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AGRICULTURAL SCIENCES

PRODUCTIVITY OF SOME CULTIVARS OF ENERGY POPLAR AND WILLOW IN THE KYIV POLISSYA CONDITIONS

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ПРОДУКТИВНІСТЬ ДЕЯКИХ СОРТІВ ЕНЕРГЕТИЧНОЇ ТОПОЛІ ТА ВЕРБИ В УМОВАХ КИЇВСЬКОГО ПОЛІССЯ

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Abstract

The article presents the results of a study of nine cultivars of poplar and willow for their suitability for the creation of energy plantations on low-yield hayfields in Kyiv Polissya. The object of the study is the energy plantations of six cultivars of the black poplar section (*Aegiri Dode*): 'Blanc du Poitou', 'Gelrica', 'I-214', 'San Giorgio', 'Tardif de Champagne' and 'Vereesken' and three cultivars willows: 'Ternopil' (*Salix viminalis* L.), 'Yaroslava' (*Salix triandra* L.) and willow (*Salix dasyclados* Wimm). The soil is light loam meadow-swamp moist. Annual woody cuttings 25 cm long were planted according to the scheme 1.0 x 0.5 m. It was found that in the study region the highest productivity has willow cultivar 'Yaroslava' (12.82 t · ha⁻¹ per year) and poplar cultivar 'I-214' (10.44 t · ha⁻¹ per year). Also quite high productivity was shown by cultivars of poplar 'Gelrica', 'Blanc du Poitou', 'Tardif de Champagne' and a clone of *Salix dasyclados* (from 4.33 to 5.93 t · ha⁻¹ per year). Energy plantations of *Salix viminalis* should be created in less humid conditions, and cultivars of poplar 'Vereesken' and 'San Giorgio' can be widely used in landscaping.

Анотація

У статті наведені результати дослідження дев'яти культиварів тополі та верби на їх придатність для створення енергетичних плантацій на низькопродуктивних сінокосах Київського Полісся. Об'єкт дослідження – енергетичні плантації шести культиварів секції чорних тополь (*Aegiri Dode*): 'Blanc du Poitou', 'Gelrica', 'I-214', 'San Giorgio', 'Tardif de Champagne' та 'Vereesken' і трьох культиварів верби: 'Тернопільська' (*Salix viminalis* L.), 'Ярослава' (*Salix triandra* L.) та верба шерстистопагінцева (*Salix dasyclados* Wimm). Ґрунт – легкосуглинковий лучно-болотний вологий. Однорічні здерев'янілі живці завдовжки 25 см висаджувалися за схемою 1,0 x 0,5 м. Встановлено, що в регіоні досліджень найвищу продуктивність має культивар верби 'Ярослава' (12,82 т·га⁻¹ у рік) та культивар тополі 'I-214' (10,44 т·га⁻¹ у рік). Також достатньо високу продуктивність виявили культивари тополі 'Gelrica', 'Blanc du Poitou', 'Tardif de Champagne' і клон верби шерстистопагінцевої (від 4,33 до 5,93 т·га⁻¹ у рік). Енергетичні плантації верби прутувидної доцільно створювати у менш зволжених умовах, а культивари тополі 'Vereesken' і 'San Giorgio' можуть знайти широке застосування в озелененні.

Keywords: poplar, willow, energy plantation, plant height, productivity of biomass.

Ключові слова: тополя, верба, енергетична плантація, висота рослин, продуктивність біомаси.

Вступ.

Використання деревної біомаси як енергетичної сировини набуває широкого розвитку в багатьох країнах світу (Caslin, Finnan, McCracken, 2012, FAO, 2016, Ilsted, 1994, Jamnická et al., 2014, Karacic, Weih, 2006, Klasnja, Orlovic, Galic, 2012), включаючи Україну (Роїк М.В., Сінченко М.В., Фучило Я.Д. та ін., 2015, Фучило, Сбитна, 2017, Фучило, Літвін, Сбитна, 2012). Плантаційне вирощування енергетичної сировини верби і тополі особливо активно розвивається у західних областях

країни, де почали у промислових масштабах створювати енергетичні плантації на малопродатних для сільськогосподарського виробництва землях. Площа таких насаджень на даний час становить близько 5000 га (Роїк М.В., Сінченко М.В., Фучило Я.Д. та ін., 2015), що не надто багато для масштабів держави. Відносно часті невдачі при створенні плантацій тополь і верб значною мірою спричинені невдалим вибором площ та недосконалою технологією вирощування, без врахування біологічних особливостей культивованих рослин. У цілому, як вказують результати досліджень, найкращі результати

виращування енергетичної біомаси верб і тополь можна отримати на вологих, багатих на гумус, добре дренованих супіщаних або суглинкових ґрунтах з реакцією водного розчину від слабо кислої до нейтральної (рН 5,5–7,0), а для тополь – до дещо лужної (рН 5,5–8,0). Такі площі, зазвичай, займають понижені частини рельєфу, заплави річок, осушені території та інші категорії земель з відносно багатими ґрунтами (El Bassam, 2010, Фучило 2011, Фучило, Літвін, Сбитна, 2012).

Необхідність суттєвого розширення площ насаджень енергетичного спрямування та різноманітність ґрунтово-кліматичних умов України спонукають до проведення досліджень у напрямку добору високопродуктивних форм тополі та верби, що мають високі показники продуктивності біомаси у тих чи інших умовах.

Метою проведених досліджень було встановити культивари тополі та верби, що придатні для створення енергетичних плантацій на колишніх низькопродуктивних сінокосах в умовах південної частини Київського Полісся.

Методика.

Об'єктом дослідження були створені 2009 року в Боярському лісництві Боярської лісової дослідної станції енергетичні плантації шести культиварів секції чорних тополь (*Aegiri Dode*): 'Blanc du Poitou', 'Gelrica', 'I-214', 'San Giorgio', 'Tardif de Champagne' та 'Vereecken' і трьох культиварів верби: 'Тернопільська' (*Salix viminalis* L.), 'Ярослава' (*Salix triandra* L.) та незареєстрований клон верби шерстистопагінцевої (*Salix dasyclados* Wimm).

Площа – низькопродуктивний сінокос, який, через занепад тваринництва у регіоні досліджень, тривалий час не використовувався за призначенням. Ґрунт – легкосуглинковий лучно-болотний вологий. Технологія створення плантацій передбачала висаджування у суцільно оброблений ґрунт однорічних здерев'янілих живців завдовжки 25 см рядами з відстанню між ними 1,0 м та відстанню між живцями у ряду 0,5 м (20 тис. шт./га). Протягом перших двох періодів вегетації щорічно проводився один ручний догляд за ґрунтом у рядах та три механізованих – у міжряддях.

Клони тополі вирощувалися протягом шести років. До статті увійшли результати досліджень після завершення першого та шостого вегетаційних періодів. Частину рослин верби, після завершення першого та другого періодів вегетації було зрізано, а потім зрізування проведене після 5 років. Оцінку росту, розвитку і продуктивності рослин проводили за такими показниками: середня висота рослин, кущистість (у верби) середня маса рослин, діаметр на 1,3 м (у тополі) та урожайність сухої біомаси. Досліджувані характеристики встановлювалися відповідно до загальноприйнятих у рослинництві методик (Доспехов, 1973, Фучило та ін., 2018).

Основна частина.

Дослідження показали, що культивари тополі значно відрізняються між собою за показниками укорінення живців та розмірами однорічних саджанців, що з них вирости (табл. 1).

Таблиця 1

Ріст і укоріненість деяких клонів тополі після першого року вирощування

№ з/п	Назва культивару	Укоріненість живців, %	Висота, см	Діаметр при основі пагона, мм
1.	'Blanc du Poitou'	60,8±6,91	90,5±9,69	7,9±0,70
2.	'Gelrica'	90,2±4,21	90,0±4,86	7,4±0,36
3.	'I-214'	72,6±6,31	121,6±6,12	10,5±0,55
4.	'San Giorgio'	96,1±2,75	86,9±4,04	10,0±1,95
5.	'Tardif de Champagne'	90,2±4,21	79,7±3,94	7,6±0,31
6.	'Vereecken'	100	89,1±5,17	7,7±0,37

Як видно з наведених даних, після першого вегетаційного періоду, найвища укоріненість живців виявилася у культиварів 'Vereecken' (100%) та 'San Giorgio' (96,1%), а найбільші показники середньої висоти рослин – у культиварів 'I-214' (121,6±6,12

см) та 'Blanc du Poitou' (90,5±9,69 см). Повторні дослідження через 6 років після їх створення показали, що найвищими показниками росту в шестирічному віці відзначаються рослини культивару 'I-214', середня висота дерев якого становила 7,7±0,34 м, а діаметр – 6,2±0,54 см (табл. 2).

Таблиця 2

Ріст і продуктивність деяких культиварів тополі після шостого року вирощування

№ з/п	Назва культивару	Середня висота, м	Середній діаметр на 1,3 м, см	Суша біомаса, т·га ⁻¹	Суша біомаса в середньому за 1 рік, т·га ⁻¹
1.	'Blanc du Poitou'	6,4±0,34	4,7±0,51	26,0	4,33
2.	'Gelrica'	6,1±0,39	4,6±0,46	35,6	5,93
3.	'I-214'	7,7±0,34	6,2±0,54	62,6	10,44
4.	'San Giorgio'	6,2±0,40	3,7±0,36	25,3	4,22
5.	'Tardif de Champagne'	6,6±0,26	4,1±0,26	30,6	5,10
6.	'Vereecken'	5,4±0,29	2,7±0,29	12,8	2,13

Вищі морфометричні показники та збереженість цього культивуру забезпечили йому також найвищу продуктивність біомаси – 62,6 т на 1 га або 4,33 т сухої біомаси за 1 рік. Цей клон також характеризується найвищими серед інших тополь показниками продуктивності при вирощуванні у багатьох країнах Європи (El Bassam, 2010, Karacic, Weih, 2006, Klasnja, Orlovic, Galic, 2012).

Насадження другого за продуктивністю культивуру ('Gelrica'), незважаючи на дещо менші розміри дерев порівняно з клонами 'Blanc du Poitou' і 'Tardif de Champagne', має вищі показники продуктивності (35, 6 т/га) завдяки високій збереженості дерев. Найменші розміри дерев і показники продуктивності біомаси виявилися у клонів 'Vereecken' і

'San Giorgio', які являють собою пірамідальні форми тополі чорної.

Таким чином, із досліджуваних форм чорних тополь у регіоні досліджень найпридатнішими для створення плантацій з шестирічним періодом ротації в умовах вологого сугруду є євроамериканські гібриди: 'T-214', 'Gelrica', 'Blanc du Poitou' і 'Tardif de Champagne'. Культивари 'Vereecken' і 'San Giorgio' більш доцільно використовувати в озелененні.

Дослідження дворічних насаджень верб показало, що взяті для вивчення три їхні культивари у перші роки теж відзначаються інтенсивним ростом (табл. 3).

Таблиця 3

Ріст і продуктивність дворічних енергетичних плантацій деяких клонів верби (Фучило та ін., 2018)

Укоріненість живців, %	Кущистість, шт.	Середня висота рослин, м	Середня маса рослин, кг	Урожай сухої біомаси, т·га ⁻¹	Приріст сухої біомаси за 1 рік, т·га ⁻¹
Верба прутівидна (<i>Salix viminalis</i> L.) сорт 'Тернопільська'					
88,2	3,9	2,5±0,07	0,31	5,4	2,7
Верба тритичинкова (<i>Salix triandra</i> L.) сорт 'Ярослава'					
91,2	2,9	3,2±0,06	0,32	5,8	2,9
Верба шерстистопагінцева (<i>Salix dasyclados</i> Wimm.)					
84,3	1,9	1,8±0,06	0,15	2,8	1,4

Як видно з наведених даних, найвищим показником укоріненості живців виявився у верби тритичинкової сорту 'Ярослава' – 91,2%. Живці верби прутівидної 'Тернопільської' укоренилися на 88,2%, а шерстистопагінцевої – на 84,3%. Показники середньої висоти кущів корелювали з укоріненістю і відповідно становили: у верби тритичинкової – 3,2±0,06 м, у прутівидної – 2,5±0,07 м, а у шерстистопагінцевої – 1,8±0,06 м. Також досліджувані сорти відрізнялися за показниками кущистості (середньої кількості пагонів у одному кущі). У рослин культивуру 'Тернопільська' в середньому сформувалося 3,9 пагонів на 1 кущ, у сорту 'Ярослава' цей показник становить 2,9, а у верби шерстистопагінцевої – лише 1,9 шт.

Продуктивність дворічної біомаси досліджуваних сортів верб тритичинкової та прутівидної виявилася приблизно однаковою – відповідно 5,8 та 5,4 т·га⁻¹ сухої біомаси, а у верби шерстистопагінцевої – значно меншою (2,8 т·га⁻¹).

