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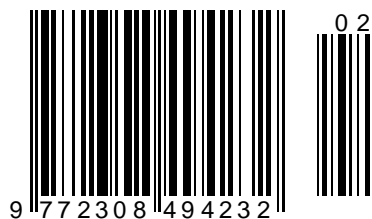**Impact Factor ICV = 6.630**

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TRANSFORMATIONS OF YOUTH CONSCIOUSNESS IN A DIGITAL SOCIETY

Abstract: *In the modern world, digitalization, increasing informatization, the development of the ability to influence human consciousness, and even our decision-making based on neurobiology and artificial intelligence are causing completely new structural changes in social development that have not been observed before. This article presents a philosophical analysis of how digitalization and the digital society will lead to changes in the minds of young people.*

Key words: *youth, consciousness, youth consciousness, digitalization, digital society, thinking, change, clip thinking, creativity, divergent thinking, convergent thinking, cognitive transformations, structural changes.*

Language: *Russian*

ТРАНСФОРМАЦИИ МОЛОДЕЖНОГО СОЗНАНИЯ В ЦИФРОВОМ ОБЩЕСТВЕ

Аннотация: *В современном мире цифровизация, увеличение информатизации, развитие способности влиять на человеческое сознание и даже принятие нами решений на основе нейробиологии и искусственного интеллекта вызывают совершенно новые структурные изменения в общественном развитии, не наблюдавшиеся ранее. В данной статье представлен философский анализ того, как цифровизации и цифровое общество приведут к изменениям в сознании молодежи.*

Ключевые слова: *молодежь, сознание, молодежное сознание, цифровизация, цифровое общество, мышление, изменение, клиповое мышление, креативность, дивергентное мышление, конвергентное мышление, когнитивные трансформации, структурные изменения.*

Введение

Цифровизация общества, происходящая более полувека, набрала обороты в последнее десятилетие и особенно в последние два года, что ознаменовало глобальное противостояние вызовам эпидемии COVID-19. В последние годы значительную популярность приобрели дистанционное обучение и мероприятия, дистанционная (гибридная) занятость, телемедицина и электронная демократия.

Сегодня признано, что в каждой стране возрастает стремление к сохранению национальной культуры, национального самосознания, индивидуальности. Особенно в

мире оцифровка, усиление информации, развитие способности влиять на человеческий разум, даже наше принятие решений, основанное на нейробиологии и искусственном интеллекте, вызывают совершенно новые структурные изменения и преобразования, которые ранее не наблюдались в социальное развитие. В то же время глобальные процессы приводят к формированию общих ценностей и общих сходств в сознании у молодежи всего мира. Безусловно, нелинейность и неопределенность происходящих процессов цифровизации оказывают как положительное, так и отрицательное влияние на сознание, ценности и духовный мир молодежи

каждой страны. Следует отметить, что будущее развитие Узбекистана будет управляться на основе науки, научных, социальных и гуманитарных технологий, цифровой экономики. В рамках реализации новой стратегии развития внедряются процессы цифровизации, основанные на технологиях создания, обработки, обмена и передачи информации.

ОСНОВНАЯ ЧАСТЬ.
Восточные мыслители, такие как Абу Райхан Беруни, Абу Али Ибн Сина, Абу Наср Фараби, выросшие в Средней Азии и внесшие несравненный вклад в развитие мировой науки, и Западные философы, такие как Аристотель, Сократ и Платон, имеют взгляды на устойчивое развитие мировоззрения, образа мышления и менталитета молодых людей.

