Consequently, stud rams, chosen for breeding out of high-grade animals of preferred type, put their genetic potential into great effect in the context of their breeding zone.

With the growth and development of young stock of different genotypes change of protein fractions takes place. The electrophoregram shows only 9 fractions in pure-bred ewe lambs, i.e. without γ -G1, while their mongrel herdmates have all the fractions. The elevated level of PostAlb, Cp and Tf in ram lambs and ewe lambs indicates the intensity of reconstruction processes in their body which considerably depend on the synthesis of ATP, i.e. on the growing capacity [2, p. 305].

Among the markers or tests, besides the blood-group systems and polymorphic types of proteins, there are blood serum enzymes – aspartate (AST) and alanine aminotransferase (ALT), catalyzing transamination processes which act as the interlink of transmutation of proteins, fats and carbohydrates, and also alkaline phosphatase (ALP), creatine phosphokinase (CPK) and lactate dehydrogenase (LDH), which are important in the process of metabolism:

Table 2 – Activity of blood serum enzymes of sheep of different genotypes

| Sex | Groups | Enzymes, u/l | | | | |
|-----------|-----------------------|--------------|-------------|-----------|-------------|-------------|
| | | ALP | AST | ALT | CPK | LDH |
| Rams | KGAKK | 144,8±12,04 | 110,0±11,43 | 28,3±1,17 | 113,6±8,21 | 524,1±37,25 |
| | SGK-Zh | 109,5±9,31 | 105,4±7,52 | 28,0±0,33 | 122,9±15,13 | 450,8±24,17 |
| Ewes | SGK-Zh | 96,3±10,09 | 120,7±10,15 | 40,8±1,26 | 100,5±13,77 | 492,7±45,32 |
| Ram lambs | SGK-Zh x KGAKK | 87,0±8,26 | 98,1±6,26 | 16,4±0,11 | 213,5±11,09 | 361,0±30,18 |
| | SGK-Zh x SGK-Zh | 92,6±10,52 | 89,5±5,18 | 18,9±0,20 | 144,0±10,26 | 453,2±29,03 |
| Ewe lambs | SGK-Zh x KGAKK | 75,2±12,17 | 108,3±9,42 | 29,1±1,39 | 188,8±13,24 | 475,8±37,22 |
| | SGK-Zh x SGK-Zh | 69,4±8,09 | 107,2±17,60 | 30,6±0,44 | 202,7±24,31 | 462,5±48,09 |

According to our data the activity of enzyme ALP (EC №3.1.3.1) in the presence of pH medium in the blood serum of the sheep under test fluctuates within the limits (69.4-144.8 u/l) but in spite of this the level of concentration in all the groups is within normal limits (27-156 u/l).

The function of aminotransferases AST (EC №2.6.1.1) and ALT (EC №2.6.1.2) is the synthesis of alanine, aspartic and glutamic acids from carbohydrates and fats by reaction of transamination. It is estimated that the level of transaminase concentration in the blood serum of ewes is higher than in rams. Consequently, for the synthesis of colostrum and milk proteins ewes need additional “metabolic pool” [3, p. 270], i.e. amino acids. And for intensification of synthesis of amino acids from nonprotein substances overactivity of transaminases is required.

The activity of CPK (EC №2.7.3.2) is inhibited by thyroxine and in young stock the level of creatine kinase is higher than in mature sheep which is due to intensive growth and involving in the process the creatine kinase-rich tissues – muscle and nervous tissues. Ontogenetic changes of LDH (EC №1.1.1.27) in young stock indicates the great role of carbohydrates in providing a growing organism with energy.

Certain concentration of these elements in the blood serum of each separate group of sheep depends not only on the above mentioned factors but also on the productivity level, general state of health and many other objective and subjective factors.

The multi-method research on determining the concentration in the blood serum of protein spectrum (PreAlb, Alb, PostAlb₁, PostAlb₂, Tf, PostTf, Cp, β_2 -G1, γ -G1, β -Lp) and the activity of enzymes (ALP, ALT, AST, CPK, LDH) showed the dynamics of their variation depending on sex, age and genotype, which may be used in breeding as basic data, characterizing the biochemical status of coarse-wooled fat-tailed breeds of sheep.

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SECTION VIII. Historical Sciences

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SCIENTIFIC DISCUSSION AS A TOOL FOR THE TRANSITION FROM DESCRIPTIVE SCIENCE TO THE THEORETICAL

Contrasting the opinions of different scientists promotes such features of scientific knowledge as intersubjectivity and invariance. These ways of scientific communication, both informal (i.e. oral communication of colleagues or meetings at scientific conferences), and those put on paper – in the form of scientific publications – allow researchers to determine the similarities and differences in their views as well as to discuss the reasons for disagreement.

Putting down a scientific text is important as this enables to fix it, transmitting the text both in time and space and making it available to any member of the scientific community.

The credibility of the articles published in scientific journals, collections of works and monographs (written by one or several authors), including their online versions, is proven by the fact that expert evaluation, some procedure of a competent review is done before their publication.

When a scientific debate develops in a scientific journal, scientific publications often form a chain of polylogue discussion. A striking example of such an ethnology discussion is the discussion of the theory of ethnos in the *Etnograficheskoe Obozrenie* (Ethnographic Review, prior to 1991 known as *Sovetskaya Etnografiya* – Soviet Ethnography).

Active discussion of theoretical problems in ethnology was initiated by a series of articles in the journal No 5, 1983 in the “Discussions” section. High standards were set from the very beginning since one of the authors was Y.V. Bromley, the Director of N.N. Miklukho-Maklai Institute of Ethnology and Anthropology, USSR Academy of Sciences (who in the same year had published his monograph “Essays on the Theory of Ethnos”, setting the course for ethnic theory development in our country for a long time), as well as such distinguished scientists as S.A. Arutyunov, Y.I. Semenov, G.E. Markov and others.

It should be mentioned that those publications formulated the immediate task which was not reduced to analyzing the most important ethnological concepts, but also coining proper terms for their registration.

However, the discussion of the problems raised did not continue at once. Only three years later, in No 3, 1986, there were theoretical articles by M.V. Kryukov and Y.I. Semenov on historical types of ethnic communities. The ideas of these ethnologists published in No 4 of the same year were developed in the articles by M.V. Kryukov and Y.I. Semenov.

The issue of the journal No 3, 1987, contained a topical article by Y.V. Bromley and M.V. Kryukov titled “Ethnography: Its Place in Science, Education, and Its Methods”. The publication of this article aroused great interest among scientific community, resulting in six more publications on this topic appearing in the next issue of the journal.

In 1988-1989 one or two theoretical articles were published in the section titled “National Processes Today”. The term “ethnos”, having wide semantics and being in fact a basic ethnological concept, was not fully adopted by the scientists.

In 1992 (No 1) the journal published an article by V.A. Tishkov, heading the Institute of Ethnology and Anthropology since 1989, titled “Soviet Ethnography: Overcoming the Crisis”. The publication of this article initiated active discussion of the theoretical aspects of Ethnology, which continued, almost continuously, until 2005. The sections where these articles came out were already called as “Reflections on the Future of Science”, “Theory and Methodology”, “Theoretical Issues”.

The name of the journal changed: from No 1, 1991, it was no longer called Soviet Ethnography, but Ethnographic Review.

Over the following years, from 1992 to 2000, *Ethnographic Review* published about 40 articles on the theory of ethnology only. After the stage of describing individual ethnic groups, which undoubtedly was very important for the accumulation of empirical data, it was possible to move to understanding the basic scientific concepts. For instance, considerable attention was paid to defining the concept “ethnos”, as well as the classification of ethnic community types and their hierarchy. Over that period one could also witness the formation of the philosophical approach to ethnological issues: there were publications which considered the scientific work of the ethnologists from the perspective of philosophical anthropology, gnosiology, and epistemology. Besides, they contained a detailed analysis of the internal structure of ethnological sciences.

The researchers formulated the problem of integration of various ethnic theories and concepts. In this respect we should mention that the article by I.Y. Zarinov devoted to this issue (No 4, 2000) was titled “Time to Find a Common Language”.

Certainly, it is almost impossible to imagine complete agreement, an absolute unification of the scientific views, especially in the field of social and humanitarian knowledge. Russian ethnology is divided into two groups – primordialists and constructivists with opposing views. This division, by now clearly formed in the scientific community, has also become a pressing issue for Russian ethnologists. Interestingly, in Russia the group supporting natural and evolutionary-historical approach (that is primordialism variations) is percentagewise much greater compared to US and European science. However, it was this discussion which enabled to reveal this feature of Russian ethnology.

During 2001-2005, the journal published at least a dozen of articles covering these theoretical issues. A kind of “spurt” occurred in No 3, 2006, which published a number of articles devoted to the theories by Shirokogorov and Gumilev and presenting an overview of their influence on contemporary ethnology.

After 2007, the “Theoretical Issues” section was no longer present. So nowadays when articles on the ethnos theory come out, they provide the assessment of the views of individual scholars or national ethnological schools.

Nevertheless, the goal has been reached. The term “ethnos” has become common in Russian science. An interesting feature of the term “ethnos” is that it is not widely used in colloquial Russian language (it is replaced by an original synonym “*narod*” – “the people”).

Furthermore, its terminological use also has a relatively short history, as we have shown above. The fact that Russian language initially borrowed the term “ethnos”, rather than had a semantic transformation of a common word, resulted in the absence of unnecessary connotations and the possibility to use this term in science in a broader meaning.

Usage of ethnological terms, their becoming part of theoretical knowledge and widely used theoretical concepts is the process which manifested a crucial for every branch of science transition from the descriptive to theoretical stage. The change of names – ethnography transforming into ethnology – marks the transition from the metaphysical method of cognition, allowing the study of the object of science in isolated and static form, to the dialectical one which requires a mandatory consideration of relationships between the object and its historical development.

It is generally accepted that the extensional characteristic of a signifier (by listing denotations) is just an initial stage of the corresponding concept analysis, the outcome of an empirical study of the scientific object. Such a perspective, in general, was sufficient, until this science was called ethnography and was mainly descriptive. At that stage of science development the main object of its study was often denoted by the term “the people”; even if the term “ethnos” was mentioned somewhere in the introduction, the paper mainly focused on the peoples. Certainly, that stage of science development should be treated with due respect. It was that “field” work on the description of the material and spiritual culture of specific ethnic groups, creation of a set of such specific descriptions which determined the need to define the term “ethnos” by means of the intension characteristic – a set of essential features typical of any ethnic group. This transition from the extensional definition to the intensional one corresponds to the transition from the empirical level of scientific development to the theoretical one and marks a change of the scientific paradigm. This transition led to a more frequent use of the term “ethnos”, not only in scientific, but also in educational texts, even if the theoretical concept of “ethnos” is not analyzed in these texts, and the basic content is reduced to the description of specific ethnic groups, done in the course of narrative ethnography. The term “ethnos” becomes “popular”, it confirms the author’s belonging to the modern paradigm, at least at the level of signifiers.

It should also be said that this transition was reflected in the change of the academic institution's name: the N.N. Miklukho-Maklai Institute of Ethnography and Anthropology, USSR Academy of Sciences, in 1990 was renamed as the N.N. Miklukho-Maklai Institute of Ethnology and Anthropology (since 1992 – being part of the Russian Academy of Sciences).

A debate in Ethnographic Review played an important role in the changes described above, regarding the term and concept of “ethnos” – a bright and characteristic example of effective communication in the scientific community.

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**THE FEATURES OF THE ARCHITECTURAL DESIGN
AND HOUSING BUILDING IN RUSSIA IN 1945-1957**

The big losses in the housing stock during the Great Patriotic War put in the face of the Soviet government and, in particular, of the Committee of architectural affairs the task to compensate the decreased living space and also to provide the houses for the increased population quickly. For the implementation of these tasks it was necessary, first, to eliminate the amateur work, existing in the building business, and, secondly, radically to reorganize the branches of the architectural design and building, using the advanced methods of production, reached in other branches, in particular, to introduce the industrial methods in the building branch.

The industrial building was understood as a building collecting: production of any parts of houses on a construction site was completely excluded, and also the number of types of details and designs, which had to be made at the plants or in workshops, was accurately defined and limited. As the industrial production was economically expedient only at the lot serial production, the nomenclature of the detail types and designs had to be minimized, that had a significant impact on the

activities of the architectural and design workshops [1, pp. 53-55].

The attempts of unification and standardization of the architectural and building elements and the projects, made of them, have been made in the 1930th by the People's commissariat on building and a number of the architectural and design workshops, however, the developed projects had a significant amount of the details of the various standard sizes, and the projects were not unified with each other not only with the constructive and planning, but also with the architectural and art sides [2, p. 13-14]. Despite of a rather strict selection of the standard projects, made by the Committee of architectural affairs and the Gosstroy in post-war years, the houses with small unification continued to be among the recommended projects. So, for example, the Series 7 of the standard projects of the houses with 3-4-5 floor sections by the architect Kovykov S. G. (Giprogor of the Ministry of city building) entered into the all-Union catalog of standard projects in 1946, was excluded from it only in 1954. In 1950 it even passed the revision on reduction in cost, in spite of the fact, that it had 25 various types of details for the interfloor overlappings (at the same time the Series 1-6, containing also a large number of details with the various standard sizes, were excluded as uneconomical in 1950) [3, pp. 25-26].

Analyzing the process of typification in the post-war housing building, we came to the conclusion, that it is possible to allocate two of its main directions:

- typification of a building in general — development of standard projects of the separate residential buildings, uniting the architectural and constructive concepts in the uniform series; each of the houses had the individual planning of the apartments at the same time, but its elements (ladders, bathrooms, windows, doors, etc.) were standard for all series, it also extended to separate designs and architectural details of the houses (eaves, sandrik, balconies, etc.);

- typification of separate parts of a building — development of the standard sections and the integrated knots, consisting also of the standard details, from which it was possible to pack the various houses.

In the first years of the post-war building the choice was made towards a serial method of the house design, which allowed to build up the small one- two- and three-storyed buildings in the complex territories by the Soviet architectural organizations. Such choice, corresponded to the state course towards the low housing building in the majority of the cities and settlements: 80% of the living space, had to make the low houses, and other 20% to fall on the houses to 4 floors above [4, pp. 11-12]. They considered that this method could be applied

with success and at the multystoried building (4-5 floors above) on the city highways and the intra quarter sites [5, p. 13]. It should be noted, that at the same time the three-storey houses did not join the general catalog of standard building projects till 1953. It caused the local architectural authorities' criticism, as the main building in the cities was conducted by the departmental builders, who were forbidden to use the individual projects in the housing building without special permission of the Committee of architectural affairs or the relevant ministry. In result, the local architectural authorities could not build up the sites, allocated to them, intended (according to master plans) for the multystoried building, within 7 years.

The use of the second approach — the design of the individual buildings of a big extent on the basis of standard sections in the first post-war years was provided in the typifications only for big cities (Moscow, Leningrad, Kiev, Kharkiv, Stalingrad, etc.), and also for the central regions of the small cities where, however, the buildings of the public appointment had to be multystoried generally (Houses of Soviets, hotels, Houses of communication, labor unions, etc.) [4, p. 11]. Also the section design was recommended to be used for the design of linking buildings between the existing structures for the purpose of creation of the complex street building and formation of a complete architectural complex.

In 1945-1953 the main design institutes were engaged in development of the method of the serial design with creation of own plannings and sets of the elements of the designs and details, unified in each series, so the Giprogor of the Ministry of the city building of the USSR (The state architectural workshops) was engaged in development of the series 1-208, 1-211, 1-221, 1-222, 1-225, 1-229, 1-230, 1-238, 1-244, 1-245; the Gorstroyproyekt of the Ministry of building of the heavy industry enterprises of the USSR — 1-202, 1-218, 1-226, 1-228; The Giproggrad of the UkSSR— 1-281; The State allied design institute 11 (GSPI 11) — the BM-401, BSh-01, BSh-11, BSh-401 projects, etc. The design of the houses on the typification basis of the separate elements of buildings was assigned to the departmental and local architectural and design workshops as each house had to be designed separately that, however, gave more opportunities for the town-planning order for a street and quarter building with a difficult configuration.

Since 1950 the change of the state course in architecture and building began at first with economy when designing and estimates [3, p. 25], in 1952 there were requirements to increase the number of storeys, density of building and economy of an urban area [6, pp. 49-

50], and since 1954 "The Industrial Building Products of Two — Five-floor Stone Houses for Building in the RSFSR" catalog (the Series II-01 standard designs and details of) was entered [7, p. 44]. As the result there was a certain mixture of two approaches in typification as the universal standard series of plannings (on the basis of the series 11 of 1950 by the architect Kalish V. G., the Giprogor), which was based on the series of details II-01, and now all the design organizations were obliged to make a start at the architectural design from the accurately limited set of options of the standard section plannings and the set of standard details, that significantly limited the creative identity of the architects.

At this time, starting from the standard multystoried frontal option of street building, the first series of standard projects to 4-5 floors 1-401, 1-407 of the Gorstroyproyekt and 1-402, 1-408 the Giprogor were developed. In view of shortcomings of such building option (generally from the insufficient insolation and the problems with the orientation of houses to the cardinals direction) in 1956 the new series of the standard projects with various options of frontal and angular execution of residential buildings were developed for the complex building of streets and quarters 1-260, 1-460 the Giprogor and 1-418, 1-419, 1-420 the Gorstroyproyekt. When developing these Series full refusal of using any individual elements and details in the projects was already made. All houses were entirely constructed from the combined standard details of mass (large-series) factory production, that allowed to increase considerably their quality and to reduce the cost.

Further changes when approaching to typification in design were connected already with aspiration of the Central Committee of CPSU and the Council of ministers of the USSR in 1957, to reduce the building cost. The main Series 1-447 (the Giprogor), 1-439 (the Gorstroyproyekt) and 1-464 (the Giprostroyindustriya) were approved, they allowed to reduce the cost of building of 1 sq.m of living space by 10-12%, and the cost of apartments for 30-40% in comparison with the standard projects of 1953-1954. [8, p. 322]. The economy was reached by the reduction of the areas and cubic capacities of apartments, the refusal of the utility rooms, the introduction of the combined bathrooms, using the invoice building materials in facade facing, instead of their finishing, by the exception of the angular sections, elevators and the built-in household services on the first floors.

On the basis of the carried-out analysis of the architectural design of the Soviet housing building in the post-war decade it is possible to mark out the following features: aspiration to a house partition on the

separate components, including an architectural finishing; attempts of the maximum standardization of these components, experimenting with the various combinations and various sets of the standardized elements for the receiving the new architectural planning solutions, gradual transfer of the all labor-intensive processes on the plants and leaving on a building site only the assembly operations, that by the end of the 1950th was actually reached in the housing building of all Soviet cities.