Дослідження цих плантацій верби через 5 років (вік кореневих систем – 8 років, вік надземної частини – 5 років) показали, що після зрізання надземної частини у досліджуваних рослин збільшилась кущистість, але найбільшими її показники залишилася у верби прутівидної (6,7 шт. на 1 кущ), значно зросла кущистість у верби тритичинкової (до 5,4 шт. на 1 кущ) і практично не змінилася у шерстистопагінцевої (2,1 шт. на 1 кущ) (табл. 4).

Таблиця 4

Продуктивність енергетичних плантацій верби.

Вік плантації – 8 років, вік надземної частини - 5 років. Густота садіння – 20 тис. шт.·га⁻¹

Кількість пагонів на одну рослину, шт.	Середня висота рослин, см	Середня маса однієї рослини, кг	Урожай сухої біомаси за 5 років, т·га ⁻¹	Середній вихід сухої біомаси за 1 рік, т·га ⁻¹
Верба прутівидна (<i>Salix viminalis</i> L.) сорт 'Тернопільська'				
6,7	3,5±0,07	1,05	18,75	3,75
Верба тритичинкова (<i>Salix triandra</i> L.) сорт 'Ярослава'				
5,4	4,2±0,13	3,30	64,10	12,82
Верба шерстистопагінцева (<i>Salix dasyclados</i> Wimm.)				
2,1	5,4±0,21	1,55	27,35	5,47

Найвищими показниками продуктивності біомаси в досліджуваних умовах відзначався культивар верби тритичинкової 'Ярослава'. Як видно з наведених даних, у восьмирічних плантаціях цей культивар суттєво перевищує за продуктивністю верби прутівидну і шерстистопагінцеву. У нього за 5 років накопичилося 64,1 т·га⁻¹ абсолютно сухої деревної маси, що становить 12,82 т·га⁻¹ у рік. За 5

років, що минули, суттєво збільшилась висота рослин верби шерстистопагінцевої (до 5,4±0,21 м) та її продуктивність (до 5,47 т·га⁻¹ у рік). Продуктивність насаджень верби прутівидної в середньому за рік становила лише 3,75 т·га⁻¹.

З порівняння даних, наведених у таблицях 2 і 4, видно, що в умовах вологого сугруду з досліджуваних девяти культиварів тополь і верб найвищою

продуктивністю відзначається культивар верби тритичинкової 'Ярослава' та культивар тополі 'I-214'. Також достатньо високу продуктивність виявили культивари тополі 'Gelrica', 'Blanc du Poitou', 'Tardif de Champagne' і верба шерстистопагінцева.

Висновки.

Дослідженнями встановлено, що на колишніх низкопродуктивних сінокосах в умовах південної частини Київського Полісся з досліджуваних дев'яти культиварів тополь і верб найвищою продуктивністю відзначається культивар верби тритичинкової 'Ярослава' та культивар тополі 'I-214'. Також достатньо високу продуктивність виявили культивари тополі 'Gelrica', 'Blanc du Poitou', 'Tardif de Champagne' і клон верби шерстистопагінцевої.

Енергетичні плантації верби прутувидної доцільно створювати у менш зволжених умовах, а культивари тополі 'Vereecken' і 'San Giorgio' можуть знайти широке застосування в озелененні.

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BIOLOGICAL SCIENCES

HAEMATOLOGICAL INDICATORS OF ACUTE RADIATION DISEASE (CHERNOBYL EXPERIENCE)

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The article is dedicated to
the 35th anniversary of the Chernobyl disaster

Abstract

The experience of early diagnosis of the degree of acute radiation disease among the liquidators at the Chernobyl nuclear power plant on the basis of a hematological examination showed the following. In this paper we present haematological indicators of radiation damage to the body, which were studied on the example of 53 radiation disease patients admitted to the Clinic of the Kyiv Research X-ray Radiology and Oncology Institute of Ukraine in May 1986. The basis for the initial diagnosis and determination of the degree of acute radiation disease was a decrease in the total number of leukocytes, the percentage and absolute content of lymphocytes in the blood volume in combination with the primary symptoms of intoxication as a result of acute irradiation. Manifestations of primary radiation damage in patients with acute radiation disease did not always correspond to the severity of radiation pathology. The primary reaction of blood parameters by the number and time criteria did not fully correspond to the next level of haematopoietic disorder. As a rule, delays in the development of leukopenia and lymphopenia were observed in comparison with the classical form of acute radiation disease. Blood cytopenia was wavy in nature.

Keywords: acute radiation disease, Chernobyl disaster, haematological indicators, lymphocytes, blood cytopenia.

Introduction. On April 26, 1986, 100 km from the capital of Ukraine, the world's largest radioecological catastrophe occurred, affecting millions of the country's population and adversely impacting their health. Even 35 years later, the Chernobyl disaster remains a source of unique material for reassessing some of the radiobiological paradigms and forecasts. Conditions and levels of exposure resulting from the Chernobyl accident have led to the development of acute radiation disease (ARD) in people that were in the immediate vicinity of the emergency zone. They were exposed to external uneven gamma and beta irradiation, application of gamma and beta nuclides on the skin and mucous membranes, incorporation of radionuclides, exposure to aerosols of burning bitumen, rubber, plastics and other materials, as well as elevated environment temperature (2, 3, 5, 7, 8, 13).

ARD is a disease that develops as a result of total irradiation of the human body in doses greater than 1 Gy. Diagnosis and prognosis of the disease depends primarily on the knowledge of the amount of absorbed dose (2, 3, 5). ARD is distinguished by the severity of the lesion, which is determined by the absorbed dose of radiation: ARD I (mild) degree (1-2 Gy); ARD II (moderate) (2-4 Gy), ARD III (severe) (4-6 Gy). With the subsequent accumulation of clinical and laboratory data, some adjustments were made to the previous notion of the classification of radiation injuries. The following grades of ARD were identified: transient (6-10 Gy) or IV (extremely severe), intestinal (10-20 Gy), toxic (20-80 Gy) and nervous (over 80 Gy).

External irradiation at a dose of 10-20 Gy, which causes the intestinal form of ARD, was previously considered lethal and the patient's death occurred after 8-12 days because of severe intoxication. Currently, radiation disease caused by ionizing radiation in the doses exceeding 13-14 Gy can be regarded as difficult, but not hopelessly incurable. However, the use of modern methods of treatment of ARD does not allow to avoid the death of patients who have been irradiated at a dose that causes apoptosis not only of radiosensitive but also of radioresistant cells and tissues. The death of huge arrays of cells causes the most severe toxemia and severe incurable hemodynamic disorders, which is the immediate cause of rapid death at too high absorbed dose (11).

In cases of uniform irradiation of an organism, the physical methods of dosimetry have the greatest informativeness. However, in cases of uneven irradiation in the absence or incorrectness of the physical dosimetry, biological dosimetry methods are used. This situation occurred at the time of the Chernobyl accident, in which the station staff, firefighters and hundreds of other people called in emergency. Yet, emergency individual dosimeters and protective equipment were missing. No one expected that such a large-scale accident with complete destruction of the active zone would be possible for RBMK-type reactors. As a result, the station lacked the necessary dosimetry and radiometric equipment. It would have allowed to quickly assess the situation on the site immediately after the accident in conditions of high dose rates. Despite the heroic efforts of the liquidators, this led to large-scale and long-term

consequences. The gradual restoration of high-quality dosimetry control was completed only in June-July 1986 (13).

In the first week after the accident, the dose of total gamma irradiation was determined mainly by the number of peripheral blood lymphocytes, and in the most severe cases - by the number of chromosomal aberrations (9). This allowed to divide the victims into groups according to the predicted severity of bone marrow syndrome: mild, moderate, severe and very severe, as well as to identify victims whose radiation dose was less than 1 Gy (7).

Methodology. In this paper we present haematological indicators of radiation damage to the body, which were studied on the example of 53 ARD patients admitted to the Clinic of the Kyiv Research X-ray Radiology and Oncology Institute (now the National Cancer Institute) of the Ministry of Health of Ukraine in May 1986 and were treated under the guidance of the country's chief radiologist, Professor L.P. Kindzelsky. The basis for the initial diagnosis and determination of the degree of ARD was a decrease in the total number of leukocytes, the percentage and absolute content of lymphocytes in the blood volume in combination with the primary symptoms of intoxication as a result of acute irradiation.

The final diagnosis of ARD and its severity was determined on the basis of the dynamics of blood and bone marrow, as well as severity of clinical manifestations of the disease.

Main part. In all patients with ARD of the I degree, changes in the composition of peripheral blood were noted both in the first days after irradiation and in the following periods. Shortly after irradiation, it was possible to distinguish three types of changes of peripheral blood and accordingly - three groups of patients.

In the first group, there was a pronounced leukopenia with the content of leukocytes $(1-3) \cdot 10^9 / l$. The percentage of lymphocytes was within normal limits for the blood formula. However, their absolute quantity - $(0.38-0.93) \cdot 10^9 / l$ - was always below the norm. During the treatment of these patients for 5-8 days, there was an increase in the number of leukocytes and sometimes lymphocytes. Subsequent blood counts were wavy in nature. On 20-25-30 days after irradiation was observed, as a rule, a marked decrease in the total number of leukocytes in the blood to $(2.1-3.1) \cdot 10^9 / l$.

The second group according to haematological parameters consisted of individuals in whom in the first days after irradiation the number of leukocytes was within the values corresponding to normal values. According to radiological analysis and the severity of primary symptoms, they did not differ from patients in the first group. The main indicator of changes in their blood was lymphopenia. Lymphocytes in the blood formula in the first days were 4-9-12%, and in absolute terms - $(0,408-0,576) \cdot 10^9 / l$. Such a low content of lymphocytes persisted for 5-7 days, and then the indicators approached the norm. Later, as in the first group, a wave-like change in the cellular composition of the blood was observed. At 15-20 days there was a decrease in the total number of leukocytes to $(3.7-2.7) \cdot 10^9 / l$ at close to

normal percentage and absolute number of lymphocytes.

A wavy decrease in white blood counts was observed at intervals of 12-14 days.

The third group consisted of patients in whom lymphopenia was not detected against the background of normal, decreased or slightly increased content of peripheral blood leukocytes. In the next observation period (20 days) the content of lymphocytes was in the range of $(0.8-1.05) \cdot 10^9 / l$. However, the wavy pattern in a significant reduction of leukocytes was maintained and recorded in the period described above. The total number of leukocytes periodically decreased to $(2.8-3.8) \cdot 10^9 / l$.

Analysis of the dynamic of blood parameters in patients diagnosed with first-degree ARD shows the heterogeneity of changes, especially in the first 5-7 days after irradiation. With the exception of the possible contribution of the individual reaction of the organism to radiation exposure (4), we can assume other mechanisms of this phenomenon. First of all, it can be caused by external irradiation or irradiation due to incorporated radionuclides. In the first case, the classical form of ARD as a bone marrow syndrome with change of cellular structure of blood in the first days after irradiation is more accurately traced. In the second case, when the predominant share in the total dose is made by radioactive isotopes, changes in blood parameters occur with a delay, because the integral dose of radiation accumulates over a period of time. Under these conditions, timely disincorporation of radionuclides can and should help reduce the level of change in haematological parameters and the potential severity of ARD during its manifestation.

In patients with grade II ARD, the number of leukocytes was in the range $(2.0-3.2) \cdot 10^9 / l$. Such low leukocyte counts were maintained for 12-15 days after irradiation, followed by a temporary rise to subnormal values. The percentage of lymphocytes was different - from 10 to 70%. Regardless of the percentage, the absolute number of lymphocytes in all patients was reduced, i.e. $(0.42-0.65) \cdot 10^9 / l$. At the expressed leukopenia, the sharply expressed granulocytopenia with preservation of the certain quantity, about $0.5 \cdot 10^9 / l$ of lymphocytes of blood was also noted. Apparently, the proportion of lymphocytes with a long lifespan persisted for some time. After rising for 10-15 days, the second drop in the content of leukocytes was observed, mainly due to the elements of the granulocyte series.

In the future, the indicators of the cellular composition of leukocytes were wavy in nature. The tendency to stabilize white blood cells was observed 45-60 days after irradiation.

At patients with ARD of the III degree, the expressed changes of indicators of blood caused by a pancytopenia of a bone marrow were noted. Restoration of blood parameters at a critical moment was possible only due to the donor bone marrow, which temporarily assumed haematopoietic function.

Thus, the initial reaction of haematological parameters of the blood by quantitative and temporal criteria was not adequate to the next level of haematopoietic

disorder. As a rule, later development of leuko-, lymphocytopenia was observed in comparison with the classical form of ARD. Blood cytopenia was wavy in nature. The terms of agranulocytosis development were later, which is obviously connected with active therapy in the first days of patients' stay in the clinic and adequate disincorporation of radionuclides by entero- and hemosorption methods.