В исследованиях таких отечественных ученых, как М.Куронов, Г.Арипова, Б.Адизов, У.Иноятов, У.Маккамов, Р.Сафарова, Б.Умаров, О.Жамолдинова, Д.Рузиева, Б.Ходжаев, Ч.Шакирова, Ш.Шодмонова, Э.Юзликаева, Н.М.Эгамбердиева, освещены факторы формирования мировоззрения молодежи, специфические особенности обеспечения ее социализаци в обществе, обучения ее творческому, креативному и нестандартному мышлению, формирования духовно-нравственного, художественно-эстетического мировоззрения, чувства уважения к национальным ценностям, толерантности; в научных работах таких философов, как Ж.Туленов, М.Н.Абдуллаева, Г.Ж.Туленова, Г.Г.Гаффарова, Л.А.Курбонова, Г.О.Жалолова[12], Ф.Чориев, Ш.Кубаева, Э.Юсупов, - философско-методологические аспекты развития человеческого мышления и мировоззрения; а в исследования таких ученых, как З.Нишонова, М.Давлетшин, Н.Сафаев, А.Жабборов, Э.Гозиев, Р.Суннатова, - психологические особенности проблемы мышления человека.

Учеными стран Содружества независимых государств (СНГ), такими как Т.А.Барышева, О.Н.Болшакова, Ю.В.Величко, Л.С.Выготский, Н.М.Гнатко, О.А.Григорьева, Ж.Е.Ермакова, Б.П.Есипов, Л.С.Зникина, Е.П.Ильин, М.М.Кашапов, О.И.Кокорева, А.Г.Маслоу, Р.С.Немов, исследованы вопросы механизмов мышления, концепция здорового мышления и ее теоретико-философские основы, соотношения мышления и психики, формирования здорового мышления у учащихся и преподавателей.

Проблемы роли творческого мышления в развитии интеллектуальной компетентности учащихся, нестандартного мышления как фактора, определяющего социальный статус личности, роли нестандартного мышления в

творческом потенциале личности, значение креативного мышления в повышении эфективности учебной деятельности, роли нестандартного мышления в обеспечениии психологической устойчивости учащегося исследованы такими учеными, как Т.В.Огородова, Л.Кананчук, Л.Адамян, П.И.Пидаксистый, Я.А.Пономарев, В.Лысенко, Ю.Крайнова, С.Марчукова, С.Морозюк, М.Михайлова, В.Опарина, А.Россохин, Н.Павлюченкова, А.Рудаков.

Зарубежными учеными, такими как Дж.Дьюи, Ж.П.Гуилфорд, И.Аршава, А.Ю.Хилман, Х.Гейвин, С.А.Медник, Е.Пикард, С.Тайлор, С.Мадди, К.Изард, В.Клочко, Р.Стернберг, О.Осадько, Н.Пил, К.Стернберг, К.Хорни, А.Хилман, исследованы психологическо-педагогические особенности нестандартного мышления, способность к самопониманию, соотношение когнитивной психологии и креативности, психологические особенности формирования нестандартного мышления у учащихся.

Среди ученых, изучавших некоторые аспекты влияния социальных сетей на духовность, мышление и сознание молодежи в британские ученые Питер Э. Майе, Стив Джонс, от российских ученых Е. Вайнера, Е. Горного, В. Паско, В. Сухаровой, О. Криштановской, а также публикации узбекских ученых Д.Рашидовой, кандидатов филологических наук, философов Ж.Раматова, И.Сайфназарова, А.Моминова, А.Мухторова, Б.Хусанова, Г.Гаффаровой, Н.Сайдалиевой, К.Мавляновой статьи могут быть включенным.

При подготовке статьи использовались исторический, критический, систематический методы.

РЕЗУЛЬТАТЫ
М. Куронов, А. Кадыров, Ш. Акрамова проанализировали такие вопросы, как воспитание молодежи, формирование у нее идеологического иммунитета, недопущение попадания под влияние чужих идей в социальных сетях в монографии «Формирование идеологического иммунитета у молодежи»[1].

Г.Гаффарова и М.Н.Абдуллаева в своих исследованиях выдвинули мысль о том, что обеспечить духовное развитие общества можно путем развития чувства любви и привязанности у членов общества, в том числе у молодежи [2, 14-15].

Г. Гаффарова выделила влияние социальных сетей на мышление и деятельность молодежи, изменения духовности в информационном обществе, роль духовности в развитии человеческого капитала в современном Узбекистане [3-6; 14-16].