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SECTION IX. Economics

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RELATIONSHIP BETWEEN ECONOMIC GROWTH AND ENVIRONMENTAL QUALITY

Since the 1970s, when the Club of Rome put forth the theory of “The Limits to Growth“, the environmental quality has been considered a new prerequisite for economic growth. The idea has passed from academic and environmental activists to political handling. In the academic world, the centre of this discussion was so called the environmental Kuznets curve, representing the relationship between various indicators of environmental degradation and economic growth. The aim of this paper is to review the most influential theories of the environmental economics in order to highlight the strong environmental approach and describe the evolution of the concept of the environmental Kuznets curve till its roots. The study highlight the impact of other factors than economic growth, that may lead to the environmental Kuznets curve pattern. The article may be useful for scientists and policy makers, analysing the trends of the economic development of the countries, and dealing with the problems of the relationship between the environmental indicators and economic growth. The environmental Kuznets curve concept might be useful for the analysis of additional factors in order to reduce the height of the curve by adopting policies that permitted to “tunnel” through the curve and provide scientific information to sustainable policy design.

For a long while, humans have believed that the planet is capable to restore the damage made by their activities. The new inventions at the end of 18th century led to the industrial revolution and over the period of about 150 years the natural processes of the planet had been broken. Since the 1970s, when the Club of Rome put forward the theory of “The Limits to Growth“, the environmental quality has been considered as another one prerequisite for economic growth (Meadows *et. al* 1972).

At the highest political level, the environmental problems have been viewed as very important for the development of the country since 1972, when Stockholm Conference on the Human Environment was held and sustainable development as the leading paradigm has been resurfaced. The environmental problems based on their relationship to economic growth could be generally grouped into three approaches. The first concept is associated with the limiting of economic growth (concept which is almost impossible to apply in the current society), the second one is the idea of outgrowing the environmental problems with a higher growth and the third concept is related to the environmental Kuznets curve (further EKC) theory highlighting the managing environment issues in the course of the economic growth. Despite the growing efforts, the environmental problems are still very acute and the natural environment are destroyed beyond repair in many places, supporting the critics that sustain and develop is oxymoron. In the scientific world, the question of how a continuous economic growth affects various environmental indicators is very important and has been analysed by many scientists. According to Panayotou (1993), the environmental problems based on their relationship to economic growth could be generally described as follows:

1. The increase of economic growth should be stopped and economies should move to the steady state economy (Meadows *et al.* 1972; 2004; Randers 2012).
2. The increase in economic growth leads to environmental improvement and, therefore, countries may become richer (Beckerman 1998).
3. The relationship between the economic growth and the environment changes demonstrates the inverted-U trajectory (Grossman, Kreuger 1993; Selden, Song 1994; Panayotou 1993; Galeotti *et al.* 2008; Franklin and Ruth 2012; Wang 2013).

The first one covers the ideas of environmentalist like Meadows and other researchers, who supported the limiting of the countries' economic growth. The second approach, having the least number of followers, suggested that no strict regulation is needed as it could be harmful to economic growth, which by itself would improve the environment. The third approach named the environmental Kuznets curve (EKC), which lately has become very popular among many scientists, raises many other questions about the turning points, the level of the environmental damage and possibilities to avoid them, as well as the role of policies and regulations and the possibilities for the developing countries, or the

countries in transition, to learn from the developed countries how to avoid the environmental damage and to find the political tunnel.

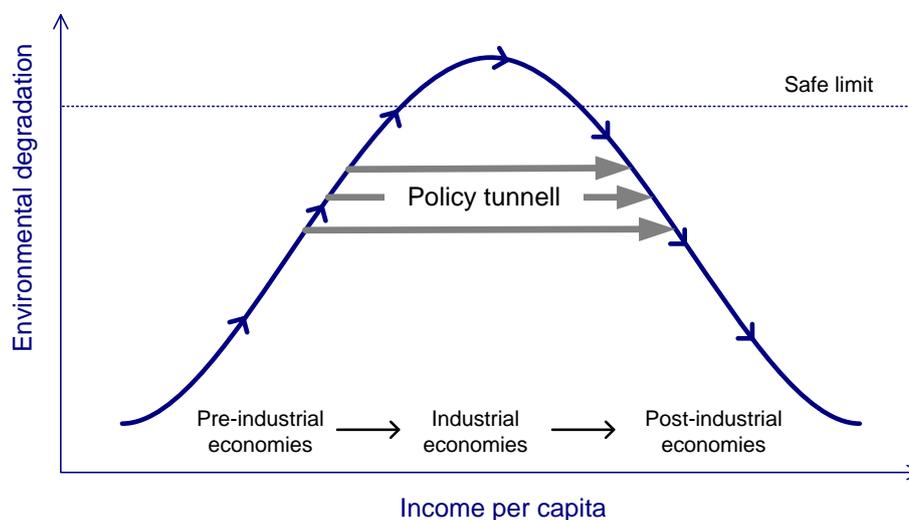


Fig. 1. The Environmental–growth relationship, the EKC approach
Source: R. Čiegis «Gamtos išteklių ir aplinkos ekonomika»
 (Natural Resources and Environmental Economics) p.147

As can be seen in the figure, at the early stages of economic growth (which can be called pre-industrial economies), the degradation and pollution are increasing, but beyond some level of income per capita (reaching the turning point at industrial economies), which varies for different countries, the trend reverses so that, at high income levels (the stage of post-industrial economies), the economic growth leads to the environmental improvement. This implies that the environmental impact indicator is the inverted U-shape function of income per capita. In their studies, Dasgupta and Maler (1994) called this empirical relationship between national income per head and concentration levels of industrial pollutants the environmental Kuznets curve.

According to Čiegis *et. al* (2008), the environmental Kuznets curve should not be used as a proof or a critical argument in grounding the statement that economic growth is sufficient to achieve the environmental improvement and as the main argument in building national sustainable development strategies. It should be viewed as the hypothesis on the interrelation between economic growth and the environmental quality. Hence, the EKC instrument might be useful for the analysis of additional instruments in order to reduce the height of the EKC based on the learning from the experience of other countries and by adopting policies that permitted to “tunnel” through the curve and

provide scientific information to sustainable policy design.

The aim of this paper is to describe the evolution of the environmental Kuznets curve, starting from its roots till nowadays, to summarise and systemise the results of empirical studies. The article may be useful for scientists and policy makers, analysing the trends of the economic development of the countries, and dealing with the problems of the relationship between the environmental indicators and economic growth.

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THE INTERRELATION OF ECONOMIC GROWTH AND THE INDICATORS OF ENVIRONMENTAL DEGRADATION – ENVIRONMENTAL APPROACH

In 1798, Thomas Malthus wrote a book “An Essay on the Principle of Population”. In this book, the author assumed that food supply grew only arithmetically, while a healthy population grew geometrically (Malthus 1798). It was called the Malthusian population trap where long-run human progress would be very dim. The author did not assess the technological progress, and the land was defined as an irreplaceable source of natural capital. A great number of ecological economists follow the idea of T. Malthus and refer to his famous book in their works.

The theoretical considerations of the relationship between the environment and economic growth starts, in many cases, with presenting the famous book “The Limits to Growth“ (Meadows *et al.* 1972) inspired by the informal organization The Club of Rome. It was noticed that the rates of such variables as population growth, usage of resources, level of pollution and material consumption grew according to the trajectory of the exponential function. They warned that the patterns of production had to be changed from quantity to quality and noticed that it was impossible to satisfy the infinite needs of every human, therefore, the necessity of choice would be inevitable. Various scenarios were built in examining the growth of the selected variables, according to which the limits of the planet would have stopped the growth in the 21th century. The authors suggested gathering the data on the development of the world in order to track and manage the processes of growth. They thought that such growth could not continue more than one hundred years and suggested the work to step into the global equilibrium and to put more efforts to preserve the environment. Since the publishing of this book, the environmental quality has been considered to be a new prerequisite for economic growth. The world has recognized new challenges and its responsibilities for changing the climate and depleting natural resources.

In 1968, another book “The Population Bomb” warned about the overpopulated Earth. As the man changed the axe into the machine, the environment lost the battle, because a man is so brutal with the infinity of his needs. The author called people to recognize that the growing population would change the living standards and the natural beauty of the environment. The solution suggested writing letters to politicians that they could see that people want to control this problem. It was thought necessary to plan for a stable population of optimum size. Family planning alone did not lead to population control. The attitude of population had to be changed. Otherwise, it was believed that the environmental deterioration would pose a colossal threat to man’s survival (Ehrlich 1968).

In 1992, the new book of the authors “The Limits to Grow” called “Beyond the Limits” was published. Using the updated results, the authors emphasized that the natural processes of the planet were broken, therefore it was very important to recognize that and make changes to alter the current path. Later, the scientists continued to study the possible scenarios for the world, comparing the results presented in the previous studies. Donella Meadows, Jørgen Randers, and Dennis Meadows updated their studies and published the book “The Limits to

Growth: The 30-Year Update” (Meadows *et al.* 2004). Starting this new book, the authors acknowledged many positive things that were done in order to preserve the environment during the past years. However, the rate of population, production and pollution were still rising, despite the emergence of new technologies and innovations. Modelling the World3-3 scenarios, the scientists included new components of rates. One of their conclusions was that it was very important to manage an orderly reduction of their activities back down below the limits of the Earth's resources.

In 2012, Randers, one of the authors of “The Limits to Growth”, published the book “2052 Global Forecast and Report to the Club of Rome”, where he forecast the future in order to answer the so frequent question given to him during the forty years. This question was as follows: what would happen in another forty years? He noticed that the real challenge was to estimate how much (or how little) of what needs to be done would actually be done. He believed that the transition to sustainability would be only half complete by 2052, because the human response to the environmental degradation is too slow. In the book, the most critical factor was highlighted as greenhouse gas emissions from human activities. The transition to sustainability will require a fundamental change to a number of the systems that govern the current world development: capitalism, economic growth, democracy, intergenerational equity and our relationship with the earth's climate. The author chose to forecast or trace the big lines of what he sees to be the probable global evolution toward 2052. Technically, the trends and tendencies that are rooted in stable causal feedback structures in the world system are described. As the author pointed out, his forecast did not eliminate free will, but rather was based on the belief that human decision making was influenced by the conditions under which the decision was being made. The book includes about thirty five glimpses of different experts in areas. The author, building his forecast on the system dynamic models, embodied a lot of academic theory drawn from economics, political science, sociology, engineering, biology, agriculture and environmental science (Randers 2012).

Environmentalists and other researchers aiming at preservation of the natural environment feel huge hopelessness as the behavioural patterns of human beings, despite the sustainable development being strategic aim for forty recent years, the environmental problems are still very serious, and, in many places the natural environment is destroyed beyond repair, supporting the critics that sustain and develop is oxymoron.

The latest studies of the environmental degradation and growth are related to the hypothetical Kuznets curve approach. The environmental Kuznets curve is a hypothetical relationship between various indicators of environmental degradation and income level, referring to the shape of the inverted-U.

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Causes of the crisis and ways to overcome it in the foreign experience

Nowadays the most relevant and exciting question is how to make Russian economy stable and how to come over the crises. Trying to find answers on these two questions, I have interviewed two economists, who are interested in this problem. Based on the obtained results can be made two different solutions.

First solution is based on the social principles. It is obvious that in the program of an exit of the country from the crisis we need the extraordinary look, there have to be scientific developments and practical experience. The strategy first of all must depend on the

national interests. In this plan it is important to stabilize and reduce stratification in the society due to more equitable distribution of the income. This deep inequality causes a mass social and psychological stress in the country, that generates, on the one hand, social aggression, and on the another hand – social passivity. Important point in stabilization of society is increase in salaries to state employees. Where can we take money? From the foreign countries experience. So, in the USA the money supply is 56-60% of GDP above, in Holland – 50% of GDP, similarly situation in other developed countries, and in Russia money supply isn't enough.[1] According to monetarist's view, increase in money supply always leads to inflation. But in the our economy where only 50% of production capacities are used, printing money for the salaries must lead to increase in the production, necessities and consumer goods. So today is very important to define the system of the national preferences and according to this system correct our economic policy.

The second solution, in my opinion, is more useful. Firstly, let's define "stable economy"-it is economy, when everyone can be sure about the future, so investors are confined in their investments. Unfortunately, our economy is not stable, because of the fact that approximately 70% of our revenue depends on hydrocarbon prices and raw material export. In this case we should find other income articles. For example, recycling raw materials in the territory of our country and sell recycled materials at higher prices (because increasing in the added value). In addition to that country's GDP will rise and investors will be interested in investing. But here is one more very important point: government should stabilize tax system. In order to help our economy, there are some unexpected reforms, that are, honestly, ineffective, moreover these reforms confused investors. To sum up the economy must be controlled by the government, but at the same time the state shouldn't overdo it and economists should find different ways to generate revenue.

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BUSINESS MANAGEMENT STRATEGY BASED ON VALUE-ORIENTED CONCEPTS

At the present stage of business management strategy in the practice of financial management in corporations formed under the influence of a value-oriented concept. Formation of this concept was the result of increasing the impact of strategic methods in the company's management system.

Demand concept of value-based management is determined by the fact that the process of value creation is generated by the key factors of efficiency, realized at the strategic level. The most important goal in the management framework of this concept is to maximize the value of the organization. The increment value occurs when excess profits from invested capital of all the costs associated with raising capital. Identify key value drivers is made taking into account the risks of loss of profit, which leads to the use of market values.

The market value of companies accounted for not only material factors, but also non-material forms of intellectual capital.

The indicators reflecting the process of creating value include: Economic Value Added (EVA), Market Value Added (MVA), Shareholder Value Added (SVA), Cash Value Added (CVA), and Cash Flow Return on Investment (CFROI).

Valuation of the organization is needed in different situations - when purchasing organization, management quality analysis firm, attract investors, obtain loans, as well as common in recent years for business trends - mergers and acquisitions. The need to control the cost of the organization due to increasing competition, which leads to the justification of the interests of all stakeholders: customers, suppliers, government officials and staff of the organization.

Cost management organization is the basis for long-term planning. Value management process identifies alternative approaches and determines which one provides the most efficient organization therefore higher market value [1, p. 3].

In applying the method of organization value management (Value Based Management -VBM) it is recommended to use the following algorithm. In the first stage, the evaluation of the cost of the organization at the moment in the real state with the creation of a model that takes into account the financial indicators of sustainable development organizations. Considering the organization as a system with the specified operating parameters, it is proposed to use a minimum of indicators that reflect the conditions for achieving the main goal. Financial indicators characterizing a rational approach to the growth of the cost of the organization, in our opinion, are:

- maximization of return on capital, ire the evaluation of the use of capital;

- minimizing the financial risks of using borrowed funds.

The proposed financial indicators allow to track the growth of the market value of the organization, which is reflected in the performance indicators of efficiency of processes of raising capital and use within the specified return and risk - EVA economic value added (Economic Value Added). The increase in economic value added show maximum impact capital, minimizing risks and costs for the use of capital, the sustainable growth of the organization. It should be noted that the index EVA:

- reflects the quality of management decisions in the long term;

- an indicator can be used for financial analysis;

- to evaluate the cost of the organization of the risk factor.

Economic value added acts as a tool to measure the actual profitability of the organization and manage it from the standpoint of the owners, and as a tool, showing how you can affect the profitability of the organization.

The first stage allows an organization to receive detailed management mechanism financial condition, which makes it possible to analyze which of the elements of the mechanism led to an increase or reduction totals.

At the second stage, the study of internal and external reserves of the organization for a maximum possible increase in its cost. At this stage of the analysis of activity in order to determine the impact of various factors on the cost of the organization.

In the next phase it is recommended to use the cost of organizing the main reference in any decision:. Pricing policy with customers and suppliers, at the conclusion of contractual relations with contractors, etc. When the positive impact of these decisions on the value of the organization - the decision is made, is rejected with a negative impact [1, p. 7]

Reasonably formulated strategy of the organization describes the basic steps to be taken to achieve the goals and desired outcomes. It is necessary to highlight the most important factors of efficiency, ie, parameters of the economic aspect of the organization, which are most important for the implementation of its strategy.

Using the key indicators of the financial activities of organizations gives the organization the opportunity to assess the financial condition of the track and evaluate the implementation of the strategy.

In Value Based Management VBM based on management in an integrated financial indicator - the cost of the organization. Value Based Management is not only a way to protect the organization from the threat of absorption, but also the basis for sustainable business development in the current economic reality. The advantage of this system is its flexibility and absolute versatility. Organization Cost Management enables organizations to overcome all sorts of crises and operate stably in the market [2, p. 99].

Constraining factors in the spread of the concept of value-based management in Russia is insufficiently developed financial market. This affects the validity of the market values and the lack of development of the concept in the Russian practice.

The above approaches suggest systemic changes in business management, which can be interpreted as a change of the paradigm of business management strategy at the present stage.

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Strategic planning of production company in the schemes of homeostat and pentagram

Annotation: Recently, there are different points of view regarding to the approach of studying the characteristics of modern strategic planning of production activities in enterprises. However, the current conditions of the enterprise, as well as the unpredictability of the environment business entity searches again actualizes issues of new process definition methods of strategic planning. In the scientific article the author deals with the construction of schemes and the Pentagram and homeostat, which are aimed to disclosure the features of modern strategic planning of production activities in enterprises.

Key words: strategic planning, enterprise, industrial activity, pentagram, homeostat.

Introduction. Problems of formation strategic plan of company devoted to many scientific elaborations and publications that united in the system of distinguish views of main composing processes of creating and implementation strategic plan of companies.

Main characteristic of any economic subject that working in conditions of economic labor is implementation of production activity. Therefore, production activity implements in different forms, in different fields of economy by physical and legal persons. This activity of production not only material goods but also non-material goods (in education, health service, culture, science and etc.), including also rendering different services in all fields.

The production activity of the enterprise is a complex and multifaceted subject, which matter in a state of continuous change and development. Therefore, the initial assessment of the enterprise should be based on the overall results of the implementation of the plan. This corresponds to the nature of the work of self-supporting enterprises that operate on their own resources and responsible for the results which are achieved before the state granted to them [1].

One of the approaches of study of modern characteristics of strategic planning production of the company is to study the strategy development process on the basis of categorical system methodology, enabling through the application of logical and instrumental

methodology define aspects of the object.