It is known that the blood circulatory system is characterized by high sensitivity to ionizing radiation. In the development of radiation-induced diseases of this system, it is difficult to establish a single etiological factor (10). First of all, it is the radiation damages to the vascular endothelium with the subsequent development of arteriosclerosis and fibrosis in the range of doses that have reached and exceeded the limit level. After irradiation in high doses, progressive changes are observed in all elements of the vascular system, as a result of which vascular function is reduced. This leads to late vascular atrophy. Thus, vascular damage plays an important role in the development of all late radiation pathologies caused by irradiation in high doses. According to (12), an increase in the frequency of diseases of the circulatory system in the range of low doses (up to 0.5 Gy) has not been established.

The mechanisms underlying vascular changes are complex. These include widening of the "gaps" between endothelial cells, changes in pinocytosis, membrane permeability, cell depletion, hyperplasia, and fibrosis.

Thus, damage to blood vessels under the influence of radiation is one of the significant consequences for the body of individuals who took part in the liquidation of the consequences of the Chernobyl accident. In addition to the direct change of the walls of blood vessels in the victims, there was a violation of the stability of the internal environment (homeostasis), and as a result - the development of various pathologies of organs and tissues.

Dynamic observation of the state of haematopoiesis in convalescents of ARD in the dose range of 1.0-3.0 Gy in the remote post-accident period showed the following(13). In the peripheral blood of the victims, there was a gradual normalization of quantitative indicators. At the same time numerous qualitative disturbances in cellular elements at the level of a kernel and cytoplasm remained. Various haematological syndromes, associated with a decrease in the content of mature peripheral blood cells, were observed in convalescents of ARD.

There is an opinion about "latent" deficiency in the hematopoietic system even many years after ARD (1). Quantitative changes in blood elements in the remote period after the accident are regarded as a pre-pathological state in the hematopoietic system (7). Therefore, ARD convalescents remain a contingent of priority medical and biological monitoring (6).

Conclusion. To summarize our research, we can conclude the following. Manifestations of primary radiation damage in patients with ARD did not always correspond to the severity of radiation pathology. The primary reaction of blood parameters by the number and time criteria did not fully correspond to the next level of haematopoietic disorder. As a rule, delays in the development of leukopenia and lymphopenia were observed in comparison with the classical form of ARD. Blood cytopenia was wavy in nature.

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ECONOMIC SCIENCES

FEATURES OF THE MANAGEMENT SYSTEM IN THE ORGANIZATIONS OF TOURISM

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Abstract

The article is devoted to the peculiarities of the tourism management system, which is a separate type of business activity, which has features due to the specifics of the industry. The authors believe that the management should identify such features and further take them into account when managing tourism enterprises and organizations. The authors of the article distinguish two features of the industry from the point of view of management: the first is the scale, the second is the vagueness and complexity of determining the goals of managerial impact.

The authors consider tourism in the article as an object of management and believe that it has a number of features due to the specifics of the industry. The authors think that the management of tourism enterprises should determine such features and further take them into account when managing tourism enterprises and organizations.

The authors have identified several features of tourism management, of which the first is the scale of the tourism industry and the complexity of the relationship between its components; the second feature of tourism as an object of management can be considered the vagueness and complexity of defining the goals of impact management.

Keywords: features of tourism, features of management, system of management.

Introduction.

Tourism as an object of management has several peculiarities inherent only to it, because of the specifics of the industry. The management should identify such features and further take them into account when managing tourism enterprises and organizations.

The first feature of tourism from the point of view of management is the scale of the tourism industry and the complexity of the relationship between its components.

We can consider the second feature of tourism as an object of management the vagueness and complexity of determining the goals of management impact. At first glance, it may seem that for private tourism enterprises, the goals are quite clear - the accumulation of values, making a profit. However, travel agencies often focus on the stated rather than the actual needs of tourists. To identify the latter, the manager must make every effort, because the inefficiency of his activities can provoke consumer dissatisfaction.

Methodology.

The theoretical basis of the research is the publications of researchers and practitioners, including monographs, scientific articles published in periodicals, collections of materials of international scientific and practical conferences, scientific and methodological materials of seminars. In working on the dissertation, we relied on and used normative documentation.

The theoretical and methodological basis of the study is such conceptual provisions as the economic theory, regional economics, institutional economics, strategic management. The methodological basis of the dissertation is a synergistic paradigm that combines and

synthesizes systemic, reproductive, and institutional approaches.

During the research, general scientific methods of theoretical and empirical knowledge we used: scientific abstraction, analysis, and synthesis, analogies, logical modeling, classification, formalization, systemic, statistical, functional, structural, economic, and comparative (comparative) methods of analysis.

We believe that the dialectical method of scientific knowledge, which is a system comprising generalized rules, is most consistent with the dissertation we have chosen. The generalized patterns in this system are typical of the field of research and the field in which we conducted our research. Our dialectical method was our focus, and all lines of our research were pagan.

Within the framework of the dialectical methodology, methods such as determinism, a reflection of reality, methods of deduction, and induction were used.

Main part.

It is quite difficult to determine clear goals and criteria for tourism organizations of the national, regional, local (city, district) level, which makes it difficult to objectively assess their contribution to tourism development, forecast, and planning the activities of such organizations. The development goals of individual tourist destinations, settlements, and regions are more complex. It is not easy to accurately predict all the phenomena and processes occurring in tourism (changes in the political situation, deterioration of climatic conditions, changes in the taxation system, etc.), so it is often possible to speak only about the probabilistic nature of forecasts and plans. Thus, tourism is a phenomenon that is difficult to predict and measure.

One of the most important characteristics of tourism as a management object is the specificity of tourism services and tourism products. They must be taken into account when developing a management system for a tourist enterprise, organization, territory, when setting service standards, training personnel, etc.

Special requirements for tourism management are also put forward by the specifics of tourist demand, which is heterogeneous and stands out among other reasons:

- Intangibility and safety of the tourist product;
- Variety of consumer preferences;
- High importance of social factors.

This feature also affected the management of the tourism sector, since the receipt of services in the complex during a tourist's stay on vacation is the main product created in the tourism sector. It is this complex, that forms the basis of tourist demand. Dependencies on customers may come to the fore with this or that service. The tourist product is created by the efforts of many organizations, dependent on each other. As a result, the importance of cooperation increases both horizontally and vertically, which facilitates the decline in services in the complex.

Under the influence of a number of objective and subjective factors: climatic, economic, social (availability of free time), demographic, psychological (tradition, fashion), material and technical (development of a network of accommodation, food, transport, etc.). The seasonality of tourist demand and supply is formed.

Another feature of tourism is that it involves many more stakeholders than any other human activity. The environment of the implementation of tourism activities includes customers, supplier companies, manufacturers of individual tourism and non-tourism services, authorities and institutions, local authorities, social funds, public and other organizations, etc., which influence or may influence it. Travel organizations cannot expect market participants to all behave the same. For example, there are certain contradictions between hotel owners, residents, and tourists. In addition, interested organizations can be divided into several interest groups: hotels in a ski resort are likely to benefit from a reduction in one-day tourism, while lift owners, on the contrary, benefit from an increase in the flow of tourists. Even within the same group (for example, among representatives of hotel complexes), different interests can be traced. Thus, large hotels are usually less interested in offering spa services, since they have everything necessary to accommodate and organize guests' recreation at their place, while small hotels are interested in the travel agency improving the resort offer and organizing appropriate measures itself. An important component is a relationship between holiday-makers and local residents. It is possible to reduce differences and balance the interests of different groups through balanced planning and coordination of tourism development with the participation of stakeholders, guided by generally accepted norms and values.

The external effects of the tourism product can also be represented as the specifics of the tourism industry. Tourism has a significant impact on areas such

as economics, ecology, politics, social life, which, accordingly, also affect tourism. The profit from tourism takes part in the local economic cycle and creates an additional (multiplier) effect. Tourism provides employment for the population, creates infrastructure, and builds new cultural and recreational facilities. Time, tourists create a load on the infrastructure, natural environment, cultural and recreational facilities, which can cause discontent among local residents. If you do not take into account these negative effects, do not determine the ways to overcome them, tourism will not be able to play the role of an economic activator. In this regard, it is necessary to plan and form the tourism infrastructure with the participation of all interested parties and organizations.

In addition, there is a certain specificity of the tourist's communication with others. The everyday life of a tourist reflects the peculiarities of housing, work, free time, etc. A vacation spent traveling is meeting with other travelers and local residents. The attitude of the traveler to them and his motives are determined by how a person is used to living, working, which opportunities for organizing free time. As a rule, the more a person feels limited natural resources in everyday life, the more she is obliged to fulfill certain norms of behavior, the more he wants to choose an unknown country for rest. Research results show that tourist behavior influences the attitude of local residents and other travelers towards him. So, if tourists arrange noisy parties, engage in recreational activities that negatively affect nature, then this causes a negative attitude of local residents towards them and can ruin the rest.

Finally, tourism management activities are specific and significantly different from the activities of workers in other industries, although at first glance it may seem that the management of a tourism region and travel agency is based on the same basis as the management of any enterprise of the "person-person" system.

The essential tasks of tourism managers are:

- In determining the type of client and identifying his actual needs;
- Comparison of the got data with the resource capabilities of the travel agency, i.e., finding out the possibility of meeting these needs with the help of the tours and routes;
- Determination of general trends and patterns of development of demand, as well as its specific features.

Management in tourism has several features because of the specific properties of the services provided by tourism organizations. As an integrated type of activity, tourism includes the activity of subjects of different levels and can be aimed at achieving different results. The organization of effective interaction between the participants should be in the center of attention of all subjects of tourism management interested in coordinating their actions and implementing joint programs for the development of the industry.

Firstly, the peculiarity of management in the tourism industry lies in the great depth of penetration and the complexity of the relationship between the constituent elements of the tourism industry: the leadership of many tourism organizations must develop a unified

management system that includes both regulatory activities and self-government bodies at the level of firms and their associations.

Secondly, the specifics of management in the tourism industry are reflected in the fact that it is inherently anthropocentric - a person, with his needs, value system, mentality, appears as the core of this entire system. It is from this that the subjects of management in the industry should make a start.

Thirdly, an equally important feature of tourism management is its seasonality. The offer of tourism services is inflexible and can only be consumed locally. The hotel, airport, recreation center cannot be moved at the end of the season to another region, they cannot adapt in space and time to changing demand. This circumstance must be taken into account by the heads of tourist enterprises since fluctuations in demand can significantly worsen the conditions for the functioning of the entire tourist complex.

Fourthly, management in the tourism industry is distinguished by its two-level nature, combining two qualitatively different states of social reality into a single system - artificially planned and consciously organized activities of people to solve certain problems, and the emerging system of relations between participants in joint activities as self-government relations and self-organization. This ratio of intentional and spontaneous components is the main social quality of the sociocultural "body" of management.

Fifth, special attention is required to take into account such a feature as the non-primary nature of tourist services. The tourist product is not a basic commodity, the demand for tourist services is extremely elastic in relation to the level of income and prices, and therefore the change in the purchasing power of the population affects tourist services, and timely receipt of information will allow adjusting the volumes and objectives of management/

Sixth, this is the specificity of marketing in tourism. For the management of the tourism industry, marketing is more important. The seller of tourist service, not being able to present its sample, as is practiced when selling goods, must find an opportunity to demonstrate the advantages of his product - service, which can only be done with a well-established marketing system. The consumer, as a rule, cannot see the tourist product before its consumption, and the consumption itself is carried out directly at the place of production of the tourist service.

Seventh, the efficiency of the tourism industry does not manifest itself immediately, but with a time delay because of a long period of return on invested funds, and if the development goal is social, then the effect will not be expressed in value form.

Eighth, the peculiarity is that because the tourist environment, despite its social orientation, is predominantly commercial, most of the subjects of the tourism business determine, of course, the primary goal of their activities, making a profit. Therefore, it is especially important that managing entities are aware of the consequences, including economic ones, that may arise due to ineffective interaction between all representatives of

the tourism market (for example, in case of late submission of documents for a visa, the entire package of travel services may be canceled). It is the personal interest in the effective organization of interaction between the subjects of management in tourism while developing management decisions that can motivate tourism enterprises to seek mutually beneficial options for cooperation, recognizing the priority of common interests over individual ones. A well-built, well-functioning, and reliable network of communications between all partners allows each individual subject of the tourism market to protect themselves, their consumers, and partners from the instability of the external environment, as well as from crisis consequences.

Ninth, the specifics of management in the tourism industry depend on the macro-environment (natural, political, and economic situation, force majeure). This affects the elasticity of demand; also emphasizes the special importance of trust in the provision of tourism services, since the relationship between all suppliers and consumers of individual services that make up it based on an integral tourism product precisely on trust. After all, we can only assess the quality of a tourist product during the consumption process.