ОБСУЖДЕНИЕ

Фактически начало XXI века характеризуется формированием информационного общества, решающими факторами которого в мире являются информация и знания. Эволюция развития этого общества представлена его трансформацией от общества знаний к сетевому обществу и от него к цифровому обществу. Известно, что в результате развития информационного общества большая часть населения занимается получением, хранением, обработкой и использованием информации. Также информатизация и цифровизация составляют этапы формирования этого общества.

Итак, что за общество такое цифровое общество? Каковы его особенности? Как такое общество влияет на умы молодых людей или какие изменения оно вызывает в сознании молодых людей?

Появление термина «цифровое общество» связано с развитием цифровых технологий и успешно вошло в общественную практику. Эти технологии стремительно вытесняют свои аналоги, использовавшиеся на этапе внедрения электронных информационных технологий, демонстрируя значительно более высокое качество передачи информации, точность и компактность информационных продуктов, что очень важно в условиях роста объемов обмена информацией. . Фактически термин «цифровое общество» происходит от существующих ресурсов цифровой информации, связанных с ними технологий и социальных структур общества. Перспективы такого общества в будущем будут зависеть от потребностей развития общества, имеющихся информационных ресурсов, развития технологий обмена информацией в обществе, возможностей согласования его социальной структуры с этими процессами.

Можно сказать, что цифровое общество – это глобальная проблема, решение которой заключается в создании нового глобального общества, управляемого информационно-коммуникационными технологиями. Основой такого общества является использование локальных и глобальных компьютерных сетей, которые собирают, обрабатывают, производят и распространяют информацию через глобальные телекоммуникационные сетевые системы. Таким образом, новое цифровое общество — это общество ИТ.

Одной из уникальных особенностей этого общества является то, что многие жизненные, познавательные, эстетические и другие потребности удовлетворяются с помощью современных цифровых (информационно-коммуникационных) технологий. В результате высвобождается много времени, позволяет решать новые задачи, расширяется сфера общения не только в определенном месте, но и в масштабах всей планеты. Особенно интеллектуальный труд заменяет физический труд. В этом отношении «цифровое общество — это технократическое общество, использующее цифровые устройства для самообслуживания» [11, 9]. Это освобождает много времени и открывает новые возможности для общения.

Действительно, цифровые технологии — это инструмент масштабной работы, и в то же время важнейшая платформа для социальных изменений, внедрения и координации инноваций, коммуникации. Молодежь является активным субъектом этих изменений, и ее культуру следует понимать как комплексную массмедиакультуру, строящую новый социальный мир.

Молодежь — самая мобильная социально-демографическая группа, быстро воспринявшая цифровые инновации. Характеристики «префигуративной культуры», которые подчеркивал М. Мид, говоря о культуре, ориентированной на будущее, очень подходят для современного общества, где молодежь не только учится у своих родителей, но и многому их учит, потому что они учатся активно создавать культурные тренды [9]. Префигуративная культура, о которой здесь идет речь, — это «культура, в которой инновации могут происходить такими быстрыми темпами, что взрослое население не может за ними уследить» [9]. В этом решающее значение имеет духовный потенциал молодого поколения, формирующий общий опыт, которого нет у пожилых людей. В то же время молодые люди также являются более уязвимой группой, чем взрослые, поскольку у них меньше адаптационных возможностей. Конечно, молодые люди учатся не только у взрослых, но и друг у друга, взрослые тоже учатся у своих сверстников и передают свой опыт младшим. Этот тип культуры сохраняет традиции, но также приветствует инновации. Однако при этом меняется и отношение к старшему поколению – оно теряет свой безусловный авторитет. Им также нужно научиться оставаться востребованными. Например, сейчас пожилые люди должны освоить компьютер и интегрироваться в мир информационных технологий, иначе они останутся позади.

В цифровом обществе функция воспитания переносится на детей, что делает старших более зависимыми и, следовательно, более уязвимыми. Молодое поколение значительно осознает развитие технологий и начинает выступать носителем опыта. Это приводит к перестройке иерархии их взаимоотношений со взрослыми и требует иного типа общения.

Конечно, цифровое общество определяет свои законы. Однако новое поколение не должно воображать о себе такого. В некоторых областях они могут учить старших, это верно, но в некоторых областях опыт и знания старшего поколения необходимы и без них не обойтись.