Theoretical basics of the industrial activity strategic planning. Modern enterprise as an object of study, is a complex of economical and intellectual systems and operates in a rapidly changing environmental factors which are, in turn, exert a strong influence on the formation and development of domestic production capacity of an economic entity. In addition, the variability of the environment of market relations, which subordinated activities of the company, leads to the fact that developed and implemented in the not so distant past, as well as implemented in this period of the methods and tools of increasing efficiency of activity of the enterprise can't be claimed and are not relevant, which results connected to the need to find and develop new approaches of adaptation of the economic entity to the new environment and improve its sustainability in the future. Indisputable that one of the main tools of increasing the efficiency of the enterprise and ensure its competitiveness in the future. Strategic plan that covers all of the processes that take place at the level of production and examines production activity as a basis for the development of an economic entity in the future. The process of contemporary strategic planning is characterized by different socio-economic prerequisites of the company. Defining the main economic priorities of development of the enterprise, it is at the same time creates the conditions for human resource development, adjusting their labor and other relations that clearly determines its social significance. The main characteristics of the development and implementation of a strategic planning process led us to conclude that this is one of the most complicated processes implemented in the company, the development and the implementation affect to all hierarchical divisions, as well as their relationship with the environment, in order to determine the stages of the various actions, capable of winning a position on the market in the long term. In other words, it may be noted that strategic planning is first and foremost, the definition of the stages of enterprise development and the formation of his prospective image in a certain future. As it is known, the effectiveness of the strategic planning is dependent on the applied methodology of planning, which is based on a specific methodology. According to many Russian scientists strategic planning methodology is a set of methods which are aimed at solving specific problems in the development and implementation of the plan. For example, Yusubalieva MF Nowicka Y. a method of strategic planning to understand "the totality of methods, design methods, study and analysis of forecasts, strategic plans and programs at all levels and time horizons, the settlement system of

targets and their mutual coordination" [2].

Vikhansky O. S., Kruglov M.I. [3] considered that content of strategic planning follows from: forming of company's mission and detection of most priority directions of development analysis of the external and internal environment of the enterprise and determination of the organization's capacity; development and adaptation scenarios subject of activity in conditions of market volatility.

Petukhov AN characterizes a strategy as a vision of the direction of future development of the socio-economic system with a fundamental understanding that is due to what the future will be achieved, and the process of strategy of production planning as a set of all activities at the enterprise, directly related to the production process and to give effect to the planned reality [4].

Strategic business planning affects almost every aspect of business enterprise, defining further priorities of operation.

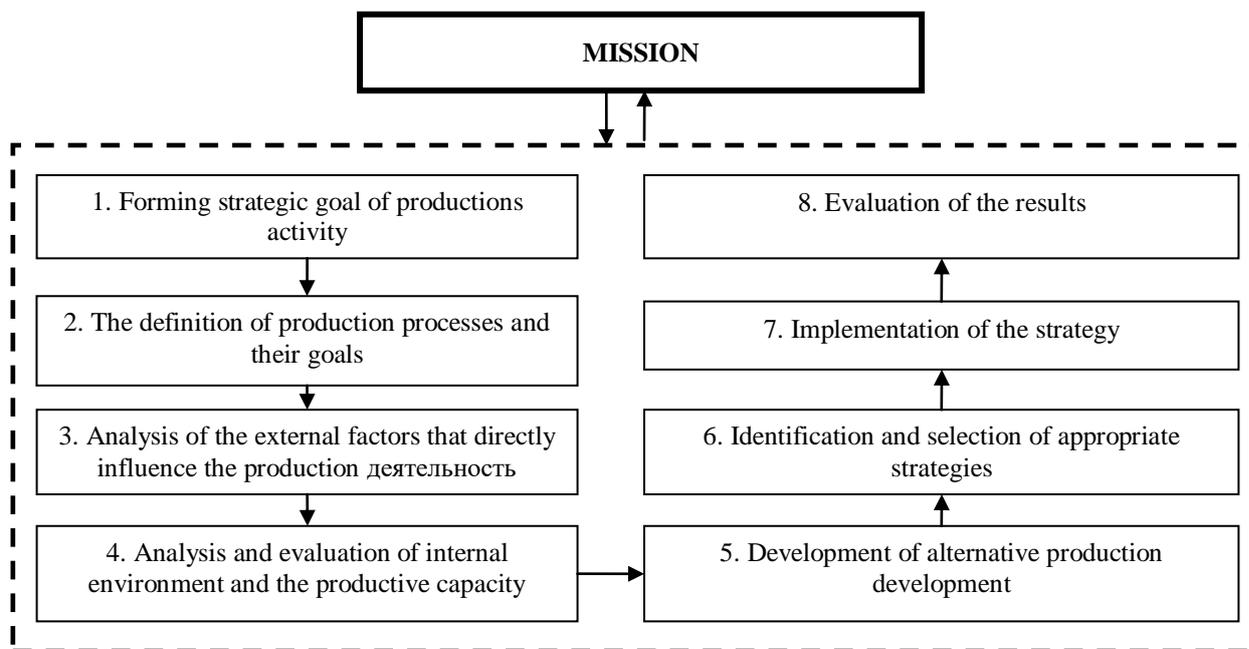


Figure 1. Scheme of the strategic planning of production activity of the enterprise

Therefore, strategic planning of the production activity of the enterprise is one of the main instruments to ensure sustainable development of economic activity in the long period of time. It should be keep in mind that in market conditions, the company, in most cases, acts as a self-organizing system, where the operation of each of its sub-system aims to maintain the viability of the entire system. However,

enterprise's subsystems are not same and differ from each other specifics performed functional tasks, where the interests in the field of production and other resources may have different priorities. This is the basis of existence of conflict in production system, which the study is able to identify the distinctive characteristics of strategy development process in enterprises. In other words, the process of contemporary strategic planning at the enterprise is possible to study in terms of homeostatic.

The functions of homeostat and a pentagram in the system of strategic planning of the production activities of the enterprise.

Homeostatics as a scientific meaning approach to the study of properties of an object, formed on the basis of fundamental cybernetic, systemic and philosophical ideas [5] and it is aimed at the characterization of the system through the study of its internal contradictions. Controversy as dialectic cause all levels of systems manufacturing facility allows the system to be not only very sensitive to changes in the internal and external environment, and ultra stable, including respect to the penetrating interference. In other words, the existence of contradictions in the production system, as well as the study of their characteristics makes it possible to identify the strengths and weaknesses of the company with sufficient clarity the parties and prepare it for the new conditions of the environment, which enhances the adaptive capacity of the enterprise in the strategic period. Also today, many companies focus on the development of strategic plans, which are not focused on survival, and for sustainable stability in the long run. The presence of contradictions in the strategy development system determines the critical system management area, and thereby forms the priorities for further action. In addition, regulation of the contradictions of the production system ensures stable operation of the company by identifying strategically important parameters. This in turn leads to the emergence of so-called wide-band compensation and adaptive control corresponding to changes in the external environment. The concept of compensatory homeostat as a system, results in the value of output parameters to zero, put Y.M. Gorsky [6], and includes a save function of homeostasis in a production environment or a higher-level system, where it is included in order to neutralize the negative energy that occurs in conflict management style.

From the view of compensatory homeostatic models, homeostasis tool finds the idea of intra-contradictions reflected in the production management system of the enterprise [7]. In the domain of the

production system model homeostat of the compensation looks like (Figure 2).

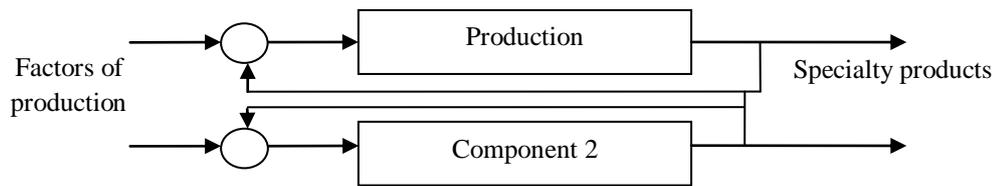


Figure 2. Production System in the compensation model homeostat
 Note: as a component 2 may make production processes that encourage the contradictions in the production activities of the enterprise.

In the production system, component "Production" can be in relationship conflicts with all production processes, implemented at the enterprise. These include: security, maintenance, distribution of resources, logistics, supply, sales and etc., which may be represented in the compensating model of homeostat as component 2 (Figure 3). At the beginning, there are the factors of production, which compete for with two clustered component, in the output - specialty products of each pair and in general.

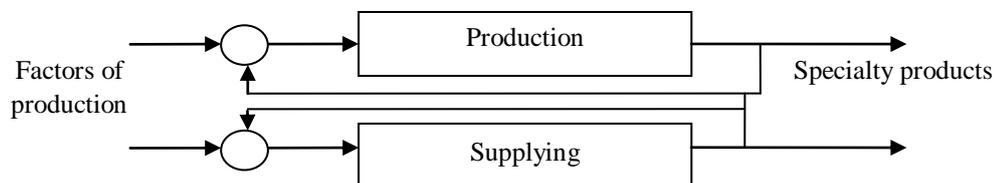


Figure 3. Compensation homeostat interaction "production" components and "supplying"

Simple model assumes the compensation homeostat cross feedback, which reflects the impact of each component of the controversial couple on the functioning of the other, and allows you to manage the development of a pair from the external. The model assumes the existence of a compensation homeostat four different modes of interaction between the two components of production, depending on the type of feedback. Each of the modes as result is either improving interaction (local progress), or its degradation, simplification (local regression), or the accumulation of potential for improvement or degradation (local izogress) [7]. Depends on the level of development of the production system, and each of constituent components of the nature of their interaction may be implemented in various forms and

lead to different results.

Using the homeostatic model in real situations with contradictions of management strategic planning system can be particularly effective if the creation and practical development of complex intelligent systems and complexes will be established. Please note that the characteristics of modern strategic planning production of the enterprise is strong enough dependent on environmental conditions, which are characterized today by the following aspects unpredictability. Strengthening the influence of political and other factors on the activity of the company is strong enough to reduce the accuracy of the forecasts of market development, which reduce the adaptive ability of enterprises to the new conditions: globalization of the market. Impact trends of the world market of increasingly tightening competitive enterprise environment lead to rapid changes in the conditions of functioning of the external environment. The dynamic development of information management systems and organization of the production process. The dynamic development of the information technology market, and the emergence of new innovation and intellectual systems of production organization generates new conditions of business, promoting it to the revision control system in enterprises in order to optimize the number of manufacturing processes, etc. These aspects have a strong influence on cognitive performance professionals engaged in labor activity in the internal environment of the enterprise, thereby changing the process of contradictions regulation. In addition, these factors provide a basis for developing new, complex and unpredictable conflict in the distribution and redistribution of production and other enterprise resources. The modern enterprise is a complex system of socio-economic relations, and implemented production process can be characterized by the presence of multiple contradictions, which can be combined into larger groups (on the basis of symptoms and functional values) and study using categorical character approach. In our case, to determine the characteristics of the strategic planning of industrial activity in the symbolism of the pentagram was used by us as a support tool. The use of this symbolism is caused by the fact that in any system of five different elements of the interaction between them is due to four main ratios - support inverse support, depression, anti-oppression [8, p. 187]. Therefore, if the process of strategic planning of the production activity of the enterprise can be described as a character, has five components (or set of its elements can be reduced to five main), between these elements for the arbitrary nature of systems are install above four relations.

From the point of view of management patterns, pentagram provide some features similar to the control system. Firstly, all the diagnostic items disorders are divided into two groups - the excess and deficiency (e.g., resources). This feature is frequently manifested in the field of management of industrial enterprise. In addition, most homeostats in the field of production concern management processes. Secondly, all the effects eliminating and reduced to adding or taking away resources. Third, preferred are indirect impacts on the production of the elements. This means that in the event of one of them should affect other elements, allowing for the distribution of contradiction [8, p. 188].

The use of pentagrams in the description and resolution of conflicts in the strategic planning of production activities makes it possible on the basis of the laws of constructing characters, schematically show the main components of the strategy development process, identifying key features and characteristics (Figure 4).

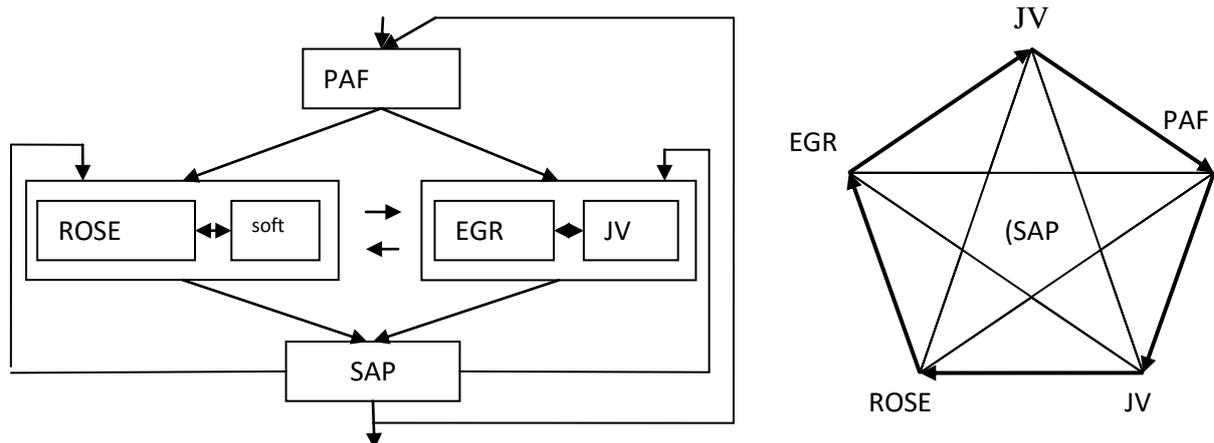


Figure 4. Homeostat and pentagram show the strategic planning of the production activity of the enterprise

(SAP - strategic business planning, PAF - enterprise management system, ROSE - resource maintenance and inventory management, software - the production process (comprising treating and processing, and the manufacture of finished products), EGR - storage of finished products (including transport and storage) JV - product sales)

Note: The figure is based on Razumov V.I. scheme [8, p. 206]

Conclusion. Therefore, the study of modern features of the strategic planning of the production system may be an economic entity in the homeostatic principles that allow us to determine with sufficient clarity on the impact of the elements of contradiction, folding and

developing the production activities of the enterprise. It should keep in mind that production of the company can develop a number of homeostatic contradictions within the production system, production between subsystems, between the subsystem and the external environment, by the production system and the external environment, etc. One of the main tools is to describe homeostats the production system and the definition of their basic characteristics are categorical and symbolic methods. For example, using of strategic planning in the field of symbols pentagram allows in addition to homeostatic management identify specific management features which is based on the relationship between the four to five of its members.

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Performance evaluation system of innovative capacity of an enterprise

Innovative capacity of an enterprise is a measure of availability and balance of physical and technical resources required for carrying out innovative activities by an economic actor [4].

The value of innovative capacity of an enterprise or an economic sector should make it possible to improve operating performance, develop the products and services rendered and introduce new technologies, thus increasing the competitive capacity and the profits.

Most methodological approaches to innovative capacity evaluation are based on forming a system of instruments that measure innovative capacity components and reducing different parameters to a unified value. Thus, the innovative capacity itself is presented in functional form of its components. Each component of innovative capacity changes in time and space, interacts with the others, having an effect on the eventual result.

The outcome of realizing the innovative capacity is presented by the output and the level of competitive ability which can be achieved in the context of current scientific and technological level and full employment of innovative resources available in the socioeconomic system (of an enterprise or a sector) [5].

The innovative capacity component division rests on the principle of functional decomposition which helps to find out all the realizable opportunities according to its structural elements.

Each of the innovative capacity components is characterized by a range of indices evaluated both in a quantitative and qualitative manner. Domestic and foreign literature gives various and sometimes contradictory suggestions in terms of evaluation of different innovative capacity components. Special, generalized and integrated indices as well as systems of special and generalized indices have been established.

The majority of current approaches to estimating and evaluating the innovative capacity components rely upon a presumption that innovative capacity is restricted by domestic resources of an economic system (of an enterprise or a sector) [1, 2, 3, 5]. As for evaluating the innovative capacity of an economic sector such an approach is working, however, to our mind, restriction of the innovative capacity of an

enterprise exclusively by internal components in most of economic sectors (manufacturing industry, agriculture, building industry, etc) is unreasonable.

Development of most national economy sectors is interrelated and interdependent. Reaching the goals of innovative development in some sectors can be restrained by the lack of innovative capacity of suppliers and consumers that represent enterprises of other sectors.

We suggest examining the innovative capacity of an enterprise in logical conjunction with the innovative capacity of sectors and enterprises which are in commercial and economic relations with the given enterprise. The connecting factor for evaluating the innovative capacity of interdependent and interrelated sectors is the innovative process in interorganizational form that includes the following stages.

1 stage – Scientific research. Carrying out the work on developing new technologies in priority sectors, on the key processes for the sector and on developing its practical application.

2 stage – Design and construction. This stage includes a range of works on industrialization of new technologies from development of construction documentation to facility commissioning.

3 stage – Project development and use. This stage includes forming a need for new technologies and contracting the enterprises of the first and the second stages.

Since interorganizational process represents stage-by-stage implementation, the efficiency of the innovative process as a whole will be equal to the efficiency of the weakest stage. The basis of the innovative capacity of a sector as a whole and of all the enterprises of the sector in particular is represented by the scientific and technological potential of the enterprises of the first stage of the innovative process. The lack of scientific development carried out by scientific and research institutions hinders the innovative development of the first and the second stage enterprises even with their own high innovative potential.

The final stage is the development and use of new technologies. Its efficiency is predicated upon availability of investment resources for financing all the stages of the innovative process.

Thus, internal innovative capacity of an enterprise at any stage of innovative process should be examined in conjunction with scientific and technological potential of the sector.

Table 1 gives the suggested innovative capacity performance evaluation system considering the peculiarities of interorganizational form of innovative process.

Table 1

Innovative capacity performance evaluation system

| Component of innovative capacity | Evaluation of the component of innovative capacity | Type of potential |
|--|--|---|
| Scientific and technological component | Evaluation of availability of domestic scientific development ready to be implemented in the promising lines of development; evaluation of scientific and technological capacity of a sector as a whole | Potential of scientific and research institutions of a sector |
| | Evaluated in a quantitative manner based on the indices of efficiency of research and development costs, return on research and development in total income of an enterprise, intellectual property ratio, etc. | Internal innovative capacity |
| Financial and economic component | Evaluated in a quantitative manner based on liquidity, financial stability and turnover ratios, profit and profitability indices, etc. | |
| Organizational and technical component | Evaluated in a quantitative manner based on indicators of capacity of an enterprise, labour efficiency, productivity of capital assets; evaluated in a qualitative manner based on the characteristics of the technological level of production, the S-curve and other parameters. | |
| Marketing component | Evaluated in a quantitative manner based on indicators of marketing research costs in sales, innovative products marketability; evaluated in a qualitative manner based on the characteristics of the innovative products market, the innovative products market competitors, etc. | |

| | | |
|--|--|--|
| Human factor | Evaluated in a quantitative manner based on indicators of staff composition of an enterprise, their qualification, educational level, availability of staff with high qualification; evaluated in a qualitative manner based on the level of organizational culture, the level of staff orientation towards innovations, etc. | |
| Organizational (integration) component | Represented by the complex of methods and means of organization of application of all the innovative capacity components using specialization of labour, optimum mix of different kinds of labour, management, planning and securing work flow, etc. The component shows the connections that unite all the resources and elements into an integral system. Evaluated by projected increase of efficiency of the enterprise and economic sector innovative process as a result of integration of innovation resources (efforts) of several participants of the innovative process. | Different forms of integration of participants of the innovative process in a sector |

It should be noted that great opportunities of an enterprise innovative capacity development depend on accumulation of organizational (integration) component of the innovative capacity. Due to organizational component enterprises can strengthen different components of their internal innovative capacity. However, the main task is to find out most efficient forms of partnership and union of participants of the innovative process for the most efficient application of scientific and technological potential of an economic sector.