Considering the tourism industry, it should be noted that it is one of the riskiest activities in the provision of services, as a result of which the number of risky cases that are characteristic of tourism is increasing. The risk is present at all stages of the provision of tourism services and covers all subjects of the tourism industry. In the tourism industry, the risk of undesirable events and their negative consequences is especially high because the very nature of the provision of services is often associated with the stay of tourists in various exotic, extreme, and unusual places for them, where it is difficult to foresee the presence of factors unfavorable for the health of tourists. In addition, when a large number of business partners interact (foreign tour operators, consular services, hotels, transport, and excursion companies), the coordination of their actions becomes difficult, which also explains the importance and relevance of the category of "trust" for the tourism sector.

We characterize globalization in modern tourism by:

- A unified information space for market entities,
- The existence of service consumers in different parts of the world,
- International representations of tourism business entities and distribution channels,
- Location of production, considering the maximum possible realization of competitive advantages?
- Savings received from an international scale of activity,
- High costs for product development and rapidly changing technologies,
- State regulation of the industry (introduction of uniform standards for the provision of services, stimulation, and support of certain types of tourism, protection of consumer rights).

We saturate the market with offers of various ori-

entations and price levels. Local and international carriers compete in national markets. We should also note that the tourism industry is open in relation to external influences that are beyond the control of the subjects of tourism activities. As a result, cooperation is actively developing between them as coordination and integration of partners' interests for implementing joint projects and strengthening of positions in the market. In the future, competitive advantages will be provided only to those organizations of the tourism industry that will compete on equal terms for consumers with foreign companies, both in the domestic and foreign markets.

Findings.

Globalization gives rise to the interdependence of participants in the tourism market - today, changes in demand in the market of one country can stimulate or, on the contrary, restrain the market of another. This relationship explains the need to develop a system of measures aimed at giving the tourism industry stability. The categories "trust" and "risk" are playing a special role for tourism entities, without which the industry cannot exist today. Thus, the listed features of management in the tourism industry show that it is necessary to create a favorable climate for its functioning and development. This is possible only with the close cooperation of all interested parties - tourism organizations, consumers, and the state that creates the policy of the tourism industry. Is based on its recognition not only as a promising branch of the economy but also as a significant component of the social sphere, which implements several important social functions in its activi-

ties. These factors actualize the question of the effectiveness of the management system in the tourism industry. However, at present, as the analysis of management shows, there is no consistency in this area, as fragmentation characterizes management.

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BUSINESS CORPORATIONS IN THE MODERN WORLD: HISTORY, PRESENT TIME

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Abstract

The properties of modern corporations are studied from the position of market efficiency, joint cognitive systems, in which shareholders play the role of only cognitive tools, and real cognitive tools are carried out by management and the rest of the corporate staff. The history of the emergence of universities from the origins of religion and corporations, approaches to corporate management with a focus on institutions and the belief of top management in the inviolability of the market, the ability to manage profits and costs are considered.

Keywords: economy, corporations, management, history, profit, costs.

Introduction. In the last 20 years, firms have come to be considered organizations run in the interests of shareholders. It was believed that the top-level management of firms acted in the interests of shareholders, and the employees of firms served as simple tools to achieve the maximum value of shares. In [1] M. Aoki transformed this view defining business corporations as cooperative cognitive systems, in which shareholders are just "cognitive tools" that monitor their use, and real cognitive actions are distributed between management and the rest of the corporate employees. He analyzed

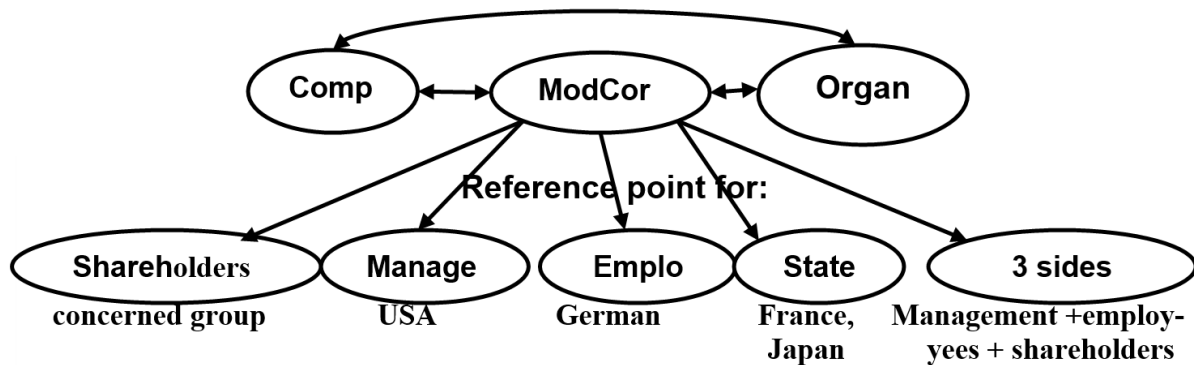
the various relationships that arise between shareholders, management and employees, and proposed various models of organizational architecture and their application in the interests of managing the activities of commercial and industrial corporations at the highest level. This approach is different from the orthodox views of corporate law and finance, the neoclassical theory of the firm, corresponds to the latest achievements of epistemic game theory, the theory of knowledge and cognitive sciences, the foundations of the historical genesis of corporations in general, their interaction with other

agents operating in the spheres of economic, political and social exchanges. All this is connected with the formation of the institutional context of society as an independently evolving system.

Previously, it was believed that the main tasks of business corporations were to maximize profits, the presented value of the aggregate of profits expected to be received in the future, to eliminate all barriers, to increase the motivation of shareholders and the benefits of the whole society. At the same time, the state and the top management of corporations sought to eliminate profligacy, maintain high labor discipline, effective employee behavior, and control illegal attempts by management to increase personal wealth at the expense of other groups of society. Lawyers and economists actively participated in discussions about corporate governance, which contributed to the emergence of the paradigm of varieties of capitalism, one of the alternatives to the theory of interest groups in the activities of corporations.

Methodology. In the 90s of the twentieth century, the ideological, political and economic battle between the administrative-planned and corporate-market economy ended with the collapse of the USSR. State-owned

enterprises were transformed into private or state-owned market-oriented firms, and their transformation was facilitated by a number of institutional factors - legal support for property rights and contracts, norms for managing property by proxy, transparency of corporate information, and management responsibility. Their further development led to two approaches: a) an approach focused on institutions, when institutional supports do not arise automatically and are not created only by the adoption of legislative acts, but take into account the specifics of historical, social and political factors in each national economy; b) an approach based on the belief in the universal value of markets with a focus on them by the management of firms, which caused the creation of appropriate legal mechanisms, autonomous progressive development of the corporate economy after privatization. The previously existing guidelines for management in the American model, for workers in the German model, and for the state in the Japanese and French models were declared invalid due to their inability to compete on an equal footing with the model focused on shareholders (pic. 1).



Pic. 1. Models of modern business corporations (ModCor):

Comp – companies; Organ – organization; Sharehol – shareholders; Manage – management; Emplo – employees; State – state; 3 sides – a combination of triple agents (managers + employees (workers + shareholders)).

However, the global crisis of 2008 clearly showed that the growth of financial assets was due to the engineering of financial intermediaries, who used distorted incentives for behavior, which gave rise to endogenously high risks of the disappearance of huge shareholder wealth in the amount of trillions of dollars. This had a negative impact on the real sector of the corporate economy, requiring in-depth research on the alternative model of production corporations and the corporate economy, its relationship with the model focused on shareholders.

Main part. Consider the essence of business corporations, one of the most important types of corporations in the history of social inventions.

1. The concept of a corporation (universitas, corpus, collegium) first appeared in Roman law. According to a number of foreign scientists (D. North, J. Wallis, B. Weingast, etc.), in Ancient Rome there was no concept of a legal entity, and a corporate organization was represented and operated with the participation of individual people. But the incorporation for social functions in many spheres (religion, education, politics, philanthropy, trade, craft) began in Europe in the Middle

Ages, which allowed it to move ahead of others to a democratic state and a modern corporate economy.

2. Today, business corporations represent an evolving highly developed form with the following specific features: a) the ability to concentrate a significant amount of financial capital; b) the ability of shares to change hands through the markets; c) capital market control over management; d) limited liability; e) the organization of operating activities through various types of contracts.

3. In general, corporations are voluntary, stable associations of individuals involved in various purposeful types of joint activities, characterized by a unique identity and self-government in accordance with the organization's systems of rules. According to W. Blackston (1765), "each corporation is characterized by: (1) continuous succession; (2) the ability to sue and respond to the corporation; (3) to acquire and own land; (4) to possess the corporate seal; (5) to enact internal rules or private laws" [2]. J. Davis (1905) considered a corporation to be a group of individuals realized in a certain class of organizations that take many forms by performing certain classes of social functions within them or

through them. He identified a number of corporate qualities: a) associative (joint) work; b) creation by the state; c) voluntary long-term existence after mandatory establishment; d) autonomy, independence, self-renewal; e) imperative unity; e) motivation based on private interest; f) functioning in the public space [3]. A. Greif considered corporations to be purposefully created, voluntary, interest-based, and self-managed permanent associations [5].

4. Corporations are capable of doing things that are inaccessible to individuals due to their biological limitations of life. Thus, T. Kuran [4], studying the absence of corporations in Muslim law, revealed that the egalitarian system of inheritance caused the periodic division of the property of merchants, which negatively affects the longevity of business enterprises. Therefore, successful merchants often invested their wealth in the purchase of real estate, and then transformed them into waqfs-unique Islamic corporate organizations in the VIII-IX centuries. The founder of the waqf could appoint himself or his heir as a trustee (mutawalli). He had the right to rent out real estate for short-term rent to commercial enterprises, and to direct the proceeds to the provision of communal or religious goods (organizing the supply of drinking water, maintaining roads, helping pilgrims and merchants, building mosques, etc.). The lack of incentives to accumulate corporate property was due to the incomplete separation of individuals from the corporate organization. Corporations as a whole are able to know and preserve what simple aggregates of individuals cannot know and preserve. The first types of corporations were established to study and pray, to encourage and support religious and educational activities. Thus, the Roman Catholic Church was established as a legitimate corporate organization under canon law during the Gregorian Reform (1075-1122). Irnerius, the teacher of the law School founded in Bologna in 1087, transformed it into an association of student corporations with the creation of universitas. In the XIII century, the Universities of Paris and Oxford were registered as corporations, and in the United States, as one of the first corporations, Harvard University. Their main functions were: a) interpretation of the world; b) accumulation, theoretical understanding and dissemination of knowledge; c) maintenance of culture as a form of general knowledge, etc. The model for the organization of the first European universities was madrassas (a structure funded by waqfs). However, universities quickly became institutions of higher education, conferring academic degrees, incorporating scientists and students.

Corporations engaged in economic activities focused on making money. At the same time, one of the dimensions of business corporations was the extension of the concept of "firms" to them according to R. Coase (1937) [6], as their belonging to a production organization that functions for a long time, not divided into many "packages" of individual short-term contracts. Externally, production and other activities within a corporate firm can manifest themselves as a simple set of individual physical actions coordinated by cognitive actions. In the absence of motivational incentives, em-

ployees can hide their intentions and information in order to have personal advantages over other people. Hence, the way corporations are organized as systems of collective knowledge requires no less attention than the financial aspects.

In the orthodox contract theory of the firm, the human aspects of a commercial and industrial corporation are considered exclusively from the perspective of the relationship of authority between its management and workers. This is at the heart of the philosophy and content of corporate governance laws. In a modern public company, the true union is not between the shareholders or between them and the managers, but between the shareholders and the workers. However, the law ignores the fact that workers are an integral part of the company itself. In legal theory, the relationship between a company and its workers is considered as a contractual relationship between the master and the servants, who are no more a part of it than its creditors. In general, the philosophy and ideology of the supporters of the shareholder-oriented model has changed very little in Europe and the United States. P. Drucker, who studied the activities of the General Motors Corporation in 1946, wrote a treatise "The Concept of a Corporation" [7], in which he called on its management to change the attitude towards workers who represent a resource, not a cost, and also introduced the concept of an "information worker" who can offer the employer both manual and headwork (the management of the corporation forbade its management and workers to get acquainted with this work). Later, this corporation experienced serious troubles due to disregard for the recommendations issued in the treatise. However, it was carefully studied by the Japanese, which contributed to the appearance of the "Japanese miracle".

Today, business corporations conduct various types of cognitive activities (collection, processing, use and storage of information), which are interconnected and systematically distributed between management and the rest of the staff, hereinafter referred to briefly as workers. Investors are actually cognitive tools in a corporation, as an organization of collective cognition. The study of the activities of commercial and industrial corporations is important from the point of view of the reasons for the emergence of firms in the economy on the basis of specialization and exchange, saving on transaction costs, replacing markets with power. Within the firm, hired workers fulfill the requirements of the entrepreneur within the limits of indifference established by contracts. R. Coase in [6] described two situations with transaction cost savings: a) if it is impossible to find suitable prices; b) if there are difficulties in negotiating renewable market contracts.