Ведь в цифровом обществе межличностные и межгрупповые отношения уникальны и имеют характер сети, формирующейся в условиях информационно-насыщенной социализации, где поле общения переносится в социальные сети. При этом иногда в соцсетях остается то, с кем ты общаешься, один это человек или много, где и в какое время, их стратегии, какие задачи они на самом деле решают, какова их система ценностей, насколько они манипулятивны. неясно. Для этого нужно быть более гибким в мире, а также помнить, что современная социализация сегодня невозможна без киберпространства. Особенно молодое поколение, которое составляет значительную часть общества, проводит много времени в Интернете.

Новые технологии определяют картину предметного мира, становятся инструментом, формирующим сознание человека и выстраивающим образ осваиваемой действительности. Цифровые технологии позволяют извлекать и собирать постоянно увеличивающиеся и обновляемые данные, а затем усваивать их. Они встроены во внутреннее пространство человека и работают как средство регуляции поведения и отношений с миром. Внутренняя психическая деятельность является результатом интериоризации внешней предметной деятельности, осуществляемой с помощью цифровых технологий. А образ, созданный с помощью новых технологий, выступает как образ, проникающий в человеческое сознание мира. Кроме того, социальный статус развития современных подростков опосредует сетевые взаимодействия.

Также, по мнению А. Мюррея, «цифровизация — это парадигматическое изменение нашего образа мыслей, поведения, окружающей среды и общения друг с другом» [10]. То есть цифровизация — это смена парадигмы общения и взаимодействия. Это также является одним из факторов, влияющих на изменения в сознании молодежи. Но, по мнению ряда исследователей, сегодня личность становится объектом неправильного и деструктивного воздействия информационной среды, формирования аутистических симптомов и других расстройств личности [7-8]. Однако поток информации (в том числе и вредной), большой объем общения, расчленение мышления подрастающего поколения (фрагментарность, поверхностность), подмена реальных социальных отношений виртуальными являются факторами и проявлениями этих расстройств.

Трансформации в сознании молодежи в цифровом обществе проявляются в следующем, то есть, во-первых, мир цифрового общества перестает быть гуманистическим, ценности переходят от самого человека к ценностям технология. В результате высвобождения большого количества человеческих ресурсов возрастает значение интеллектуальной деятельности у молодежи, сокращаются усилия, затрачиваемые на физический труд, что должно способствовать повышению самосознания. Также все появляющиеся инновации вытесняют человеческое Я, вызывают безработицу, замещают человеческие ресурсы роботами, реструктурируют пространство межличностного взаимодействия, делают его общедоступным с большой и неизвестной аудиторией в социальных сетях, переводят в контактную плоскость. Ведь в ряде случаев она повышает стрессоустойчивость молодых людей, разрушает самочувствие, приводит к девиациям, лишает человека места в социальном пространстве.

ЗАКЛЮЧЕНИЕ

Безусловно, цифровое общество складывается в очень быстром, очень нестабильном, мелькающем, изменяющемся мире, характеризующемся текучестью, гибридностью и непредсказуемостью. С одной стороны, неопределенность — это вызов, требующий поиска новых смыслов, ответов на возникающие вопросы, выяснения происходящего. С другой стороны, это нужно терпеть. Он заставляет нас быстро перестраивать систему норм и ценностей, учит примиряться с действительностью, изменять ее в связи с ее изменениями. Неопределенность делает мир динамичным и изменчивым, она требует от человека готовности познавать неизведанное, быть открытым ему, защищать эффективные традиции, находить в них опору для встречи с хаосом окружающей действительности. Это приведет к изменениям в сознании молодых людей в результате возрастающей неопределенности.

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Issue   Article

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FROM THE EXPERIENCE OF IMPROVING STUDENTS' SCIENTIFIC LITERACY IN CHEMISTRY

Abstract: This article presents an issue of practical methodological content intended to further increase the level of scientific literacy of students, develop non-standard and creative thinking abilities, and create high knowledge and skills.