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**Travel services market Aspects and their specific features
in tourism industry**

Abstract: Attractiveness of the national market for foreign tourists is one of the key aspects for international tourism development in a country. The territorial tourist attractiveness should be evaluated through its criteria and their correlation. Usually by investigating and measuring the destination attractiveness two main methods are used: studying of those tourist attractions that attract tourists directly, or of those who show such an interest in them.

Key words: tourism, innovations, national market, tourist attraction, destination, infrastructure, tourist attractiveness, international travel business, attractiveness, tourism product.

“Crimea – here is the key to health and high spirits”

The national market attractiveness for foreign tourists depends on the notion of “criterion” that is “index on which economic entity and process quality rating is based, a measure for such evaluation”.

Specialists from Nottingham Travel and Tourism Research Institute suggested eight territorial tourist attractiveness criteria:

- reasonable prices;
- developed infrastructure;
- environmental quality;
- human factor; engineering support; human resources;
- openness of economy; social development.

Classification based on four tourist attractiveness criteria of a country, namely outstanding landmarks, absence of admission formalities, safety, and reasonable prices, can be found in the Russian scientific works.

National market tourist attractiveness definitions suggested have been put on strong grounds and reveal different sides of the phenomenon under investigation nevertheless, they do not provide profound and comprehensive view about its essence. At the same time, proper understanding of the notion “attractiveness” itself and clear vision of the national economy functioning mechanism within the international tourism market is the precondition for the correct attractiveness criteria presentation.

Tourism resources represented by combination of natural and human-created objects adapted for tourism product production with such features as: attractiveness, availability, potential reserve, popularity, unique character, integrity, educative and recreational value are the basis for the tourism demand and defining attribute for travel business formation. As a rule, tourism resources are divided into direct (inherited) and indirect (human-created) ones. But the careful study of territorial tourist attractiveness requires more detailed investigation of tourism resources being crucial and basic criteria for region’s attractiveness. That is why it is reasonable to define notionally three groups of tourism resources:

- direct (natural and historic cultural);
- indirect (infrastructural); secondary.

The geographical position, climate conditions, fauna and flora forms are referred to natural resources. Historic cultural resources are represented by listed buildings, workmanships, traditions, and customs. Indirect resources include tourism infrastructure, hotel and catering

business, special events running, entertainment complex development, special shops, etc. Secondary resources make conditions for the effective tourism industry functioning. They consist of: total infrastructure development, service level, educational and health-care system state, existing communication lines and tools, hospitality and friendliness of a tourism region.

The next element of the national market attractiveness is represented by tourism demand conditions marking some kind of activity directions. As a rule, three main elements are studied within this approach: awareness, comprehension, and preferences. Marketing activity aim of many countries is concerned with the positive image creation which would become a symbol for core audience and would positively comprehended by it; all this should influence the foreign tourists amount and stimulate region competitiveness increase. One of the most effective tourism marketing tools is a country position in the international tourism market that is represented by natural market segmentation completion and target oriented marketing and aimed at the positive image creation of a tourism region which provides opportunities for country attractiveness increase among others. Due to the fact that marketing segmentation is based on the concept that various tourism regions are targeted at different types of tourists the core markets should be firstly chosen; afterwards it is important to concentrate on perspective customer attraction. If to investigate certain attraction indexes more closely first of all one should take into consideration aims of trips. Whereas people travel over different reasons, different tourism region features interest them. For instance, if one wants to visit historic cultural places the attractiveness criteria will be based on outstanding landmarks (the Swallow's Nest, the Vorontsov Palace, the Livadia Palace, Massandra); and if a tourist visits country over his business affairs the main places of his interest could be infrastructure objects and their specialties (the "Moskva" Hotel, in the city of Simferopol, the "Oreanda" Hotel and the "Intourist" Hotel in the city of Yalta, and others).

Tourism resources, founding destination attractiveness basis and tourism demand that determines the best way these resources can be used, are initial attractiveness criteria. In other words, they form national market potential ability to attract foreign tourists whose requirements and wishes can be realized with the help of existing resources.

One of the specific features of the international tourism market consists in a concept that travel goals, whether they are historic cultural sightseeing, holidays at a seaside, visiting relatives, do not require direct costs. But after reaching the travel goal tourist begins to have certain needs in transport services, board and lodging, and those connected with the money waste for souvenirs and presents.

That is why, tourism product can be defined as a separate tourist services complex, and these services make it possible to stay in a country or to travel, and they can meet all requirements of a client only being combined. Tourism product is distinguished by some features unusual for goods, in particular it is immaterial, it has inhomogeneous character, and it cannot be stored or received as a property, and its production occurs simultaneously with the consumption. Consequently, the connection between tourism resources existence and tourism product production targeted at tourists needs and requirements met through usage of certain technologies is clear. Thus, carrying-out a policy focused on innovations and aimed at the effective tourism resources usage and maximum tourism demand satisfaction is now more than ever of high importance. Tourism innovations are divided into several types: grocery (new goods and services production); administrative (new management forms); technological (new ways of production, promotion or usage of a tourism product); organizational (travel agency reorganization or restructuring). Their implementation helps travel agencies to stay competitive and offer high quality services. Tourism supply marks the economic situation within the tourism market from the services suppliers' point of view and presents tourism products set with the determined prices which is intended or can be sold by suppliers. Marketing activity, concerning the national tourism product promotion covering not only the universal and profound study of prospective and real visitors and offered services adaptation but active demand creation, distribution stimulation in order to increase tourist services export, country activity efficiency in the international tourism market as well, is an effective mean of competitiveness, impact on consumers, and distribution area development.

State of supply and demand tranquility under the market economy conditions is reached by means of pricing mechanism functioning. Practically, market tranquility settlement is a very complicated process due to a number of facts: monopolistic concerns; state tourism regulation limiting free trade; lack of the full information about prices either for producers, or for consumers; rapid external conditions changes. Furthermore, tourism market has such distinctive features as

different tourism product comprehension by services suppliers and customers, and supply consistency with demand dynamism. The first feature is connected with the concept that majority of tourists consider rest as something integral and indivisible which can be realized in terms of a trip. The cluster oriented strategy including enforced cooperation of competitive tourist services suppliers might be used by solving this tourism product comprehension contradiction.

The second distinctive international tourism market feature based on the idea that travel agencies location is of resource oriented character and tourism resources consumption occurs at their localization place. As tourism product is not transferred to those regions where a consumer is located and the crucial condition for tourism consumption is the clients' migration, the contradiction between supply consistency and demand dynamism takes place.

Furthermore, international travel activity is mostly seasonal which requires additional demand stimulation means creation during off-season time, for example, price lowering, and extra services.

Despite the difficulty of balanced state performance within the tourism market it is the important aspect for tourism region attractiveness increase. In this very case, tourism product prices corresponding to offered services quality, are meant, i.e. steep cost, as well as low cost, can negatively influence the destination attractiveness. Assumptions that the lower price level in a country is, the more attractive this country for foreign tourists is, are not always correct. Price advantage should not be beyond balance limits because low prices are often associated with the low tourism product quality. That is why, international tourism regions are rarely represented in the international market in such a way. At the same time, country attractiveness is a complicated combination of many elements creating its unique image. Every tourism region uses its characteristics in its own way in order to gain the maximum success among tourists. Thus, for instance, Malaysia makes itself known with the following slogan: "Malaysia gives more than just natural advantages". This statement is connected not only with price advantage (more for less money) but with the natural potential of the country.

Consequently, tourism in Crimea has been formed under the influence of the international experience. Various factors have made impact on its development, namely system functioning of transport, hotel, catering, recreational infrastructure, last century economy recessions, and innovational logistic concept of population tourism needs satisfaction. Nowadays Crimea has all preconditions to take

rightful place in the international tourism market having all necessary material and technical, historic and cultural, and recreational resources.

“Crimea – because of tradition and need of heart”

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THE MODELING OF HEALTH RISK FACTORS IN RUSSIA

The article analyzes particular reasons, or risk factors, that cause the deterioration of public health. Most attention is paid to the ecological factor. The maximum permissible concentration of harmful substances in the atmosphere and water reservoirs in practically all the cities of Russia is exceeded.

The present research attempts to give not only analytical but also quantitative assessment of the influence of various factors (with the help of regression analysis) on the health condition of Russian citizens. A

forecast for the ecological-economic development of the Russian Federation by the year 2020 was made. Using the results of the forecast the influence of the ecological factor on the sickness rate was estimated.

The Russian economic development is characterized by serious enough health aggravation of the Russian citizens (Fig. 1).

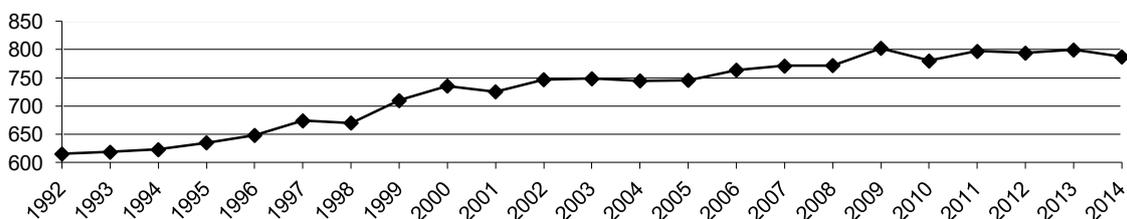


FIGURE 1. Morbidity in Russia (registered patients with the first diagnosed disease for every thousand people).
Source: Data of Russian State Statistic Committee

Public health is formed and supported by a combination of living conditions. Concrete reasons causing aggravation of health are called risk factors [Gilmundinov V.M., Kazantseva L.K., Tagaeva T.O., 2014]. Specialists of the World Health Organization believe that 20% of losing public health is connected with environment. This is an urgent problem for Russia, as its territory, especially industrial cities, is one of the most unfavorable in the world if state of environment is considered. Though it is accepted to believe in literature that the most important factors influencing health aggravation are social, we think that ecological factor is the main one among other risk factors influencing increase of sickness rate as it may influence all other factors. There is a great deal of toxic waste having a negative effect on the human body in the air, water and soil. There are about 200 of chemical compounds (carcinogenic multiring hydrocarbon, carbon dioxide, poison yellow lead etc.) in car exhaust fumes – the main air pollutants in cities. Radioactive substances are accumulated in troposphere because of testing nuclear weapon, nuclear reactor accidents and nuclear industry waste. Heavy metals, for example, mercury, lead, cadmium etc., polluting water and soil, not only cause diseases but influence chromosomal bond and educational abilities and memory. The following pollutants having ability to penetrate into all tissues and organs of a living organism and a human brain, cause the deepest nervous system disorders which lead to increase of mental diseases and suicides. Even if a person has a sound nervous system the organism has to mobilize its adaptive mechanisms when

unfavorable ecological factors influence the nervous system for a long time. The reserves of adaptive mechanisms gradually become exhausted and adaptive mechanisms overstrain themselves and collapse prematurely. As a result, diseases and unhealthy conditions develop.

The problems of ecological influence on health are analyzed of many researches, but quantity estimations of this influence either haven't been suggested, or have done on theoretical and regional level. In order to explain the dynamics of sickness rate of the Russian population we carried out a multi-factor analysis of indices that characterize the health condition of the Russian population depending on various factors. For this purpose, an information base for 2005–2012 was constructed. It included 80 subjects of the Russian Federation (oblasts, regions, and republics). There is the list of sickness rate explanatory factors: 1) Climatic: the difference between average temperatures in July and January (degrees C), average monthly precipitation in July and January (mm); 2) Medical-infrastructural: average number of hospital beds per 1000 people (by year end), number of doctors per 10,000 people (by year end), capacities of polyclinics (numbers of sick peoples' attendances to polyclinics a shift), share of medical expenditure in the state budget (%), medical expenditure per capita (rubles) in 2005 price; 3) Social: the share of expenditures on alcoholic drinks and in consumers' expenditure (%), level of criminalization (number of registered crimes per 100,000), the share of citizens in total population (%); 4) Economic: GDP per capita (rubles), the share of industry in GRP (%), the share of health care expenditures in consumer expenditures (%), the share of health protection expenses in consolidated region budget (%), the ratio of average per capita incomes to subsistence level (%), ratio of health care expenditures to subsistence level (%), share (%) of poor population (whose income less subsistence level); 5) Ecological: average per capita disposal of contaminated waste waters (cubic meters), accumulation per capita of water resource pollutants (kg), average per capita atmospheric emissions (kg), average per capita emission of greenhouse gases (tons CO₂ equivalent), greenhouse gas accumulation per capita (tons CO₂ equivalent).

The impact assessment of the considered factors (covariates) on the health of the population was used a standard regression panel model with fixed effects. Parameter estimation of regression equations was performed using the least squares method from 640 observations (data for 8 years from 80 federal subject). The correlation analysis indicated the presence of multicollinearity in the matrix of explanatory factors; in order to eliminate this multicollinearity, we dropped factors individually

for each regression equation. In order to be sure that multicollinearity did not occur, regressions of each independent variable onto another were evaluated. For all the obtained regression equations and their parameters, estimates were carried out via standard procedures of statistical hypothesis testing, which indicated their statistical significance at a significance level of less than 10%. The checking of the regression equations for errors heteroscedasticity showed its absence by the Glazer method.

Table 1 presents equation of sickness rate of the whole population of the Russian Federation. You can see the relatively low value of the determination coefficient. This can be explained by several circumstances. First, by focusing attention on the morbidity factors, which are general for the regions under consideration, we removed specific regional factors for which there are no wide official statistics from examination. Second, we can avoid building nonlinear regressions, that enable significant growth in the determination coefficient if correlation between the indicators is not linear, and instead focus on more understandable linear regression models and informal conclusions obtained on their basis. Third, the list of causal factors unfortunately did not include the incalculable factors, such as genetic predisposition to a certain type of diseases, excessive or insufficient nutrition, low physical activity, psychological state, etc. Nevertheless, despite the relatively low determination coefficient of the equation that characterizes general morbidity, we believe that the obtained estimates are of some scientific interest.

TABLE 1. Characteristics of equation of general morbidity in Russian Federation (the number of registered cases per 1,000 people)

| Variable | Measurement | Regression coefficient | Level of reliability, % |
|---|---------------------------------|------------------------|-------------------------|
| Constant | | 980.64 | 99.9 |
| Share of health protection expenses in consolidated region budget | % | -5.28 | 97.2 |
| Ratio of consumer expenses for medical purposes to living wage | % | -23.63 | 99.9 |
| Share of population with incomes lower than the living wage in total population | % | -6.67 | 99.9 |
| Number of doctors per 10,000 people | persons | 1.45 | 95.0 |
| Greenhouse gas accumulation per capita | tons CO ² equivalent | 0.92 | 99.9 |
| $R^2 = 34.2\%$; F statistics = 33.5; level of significance = 0.0 | | | |

Source: own elaboration using Eviews program package

The results visually demonstrate a key disadvantage of the general morbidity indicator, i.e., that it is formed based on the statistics of the first registered applications to medical institutions on the occasion of diseases instead of actual morbidity. A major disadvantage of the statistics of primary applications to doctors is that they do not give an objective idea of true morbidity, since the level of registration of diseases depends on the frequency of patients' applications for medical aid, which in turn depends on the following: the age structure of the population, the strictness of labor legislation, psychological and economic factors, quantitative indicators, and the quality of medical services (the potential of medical institutions, quantity and qualification of medical staff, and the level of diagnostic methods). In regions with low levels of medical services, the degree of disease detection can be low; however, this does not mean that the population of this region has good health. At a low level of welfare and strict working standards, the adult population prefers not to apply to doctors for sick lists due to fear of losing part of their salaries or jobs. The insufficient financial potential of the population also hinders paid medical examinations and, consequently, the detection of diseases. Therefore, it is necessary in future to search for alternative indicators of public health, which reflect the actual health state of the population more adequately with respect to the indicator "general morbidity." In spite of these disadvantages of giving equation we have essential effect – the negative influence of ecological factors.

The next stage of our research was concerned with constructing the forecast of ecological-economic development of the Russian Federation for 2015–2020. For forecasting the dynamic input-output model (DIOM) of the Russian economy with an environmental protection block (EP block) was used. This model complex has been developed in the Institute of Economics and IE SB RAS. A detailed description of the economic and ecological units of the model complex is given in the (Baranov et al., 1997; Tagaeva, 2011).

The model calculation was based on several scenarios of Russia's economic development in the period of overcoming the global economic crisis in 2015–2020: pessimistic scenario with slowdown of economic growth and optimistic scenario with acceleration of economic growth. The optimistic scenario is realized under hypothesis about oil prices increase and real ruble exchange rate strengthening beginning of the end of 2015, the revival of investment processes, the successful policy of import substitution, and the competent using of instruments of monetary and fiscal policy. The pessimistic scenario is implemented under

assumption of negative economic tendency prolongation of the 2014. Based on the results of the calculations you can see the future increase of environmental pressure, which will be expected in optimistic scenario (Fig. 2).

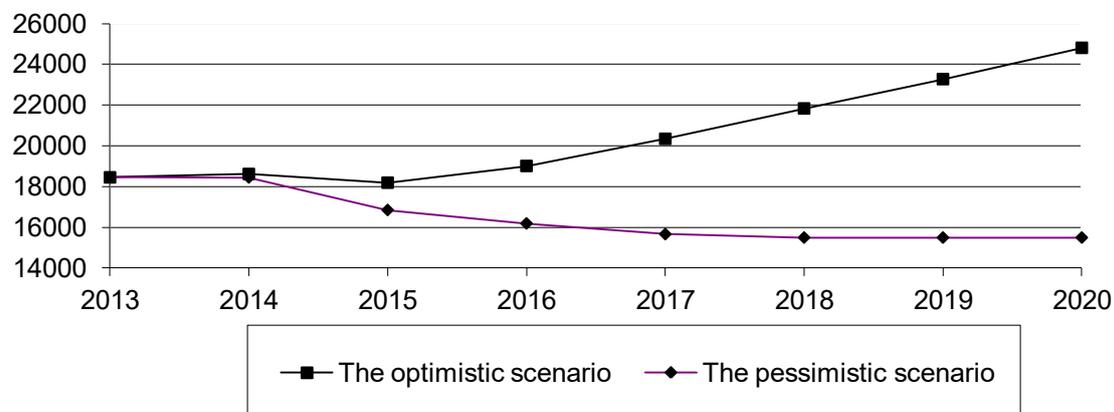


FIGURE 2. Forecast stationary emissions (thou tons).