Recognizing the potential importance of shared knowledge among corporate employees requires answers to a number of questions: a) how are the acts of cognition distributed and what is the relationship between the members of the system; b) how are they related to the processes of informatization of the system of cognition tools itself; c) which cognitive assets are more important in the economic sense; d) workers from the position of joint cognition - are they a part of the

management brain in the architecture of the corporation?

Today, many properties are used to characterize business corporations. Thus, lawyers distinguish the property of the legal personality of corporations, their ability to be the subject of contracts, ownership of property, the possibility of its transfer, as well as delegated management. Their activities can be aimed at making a profit (the model focused on the shareholder), or at broader goals (the model of interested groups). G. Hansmann and R. Krakman [8] proposed a simplified classification of business corporation models focused on: a) management (typical American model.); b) workers (standard German); c) the state (standard Japanese and French). M. Aoki proposed a model that includes a relatively new three-way relationship between management, workers and investors. The importance of these relations increases along with the increase in the role of human cognitive (intangible, intellectual) assets in economic activity.

Of great importance in the study of the nature of corporations are: 1) general rules that are perceived by the founder as acceptable and accepted for execution; usually this is the voluntary participation of people in the corporation; 2) attitudes that correspond to the general rules adopted in society; usually this is a stable competitive position of corporations in society; 3) management rules that ensure the effective performance of corporations by generating people's expectations of relative safety; usually this is performed by formal laws, compliance with legislative norms with the basic principle.

All founders of a business corporation or (equivalently) holders of its constituent human, material and financial assets can expect to receive benefits from participating in joint activities of corporations, although their interests in this process may be opposite. This is the essence of the problem of corporate governance in a broad sense. It satisfies with a number of fundamental requirements that correspond to the basic axioms of the solution of J. Nash for the problem of negotiations or transactions [9]: a) competitive stability of joint work; b) compliance with the general sense of honesty/fairness; c) cognitive economy, independent of inappropriate (unfair) information. In the context of the desire for self-government, the solution of their economic tasks, corporations explicitly or implicitly produce social impacts. Corporate governance should generate corporate behavior that remains consecutive and coordinated with societal institutional arrangements that include, but are not limited to, enforceable formal laws.

We need a structure that can be used to analyze the bilateral relations between corporations and other social actors (individuals and legal entities, government agencies, individual groups, non-governmental organizations, etc.), whose joint interactions are based on certain intentions and actions to achieve the desired political, economic or social goals. In this sense, social interactions are games of various kinds, regardless of the nature of the winnings (egoistic, material-oriented, societal, etc.), the founders of the theory of which were J. Von Neumann and O. Morgenstern [10]. Game theory

allows us to analyze the relationship between the societal rules, including the structure of state administration at the highest level, social and legal norms, social status, and corporate rules of self-government, as a stable phenomenon of "balance" corresponding to the outcomes of the game, as interrelated societal and organizational games.

This "balance" allows us to identify stable and mutually reinforcing aspects of the societal order, its impact on the architecture and management structure of a business corporation. Corporations adapt different types of joint work to the changes taking place in the external market and social environment, which are affected by the development of corporate governance.

How and under what conditions do these mutually reinforcing processes generate a stable joint evolution, and should they be considered as an aggregated result of the rational choice of individuals and corporate organizations that are sufficiently strong, have their own tastes, goals, beliefs, values, cognitive abilities, intelligence, etc., formed before the beginning of the processes of societal interactions?

The evolution of a stable societal order may require more – for example, common grounds in information and conclusions, various social cognitive categories (significant social symbols, public norms, laws, regulatory rules, culture, general preliminary information, etc.). To understand the original nature of institutional evolution, it is necessary to "melt down the armor" that protects methodological individualism. The Nobel Prize winner K. Arrow considered that it is important to take into account social variables that are not specific to individuals in order to study and understand the economy and any social system – first of all, knowledge and technical information [11].

Findings. At present, the growth of corporate diversity is due not to the specifics of different countries, the varieties of capitalism, but rather to the phenomenon common in national economies—the product of global integration of economies. The global corporate landscape is driven by the difference in the construction of diverse corporate architectures and structures, rather than sovereign control over non-financial business corporations of all types.

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FEATURES FORMATION OF ACCOUNTING POLICY OF THE REPUBLIC OF UZBEKISTAN

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ОСОБЕННОСТИ ФОРМИРОВАНИЕ УЧЕТНОЙ ПОЛИТИКИ РЕСПУБЛИКИ УЗБЕКИСТАН

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Abstract

This article examines the stages of development of the legal foundations of the accounting system of the Republic of Uzbekistan in the years of independence and also considers issues related to the peculiarities of formation and factors affecting the development of accounting policies based on the characteristics of economic entities.

Аннотация

В данной статье рассматриваются этапы развития правовых основ системы бухгалтерского учета Республики Узбекистан в годы независимости и также рассмотрены вопросы, связанные с особенностями формирования и факторов, влияющих на развитие учетной политики исходя из особенностей хозяйствующих субъектов.

Keywords: accounting policy, accounting methods, technological features, chief accountant, national accounting standard, business entities.

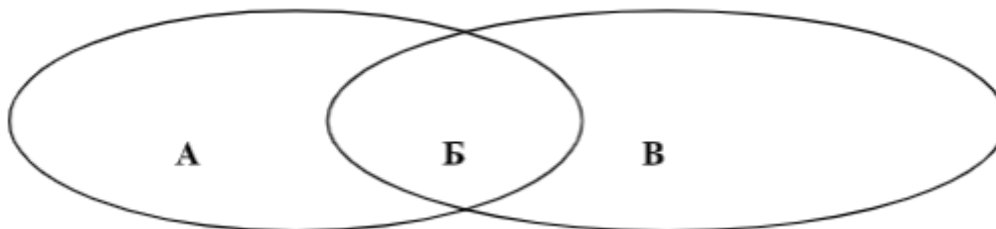
Ключевые слова: учетная политика, методов бухгалтерского учета, технологической особенности, главный бухгалтер, национальный стандарт бухгалтерского учета, хозяйствующих субъектов.

Введение. Термин «Учетная политика» впервые получил между-народное признание в 1973 году. В том же году комитет по международным стандартам финансовой отчетности разработал стандарт под названием «Раскрытие информации об учетной политике». С тех пор существовали разные интерпретации учетной политики. Данный термин отражен в системе бухгалтерского учета республики приказом Министерства финансов Республики Узбекистан от 26 июля 1998 г. № 17-07 / 86 в Национальном стандарте бухгалтерского учета № 1 «Учетная политика и финансовая отчетность». Хотя в этом стандарте не даётся определение учетной политике, он является одним из первых основных источников использования термина «Учетная политика» в экономике и науке республики.

Методы. При подготовке статьи были использованы такие методы, как научная абстракция, анализ и синтез, индукция и дедукция, группировка, статическое наблюдение и другие экономические методы.

Основная часть. По нашему мнению, «Учетная политика - это совокупность документов, имеющих юридическую силу, отражающих применение общепринятых нормативных документов, принципов и методов в организации бухгалтерского учета в соответствии с технологической особенностью хозяйствующих субъектов».

Профессор Я.В. Соколов в своей книге «Управленческий учет: миф или реальность?» бухгалтерский учёт делит на две части, и их взаимосвязь представлена следующим рисунком:

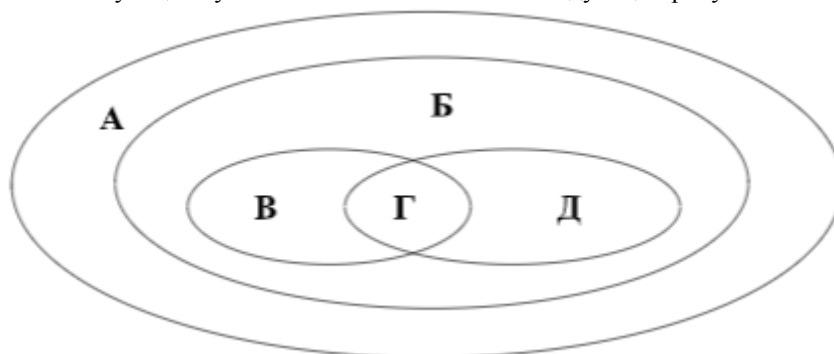


Здесь: А - управленческий учет;
 Б - учетная политика;
 В - финансовый учет.

Рисунок 1. Взаимозависимость бухгалтерского учета. [9]

Как видно из этого рисунка, автор делит бухгалтерский учет на две части, то есть на финансовый и управленческий учет, и показывает, что учетная политика их связывает. Это подключение в основном касается хозяйствующих субъектов.

По нашему мнению, каждое государство имеет свою независимую учетную политику. Исходя из вышеизложенного, мы хотим выразить структурную структуру учетной политики каждого государства на следующем рисунке.



Здесь: А - учетная политика государства;
 Б - учетная политика хозяйствующих субъектов;
 В - финансовый учет;
 Г - национальный стандарт бухгалтерского учета;
 Д - управленческий учет.

Рисунок 2. Организационная структура бухгалтерского учета.

Как видно из приведенных выше примеров, ученые дают разные определения. Кто-то считает, что это «Учётная политика», а другие «Политика ведения учёта». Это указывает на то, что консенсуса по этому вопросу пока не достигнуто. Следует также отметить, что по некоторым взглядам и мнениям учетная политика также становится более абстрактной.

Статья 11 Закона Республики Узбекистан «О бухгалтерском учете» возлагает эту задачу на руководителя хозяйствующих субъектов. Однако главный бухгалтер или бухгалтер должны присутствовать при разработке учетной политики предприятия.

В учетной политике хозяйствующего субъекта должны отражаться следующие и утверждаться руководителем:

- план рабочих счетов бухгалтерского учета;
- формы первичных учетных документов и регистров бухгалтерского учета, а также наименование документов для внутреннего учета;
- порядок инвентаризации активов и пассивов предприятия;
- методы оценки активов и пассивов;

- порядок и правила обращения бухгалтерских документов, технология обработки учетных данных;

- порядок управления экономическими процессами;
- другие необходимые решения для организации бухгалтерского учета.

Содержание вышеуказанных должно быть указано в законе о бухгалтерском учёте или стандарте по бухгалтерскому учету. Но это пока не отражено в наших юридических документах. По этой причине руководители и главные бухгалтеры (бухгалтеры) многих хозяйствующих субъектов не понимают структуру, содержание и сущность учетной политики.

Факторы, влияющие на формирование учетной политики хозяйствующих субъектов:

- спрос (национальный стандарт бухгалтерского учета, устанавливаемые собственником имущества);
- ограничения (ограничения, налагаемые национальной учетной политикой);
- профессиональные навыки (3- рисунок).



Рисунок 3. Соотношение факторов, влияющих на учетную политику. [8]

Выводы. Национальный стандарт бухгалтерского учета Республики Узбекистан Как указано в Стандарте № 1 «Учетная политика и финансовая отчетность», «Методы бухгалтерского учета, выбранные организацией при формулировании учетной политики, применяются с 1 января года, следующего за годом выпуска соответствующего организационного документа, из которого вновь созданные хозяйственные общества являются исключением.

Учетная политика в течение отчетного года не меняется. Изменение учетной политики хозяйствующего субъекта допускается в следующих случаях:

- при реорганизации субъекта (слияние, выделение, слияние);
- смена собственников;
- изменения в законодательстве или системе регулирования бухгалтерского учета в Республике Узбекистан;
- при разработке новых методов бухгалтерского учета. [1]

Многие ученые высказали свои взгляды об учетной политике. Например, по мнению российского учёного - экономиста, профессора П.С. Безруких, «Учетная политика - это набор методов бухгалтерского учета. Это первое наблюдение, измерение стоимости, текущая группировка и обобщение бизнес-процессов». [3]

А по мнению профессора Н. П. Кондракова, «Организация учетной политики- это применение общепринятых методов бухгалтерского учета".[4]

М.С. Ерджанов, С.М. Ерджанова дают такое определение: «Учетная политика - это набор методов, применяемых предприятием для ведения бухгалтерского учета и раскрытие финансовой отчетности». [5]

Ученые республики Узбекистан, профессор А. Каримов, Ф. Исломов и А. Авлокулов поясняют, что «Учетная политика - это набор методов, ис-

пользуемых руководителем хозяйствующего субъекта для ведения и подготовки бухгалтерской (финансовой) отчетности в соответствии с основными принципами». [7]

По словам профессора Н. Джураева, «Учетная политика - это развитие методов, которые выбираются из разрешенных в нормативно-правовых документах, регулирующих ведение бухгалтерского учета субъектов хозяйствования, а также в случаях, когда альтернативные методы не предусмотрены или отсутствуют вовсе». [6]

Статья 11 Закона Республики Узбекистан «О бухгалтерском учете» возлагает эту задачу на руководителя хозяйствующих субъектов. Однако главный бухгалтер или бухгалтер должны присутствовать при разработке учетной политики предприятия.