Source: own elaboration using DIOM

According to this scenario emission will increase by 33% in 2015–2020, according to the pessimistic scenario – it will be decrease by 16% in this period. So, the optimistic scenario is more pessimistic from ecological point because of the most environmental pressure.

Having studied the most interesting results received during the econometric analysis of sickness rate of the Russian population and having received estimates of the amounts of pollution for the forecasting period, let us now to evaluate the effect of the ecological factors on the condition of health of the population of Russia in 2015–2020. For this purpose we will use the regression equation that will model the general sickness rate of the Russian (see table 1) and construct an interval estimate of the contribution of environmental pollution to the population sickness rate for the optimistic scenario.

The estimated value of the coefficient under the variable “Greenhouse gas accumulation per capita” accounts for 0.92 and its standard error is equal to 0.1187. It means that the increase of per capita emissions of atmospheric gases per one ton will lead to the growth of sickness rate of the Russian population by 0.724 to 1.116 of all the registered cases per one thousand people under the confidence probability of 90%. Taking into account the estimate of atmospheric emission dynamics received for 2015–2020, let us evaluate a change in the population sickness rate during this period under the influence of the

ecological factors taking the population size of Russia, in the period under review, as unchanged (table 2).

TABLE 2. “Freshly” sick in the population of Russia in 2015–2020 due to ecological factors

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--|-------|-------|-------|-------|-------|-------|
| The increase of greenhouse gas accumulation per capita (tons of CO ² equivalent per person in comparison with previous year) | 2.04 | 1.28 | 1.47 | 1.66 | 1.67 | 1.75 |
| The growth in the numbers of “freshly” sick by ecological reason (registered cases for every thousand people in comparison with previous year) | | | | | | |
| low level | 1.477 | 0.927 | 1.064 | 1.202 | 1.209 | 1.267 |
| high level | 2.277 | 1.035 | 1.187 | 1.341 | 1.349 | 1.414 |
| The growth in the numbers of “freshly” sick by ecological reason (thousand people in comparison with previous year) | | | | | | |
| low level | 212.2 | 133.2 | 152.9 | 172.7 | 173.7 | 182.1 |
| high level | 327.2 | 148.7 | 170.6 | 192.7 | 193.9 | 203.2 |

Source: results of forecast using DIOM

Thus the optimistic scenario forecasts that the greenhouse gas accumulation in Russia are expected to grow in period 2015–2020 on average to 1.65 tons of CO² equivalent per capita in year, which might lead to the growth in the numbers of “freshly” sick from 1026.8 to 1236.3 thousand people for forecasting period. We have to understand that really situation is much worse, because we consider only atmospheric pollution, but there are many other types of pollution.

Research results stated in the article, unlike other investigations in this area, give a numerical estimate of the influence of various factors on the health condition of the Russian population and present a forecast of the effect of ecological factors on total sickness rate. The set of dynamic intersectoral models used in the forecast makes it possible to take into account the influence of structural biases in the Russian economy, which occurred as a result of the world economic crisis, on the ecological situation and the number of “freshly” sick. The proposed approach combines the application of the advantages of intersectoral modeling methods and econometric methods for the purpose of analyzing and forecasting ecological-economic processes.

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SECTION X. Philology

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INTERPRETATION OF TIME AND MAN IN STORIES BY NAZAR ESHONKUL

By the end of the 1980s Uzbek readers discovered some new young authors. Nazar Eshonkul, a talented writer with an original individual style and a novel poetic thinking, is one of them. He has written more than thirty stories, several novels, short novels, essays, literary critiques, which have attracted the readers' attention. With his very first works raising debate in literary circles, the author tries to harmonize certain aspects of the Eastern and Western literature. This is possible as both the lifestyle and literature continue the tradition of creative loan by different peoples. Learning the literature of different nations, creative absorption of this contributes to the development of artistic thinking. That is why the works of Nazar Eshonkul focus on the descriptions of human soul, aspirations, ideals, described in original colors and reaching the level of aesthetic principles.

Most of the writer's works, particularly the stories *Urush odamlari* (*People of the War*), *Momoko'shik kissalari* (*Tales of Momoko'shik*, literally: *Mother's Songs*), *Yalpiz Hidi* (*Peppermint Odor*), *Shamolni Tutib Bo'lmaydi* (*You Cannot Hold the Wind*), *Azhr* (*Tribute*), *Sibizga Volasi* (*Sibizga Melody*), were influenced by folklore, and the writer is kind of finds his creative energy in it. For example, in an interview with Korean scientist Doctor of Philology Ms Ingyong, the author says: "Folklore provides a writer of each time period with enough stories, similes, philosophy, metaphors, and style. One just has to find, understand and use them. Folklore is like the sea, the more one draws from it, the more wisdom he obtains. Most of my works clearly demonstrate this. Some people, who do not know their folklore, call it a "Western influence"¹.

As noted by literary critics, literature is a primarily aesthetic phenomenon, its ancient and eternal theme being the human and his inner world. However, the human being in the focus of literature is, above all, the man of his time.

The story *Shamolni Tutib Bo'lmaydi* describes a person from a very recent past – the Soviet period, his psychological state, unhappy life due to the time he lives in, the "Time" which tried to deprive the nation of their identity, spirituality and national values, to sow enmity between people, robbing them of their beliefs².

The main character in the story *Bajna momo* is one of the victims of the Soviet policy which killed millions of Uzbeks. Not only the body, but the soul of the woman who in a moment lost both her husband and a child turn into a stone by hatred and sorrow. The force, that is the centre of the story and which made Bajna momo live fifty years, is that boundless hate, the fire of vengeance, blazing in the depths of her soul. Sometimes the writer leaves out this central theme, creating the impression that she had lost contact with the villagers and got used to living alone with her grief and memories of the past. Only in a few episodes with some details the author makes the reader pay a close attention, leading him to the climax. We understand this when we read the words of the heroine, addressed to the villagers: "There are no men in this village. Well, you, horse-rider Salim, why are you wearing your

¹Nazar Eshonkul. Mendan "Men" gacha.–Tashkent: Akademnashr, 2014, p. 222.

² There is a good reason why we write the word "time" with quotation marks. One of the heroes in the story by Nazar Eshonkul is called Zamon. This name can be translated as the time, period.

wife's pants?" Or, "What is it, Hakim Race track? Why are you grimacing like a mare?..."

The right understanding comes to us when, despite of these reproaches to the villagers, she did not say a word to the person, responsible for that tragedy – groom Zamon.

This is a story about inner rebellion, a soul turning into stone because of the grief. The author describes this condition using an antithesis. So great are the grief and the flame of vengeance in Momo's heart, so immense her outward calmness and patience are. The heroine of the story overcomes misfortune which deprived her of the husband and son, as well as all hopes, dreams, happy days, and she can do this because of her endurance, masterfully described in the story. The image of Momo living, at first glance, by her memories, reveals a strong character which has absorbed such personality traits as strong will, patience, loyalty, devotion, inherent in our nation and the whole mankind. The author describes Momo's strong will logically and truthfully.

The psychological state and emotions of Bajna momo have unusually strong images, like taken from a book. However, these descriptions help to understand her way of life, specific features of her personality, to feel the power that helps her live on.

Bajna momo's skinny, little body, crooked with grief, confronts the storm of suffering, the hurricane of hatred, hidden in her soul. This rebellious spirit cannot be stopped by any power, even the weakness of the body. Hence the name of the story...

The author's perspective in the story, the special features of Bajna momo's character, i.e. overcoming the grief of loss through willpower and courage, remind us of the image of a woman who lost her son, portrayed in the story of Japanese writer Ryunosuke Akutagawa *The Handkerchief*. The heroine of *The Handkerchief*, the mother, trying to hide her suffering and grief of loss, is barely holding the handkerchief with her fingers, trembling as she can hardly control the inner pain, as if it all will explode if she lets go of the handkerchief. Using an artistic detail – a handkerchief – the writer praises the best qualities, the inner strength of Japanese women, Japanese people. The image of Bajna momo celebrates universal human qualities, courage, inherent in the character of the Uzbek nation.

Famous literary critic Kozokboi Yuldoshev, upon the analysis of the story *Shamolni Tutib Bo'lmaydi*, wrote: "Nazar Eshonkul has managed to bring a new tone into the Uzbek prose of the independence period. His story *Shamolni Tutib Bo'lmaydi* fascinates the reader not

only with novel methods of artistic expression and representation of human nature, being in the center of the author's attention, but also its special tone and intonation. Such works of art, creating the artistic atmosphere with the melodious narrative, are rare in our national literature. Nazar has enriched our national prose with melody, unique in a way it reflects the features inherent in the Uzbek nation"¹.

No-one in the village, even the police, does not dare to suspect a small, gray-haired, weak old woman of murder.

The denouement comes after the death of Bajna momo. Before washing the dead body, they open a chest and find the clothes prepared for this day, white cloth, bracelets that she wore when she was young and married, a yellowed book – the Quran, an amulet with dried blood, and finally – ten fingers, turning into ashes after so many years of storage, and everything becomes clear...

The image of Bajna momo, who did not show the storm raging in her heart, absorbing the human qualities inherent in Uzbek people such as pride, dignity and thoughtfulness, provides a bright illustration of the Soviet period; it makes the people of the county to stop and meditate on this, now in the time when people are losing their spiritual values, their unity, driven by the psychology of fear.

In this regard we would like to quote the author himself: “the skillful reflection of suffering denotes even greater grief experienced by the writer. The work of art which brings us enjoyment is created with pain and suffering of the writer”².

The skill of the author is revealed in this story through the poetic expression of the truth – constraining power which calls for a great deed is not in the human body, but in his soul, when every feeling rising into the heart whether it is love or hatred, drives a man, leads him to the goal set, regardless of any suffering.

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¹ Yuldoshev K. Yonik so'z. Tashkent: Yangi asr avlodi,2006. - p.81-82

² Nazar Eshonkul. Mendan “Men” gacha.–Tashkent: Akademnashr, 2014. -p. 185.

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On one type of the metaphorical models

An increasing interest in the study of metaphors is at present moment a characteristic feature of the linguistics development. This study was conducted in the framework of conceptual and metaphorical theory of J. Lakoff and M. Johnson [3]. According to their theory, the metaphor is formed by the interaction of two knowledge structures – cognitive structure of the “source” (source domain) and cognitive structure of the “target” (target domain). Stable links between the source domain and the target domain fixed in the language and cultural traditions of the society are called “conceptual metaphors” [1, 11] or metaphorical models. Exploring ways of denoting such concepts as PHYSICAL ABUSE, PUNISHMENT and DISAPPROVAL in various languages, we have identified the following metaphorical model: PHYSICAL ABUSE / DISAPPROVAL / PUNISHMENT REPRESENT THE IMPLANTATION OF FOREIGN ELEMENTS INTO THE OBJECT. These concepts are parts of similar conceptual field, which makes it possible to reconsider them from the perspective of the same target domain, while the proposed model acts as the basis of visual motivation of figurative meanings of lexical items and idioms the type we are exploring.

Actions or processes that may be regarded as the “implantation” of foreign elements or substances into an object have a different nature:

1. These can be actions associated with cooking – such as, for example, stuffing, seasoning with salt, sugar, spices, etc. The “gastronomic metaphor” is very typical of French language. Here are some examples: a) *assaisonner* ‘to put seasoning into something, to flavor’ – figuratively ‘to beat, to batter’; ‘to scold, to call over the coals’; ‘to punish’; b) *saler* ‘to add salt’ – fig. ‘call over the coals, give somebody a thrashing; severely punish’; c) *sucrer* ‘to put sugar’ – fig. ‘to beat, to batter’; ‘to punish’. We can find similar expressions in English language: a) the verb *to pepper* also means ‘to criticize, to scold’; b) the predicate *to salt down* in American English means ‘to give a thrashing’.

2. These may include actions such as tinning, stuffing, plugging, etc. For example: a) *bourrer* (French), this verb’s meaning ‘to beat’, ‘to be mean to somebody’ is associated with an idea of filling the inner

space of an object with a certain material (*bourre* ‘stuffing, stuffing material’), i.e. with “implantation of foreign elements into the object”; b) *étamer* (French) ‘to tin’ – fig. ‘to beat’, ‘severely punish (in case of a repeated offense)’; the action ‘to tin’ can also be regarded as ‘implantation’ since it results in an object being covered with a layer of foreign matter, forming an amalgam with it; in) *tamponner* (French) ‘to plug; to tampon’ – fig. ‘to beat, to give a bashing’.

3. They may be actions or processes, saturating the object with some substance – ‘to oil’, ‘to wet’, etc. For example: a) the verb *to soak*, which means ‘to plunge something into the water, to wet’, in American English has some figurative meanings like ‘to give a beating, to whop, to batter’, ‘to criticize’; b) the Spanish verb *mojar* ‘to wet, moisten; to dip’ also means ‘to strike with a knife or a dagger’; c) the French verb *graisser* – ‘to grease’ – also means ‘to beat’. It should also be noted that the verb *graisser* does not simply mean greasing an object with some substance, but also ‘greasing it, soaking it with this substance’: *graisser* – “enduire d’un corps gras” [7] – ‘saturate it with a fatty substance’ (*enduire* – “recouvrir une surface d’une matière plus ou moins molle qui l’imprègne” [6]). In American English the verb *to grease*, which has French roots, also has a meaning ‘to kill’. The abovementioned processes may be represented through the rain, especially – a heavy rain or a shower (cf. *exposed to rain and soaking wet*). However, in different languages we may find the idioms with a meaning of ‘rain’ or ‘shower’ which denote figurative meanings of ‘battering’, ‘damaging’ and ‘scolding’, etc. For example, the Spanish words *chaparrón*, *chubasco*, *aguaje* meaning ‘a heavy rain’ in Latin America are also used with a connotation ‘rebuke, scolding’.

4. This may refer to movements directed inwards an object. For example, when interpreting the expression *rentrer dedans* ‘pounce on somebody, give it to somebody’ [literally ‘penetrate (again)’], the authors of the dictionary “Dictionnaire des expressions et locutions” write [7, 261]: “This expression is a generalization of the phrases *rentrer dans le chou, dans le mou, dans le lard, dans le tas (à quelqu’un)* in which physical aggression is compared to the penetration into another person’s body” (emphasis added – E.I.). In addition to the phrases in the quotation from this dictionary, there are a number of combinations with the verb *rentrer* which mean ‘physical abuse’: *rentrer dans le blair* (literally ‘penetrate (again) into the nose’), *rentrer dans le bide / le bidon* (literally ‘penetrate (again) into the belly’), *rentrer dans le ventre* (literally ‘penetrate (again) into the stomach’), *rentrer dans la gueule*, *rentrer dans le portrait*, *rentrer dans le cadre*

(the literal meaning of the last three expressions is ‘to penetrate (again) into the face’: *une gueule, un cadre, un portrait* – ‘a mug, snoot’], *rentrer dans l’oeuf* [literally ‘penetrate (again) into a bald pate’; *un oeuf* – a colloquialism for ‘bald-head’), *rentrer dans la viande* (literally ‘penetrate (again) into the flesh’).

5. This may refer to an excessive consumption of something. A too large serving, overfilling the stomach – “bad” food (especially food causing a feeling of suffocation), “alien” to the human body, harming it. In this regard, let us compare Anna Zaliznyak’s interpretation of one group of Russian verbs which have the prefix “za-”. The latter makes explicit the connection between “excessive” and “harmful”: “za – V + X (accusative): ‘produce effect V’ excessively, until the object X is damaged or destroyed” [2, p. 317]. Here are some more examples from French language: a) *s’en mettre (en prendre) plein la gueule* (French) ‘to gorge, to overeat’, which is figuratively used as ‘to get a beating, to be beaten’ and ‘to suffer from emotional distress’; b) *se goinfrer* – ‘to guzzle’ and ‘to catch it, to get a term’; c) (*se*) *morfler*, which is derived from the verb *morfier* – ‘to guzzle, to overeat’ (see, e.g., [5]) in the modern language means ‘get it (a smack, etc.)’ and ‘get a term’. The verbs meaning ‘having a meal’ are also used as ‘to be smacked’, for example, if the absorbing object is represented by inedible items: *manger une grosse tête* ‘get a thrashing’ (literally, ‘to eat a big head’); *bouffer de la tête de cochon* ‘to get hit (in the stomach)’ (literally, ‘to eat a pig’s head’), etc.

6. The metaphorical model PHYSICAL ABUSE / DISAPPROVAL / PUNISHMENT AS THE IMPLANTATION OF FOREIGN ELEMENTS INTO THE OBJECT can also be found in Russian language. Compare, for example, Russian verbs *vlepit* (direct meaning – ‘to fix the object by inserting something sticky, viscous’), *vmazat* (direct meaning – ‘to insert, strengthen with something sticky’), *vsypat* (direct meaning – ‘to put, to bulk’), *vrezat* (direct meaning – ‘to insert into a cut-out space’), *vletet* (‘fly into’ as ‘to catch hell’), *vteret* meaning ‘to strike’ (thieves’ slang, direct meaning – ‘rubbing, make it soak in’), *vpilit* (‘to hit’), *vrubit* (‘to hit’, ‘to punish’), *vsadit* (‘to hit’; ‘to sentence’), *vkleit* (‘to hit’; ‘to punish’, ‘tell off’), *vklepat* (‘to hit’), *vlomit* (‘to strike’); *vmochit* (‘to hit’), *vpayat* (‘impose penalty or punishment’, etc.) [4] and others.

Summing up, since the presence of foreign elements or substances in the object is interpreted as negative, aggressive, it is possible to use the model considered by us to conceptualize other activities or processes, regarded by the society as negative – such as a theft or a

fraud. For example: the verb *assaisonner*, apart from connotations ‘to beat, to batter’; ‘to scold, call over the coals’; ‘to punish’ also denotes ‘to rob somebody’. Similarly, the verb *saler*, apart from connotations ‘call over the coals, give somebody a thrashing; severely punish’ is used as ‘to rob somebody’. The verb *sucrer* means ‘to beat, to batter’, ‘to punish’, ‘to steal’ and ‘to trick’.

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Towards the possibility of defining prototype schemes of technical terms relations in semantic networks¹

A lot of attention is paid today to the study of naïve and academic knowledge organization and its reflection in the language. Building semantic networks is one of the approaches to model different pieces of the world map to solve various applied and theoretical problems such as the development of expert systems, glossaries, Semantic Web, etc. The structural elements of each semantic network are vertices and arcs that represent semantic relations between the vertices. The diversification of principles and approaches to semantic networks construction usually stem from the project objectives and the specificity of the research material. Thus, WordNet that is a lexical reference system developed in the USA is based on synsets that are blocks incorporating the meanings of synonymous lexemes. The meanings of polysemantic lexemes belong to different synsets. The synsets are interlinked by the relations of hyponymy and meronymy [Fellbaum, 1998]. S.A. Zhabotynska relies on the principles of network semantics and builds a conceptual network to study the genesis and development of the meanings of a polysemantic lexeme that are the structural elements of the network [Zhabotynska, 2013]. D.V. Lande suggests a conception of automatic construction of networks of natural hierarchies of terms, where the vertices are represented by individual terms and the links reflect the occurrence of one term in another, i.e. word building processes when one term is used in the underlying form of a derived multicomponent term [Lande, 2014]. A terminological network is a semantic network the vertices of which are represented by technical terms linked together by binary relations of preselected types. [Malkovskiy, Solovyov, 2012]. Thus, a terminological network is a model of knowledge organization within a given field of science. Since technical terms may verbally express mental constructs of various categories, such as **variable star** (Object of natural environment), **accretion** (Process), **habitable zone** (Locus),

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galactic year (Ideal phenomenon), **metallicity** (Characteristic), we claim that the conception of terminological network construction should be based on the diversification of the vertices types in accordance with the types of notions that technical terms generally express, as well as the differentiation of semantic relations that exist between them and not limiting them to the opposition of taxonomic and the synthesis of other relations (has-reference-to relation) without identifying them as it has been previously suggested in some papers.

Specification of vertices types reflects the natural stratification of technical term within a terminology according to the categories of notions they express and whose referents may be material or non-material. The material ones are subdivided into referents of natural origin among which are *object of natural environment*, *natural substance*, *locus* and that are man-made among which are *instrument*, *mechanism*, *man-made material*, *man-made locus/construction*. To the non-material refer *process*, *characteristic*, *ideal phenomenon* (that is an abstraction necessary for further academic knowledge development in the field such as methods, values, for example **kilobyte**, etc.), *situation* and *actor*. The results of the definition analysis have proved that vertices are linked by the semantic relations of the following types: *AKO* – “a kind of” (the relation between the generic term and its direct hyponyms), *ISA* – “is a” (the relation expressing concurrence or inclusion into some aggregate that is not the direct generic term), *PISA* – “partially is a” (the relation expressing that some representatives of an aggregate are also incorporated into another aggregate), *PO* – “part of” (the relationship of meronymy, links the referents that are considered to be a part of another referent), *At* – “attribute” (the relation with characteristics and properties), *Ag* – “agent” (the relation linking the process with the doer), *Obj* – “object” (the relation between the process and the object under influence), *Loc* – “locus” (the relation pointing at the location), *Sr* – “source” (pointing at the initial position of the referent), *Rec* – “recipient” (links the referent with the concept expressing the final position), *Inst* – “instrument” (a relation with the referent that is seen as an intermediary or an instrument to attain some aim), *R* – “result” (the relation linking the referents seen as the reason and the result). A separate case is the *Sub* – “subordinate” relation that links the referents belonging to the actor category (superiors and subordinates, for example, a **physician**, a **head nurse** and a **nurse** in the medical terminology) and is unequally represented in different terminologies. It is also used to build up classifications like *AKO* for other categories of mental constructs.

The research of the terminological network construction process and the analysis of the systemacy of technical terms the cases of stereotypic organization and interaction of adjacent vertices belonging to one or different types. The latter points to the presence of prototype structures in the systemic organization of pieces of academic knowledge represented by technical terms. Thus, the vertex of a given type may be related to a certain set of vertices of other types by means of specific semantic relations. For example, a Process vertex may be linked to an Actor, Instrument, Mechanism, Natural object vertices by means of an Ag relation that have the potential to act as initiators of an action, expressed by a technical tem. It is worth noting that the presence of such relation is potentially possible but not obligatory for the technical terms that constitute any of the mentioned vertices because a referent may not initiate a process, expressed by a technical term at all or otherwise if it does, such an action may not represent a concept of the field of knowledge that is expressed by a separate technical term. A Process vertex also has a potential to set up relations with an Actor, Instrument, Mechanism, Natural object, Substance, Material and Construction vertices by means of an Obj relation because their referents may act as the objects under influence of the process. The Ag and Obj semantic relations do not connect Process vertex with all the given types of vertices, for example, such relations are impossible with a Charateristic vertex. Likewise such relations are not set up between two vertices if one of them is not a Process vertex, for example, between Locus and Mechanism vertices. The vertices cannot be considered to be constituents of a process and be related to the correspondent vertex by means of a PO relation, because they act as initiators, objects under influence, results/production of the process, etc. A PO relation however may connect a Process vertex with the vertex of the same type because some processes may be considered as constituent parts of another process, as well as link it up with a Situation vertex the referent of which expresses the peculiarities of interaction of other referents of this field of knowledge. For example, a PO relation connects the technical terms **dogfight** (Situation vertex) and **fighter, fighter-bomber** (Mechanism vertex), **frontal attack, dive attack** (Process vertex), **air-to-air loss** (Situation) as well as various types of armaments depending on the specificity of an **aerial combat**.

A Characteristic vertex sets up a limited number of types of arcs with adjacent vertices. Thus, it is connected with vertices of other types by means of an At relation because it represents a relation between a primary and secondary pieces of scientific knowledge with the fact

being reflected in definitions. This type of vertex may also be related to an Ideal phenomenon, Mechanism by means of Inst relation, for example, the referents of the technical terms **ampere**, **ammeter** by means of which **current strength** is measured. It can also potentially have hyponyms (if any) by means of an AKO relation for example, **space velocity** that is subdivided into **orbital velocity**, **parabolic velocity**, **solar escape velocity**, etc. Thus, different types of vertices representing information blocks are characterized by a specific set of potential prototypic schemes of interaction with adjacent technical terms that may be manifested or not manifested. The manifestation of the schemes depends on the presence of the adjacent technical terms of the correspondent types of vertices.

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Some optical illusion devices in literature (in the context of the prologue to the novel *Angels and Demons* by D. Brown)

The essential element of a thriller as a movie genre and a thriller in literature is the enlargement of the narrative in a movie and the amplification of visual representation of action in literature. What characterizes a movie, for instance, is the creation of images designed to increase emotional sufferings of a viewer. Contemporary literary process suggests devices useful for creating an illusion of visual

impressions that could bring a reader closer to everything happening on the pages of a literary work, making the reading more emotionally captivating.

In a thriller as a movie genre the communication with a viewer originates on the principle of the most persistent paradigm “I see – I feel – I experience”. In a thriller as a literary work there arises a necessity of constructing a specific paradigm of communication with a reader, where the first element “I see” could be replaced with “I imagine”. While in terms of movies all the elements of the paradigm are clear, contemporary literature mobilizes all the accessible imagery devices in order to achieve the illusion of visual effects. The process of amplification of visual representation in literature can be demonstrated more interesting using the example of a thriller genre in particular, which gained its modern features during the golden age of action movies.

Amplification of visual effects in literature may be exemplified by the analysis of the prologue to the novel *Angels and Demons* (2000) by Dan Brown.

The text of the prologue includes approximately 150 words forming 8 paragraphs. The period of actions amounts to a few minutes. What causes visual representation of the gruesome torture which the character of a physicist Leonardo Vetra is being put to? How does the author express the maximum emotional tension?

The effect of maximum intensity of the action is created using the method, that in the film art is defined as the cross-cutting method, and it represents one of the forms of generating the essence when demonstrating various images altogether. In a literary work one of the elements of building up the intensity of the visual image formed is the spatial property of the position of the characters relative to each other. «He stared up in terror at the dark figure looming over him». [1] Considering a typical for a prologue situation of defining the basic conflict which will unfold through the story line in the main part of a novel, it may be assumed that the opposition of characters represents the essential conflict of two attitudes which owing to indecent atrocity leading to the death of the one and committing a crime by the other becomes a choice between life and death.

The description of the torture itself is given by showing the pain and emotional sufferings of a character: «smelled burning flesh», «hiss of broiling flesh», «cried out in agony», «drifting toward unconsciousness», «the darkness was closing in» [1]. It intensifies to the full the emotional empathy towards the character at the moment of his

suffering. The effect of such description creates an illusion of synchronism of the action and the viewer's perception of it, which is the essential condition that makes the viewer go through certain emotions. Most commonly this condition is fulfilled in the movies with its visual form of existence that can perceive the event and experience it. Similar to this phenomenon in a literary work are the phrasal unities that in the context of maximum economy of lexical devices record the maximum number of changes, creating an illusion of the action.

The method of cutting as a device can be observed in showing the events the interrelation between which is determined exactly by their accurate sequence, intensifying the illusion of the time line compression. «The intruder pressed down again, grinding the white hot object deeper into Vetra's chest. There was the hiss of broiling flesh» [1]. The colour grade «dark figure looming over him», «white hot object» is aimed at visual perception of the described scenes. Also the intense action effect arises from opposing two characters of the prologue in the context of accuracy and nebulosity of outlines. Once again it is the visual properties of the images created by the author that catch the eye. The Physicist Leonardo Vetra is identified by his name that is repeated very often: «Physicist Leonardo Vetra», «Vetra's chest», «Vetra cried», «Vetra fought...», «Vetra screamed». The figure of his torturer is presented by an obscure image of penumbra and uncertain sounds: «dark figure» «the raspy voice», «the intruder», «the figure glared attacker». Obviously, imagining Leonardo Vetra, who is identified by the exact name, suffering but keeping his mind clear, is easier than imagining some misty image of his torturer, whose obscure shape both externally and internally refers to mysterious medieval figures, stricken by mystical sense of destruction for destruction, by sadism for achieving some irrational preferences in one world or another. However, the opposition itself, represented by visual and symbolic images, can create certain mood for the perception of the main conflict. In other words, the main conflict is with the utmost clarity defined as amplification of the events intensity. The illusion, the lack of time split between a reader and a work being read, in its turn, is created by using the cutting method similar to the one used in the movies.

Thus, the prologue to the novel serves the function of articulation of the main conflict, thus transforming not exactly conventional for literary activity visual forms of presenting the matter, typical for quite another form of art, into the language of symbols. It may be stated that contemporary literature in the context of a thriller creates its own

narrative style based on achieving the maximum emotional tension used in the modern motion picture.

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**National Auto- and Heterostereotypes
on Human Behavior in Novels and Short Stories
by W.S. Maugham, A. Huxley and E. Waugh**

Stereotypization is a process targeting all key aspect of human life. Stereotype is a social, nationally motivated double-natured phenomenon. One of the most popular linguistic approaches to differentiation of stereotypes is based on their targeting, i.e. external and internal. There are stereotypes based on a people's images of themselves and those that are based on a people's image of other ethnic groups [Adamova 2005, p. 88; Vladimirova 2004, p. 72; Khotinets 2005, p. 35]. Some scholars consider gender-focused stereotypes in different linguocultures from the point of view of their internal and external nature [Anosov 2013; Kuznetsova 2012]. In this connection V.A. Maslova introduces the term "autostereotype" to denote a people's self-image and the term "heterostereotype" to denote image of other peoples [Maslova 2001, p. 108].

This article presents national autostereotypes and heterostereotypes typical for English linguoculture of the first half of XX century found as the results of analysis of novels and short stories by W.S. Maugham, A. Huxley and E. Waugh.

Analysis of the abstracts of the novels by W.S. Maugham, A. Huxley and E. Waugh brought out stereotypes related to human psychological features that existed in Post-Victorian English linguoculture.

Below there are some examples of heterostereotypes about psychology and behavior of representatives of other cultures:

France:

Kitty thought it unnecessary to have told her that the Mother Superior belonged to one of the great families of France; there was that in her bearing which suggested ancient race; and she had the authority of one who has never known that it is possible to be disobeyed [Maugham 1934, p. 144].

I've known a great many artists, and I've always found their mentality very interesting. Especially in Paris [Huxley 2001, p. 19].

And the French aren't so damned technical [Maugham 2000, p. 183].

"Of course, we know that English actresses are not like French ones...It's almost an understood thing for a French actress to have a lover." [Maugham 2010, p. 131].

But the French, I think, have an attachment to their country which is almost a physical bond [Maugham 1934, p. 128].

... showed that the innuendo of French farce is not so unknown to the upright, honest Englishman as might be supposed [Maugham 2011, p. 27].

USA:

He had been taught to look upon Americans as wild and desperate barbarians [Maugham 2004, p. 179].

...the acidulous humour with which the American treated the Church of England disconcerted him [Maugham 2004, p. 225-226].

They say the Americans are awfully hospitable and I shall get a lot of free meals [Maugham 2010, p. 25].

Germany:

The Germans were gross and life there was common; how could the soul come to her own in that prim landscape? [Maugham 2004, p. 251].

Italy:

I'm just the ordinary normal Englishman. I'm not an Italian organ grinder [Maugham 2010, p. 32].

Russia:

Generally speaking, Russians are not shy about using their titles, are they? [Waugh 2008, p. 15].

Spain:

...for the Spaniards were too idle, too proud and too dissipated to engage in menial pursuits [Maugham 2009, p. 9].

Analysis of the examples beyond present that representatives of English linguistic world image of the early XX century used to attribute to French national character such features as authoritativeness, creativity, concern of ceremony, focus on love, attachment to home. French character is the most frequent to refer to in the analyzed material. Another national character often mentioned in the novels by W.S. Maugham, A. Huxley and E. Waugh is American. The analysis results says that British people of the first part of the XX century thought Americans to be wild, cynical and hospitable. Russian

people were depicted with a focus on their way of demonstration their titles and affiliation to high society.

The example rendering the image of Italians needs a more detailed analysis. There is no direct estimation of behavior typical for Italians. Still, there is an opposition of a “normal Englishman” to an “Italian organgrinder”. In the above-mentioned example this kind of lifestyle is unacceptable. If reflected through the definition given in the dictionary, it is possible to outline such character features of Italian as filibusterism.

Still, the bigger part of research material refers to Englishmen (26 abstracts). It must be mentioned that the public opinion is rendered by the characters who are Englishmen and Englishwomen themselves. Thus, it can be concluded that these are autostereotypes. 14 most remarkable autostereotypes were selected:

Comfort-loving: Strickland was distinguished from most Englishmen by his perfect indifference to comfort [Maugham 2000, p. 83].

Modesty: ...was it that his English modesty was shocked at her nakedness? [Maugham 2004, p. 92].

How English you are, Teddy so shy of talking about personal things, intimate things [Waugh 2003, p. 41].

Honesty: Tom's a very good type of clean honest English boy and he's by way of being a gentleman [Maugham 2010, p. 94].

...the French farce is not so unknown to the upright, honest Englishman as might be supposed [Maugham 2011, p. 27].

Cosmopolitanism: We English have no very strong attachment to the soil. We make ourselves at home in any part of the world [Maugham 1934, p. 128].

Ready for compromise: Dick, who was a real Englishman, arrived at a satisfactory compromise [Huxley 1920, p. 44].

Stolidity: "A curiously untypical Englishman to be a national hero? So emotional and lacking in Britannic phlegm." [Huxley 1920, p. 154].

'Well, we've finished dinner and set a fine example of British phlegm,' said my wife [Waugh 1960, p. 127].

You would think him so calm and English [Waugh 1960, p. 52].

Patriotism: ... how a man who was so intensely a patriotic Englishman could have done such a thing [Huxley 1920, p. 155].

Tactfulness: Englishmen are so gentle and considerate [Waugh 2003, p. 41].

Purity of morals: I shouldn't have thought it was necessary to tell an Englishman that purity of morals is a national tradition [Huxley 1920, p. 155].

Reticence: It is our English tradition that we should conceal our emotions [Huxley 1920, p. 191].

...assumed an English softness and reticence [Waugh 1960, p. 117].

My wife's softness and English reticence [Waugh 1960, p. 120].

Kindness: Sometimes when I look back at my life, especially at times like

this among lovely old English things and kind people [Waugh 2003, p. 41].

... with upper-class English graciousness [Huxley 1950, p. 10].

Calmness: You would think him so calm and English [Waugh 1960, p. 52].

Snobbism: English snobbery is more macabre to me even than English morals [Waugh 1960, p. 139-140].

Conventionalism: ...being smug and self-satisfied and conservative, like the English [Huxley 1950, p. 224].

As a result of the study of the lexical units selected in the abstracts of the novels by W.S. Maugham, A. Huxley and E. Waugh where characters' behavior and temper are described, it was found out that most of the lexical units have positive axiological connotations (*modest, honest, clean, upright, patriotic, gentle, considerate, soft, kind, well-bred*). There are some case when axiological connotations are not obvious and it is possible to clarify them (*shy, unemotional, calm*). Lexical units that gave negative connotations are *phlegmatic, reticent*. Thus it can be concluded that autostereotypes typical for English lingoculture of the first part of the XX century that were related to the national character features are mostly positive.

Another specific feature of depicting characters' temper and behavior is that is carried out through speech of other characters and so-called "background character". That is the way an author renders the opinion that existed in the society but were shared or not shared by him. It is interesting to trace how in the examples below English character is described as a tradition:

I shouldn't have thought it was necessary to tell an Englishman that purity of morals is a national tradition [Huxley 1920, p. 155].

It is our English tradition that we should conceal our emotions [Huxley 1920, p. 191].

Thus, the comprehensive analysis of stereotypes represented in the abstracts of the novels and short stories by W.S. Maugham, A. Huxley and E. Waugh where characters' temper and behavior are depicted, motivates some important conclusions. It was found out that the most of the stereotypes are related to nationality. In 63% of all cases these are autostereotypes that shows that Englishmen tend to demonstrate their nationality due to patriotism and being proud of their national character.

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MEDIA DISCOURSE. ECONOMIC MEDIA DISCOURSE OF THE CRISIS PERIOD

The media discourse is one of specific kinds of a modern discourse. Complex research of mass media discourse has begun relatively recently and it tends to be interdisciplinary. Very different scientific disciplines among which linguistics, sociolinguistics, discourse analysis, semiotics, the theory of communication, sociology and social psychology are involved in studying of the mass media language.

Discourse analysis, and in particular, critical discourse analysis approach to mass media language studying is getting more and more popular nowadays. Many researchers such as Norman Fairclough, Roger Fowler, Alan Bell, Danuta Rhee John Richardson, David Kynaston are engaged in studying of a media discourse.