В учетной политике хозяйствующего субъекта должны отражаться следующие и утверждаться руководителем:

- план рабочих счетов бухгалтерского учета;
- формы первичных учетных документов и регистров бухгалтерского учета, а также наименование документов для внутреннего учета;
- порядок инвентаризации активов и пассивов предприятия;
- методы оценки активов и пассивов;
- порядок и правила обращения бухгалтерских документов, технология обработки учетных данных;
- порядок управления экономическими процессами;
- другие необходимые решения для организации бухгалтерского учета.

К учетной политике в соответствии с Международными стандартами финансовой отчетности интересы субъектов хозяйствования, даже если они определены и учтены особенности. Одним из основных факторов, влияющих на учетную политику

предприятия, является производственная технология хозяйствующего субъекта.

На наш взгляд, к влияющим факторам на формирование учетной политики хозяйствующих субъектов, целесообразно включить такие понятия, как

«особенность» и «возможность». Это связано с тем, что каждый хозяйствующий субъект при формировании учетной политики учитывают технологические особенности (рисунок- 4).



Рисунок - 4. Соотношение факторов, влияющих на учетную политику с учётом технологической особенности хозяйствующих субъектов.

На основании приведенных выше определений делаем вывод, что учетная политика - это не простой термин или абстрактная вещь, а набор бухгалтерских документов, которые имеют определенный вид, содержание, нормативно-юридическую силу.

Правильная или неправильная формулировка учетной политики может положительно или отрицательно сказаться на финансовых показателях хозяйствующих субъектов. Формулировка и раскрытие учетной политики предприятия основаны на основных требованиях и принципах учётной политики государства. Насколько важны требования, зависит от уровня важности требуемой информации. Неоднозначность требуемой информации приведёт к неточным расчетам. Неопределенные расчеты отрицательно сказываются на принятии экономических решений.

Содержание вышеуказанных должно быть указано в законе о бухгалтерском учёте или стандарте по бухгалтерскому учету. Но это пока не отражено в наших юридических документах. По этой причине руководители и главные бухгалтеры (бухгалтеры) многих хозяйствующих субъектов не понимают структуру, содержание и сущность учетной политики.

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PHYSICAL SCIENCES

THERE IS NOT ONLY ANTIMATTER, BUT ALSO ANTI-SPACE AND ANTI-TIME¹

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Abstract

The article shows that the special theory of relativity (SRT) created in the last century was based on postulates due to the lack of the required experimental information and turned out to be incorrect, as its principle of light speed non-exceedance was refuted by studies of special processes in linear electric circuits in the 21st century. And thus, it made obsolete the OPERA and ICARUS experiments carried out at the Large Hadron Collider. Therefore, an alternative version of the SRT has been proposed. Its relativistic formulas imply the existence of numerous mutually invisible parallel universes and antiverses. It is explained how they can be seen. And in these antiverses are antimatter, as well as anti-space and anti-time.

Keywords: Imaginary numbers, special theory of relativity, invisible universes, antimatter, anti-space, anti-time

1. Introduction

In 1826, when Georg Simon Ohm discovered the law named after him, the science of physics did not yet exist. There was a natural philosophy. Alexander Grigorievich Stoletov wrote in this regard: "...*physics especially tempted natural philosophers. What a favorable theme were electrical phenomena for the most riotous imaginations... Attractive and vague deductions were in the foreground: hard work of experimenter and exact mathematical analysis were not honored; they seemed superfluous and harmful in the study of nature...*". And in 1828, Ohm was fired by personal order of Minister of Education for publishing his physics discoveries. The senior official believed that the use of mathematics in physics was unacceptable.

In 1897, Charles Proteus Steinmetz proposed his interpretation of Ohm's law in respect to linear AC circuits [1]. Now it is daily used by millions of engineers in their practice. Moreover, in addition to its direct purpose of calculating electrical circuits it also proved physical reality of imaginary numbers in the simplest and most convincing way, and thereby refuted generally accepted version of the special theory of relativity (SRT).

However, the SRT had to be first created and then refuted. And such a version of the SRT was created by efforts of Joseph Larmor [2], Nobel laureate Hendrik Antoon Lorentz [3], Jules Henri Poincaré [4] and Nobel laureate Albert Einstein [5] in the 20th century. Due to the lack of experimental data required for its creation, that were obtained only in the 21st century, it was created using the postulates, i.e. assumptions from which the principle of light speed non-exceedance turned out to be incorrect.

But that's not a big deal. Ultimately, all scientific theories are created as a result of identifying and correcting the errors of previously created theories. And

then, sooner or later, they are inevitably refuted by subsequent newer theories. Otherwise, science would not have developed. Therefore, this article further proposes a corrected version of the SRT.

2. Refutation of the principle of light speed non-exceedance

Since the principle of light speed non-exceedance in the generally accepted version of the SRT, set forth in all university and school textbooks of physics, has still been believed to be true, it will be necessary to explain why this is not so and why this principle, which is just a postulate, since it has never been proven by anyone, turned out to be in demand.

That is because the relativistic formulas obtained in the generally accepted version of the SRT couldn't be explained by its creators. For example, the relativistic mass m , apparently, takes imaginary values at hyper-light speeds, when $v > c$, in the Lorentz-Einstein formula

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

where m_0 is the rest mass of a moving physical body (e.g. elementary particle);

m is the relativistic mass of a moving physical body;

v is the velocity of a physical body;

c is the speed of light.

However, the authors of the SRT did not know how to explain such a result. As well as no one could explain physical meaning of imaginary numbers 400 years before them. Admittedly, today no one can do it so far. Indeed, everyone knows what 2 kg is, but, no one knows what 2 i kg is, where $i = \sqrt{-1}$.

¹ This is an extended version of the article "Antonov A.A. 2021 Antimatter, anti-space, anti-time. Journal of Modern Physics. 12(5). 646-660"

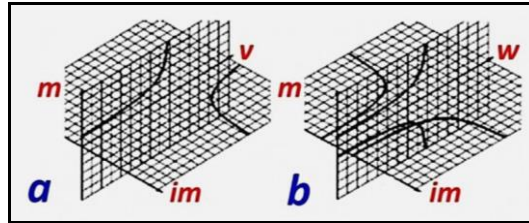


Fig. 1. Graphs of functions (1) and (2)

Even if the relativistic mass m at hyper-light speeds, when $v > c$, in function (1) corresponded to real numbers, then its graph would still be inexplicable in this velocity range (see Fig.1a), since it corresponds to a physically unstable process that cannot exist in nature. Consequently, formula (1) is incorrect and that is why it could not be explained.

After all, physical reality of imaginary numbers has been proven and explained in publications [6] - [21]. In order not to repeat these proofs, we only note that it follows from them that if the principle of light speed non-exceedance were true:

- no shock oscillations such as tsunami, Indian summer, noise of bells, piano music could exist in nature, and even a kid’s swing couldn’t swing after being pushed by parents;
- there could be no resonance in electric circuits, as well as no electric filters could exist; and thus, there would be neither television, nor telecommunication, nor radiolocation, nor many other things without which modern life would be unthinkable;
- even Ohm’s law in Steinmetz’s interpretation would not exist.

Since, in accordance with Ohm’s law in Steinmetz’s interpretation, inductive and capacitive reactances the values of which are imaginary numbers, are measured by the devices available in each radio engineering laboratory, this unambiguously proves their physical reality. After all, it is exactly the ability to register with devices X-ray, radioactive, ultraviolet and infrared radiation, infra and ultrasound, magnetic field, atoms and subatomic particles, as well as many other physical entities that are not registered by the human senses, proves their physical reality. Why, then, a simple and cheap experiment using an ordinary tester (see Fig.2), in physics is less convincing in solving the problem of proving physical reality of imaginary numbers than the unique expensive OPERA and ICARUS experiments at the Large Hadron Collider?

In fact, since mathematics is the unique universal language of all exact sciences, the correct mathematical interpretation of, let’s say, radio engineering and any other experiment is indisputably convincing for all other exact sciences. After all, the Nature is unique, and only people, solely because of their barrenness of intellect, invented many sciences to describe it.

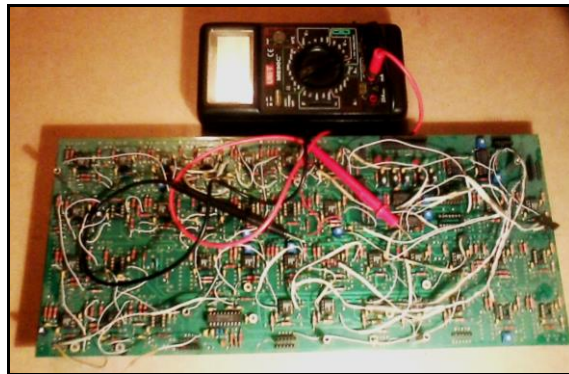


Fig. 2. And this is all that is needed instead of the Large Hadron Collider for the experimental proof of the physical reality of imaginary numbers.

Due to experimental proof of the principle of physical reality of imaginary numbers in the SRT, the principle of light speed non-exceedance is no longer required and there is a need for corrected relativistic formulas that allow explaining SRT at speeds $v > c$.

3. Relativistic formulas of the corrected version of the SRT

How can corrected relativistic formulas be obtained? Different approaches can, actually, be proposed to solve this issue. And one can reason as follows [22]. The graph of the corrected Lorentz-Einstein function in the range of velocities $v > c$, must in some respect be similar to the graph of this function in the range of ve-

locities $0 \leq v < c$. For example, as in Fig. 1b. A simple and understandable analytical description can be offered for such a graph

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

where $q = \lfloor v/c \rfloor$ is the ‘floor’ function of argument

v/c in discreet mathematics (see Fig. 3a);

$w = v - qc$ is the local velocity (see Fig. 3b), the meaning of which will be explained below.

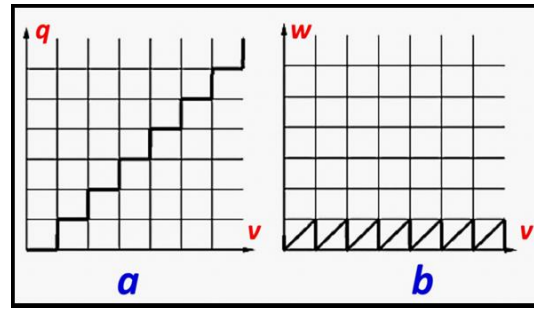


Fig. 3. Graphs of functions $q(v)$ and $w(v)$

Other relativistic formulas can be corrected in a similar manner.

4. Explanation of relativistic formulas of the corrected version of the SRT.

A simple explanation can be proposed for the simple formula (2). The quantity $q=0$ obviously corresponds to our visible universe, which is assumed to be the one and the only in the existing version of the SRT. However, this version turned out to be incorrect, as its principle of light speed non-exceedance had been refuted.

Therefore, the quantity $q=1$ corresponds to another really existing universe, for which $v=w+1c$ follows from $w=v-1c$, i.e. we get $c \leq v < 2c$ for $0 \leq w < c$. In other words, another adjacent universe is beyond the event horizon and therefore is invisible to us. Therefore, let it for definiteness be called a tachyon universe, like subatomic particles possessing superluminal speed. Herewith, we get $m=m_0i$ for a tachyon universe from the formula (2).

By a similar argument let our visible universe be called a tardyon universe. For our tardyon universe $m=m_0$.

Subsequently, the quantity $q=2$ corresponds to one more really existing universe, for which $v=w+2c$ follows from $w=v-2c$, i.e. we get $2c \leq v < 3c$ for $0 \leq w < c$. Consequently, this one more universe is also beyond the event horizon and therefore is also invisible to us. It is also invisible to the adjacent universe that is closer to us. Herewith, we get $m=-m_0$ for this universe from the formula (2). That is, this universe can be called an antiverse in relation to our universe.

The quantity $q=3$ corresponds to one more really existing universe, for which $v=w+3c$ follows from $w=v-3c$, i.e. we get $3c \leq v < 4c$ for $0 \leq w < c$. Consequently, this universe is also beyond the event horizon and therefore is also invisible to us and to other universes. We get $m=-im_0$ for this universe from the formula (2). And therefore let it be called a tachyon antiverse. Etc.

Hence, it turns out that we live in the Multiverse containing a plenty of mutually invisible universes, rather than in a unique visible universe as asserted in the generally accepted version of the SRT. Let this Multiverse be called a hidden Multiverse [23] - [27].

5. Dark matter, dark energy, dark space

Many interesting hypotheses of the Multiverse have been proposed by now [28] - [35]. However, they all are unverifiable, i.e. their truth or falsity can be proven experimentally neither now nor in the distant future. Therefore, they are of limited interest. Another drawback is the fact that they do not anyhow explain extremely incomprehensible phenomena of dark matter and dark energy [36] - [48].

Such extreme incomprehensibility refers also to the hypothesis of the visible Monoverse in the generally accepted version of the SRT, about which Albert Einstein spoke very clearly: "Insanity: doing the same thing over and over again and expecting different results"

However, the phenomena of dark matter and dark energy can be quite explicable within the framework of the hypothesis of the hidden Multiverse. Besides the phenomenon of dark space can also be discovered and explained:

- invisibility of dark matter and dark energy is explained by the fact that they are actually neither matter, nor energy, nor any other material physical substance, but only images (though not optical and still less electromagnetic, but gravitational), a sort of a shadow;
- impossibility of detecting any of the chemical elements known to us in the composition of dark matter and dark energy is also explained by the absence of any material content in them, since they are just images;
- at the same time the phenomenon of dark matter is evoked by invisible parallel universes of the hidden Multiverse adjacent to our visible universe;
- the phenomenon of dark energy is evoked by other universes except for our visible universe and invisible parallel universes of the hidden Multiverse adjacent to it;
- in addition, the phenomenon of dark space is similarly evoked by invisible universes outside the hidden Multiverse;
- universes located in and beyond the hidden Multiverse together form the Hyperverse.

6. Analysis of WMAP and Planck spacecraft data

However Albert Einstein did not exclude such correction of the SRT in future. He wrote: "There is no single idea, which I would be sure that it will stand the test of time". And he was absolutely right. After all, if this were not so, then the development of science would be impossible.

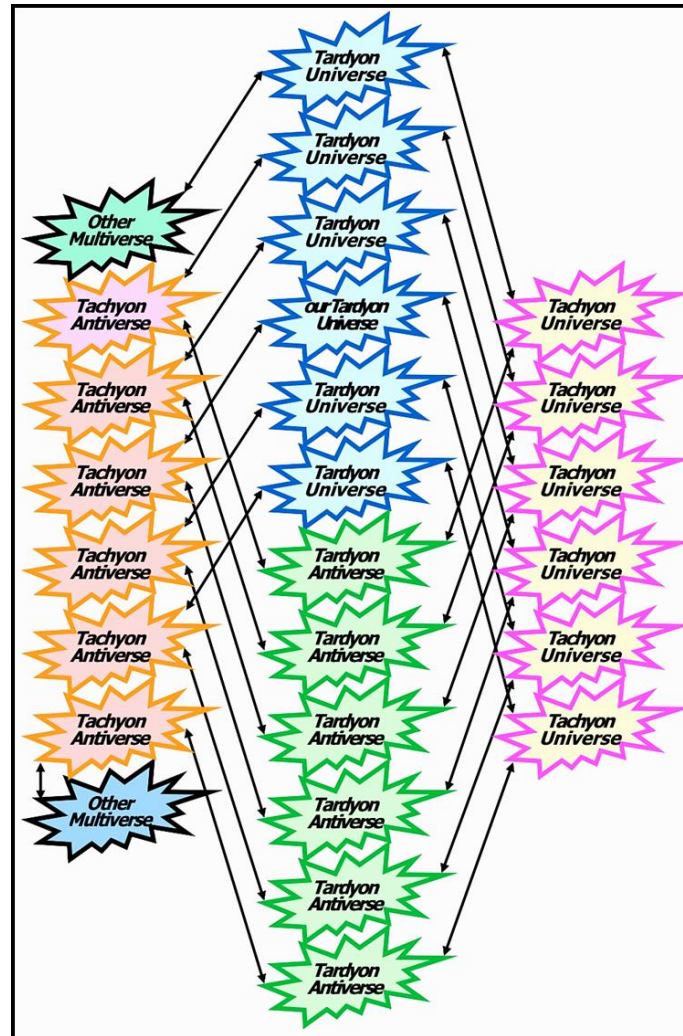


Fig. 4. The screw structure of the hidden Multiverse corresponding to the formula (2), which illustrates the existence of other Multiverse beyond its borders

An example of the structure of such a hypothetical hidden Multiverse is shown in Fig. 4. As can be seen, the universes drifting in the extra spatial dimension are interconnected through portals [49], [50] indicated by single two-sided arrows. The portals arise due to shallow mutual local penetration of the universes into each other. Moreover, the end universes in such a helical structure, evoking the phenomena of dark matter and dark energy, are connected with the universes of dark space.

In order not to repeat the mistake of Albert Einstein due to erroneous assumptions, it is useful to check these results for compliance with the data obtained in the 21st century by the WMAP [51] and Planck [52] spacecraft. According to the WMAP data, the entire universe (in fact, the entire hidden Multiverse, as suggested in the article) is 4.6% of baryonic matter, 22.4% of dark matter and 73.0% of dark energy. According to more recent Planck data, the entire universe (in fact, the entire hidden Multiverse) is 4.9% of baryonic matter, 26.8% of dark matter and 68.3% of dark energy.

Based on these data, it is conceivable that mass-energy of parallel universes of the hidden Multiverse has largely averaged over billions of years of existence as a result of the mutual ex-change of their micro- and mini-content through the portals (even if for some reason their mass-energy in different universes turned out

to be different immediately after the Big Bang) and it is equal to the mass-energy of our visible universe, with precise accuracy.

Thus:

- according to Planck data, the hidden Multiverse contains $100\%/4.9\%=20.4$ parallel universes (according to WMAP data $100\%/4.6\%=21.8$ parallel universes), i.e. probably 20 ... 22 parallel universes;
- according to Planck data, the hidden Multiverse contains $26.8\%/4.9=5.5$ parallel universes (according to WMAP data $22.4\%/4.6\%=4.9$ parallel universes), evoking the phenomenon of dark space, i.e. probably 5 ... 6 parallel universes;
- according to Planck data, the hidden Multiverse includes $68.3\%/4.9=13.9$ parallel universes (according to WMAP data $73.0\%/4.6\%=15.9$ parallel universes), evoking the phenomenon of dark energy, i.e. probably 14 ... 16 parallel universes.

However, these results do not correspond to the structure of the hidden Multiverse shown in Fig. 4, since our visible universe should have not two, but 5...6 adjacent invisible universes.

Admittedly, each tardyon universe in Fig. 4 is adjacent to one tachyon universe and one tachyon anti-universe. And according to the above mathematical analysis of the data obtained by the WMAP and Planck spacecraft, each tardyon universe should have three

tachyon universes and antiverses. Therefore, the assumption that the structure of the hidden Multiverse is described by complex numbers and has one extra spatial dimension turned out to be incorrect. In fact, the hidden Multiverse has three extra dimensions and is described by hyper-complex numbers $f_{q,r,s}(x,y,z) + i_1q + i_2r + i_3s$ [53], where the function $f_{q,r,s}(x,y,z)$ describes distribution of material content of the corresponding parallel universe with coordinates in coordinates x,y,z , and the imaginary units i_1, i_2, i_3 are connected by the following relations

$$i_1^2 = i_2^2 = i_3^2 = I \tag{3}$$

$$i_1i_2i_3 = i_2i_3i_1 = i_3i_1i_2 = -I \tag{4}$$

$$i_1i_3i_2 = i_2i_1i_3 = i_3i_2i_1 = I \tag{5}$$

Lisa Randall wrote in this regard: “We can be living in a three-dimensional space sinkhole in a higher-dimensional universe”. And she was right.

7. Correction of relativistic formulas of the corrected version of the SRT

Repeatedly corrected relativistic Lorentz-Einstein formula will be written as follows

$$m = \frac{m_0(i_1)^q(i_2)^r(i_3)^s}{\sqrt{I - [v/c - (q+r+s)]^2}} = \frac{m_0(i_1)^q(i_2)^r(i_3)^s}{\sqrt{I - (w/c)^2}} \tag{6}$$

where $w = v - (q+r+s)c$ is the local velocity for the corresponding universe, which can take values only in the range $0 \leq w \leq c$.

Other relativistic formulas can be corrected in a similar manner [54] - [57]

$$\Delta t = \Delta t_0(i_1)^q(i_2)^r(i_3)^s \sqrt{I - [v/c - (q+r+s)]^2} = \Delta t_0(i_1)^q(i_2)^r(i_3)^s \sqrt{I - (w/c)^2} \tag{7}$$

$$l = l_0(i_1)^q(i_2)^r(i_3)^s \sqrt{I - [v/c - (q+r+s)]^2} = l_0(i_1)^q(i_2)^r(i_3)^s \sqrt{I - (w/c)^2} \tag{8}$$

The structure of the hidden Multiverse corresponding to the formulas (6), (7), and (8) can be as shown in Fig. 5. As can be seen, its quaternions [58], [59] structure differ from the one shown in fig. 4 in that it contains three tachyon universes i_1, i_2, i_3 and three tachyon antiverses i_1, i_2, i_3 , which provides three required extra dimensions. Thus, the six-dimensional space of the hidden Multiverse (see Fig. 5) has three extra dimensions q, r, s , where parallel universes are located, and three dimensions x, y, z , where material content of each of these universes is located. Moreover, the structure of the hidden Multiverse corresponding to the formulas (6), (7) and (8) differs from the one shown in



Fig. 5. The structure of the hidden Multiverse corresponding to the formulas (6), (7) and (8)

Fig. 4 by the fact that it contains unidirectional portals corresponding to the formulas (4) and (5) in addition to bidirectional portals corresponding to the formula (3).

8. Antipodes in space

The 20th century turned out to be rich in outstanding physical discoveries, such as special and general theory of relativity, quantum mechanics, radio electronics, radioactivity, X-ray, dark matter, dark energy, etc. And if radioactivity and X-ray were almost immediately explained and used, dark matter and dark energy have remained unexplained to this day.

Antimatter [42], [60], [61] is another no less incomprehensible astrophysical object than dark matter and dark energy. It is now generally accepted that the Big Bang produced not only matter, but also antimatter. Moreover, they were generated in equal quantities. However, no antimatter has been found in any noticeable quantities in our visible universe. It was obtained only in the form of subatomic antiparticles and some antiatoms, and also was found in some natural phenomena in negligible quantity for a very short time. Synthesis of such antimatter was extremely expensive. Thus, one gram of anti-hydrogen would cost \$ 662.5 trillion.

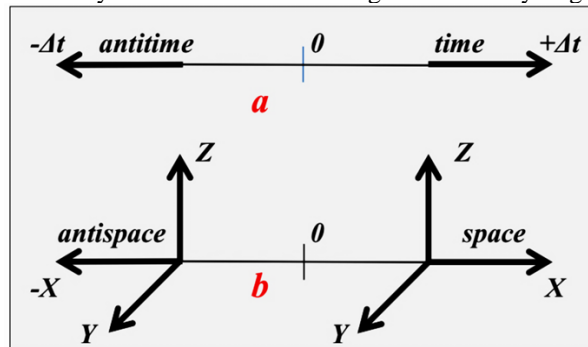


Fig. 6. Geometric interpretation of the concepts "anti-time" and "anti-space"

So, where can antimatter in the form of antiverses be found? And does it at all exist any-where in this form? It cannot apparently be in our visible universe, since otherwise it would annihilate with matter and the universe would be destroyed. By the way, this fact is another refutation of the generally accepted version of the SRT. Hence, it can be found only in another universe. And the hidden Multiverse, unlike other hypothetical Multiverse, is quite suitable for this role, since it has antiverses. Moreover, tardyon and tachyon universes and antiverses alternate in the hidden Multiverse in such a way that they assuredly prevent their mutual annihilation. Thus, the hypothesis of the hidden Multiverse completely solves the problem of the existence of antimatter.

But the most interesting thing is that, just as formula (6) implies the existence of antimatter in antiverses, from formulas (7) and (8) it follows that anti-space and anti-time exist in the same antiverses. In the same way as in the antipodes on Earth, the directions of gravity are opposite to each other. Moreover, people would find nothing unusual in these antiverses (as antipodes on Earth), if they got there, since there operate the same physical, chemical and other laws of nature as in our visible universe.

Fig. 6 shows a fairly obvious geometric interpretation of these new concepts. As can be seen, time and

anti-time differ by the sign of the value appearing in formula (7), and space and anti-space differ by the sign of the value appearing in formula (8). Time and anti-time, in addition, can differ in their different distance on the time axis from the common origin, which depends on the time of occurrence of the corresponding universes and antiverse. Fig. 5, for example, depicts a situation in which the universe and the antiverse arose simultaneously.

9. How to see invisible universes

Thus, the hidden Multiverse is quite unusual in many respects. This arouses some mistrust. Does it exist at all? Nature can give an unequivocal and convincing answer to this question only if its invisible universes are seen. And they can be seen as follows [62], [63].

Since the sky maps of invisible parallel universes are supposedly extremely different, their constellations can be confidently distinguished from those observed in the starry sky by observatories on Earth. Moving along the Earth portals between our visible universe and adjacent invisible universes, one can observe as the star map of one universe is gradually replaced by the star map of the adjacent universe. Therefore, all it takes to make sure of existence of invisible universes is to register differences between the constellations in the starry sky in the portals from the constellations observed in the starry sky outside the portals.



Fig. 7.