Media discourse represents a type of discourse in studying of which it is necessary to take into account such aspects as an inclusiveness in social, economic, ideological context, and also joint designing of meanings by various participants of mass communication.

In our research we define media discourse as interactive process of mass media communication with the audience, as opposed to the text in which the result of deployment of media discourse can be found. [6].

Media discourse reflects features of mass consciousness and, on the other hand, participates in the organization of mass media audience consciousness and, thus, possesses "the hidden power" over society [2, p. 43].

While analysing media texts it proves to be of a particular importance to study the interrelation of the author and the addressee as the audience interprets the obtained information in a special way depending on various factors (age, background knowledge, the context of reading etc).

Another crucial aspect is research of the language identity of the addressee since authors of media texts are in many respects guided by possible values and mindset of the audience, thus carrying out selection of material and the choice of statements.

The addressee impact is obvious in all kinds of the media discourse, including the discourse of the economic press.

The economic discourse possesses features of both institutional, and personally focused discourse. [3]. Among the main characteristics of the economic discourse one can distinguish openness, availability, figurative sense, stability of the subject.

Many researchers consider economic discourse as semiotic system with a specific world view, concepts, functions and purposes, as a linguo-cognitive phenomenon reflecting the surrounding reality in an unusual way, and designing its own special reality. There are two layers of the economic discourse, one of which is represented by the cognitive structures, and another one is made up of linguistic components. The sublanguage of the economy is considered to be a language correlate of a certain mentality, revealed in the discursive texts.

The subject field of the media discourse includes the concepts forming its thematic and semantic essence. Thus, the economic discourse functions on the basis of concepts "economy", "money", "enterprise", "buyer", "goods", etc. Diverse verbalizations of the concept "money", names of various financial institutions such as banks, funds, trusts, operations with money and their analogs belong to the main indicators of the economic discourse.

The economic discourse is widely presented in mass media in the form of reviews, analytical articles, specialized editions.

Economic discourse is a special, directly related to the extralinguistic factors discourse type. Even the economy itself can be analysed as discursive practice i.e. as an infinite series of separate decisions of people who attribute values to the events and objects all together making the "economy" [2, p. 144].

The most important trait of modern economic, social and cultural changes is that they exist as discourses, and the processes happening outside a discourse are substantially formed by discourses [1].

According to Norman Fairclough, the social order of a discourse represents structuring of institutional orders of discourse separate structures which can change throughout social changes, social fight, etc. [2, p. 198]. Therefore, critical discourse analysis (CDA) can be used when studying changes, and turning points in development of the society such as financial and economic crisis.

Crisis constantly accompanies society and represents a turning point when a lot of things in life of the society and people change. Not only the sphere in which crisis breaks out, but also areas, adjacent to it, and the language reflecting the events at various levels are exposed to changes. The discourse of the crisis period considerably differs from a

discourse of quiet, not crisis periods, and therefore it needs a specific research.

According to G. Lakoff and M. Johnson opinion expressed in a famous book "Metaphors we live by": "If the metaphor influences decision-making process in problem situations, then the quantity of metaphors has to increase during the periods of social and political and economic crises" [4, p. 17]. Authors write about functioning of a metaphor, however the idea can be extrapolated to the overall language of a crisis period.

One of the spheres of public life, where changes occur constantly, is the economy. There can be crushing blows such as, for example, oil crisis or a collapse of world trade and production during the Great Depression. There are also changes which happen gradually such as a slow decline in the economy (Eastern Europe, Latin America from 1950 to 1990). [5, p. 8].

The world economic crisis of 2008-2009 has been one of the most severe recessions over the last few decades, and it has been the talk of the town for a long time. Our research of the economic media discourse is devoted to the thorough examining of crisis media texts based on famous economic editions "The Wall Street Journal", "The Financial Times", "The Economist". [6].

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Figurative description of human movements in spoken language (a study of metaphors and similes)

There are numerous philological works devoted to the study of imagery and figurative language in belles-lettres and journalism, whereas their role in spoken language (hereinafter – SL) has not been investigated properly.

The imagery – metaphors and similes – is used in SL to provide a figurative description of a person: his physical appearance, intelligence, behavior, character, psycho-emotional state, the way of movement/motion, the manner of speaking, human relations, financial situation, and work. In addition, in SL the imagery also describes objects belonging to the people’s living space, everything that we consider important, relevant and necessary: food, clothing, household items, buildings, facilities, and pets [2].

The figurative language makes the speech vibrant, original, rich, and it allows us to express the whole range of human emotions, promoting the effective interaction and preventing communication risks. It also enables us to avoid being unnecessarily categorical in our communication [5].

The article analyzes metaphors and similes used to figuratively describe the movements of a human.

The study is based on the voice recordings and written notes of colloquial speech collected by the author.

Spoken language, as a rule, provides a figurative description for all things that attract the attention; this goes beyond accepted norms, being unusual and noticeable. The anthropocentric nature of SL facilitates the figurative description of the human himself and the reality he lives in. For example, in this study we came across a group of metaphors and similes which describe the manner of human movements. Ranging the manner of human movement on the scale “fast – slow” is the basic metaphor and is most frequently seen in the semantic field of motion.

Researchers note that in Russian linguistic worldview, many verbs of motion can be used in two ways: descriptive and interpretative. “The descriptive mode requires an indication of the movement by this or that specific way. Whereas in the interpretative mode the speaker wants not

only to describe the manner of a movement, but express their assessment of it. For example, the verb *плестись* (to tag behind) implies that someone, from the speaker's point of view, is too slow; cf: *Ну где ты там плетёшься?* (Well, where are you tagging behind?" [1, p. 272].

The speech can have a humorous description of a smooth prance, especially that of a woman: *Смотрю вчера Татьяна по проспекту проплыла / вся такая важнецкая // (Yesterday I saw Tatyana floating along the avenue / being so self-important); the speed of the movement (fast/slow): Из дома вылетела / взять ниче не успела / надо в столовую тогда спуститься //(Took off like a shot/ didn't have time to take anything / should go down to the canteen then//); Я вчера до почты / еле доползла / ноги не ходят совсем //; (Yesterday I walked to the post office / at a snail's pace/ legs fail to walk properly//); the intensity of the movement: (neighbors, two ladies A. and B. met at the entrance; they had already met in the morning) А: Добрый день / еще раз / Б: Что-то мы с вами встречаемся все время / снова встретились / А: Я как челнок / туда-сюда //. (A: Good afternoon / again / B: It's strange you and I meet all the time / and so we met again/ A: I'm like a shuttle / running here and there//). What's more, with these metaphors the speaker can emphasize his being lightheaded, hasty: *Вчера / короче выпорхнула на радостях / короче с работы / и на тебе / вспомнила / забыла ведь сдать / табель-то...// (Yesterday / in short, I fluttered, joyful, / from work / and holy cripes! / it dawned on me / I forgot to return / the timecard...//), or the speaker makes it clear that at that moment he wants to be alone: Так товарищи дорогие попрошу отчалить из этой комнаты / мне курсовую писать / свое ля-ля / идите на кухню // (So, my dear fellows, I'll ask you to sail out of this room / I should be writing a term paper / go to the kitchen / with your chitter-chatter //).**

The manner of human movement in SL can be expressed by the noun in the instrumental case: *В принципе Юрка всегда косовато ходил / уткой что ли / ну не знаю / как-то вот на одну ногу переваливаясь //; Сергей / нет / ведь не слышит / я кому говорю / так / хватит белкой скакать / кашку кушать иди //; А: Да/да-да-да/ да многие рвались.../ Б: ...и около меня обходил павлином-то / ходил...все не та-ак все не э-дак...// (In fact, Yuri has always kinda limped / like a duck or something / donno / like he was waddling from one leg to another //; Sergey / no / he doesn't hear / who am I talking to? / well / stop jumping around like a squirrel / go home and have some tasty porridge //; А: Yes / yes, yes / yes, many were dying ... (to get*

the position) В: ... and he was circling around me like **a peacock** / was walking ... he didn't like this and he didn't like that... //). Often, such similes are found in parents talking with their young children. Here they use the diminutive form of nouns: *Дочь/ ну-ка на лесенку **обезьянкой** / кто быстрее...//; Манюнь / Ну-ка **снежинкой** покрутись / покажи тете Жене платице // (Daughter/ Climb that ladder like a little monkey / who is faster... //; Manyunya / Come and spin around like a little snowflake / show aunt Zhenya your dress //). Here the speaker uses images that the child can understand, emphasizing the manner of movement which the child can comprehend. Parents show children their love and care with these metaphors. Besides, the metaphors perform an educational function, they help to establish contact with children and create better conditions for mutual understanding [6]. The similes which are quite common in speech not only allow the description of the manner of human movements, but can also be used in situations when the speaker evaluates the behavior, personality and appearance, in situations when the person assesses the buildings, rooms, as well as domestic animals and household items. Perhaps, this helps the speaker to express his idea more accurately and clearly.*

The findings demonstrate the tendency that if the speaker understands how a person is moving, and he is sure that he can select an accurate description, as a rule, a metaphor is used. However, in a situation when the verb has a vague meaning, and the speaker is not sure of his description, he usually uses a simile in order to define the manner of the movement.

In the material collected for the study we also came across original author's characteristic of the human movement. "Any object and phenomenon of the reality a person lives in can become the source of original author's metaphors and similes" [4, p.68]: *Танцую я ужасно ... как **деревянная лодка** / которая плывет/ но на вид уже старая //; А бабки-то шустрые.../ картонки подложили и уселась **как ласточки** //; (I'm hopeless at dancing... **like a wooden boat** / that can sail / but looks quite old//; These old ladies are so nimble... / put cartons and sat on them **like swallows** //); In the shop, the mother addresses her young son: *Ну что ты болтаешься .../ как **сосиска** ...//; (Well, why are you hanging about ... / **like a sausage**... //); A choreographer addresses the dancers, who once again, in his opinion, are making a wrong movement: *Что вот вы опять сейчас сделали... / ну сколько можно одно и тоже / что вот это за повороты / все время падаете / как **доллар** ...// (What are you doing again ... / how many times do you have to do the same thing / are these good turns / you fall***

all the time / like a dollar .../); Вчера нагулялись/ меня качало / как моряка во время шторма //; (Yesterday we had a great time / I was tossed / like a sailor during a storm //); a passenger addresses the conductor: Женщина/ Ну что вы как локомотив / все прете и прете/ поаккуратнее наверное надо // (Woman /Why are you rushing like a locomotive / pushing so hard / you should be more careful//). The examples demonstrate that with the help of metaphors and similes the speaker not only figuratively describes a person, but also expresses his emotional attitude towards him or her. It is these emotions that often cause a person to use metaphors and similes in his speech [3]. It should be noted that a stressful situation, when a person is dissatisfied or loses self-control, often results in the use of the imagery which, in turn, can cause a mixed reaction from the people around and start a conflict, provoking a quarrel and a heated argument. However, the findings show another trend when the speaker uses imagery to sound less categorical, to mitigate undue roughness and lessen communication risks.

Summing up, the imagery describing human movements is used in SL not only to assess it, but also to express the speaker's emotional attitude to both his own and other people's manner of movement. In addition, the metaphors and similes facilitate a more informal communication, moderate the negative assessment, and reduce the risks of communication failure, making the speech more expressive and original.

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SECTION XI. Educational Sciences

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Implementation of Blended Learning in Russian Universities

Although appeared recently, the technology of blended learning has already proved itself to be an effective way of organizing learning process at a university. All over the world it is used in teaching different courses, such as foreign languages, psychology, informational technologies and other.

According to V. A. Fandey in 2012 only 105 out of more than a thousand higher educational institutions in Russia actively used information and communication technologies in teaching students. Among the pioneers of implementing this educational technology were such institutions as Moscow State University, Higher School of Economics - National Research University, Moscow State Agricultural University, Moscow State University of Civil Engineering in Moscow and Saint Petersburg State University of Information Technologies, Mechanics and Optics, Saint Petersburg State University in St. Petersburg[1]. As mentioned above, four years ago blended learning was implemented mostly in those universities, which are situated in the capital city.

A research conducted by us recently showed that lately provincial city universities have also started successfully implementing blended learning in teaching various subjects. Usually blended learning is used to teach foreign languages so we are going to speak about such courses

developed in Siberian Federal University, Southern Federal University, National Research Tomsk Polytechnic University and Kursk State University.

A.S.Trach describes the implementation of blended learning in Southern Federal University in the department of foreign languages. She points out that using this technology helps solve two problems: lack of teaching hours and of specialized textbooks for teaching professional communication to a number of specialists.[4]

The nuclear component of the Southern Federal University blended learning system is electronic textbook. In Southern Federal University electronic textbooks are used to organize student's individual work, as well as distance learning. Wise organization of the book helps students and professors choose pace of work that matches their learning purposes and goals, as well as their opportunities.

Apart from electronic textbook an important component of organizing blended learning in Southern Federal University is digital campus – a web-portal where students can find all the necessary information. Moreover this portal gives students and professor a good opportunity to interact, and to control the understanding of the material.

The professors of Southern Federal University have imposed a new component of blended learning, a so-called “blank unit” –“a unit in the textbook that is filled with content on the topic or problem that has been recently studied”[5]. So instead of passive listeners and readers students become active participants of the learning process and get an opportunity to use their knowledge on practice, take part in research work and learn to construct textbooks and structure the knowledge.

V.V. Vonog and O.A. Prockhorova describe the implementation of blended learning technology in Siberian Federal University. It is used there to teach foreign languages to postgraduate students. In order to implement this technology a digital course was developed – “a resource containing a complex of teaching materials that are integrated into a learning managing system”[5]. Postgraduates' lessons are organized in such a way that whilst face-to face studies the teachers give only the crucial information and test the students' knowledge. The LMS contains additional materials and tests, as well as lectures that are delivered in face-to-face classes in order for the students who have missed them not to fall apart from the group.

- The authors of the course think that it helps the postgraduates acquire a number of competences that are useful in doing research such as:

- Giving a report in a foreign language on a scientific conference;
- Making synopses of articles, as well as translating them and writing their own articles in foreign languages;
- Reading specialized books and articles written in foreign languages[].

The course has been designed in accordance with the calendar plan, so it is very convenient for the teachers to use it, and the post-graduates do not get lost in the schedule of exams and tests. What is more there are a lot of tests in the LMS in order for the students and teachers to be able to control the understanding of the material.

Professional communication between professors and students is organized in the form of chats and forums. As the authors of the article[5] mention, this approach contrary to the traditional one gives each student an opportunity to speak his or her mind and to be heard. The professors also use such contemporary instruments as blogs and wikis which helps the students overcome difficulties in reading and making synopses of articles.

This educational technology gives very good results. Among them V.V.Vonog and O.A. Prockhorova mention:

- the mastery of the strategies of reading, making synopses and annotating articles;
- the development of listening and speaking skills;
- the development of writing skills.

What is more thanks to this course the students enrich their vocabulary dramatically due to the use of a vast amount of additional materials. Finally, the students develop their skills of time management and working with various sources of information which are crucial for the future scientists.

The technology of blended learning is also actively used in National Research Tomsk Polytechnic University. A special program of innovational development was developed there, and the project of electronic education is a part of it. T.I. Krasnova in her article “Blended learning as a new form of organizing language learning environment in a non-linguistic university” describes a course, developed to teach foreign languages to the students of non-linguistic departments[2]. It is mostly about teaching grammar, but there are also modules meant to develop listening and reading skills, as well as enrich the students’ vocabulary.

N.P.Fix describes existing in Tomsk Polytechnic University courses on teaching masters’ specialties. Section “Lectures” contains

theoretical and multimedia material on the subject, section “Laboratory works” – methodological directions essential for completing practical tasks, section “Tests” – control and measuring materials on the topics studied. Also students can find trainers that model real communication situations. N.P. Fix notices that the electronic component helps increase students’ motivation as well as effectively organize their individual work[1].

In Kursk State University blended learning is also used. L. I. Studenikina in her dissertation describes implementing it in teaching higher mathematics to five year’s students of the Department of Economics. At the heart of the blended course lies an electronic textbook. Students were assigned to work with this textbook in specially equipped classrooms. The test that was held at the end of the course showed that the use of blended learning influenced positively on the students’ results, as well as their motivation[3].

Another blended course has been developed in Kursk State University as a result of our research. The aim of our course is to make teaching English in non-linguistic departments more effective. In our course the learning process is optimized through implementing an electronic component that is developed in coherence with the off-line course. The online component contains grammar exercises as well as additional material for developing listening and reading comprehension. At the moment experimental learning is conducted in order to evaluate the effectiveness of using this course.

All in all we must conclude that blended learning is proving itself to be an effective technology that helps to make the educational process cheaper and less time-consuming. However, further research is needed in order to find out if this technology is efficient in teaching foreign languages.

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**EDUCATIONAL TECHNOLOGIEST
USED IN THE PREPARATION OF STUDENTS
IN A «DENTAL-TECHNICIAN»
IN MEDICAL COLLEGE-PLOVDIV**

Abstract: The purpose of the present article is to inform and acquaint the audience with the educational technologies applied in the training of students in Dental technology. To that end, an extensive survey with students at the Medical College – Plovdiv has been conducted. The most efficient has turned to be the lecture and the tutorial.

Key words: Educational technologies, „Dental- technician” students, Medical college

Introduction: Training is a major socio-educational category of eternal importance. It is related not only to the separate individual, but also to the development of human society, civilization and culture. Its functions, being an educational activity, are presentation of the subject matter and realization of the “teaching and learning” activities in the course of training.

What is interesting here is the information found in the students'

responses to the questions concerned with the educational technologies of the Dental technology programme, and more particular, to the applied methods and forms of education. An important instructional component are the methods which are used, for the pedagogical, educational, instructional and didactic objectives and tasks to be realized. Methods are also important in terms of initiating and maintaining the educators' interest and activeness throughout the educational process. They facilitate intake and stability of acquired information; provoke the critical and creative thinking of learners and motivate them. Thus, according to G. Petrova [1, p. 40 – 43, 2], it is important that we know our students' opinion on the methods and forms used by their teachers, and to what extent they have been incorporated within the daily training.

Aim: The present study is concerned with analyzing the most commonly used forms and methods of instruction ensuring effective training in the major Dental Technology at the Medical College – Plovdiv.

Material and methods: The type of sociological research is anonymous, direct, group survey. The analyzed students' opinions show to what extent do the applied methods and forms facilitate and stimulate the intake of theoretical and practical knowledge and professional skills throughout the course of training in Dental technology at the Medical college of the Medical Institute – Plovdiv.

Subject of the examination are 62 first and second year students during the winter semester of academic year 2013/2014.