Main astronomical observatory of the National academy of science of Ukraine located in the anomalous zone

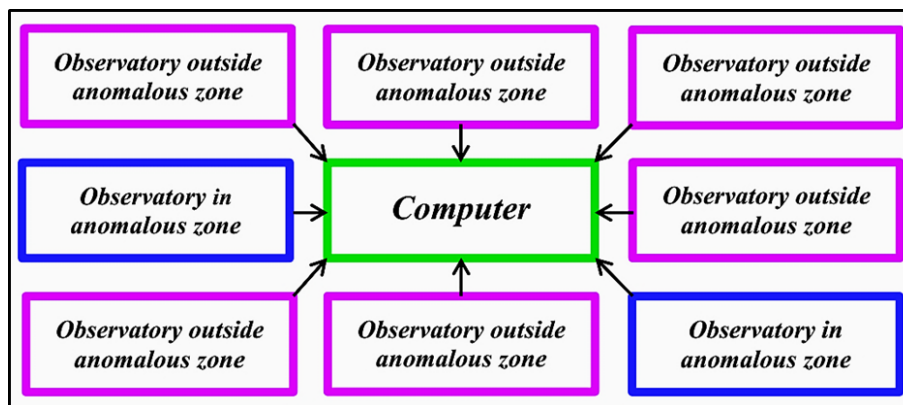


Fig. 8. Scheme of an experiment to detect invisible universes by identifying differences as a result of comparing the constellations of the starry sky in anomalous zones and outside anomalous zones

What needs to be done to carry out such an experiment is to find a portal and perform the astronomical observation therein. And although it is clear that entrances to portals are located, at least, in some anomalous zones, which are quite numerous on Earth, no one has yet been engaged in the study of portals directly in portals, since no one has needed it. And besides, it is unsafe, since portals are a sort of invisible labyrinths. Therefore, one can get lost there without an appropriate portal orientation device (similar to marine compass). Such a danger can be minimized, if such observations are carried out at the very entrance to the portal, in the anomalous zone. It is conceivable that some astronomical observatories are already in the anomalous zones, without knowing it. As, for example, the Main Astronomical Observatory of the National Academy of Sciences of Ukraine, which is located in the Holosiivskyi forest, just 12 km from Kyiv, the capital of Ukraine (see Fig. 7).

Therefore, an experiment in detecting invisible universes turns out to be very simple and inexpensive in this case. It consists in comparing computer images of the same area of the starry sky provided by several observatories located close to each other, at least one of which being located in the anomalous zone (see Fig. 8); and in revealing differences in the relative position of the stars depicted in these images. If such an experiment is successful, its significance for human civilization will significantly exceed the significance of the discovery of America by Columbus.

10. Conclusions

The answer given in the article to one of the questions from the list of unsolved issues of modern physics ‘where is antimatter?’ turned out to be simple and quite logical: it is in the antiverses. At the same time, it has been explained that there are many pairs of universes-antiverses in nature. And therefore there are many antimatters. Moreover, it has been explained that, in addition to antimatter, there is anti-time and anti-space in the antiverses.

The concept of anti-time allowed us to answer another question from the list of unsolved problems of modern physics ‘why does time have a direction?’ It turned out that the ‘arrow of time’ concept is incorrect, i.e. contrary to popular belief, time can be not only positive, but also negative. This is how it happens in the cosmic antipodes - universes and anti-universes.

But in order to answer these questions, we first had to answer one more question from the same list ‘are there invisible parallel universes?’. And the article not only makes it clear that they exist in the Multiverse, which we have called hidden, but also why they are parallel and invisible. It also clarifies how and where on Earth invisible universes can be seen.

The answer to the third question was obtained in the process of answering two more questions from the list of unsolved issues of modern physics ‘are there extra dimensions?’ and ‘what is dark matter and dark energy?’. Due to mathematical analysis of the data obtained by the WMAP and Planck spacecraft it has been

concluded that our hidden Multiverse has a quaternion structure in six-dimensional space. And the phenomenon of dark matter and dark space is explained by the existence in our visible universe of a gravitational wave background generated by the rest of the invisible universes of the hidden Multiverse.

All these answers to the questions from the list of unsolved issues of modern physics became possible after receiving an answer to one more question, although from the list of unsolved issues of modern mathematics, 'can imaginary numbers be physically real?' An affirmative answer has been obtained as a result of theoretical and experimental studies of special processes in linear electric circuits, which made it possible to prove the general scientific principle of physical reality of imaginary numbers that, in its turn, refuted the principle of light speed non-exceedance in the STR. And this enabled us to assert that the relativistic formulas obtained in the generally accepted version of the STR are incorrect; they have been incorrectly explained and entailed wrong conclusions. Therefore, attempts to solve the above-mentioned and other physical issues within the framework of this theory were certainly destined for failure.

Thus, it is logical to conclude that the version of the STR presented in textbooks is outdated, since it does not correspond to the experimental data obtained in the 21st century, and therefore it hinders the development of modern physics.

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POLITICAL SCIENCES

FEATURES OF GEOECONOMIC ANALYSIS OF INTERNATIONAL RELATIONS

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ОСОБЕННОСТИ ГЕОЭКОНОМИЧЕСКОГО АНАЛИЗА МЕЖДУНАРОДНЫХ ОТНОШЕНИЙ

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Abstract

In the article, the author analyzes the widespread use of geoeconomic tools instead of geopolitics, the specific advantages of geoeconomic analysis of international relations, the laws and principles of geoeconomic analysis.

Аннотация

В статье автор анализирует широкое использование геэкономических инструментов вместо геополитики, специфические преимущества геэкономического анализа международных отношений, законы и принципы геэкономического анализа.

Keywords: geoeconomic analysis of international relations.

Ключевые слова: геэкономический анализ международных отношений.

Понятию “геоэкономика” даются различные определения. И хотя этот термин использовался в научной литературе уже в 70-х годах(1), ближе всех к современному пониманию подошел Эдвард Люттвак. По его мнению, геоэкономика - это государственная политика экономической конкуренция, геополитика внешних экономических связей(2). По утверждению К.Жана и П. Савоны, геоэкономика - мероприятия государства на международной арене по повышению конкурентоспособности, занявшая место военной геополитики экономических факторов(3) А. Фриден и Д. Лейк трактуют геоэкономике как политизацию экономических проблем, экономизацию политических проблем(4). Российские исследователи В. Лапкин и В. Пантин определяют геоэкономике как синтез политической науки и экономического анализа(5). Некоторые из исследователей трактуют этот термин как направленность виртуального пространства и финансово-экономических сил.

В отличие от других общественных наук геоэкономика оперирует понятиями пространства, территории и границ, так как географические понятия продолжают играть немаловажную роль в экономической жизни. Она связана прежде всего с экономической теорией и политологией, зависит также от достижений философии, культурологии, религиоведения, этики, эстетики, социологии, права, лингвистики, истории и других смежных наук. В отличие от экономической теории геоэкономика использует понятия виртуального пространства(6), высоких технологий, нетарифных барьеров, поддержки собственного экспорта, стратегического эмбарго, экономической экспансии и другие “неординарные” термины(7).

Геоэкономика, в отличие от экономической географии, обладает собственными объектом, субъектом и методами исследования, тогда как экономическая география научает экономические отличия территорий, экономику стран и регионов(8). На наш взгляд, если и экономическая география занята больше статичными формами, геоэкономика пытается изучать полную динамику мировой экономики, экспортно-импортные и политико-экономические возможности той или иной страны в эпоху глобализации.

Вместе с тем, один из важнейших геэкономических показателей, так же как и в экономической географии, - *природно ресурсный потенциал* (ПРП)(9). Это направленность и объем хозяйственной деятельности экономических субъектов, количество природных богатств на определенной территории; минеральные, земельные, растительные, животные и рекреационные ресурсы. Кроме ПРП, в оценке геэкономических возможностей того или иного государства учитывают транспортный потенциал (железные дороги, асфальтированные автомобильные дороги и др.), трудовой потенциал (население в целом, трудоспособное население и население, привлеченное к экономике), образовательно-интеллектуальный потенциал (обучающиеся в высших, средне-специальных, общеобразовательных учебных заведениях, лица с высшим образованием, высшей профессиональной квалификацией, финансовая стоимость выполняемых научно-исследовательских работ и программ), технологический и экологический потенциал (водные ресурсы, вредные выбросы в атмосферу, очистители атмосферного воздуха), финансовый потенциал (уставной фонд банков, объем заключенных на биржах контрактов). Кроме того, в геоэкономике большую

роль играют показатели развития промышленности, сельского хозяйства, предпринимательства, величина и собираемость налогов, состояние внешних экономических связей, социальная защита населения.

Границы, территорию и пространство государства, развитие, структуру и расположенность: экономики, осуществление и реализацию экономических интересов можно считать объектом геоэкономики. Она исследует, какие экономические цели, интересы и принципы преследует тот или иной хозяйствующий субъект, та или иная политическая или социальная группа, общественно-экономическая значимость, потенциал и будущее той или иной географической территории, отношения между государствами, «географические» устремления и стратегические цели политических режимов.

Термин «геоэкономика» входит и обиход общественных наук Узбекистана. Поэтому в его определении встречаются различные трактовки и даже различные переводы («геоэкономика», «геоиктисод», «жўғрофий иктисодиёт» на наш взгляд, первый термин узбекского эквивалента предпочтительнее, ибо ближе отражает тематику значимость, исторические традиции, порядок международного лексикона).

Как подчеркивалось выше, в геоэкономике ведущую роль играет политико-экономическое значение территорий. Между тем нельзя не учитывать также национальные и транснациональные структуры. Хотя в центре геоэкономического анализа остается национальный интерес государства, данный анализ осуществляется посредством исследования власти, социальных слоев и политических групп, элиты и кланов.

Геоэкономические принципы основа, основная идея и главное правило внешних экономических связей. В античный период эту роль выполняли торговля, судоходство, караванные пути и т.п. Ныне их место, на наш взгляд, занимают: влияние географических факторов на экономическое развитие; взаимосвязь экономического и политического потенциала с географическим положением; направленность на определенные государства или группу государств; наличие экономических «центров».

Предмет геоэкономики составляют внешне-экономическая деятельность, международные экономические отношения и финансовое господство. Если считать народ *субъектом геоэкономики*, то его в этом качестве можно подразделить на категории: социальные группы, этнос, государство, общество. Следовательно, геоэкономические отношения могут вполне проявляться во внутренней политике. Последняя является фундаментом политики внешней и, значит, динамично изменяется в зависимости от событий внутриполитической жизни. *Геоэкономические цели* можно подразделить на активные и пассивные.

Геоэкономические отношения часто бывают причиной экономических противоречий финансовых, валютных, промышленных войн. Для предотвращения этого используют *экономическим про-*

гноз, который зиждется на оценке состояния и перспектив мировой экономики.

Законы геоэкономики подразделяются на две группы: направленные на внешнеэкономические связи - обеспечение экономического благополучия; сохранение экономической стабильности; создание основы для устойчивого роста; пропаганда экономических знаний; уважение прав собственника - и на мировую экономику: обеспечение экономической безопасности и стабильности; разрешение экономических противоречий мирным путем; решение глобальных проблем современности; использование выгод глобализации.

В то же время общими закономерностями в сфере экономических отношений выступают необходимость экономического роста; глобализации; взаимосвязи экономических целей с экономическими интересами; взаимодействия экономических действий с политической системой; соответствия экономических задач общественно-политической обстановке.

Геоэкономика выполняет *теоретическую и практическую функции*. *Теоретическая* функция подразделяется, в свою очередь, на познавательную, прогностическую и идеологическую. *Функция практическая* - определение перспективных с экономической точки зрения территорий.

Теоретико-методологическую основу геоэкономики составляют общечеловеческие и общечивилизационные ценности. Можно, подобно политологическим, выделить следующие *парадигмы* геоэкономики: государственно-отражательные, антрополого-географические, деятельностно-социальные, региональные и отраслевые. Методами геоэкономики являются:

- 1) сравнительный;
- 2) моделирование;
- 3) эмпирико-социологический;
- 4) логико-математический;
- 5) системный;
- 6) исторический;
- 7) функциональный;
- 8) структурный;
- 9) институциональный;
- 10) общелогический.

В условиях достаточно напряженной международной обстановки, когда геоэкономические факторы все в большей степени определяют расстановку политических сил на международной арене, геоэкономический аспект внешней политики любой страны становится приоритетным.

Мировая пандемия заставляет мобилизовать все возможные усилия и ресурсы для его скорейшего преодоления и минимизации негативных последствий. Недооценка важности геоэкономического аспекта внешней политики недопустима. Начало движения в нужном направлении положено. Следует двигаться дальше, закладывая основы постковидной экономики, инновационной экономики будущего.

Таким образом, можно определить геоэкономике как науку, изучающую политику и экономику

государства с позиций географических, территориально-пространственных факторов. Сферой интересов являются экономические отношения между государствами и внешнеэкономическая деятельность государства и международные отношения.

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