The questionnaire comprises 22 questions regarding various sides of the educational process. Serving the set aim, we have focused on the questions concerned with the training forms and methods.

Table 1. Distribution of the students with major Dental technologist by year of study

| | Men | Women | Total |
|--------------------|------------|--------------|--------------|
| First year | 18 | 16 | 16 |
| Second year | 14 | 14 | 14 |

Results and consideration: Effectiveness of a method could be seen as its ability to bring to the objectives it is designed for. In that sense, effective is that method which allows for the quick and easy learning.

As it is seen from the survey results, the most commonly used and most efficient turn to be:

- Lecture and tutorial practice – 90 %
- Demonstration and tutorial practice – 85%

Demonstration, individual practice, discussion, instructing, situational method are assessed as effective by the majority of the student from 20% to 50 %, 85% admitting lectures and tutorial practice as the most acceptable, contributing for the quick and easy learning. The group of methods considered less effective by the students are on the last place: role-play, individual practice in a seminar; computer simulation, extramural individual practice.

To summarize, the responses to that question from the survey in the sphere of the Dental technology major, demonstrate a moderate to passive attitude towards the educational process. In the modern educational process students are expected to have a deep interest in improvement and extending their knowledge mainly through performing a number of individual practices like: individual practice in a seminar, specialized literature and documentary research, extramural occupation, participation in personal sessions and conferences.

The issue which methods facilitate easy learning could probably be interpreted by students in yet another way – what their preferences to one or another educational method are. They point in their gradation as most accessible: lecture presentation, practicing, individual practice, demonstration as the highest share in the listed technologies. The forms of training most frequently pointed as applied in this major are again lecture, tutorial – 90% , and just the opposite, the less frequently used are: study group work and student scientific conference – 4%. What is notable is that with the forms of training assessed by their effectiveness, the ranking is almost the same as with the methods. Dominating (as the most effective and most frequently used, according to the students' opinion), however, is practicing.

In the Dental technology programme at the Medical College – Plovdiv, individual practice is not limited in its amount. An example is the fact that this individual practice is in the form of delivery of a course work in the IV semester, and in the same way they conclude their internship.

Analogical results could be seen in the survey by T. Popov, where the inquired students in Dental technology, consider their individual practice in the major is dominant, and according to them, it represents an evaluation for the applicability of knowledge and skills [3, p. 122].

Conclusion: The research on the forms and methods leading to easy and quick learning in the Dental technology programme is classical as a type, and the dominant and most effective are the lecture and tutorial

practice. From the other hand, there is that “layer” of the active forms of training complemented by the additional forms: demonstration, observation, individual practicing, course project, self directed learning, discussion.

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PEDAGOGICAL IMPLICATIONS ON TRANSNATIONAL IDENTITIES AND LANGUAGE TEACHING IN THE GLOBALIZED WORLD

Slavic departments at the university level can play an active role in helping students of Slavic and East European background maintain their heritage languages. Some programs have developed separate tracks for heritage language learners, especially in Russian and in some areas in Polish, but at most universities and for most of the Slavic and East European languages, this is economically untenable. Therefore, most heritage language learners must sign up for regular foreign language (L2) classes. When differentiating the curriculum for these students, instructors must be prepared to address their specific needs, building on what they are likely to know already, while enabling them to expand their linguistic breadth and overall competence. With the rise of transnational migration patterns, and, consequently, higher levels of acquisition and maintenance in heritage communities, the task has

become considerably more difficult, the more so since budget cuts have led to the reduction of many programs to a single year of language instruction.

The literature on heritage language instruction identifies seven main goals, following pioneering work on Spanish as a heritage language by Guadalupe Valdés [1, 2, 3]:

1. Language maintenance
2. Acquisition or development of a prestige language variety
3. Expansion of bilingual range
4. Transfer of literacy skills
5. Acquisition or development of academic skills in the heritage language
6. Positive attitudes toward both the heritage language and various dialects of the language, and its cultures
7. Acquisition or development of cultural awareness [3]

In order to meet these goals, Valdés 2000 [2] and Kagan and Dillon 2001/2002 [4] suggest an overarching model based on a distinction between the “interpersonal,” “interpretive,” and “presentational” modes, as advocated by the American Council of Teachers of Foreign Languages. Each of these modes can incorporate the four primary skills of speaking, listening, reading and writing, as well as a range of stylistic registers. Heritage students tend to have the most experience in oral and informal interpersonal and interpretative communication, and the least in presentational communication. In all three modes, they lack experience in relatively formal and/or academic registers.

Typical foreign language (L2) instruction incorporates a “bottom-up” approach, gradually developing individual skills and adding new ones incrementally [5]. This often involves introducing and drilling individual forms before they are incorporated into the students’ speech at the level of a text. For heritage language learners, Carreira & Kagan [6], Kagan & Dillon, 2001/2002 [4] and Beaudrie, Ducar & Potowski [3] advocate instead a “top-down” approach, starting at the level of the text. This acknowledges and builds on heritage language learners’ previously acquired language abilities and allows for greater flexibility and more cultural grounding. This “macro” approach is especially effective given heritage language learners’ stronger receptive skills: since they can understand more than they can produce, they can make use of authentic language material from the start. For example, heritage language learners may be able to understand both the language and certain aspects of the cultural context of a movie much more than

foreign language learners. Depending on the level of the specific students, Beaudrie, Ducar & Potowski 2015 [3], following Carreira and Kagan [6], suggest the following activities for heritage students:

1. Discuss or debate interesting themes in the movie.
2. Transcribe lines or write a description of a scene from the movie (individually or in groups).
3. Write an analysis or evaluation of the movie.
4. Evaluate pieces of dialogue as either formal or informal registers; convert one to the other [3].

Some of these activities, such as discussion, debate and analysis, require at least an intermediary level of language ability, but others, such as transcription or evaluation of registers enable students to build on relatively low levels of language ability, extending knowledge and skills acquired in the home to other domains. Many students have experience viewing heritage language movies passively, and these tasks extend this experience to the interpretative level, while building on cognitive and academic skills that they have acquired in their dominant language. Given recent technological advances that make media more accessible to individuals (including restricted course websites), movies can be viewed independently with a variety of levels of scaffolding: introductory foreign language learners can view the movie with English language subtitles, while heritage students can use heritage language subtitles (captions), no subtitles, or a combination of these three options, as needed. Movie scripts can be used and adapted in various ways, both to scaffold understanding and to help students transfer their oral skills to reading and writing. The Brown University Online Czech Literary Anthology provides a model of how this can be done in combination with a variety of other culturally grounded materials, and Kaiser [7] suggests various ways to incorporate highly focused individual clips into language courses at all levels.

A core characteristic approach of the “top-down,” macro-level approach is that, to a large degree, grammar and vocabulary are addressed as they appear in motivated contexts. This presents a significant challenge in mixed heritage/non-heritage classes, especially at the beginning levels, where most textbooks favor a micro-level approach. Instructors can combine these two approaches in individuated tasks and projects that enable heritage language speakers to focus on their specific needs and interests independently, as spin-offs from the main curricular plan. Combined with reports to the class, this also provides an opportunity for students to practice the presentational mode. For example, in connection with the topic of cities and grammatical

constructions of location, heritage students can conduct independent research on locations in the home country that have special relevance to their families. Using their oral skills, they can interview native speakers, both in the heritage community and in the home country, using communication technologies such as Skype and easily accessible recording systems. Internet resources provide an easily accessible way for them to work on literacy skills in a variety of registers (both reading and writing with models) [5].

These resources beyond the textbook are likely to introduce topic-related vocabulary at a higher level than the students' active command, creating an "island" of higher-level competence [8]. While presentations in mixed-level classes can be problematic for those with lower levels of listening skills, presentation software like Powerpoint or Prezi enables students to provide visual scaffolding and/or dual language reinforcement for students.

Combining heritage themes with the study of modal constructions can be especially fruitful. In connection with studying expressions of purpose, desirability, potential, and alternative worlds (subjunctive and conditional), students can explore and discuss the reasons for their family's migration and/or earlier waves of emigration. Interviews in the heritage community can be supplemented with independent research on personally motivated topics, such as specific historical periods and events, using documentary films, non-fiction texts, memoirs, and other literary works. Students who are motivated to take heritage courses for career opportunities can research and report on job opportunities in the home country and investigate qualifications that they would need, using online advertisements and sample CVs. In this manner, a combination of individualized interpersonal, interpretation and presentational tasks that extend the core curricular topics can enable instructors to differentiate language instruction, while building on the specific strengths and resources that students have previously acquired from their heritage background.

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SECTION XII. Political science

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Terrorism as a form of political struggle integrated into cultural media discourse

In the process of interaction between media and audience the discursive construction of events and phenomena is always going on. In the context of the main threats of our time – terrorism – the nature of the context in which the interpretation of the subject is highly important. This, in our opinion, is determined by the need to study the discursive practices of messages in mass media about the most high-profile

terrorist attacks and the need to identify specific characteristics of discursive contexts. Because the discursive practice has not only a descriptive but also a constructive function, it is important to understand that currently the media becomes a tool for the formation and maintenance of terrorist ideology, although it occurs indirectly.

Due to the discourse of media and the interactive nature of presenting the information, broadcasts/messages are transformed into real social representations, shared by the majority of recipients, broadcast codes, ideas, theories, events – they are not only subjects of common sense, but a new social reality based on the emotions. Consequently, public perceptions of terrorism is formed by the discursive, and in consequence, the destructive practices of the MCT. In this regard, we can cite the opinion of the researcher of this phenomenon M. Moscovici, indicating that the image is not based on those things and situations that they mention, but on the communication concerning these things and situations [1].

The process of integration of terrorism into the matrix of social reality takes place successfully (although the media do not pursue this objective) due to the “naturalization” of the subject of the message, giving it the traits of objectivity and reality. For example, a threat of a terrorist attack, a terrorist may be positioned as elements of social representations about terrorism. Modern researchers have concluded that currently the number of obsessive fears (phobias) include a fear of terror [2]. These fears and concerns, in our view, appear due to the formation and development of social representations about terrorism occurring under the influence of the mass media.

The dreadful effect of terrorist activity on the society (instinctive fear of violent acts, which is generated by the unknown and uncertainty of place, time and nature of violent threats) is documented in sociological surveys, according to which the citizens of our country are very concerned about the threat to suffer from a terrorist attack.

In our opinion, in modern conditions the “terrphony” [3] plays an important role in the formation of such a reaction. It is a process that starts the mechanism of psychological change in the mindset, worldview, way of life, imbuing social life with constant reminders of the terrorist threat, unpredictability, chance and risk. Here the tool to achieving this effect is media discourse organized a certain way, which corresponds exactly to the hidden intentions of the leaders of the terrorist organizations. In this regard, we emphasize that discourses are “dynamic activity, that constructs the meaning”[4]. Accordingly, the

discourse, on the one hand, is formed by social relations, and on the other hand forms them.

Consequently, we can speak about the bilateral relations between actually existing objects and the discourse. On the one hand, different discourses correspond to real objects and events. On the other hand, real objects and events turn into what value is given to them in the discourse in which they appear [5]. Note that the discourse is actualized in texts, where the text is understood, and oral presentation, written materials, visual images, and even codes that have a particular semantic sense.

4 September 2015 a triumphal arch in the Syrian city of Palmyra was blown up, and also several funerary towers and temples – the objects representing cultural and historical value. This attack can be seen as a kind of a “text” in which the subject was chosen not randomly. Depicted on the cover of history textbooks ancient arch, was the subject, familiar to several generations; therefore, its destruction made recipients and authors of this media messages closer. The importance of the “backdrop” for the terrorist attacks is worth noting: they payed much attention not to the actual destruction of cultural heritage, but to the withdrawal of the spiritual heritage, in this case, even more personal than public. After the broadcast of the defeat of Palmyra, a whole series of photos of the aforementioned history textbook, accompanied by the same type of evaluative messages and hashtags appeared in social networks (Twitter, Instagram).

This event was discussed and shown in all traditional media and social media, so it became a part of the media discourse (formally organized) and social (spontaneously organized). This text became a representative reflection of what exact social and cultural values people assign to different phenomena, events and circumstances. Words, messages, stories, acted as a manifestation of a given discourse and became a projection of events in social life. The effect of this attack was made on each person in particular, and on the discursive culture (which is embedded in people) in general.

Speaking about this attack it is also important to note that it was made in the cultural sphere, closely associated with the spiritual environment of the individual world and society as a whole. The attack was intended as a “sensation”: the action took place not on the usual scene, affecting only the social, economic or political aspects of reality, but in the part of social reality, which has always been considered the least prone to terrorist attacks. The choice of the cultural sphere as an object of aggression also carries a semantic load; – control of terrorists, even over the spiritual sphere; if we consider the monuments as coded

messages, then we can speak about an attempt of terrorists to destroy semantic security, and not of a particular society, but of the world civilization in general.

In this case, it is even more important, that we have to say about solely culturally-based semantics, non-textual expression, and serving as a field-carrier of non-verbal meanings. Then this violent action represents the whole new level of formation of terrorist ideology without the content of Internet sites, but with the use of non-verbal psychological techniques that affect the level of the collective unconscious, relevant to the representative of any nation.

Mass media that broadcast terrorist attacks, become the most important mechanism of formation and development of social representations, while these perceptions are formed in the direction, favorable to terrorists and placed them in a given ideology. This happens because the media show not only reflected reality, but also interpret events in a certain way, giving the interpretations the status of a generally accepted “truth”. The described attack can be interpreted as a text, or a complex communicative phenomenon, appearing in media, this attack launches the dialogue of social actors: society and terrorists. Thus mass communication is not just “mechanically” connects them together and forms them into a unite object, it fully includes the audience, and terrorists in a social situation. This process is mediated by the inclusion of media in the formation of terrorist ideology, the creation of such knowledge, special mood due to the symbolic systems used in the discourse of the media. Both the communicator and communication tools and the audience are involved into a context, corresponding to a certain predetermined concepts, and in the case of terrorism, the concept is determined by outside “forces”– the leaders of this political movement. Communicator always simulates the message, he also becomes involved into the process of the broadcasting messages. Both the communicator, and the recipient complicit in the processes of formation of meaningful structures. Mass media become a tool for the formation of such entities as stereotype, myth, ideology.

Based on the foregoing, we can conclude – the media discourse is in modality to the subject of the display. It is also important to note that when considering terrorist acts as the subject of the display, the media inevitably have to deal with thematically focused, due to socio-cultural message. Thus, the media discourse on terrorism can be attributed solely to representative type; because terrorism is presented as one of the most significant threats of our time, it is revealed through the positioning

specific events, persons, statements, estimates in the discourse, which in turn are agents of an extremist ideology.

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SECTION XIII. Ecology

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The development of ecology, increase knowledge within the field of the recovery the coastal zone

Ecology in Russia is quite a young and rapidly developing science. Every year, a border of environmental knowledge as a science expands, bringing knowledge from other areas. This expansion caused by the solution of specific environmental problems. This article discusses the strategy of scientific development environment as part of the recovery of the coastal zone.

Recovery the coastal zone in the first place implies management morphodynamics systems of coast, as well as the chemical composition of water. This control can be operated as a subject in the course of its operation by itself, and the management of the facility without our direct intervention in the process (so-called, self-management).

For a start, consider the management morphodynamics processes in the coastal zone of the sea. In 1997 the theory of morphodynamics systems of the coastal zone was based on 3 issues:

1. The problem of implementing a systematic approach to the study of the coastal zone.
2. The problem of forecasting the dynamics of the coastal zone
3. The problem of rational use and protection of the coastal zone.

Now we can safely say that the management of morphodynamics processes based on the application of a systematic approach when analyzing the state of the coastal zone. The most appropriate and rational is the selection in said zone defined organizational structures - morphodynamics systems. Such systems can be either open that is connected to each other longshore drift and closed, not having such a link. Management process in this case usually is to restore a state of equilibrium in the coastal zone. This can be explained by the fact that the negative impact on it, manifested in different parts of the taking of such a zone, associated with the violation of its stability.

To achieve recovery of a zone as a whole or its various parts is possible only knowing the laws of coastal development. To implement dynamic management of coastal zones is necessary, first of all, the allocation of them local morphodynamics systems, which is carried out their detailed examination. The result is determined by the state of the coastal zone, and its separation into morphodynamics system. Then it is necessary to determine the initial state of the coast and localized negative impacts on it, and then proceed to establish the causes of the incident and to the elimination of the consequences.

After determining the initial state of the selected zone and knowing the dynamics of its development model, in our case was taken by a mathematical model, it is possible to obtain phased zone status and correct management. After determining the basic quantitative and qualitative characteristics of the system and the extent of its damage (in comparison with the state of the system before exposure to it or the legal permissible values in the case of concentrations of pollutants control), it is necessary to establish the basic management objectives by it, which may be the system restore to equilibrium state, the elimination of the negative effects on it from the human economic activity and he created an appropriate structure and others. That is, it is necessary to identify the sources of negative impact on the coastal zone [1].

In 2010 in Leningrad region for the needs of the Ministry of emergency situations was established alluvial beach. If this project is not applied the

system approach to the study of the coastal zone, has not been fulfilled predict the dynamics of the coastal zone, and as the investigation has not been carried out actions for protection of the coastal zone. Now obviously this river covers the beach sediments on coastal area in district 58 km road, leading to blur.

In our case, the negative impact is not only the pollution of waters, sediments and soils of the coastal zone and the movement of coastal sediment, blurring the shores and roads. After removal from the morphodynamics system of anthropogenic load, the system itself will be restored, depending on the degree of degradation, self-healing speed and the desired result, it may take a long or very short period. In cases where the self-healing takes more time planned, possibly artificial recovery options, for example, embankment beach, or launch the dredger. The recovery process can be accelerated by external intervention, creating optimal conditions, for example, by adding material (sand) in the flow started to accelerate aggradation beach. On the other hand, planting certain plants along the creek, which has long dumped contaminated wastewater, to speed up the recovery process of the chemical composition of soil and sediment of the stream.

So the strategy development environmental as a science, it is the expansion of knowledge as solutions to environmental problems. The broader challenge-facing ecologist, the more features it is necessary to understand. In our case, to restore the coastal zone requires knowledge of geomorphology, to highlight the morphodynamics systems, chemistry and biology for the purification of waste water flowing into the selected system, mathematical modeling, control sediment, etc. in particular within the framework of environmental problems.

Today, biological wastewater treatment, gas purification chemical method is commonplace for the modern ecologist. In Russia, 30 years ago biologists and chemists did this. Now, many environmentalists, faced with the problem of modelling the coastal zone, turning to geography, mathematics. It is quite possible that in a few years, we will not make any science of ecology, introducing the knowledge total whole, an indivisible amount of information needed by the ecologist for everyday tasks.

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