Key words: soda, carbon dioxide gas, food industry, cooking, sodium carbonate, sodium hydrogen carbonate, metal atom, salts.

Language: English

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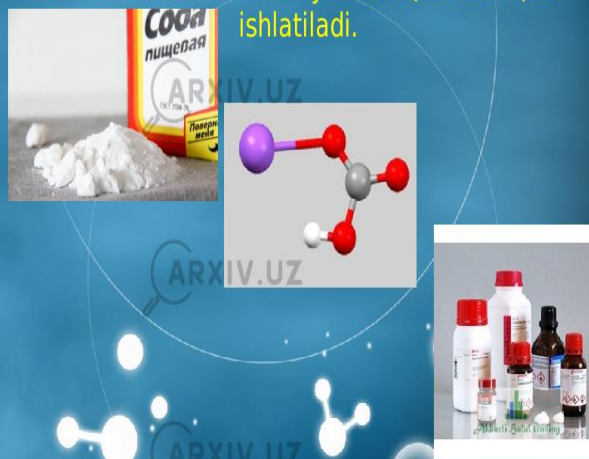
Soi: http://s-o-i.org/1.1/TAS-02-118-2   *Doi*: crossref https://dx.doi.org/10.15863/TAS.2023.02.118.2
Scopus ASCC: 3304.

Introduction

Picture 1.

We know that baking soda is also called bread soda in the local language and it is mainly used in the preparation of dough, baked goods and desserts using flour products. The food industry and cooking are unthinkable without baking soda. Because when baking soda is heated, carbon dioxide (CO_2) is released. The released gas makes the dough porous.

This, in turn, is one of the main reasons for the perfect taste and appearance of the finished dessert or dish.

1- question

Using the information above, choose the answer that correctly states the chemical formula for baking soda?
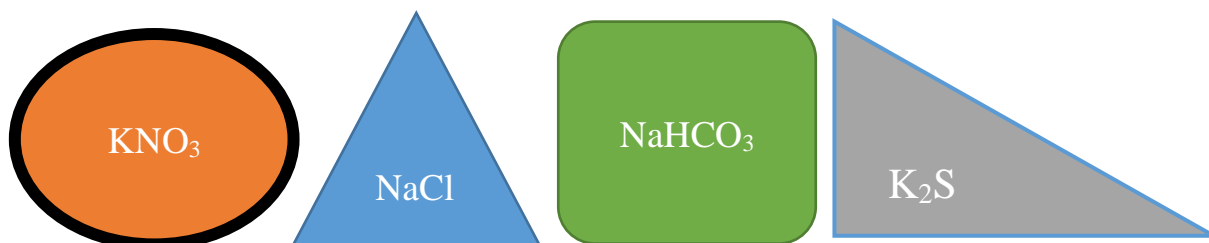
Picture 2.

Baking soda belongs to the fourth class of inorganic compounds, which is considered the main branch of chemistry, that is, the family of salts, and is known as sodium bicarbonate as a salt. The composition of this salt includes a metal atom, hydrogen and an acid residue, so it is considered an acid salt. Sodium bicarbonate decomposes when it is placed in a dry state in a test tube and heated using special devices. As a result, sodium carbonate salt, carbon dioxide and water are formed.

2- question

Among these reaction equations, determine the correct line of the reaction equation for the decomposition of baking soda?

A) $NaHCO_3 \longrightarrow Na_2CO_3 + CO_2 \uparrow + H_2O$
B) $NaNO_3 \longrightarrow NaNO_2 + O_2$
C) $CaCO_3 \longrightarrow CaO + CO_2$
D) $MgCO_3 \longrightarrow MgO + CO_2$
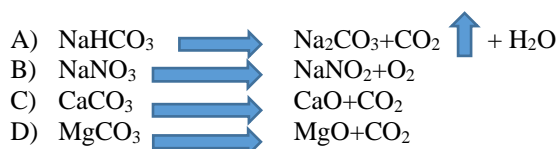
Picture 3.

3- question

Dear reader, you have identified the correct answer to question 2, you must find the solution to question 3 using this answer.

According to the molecular formula of sodium bicarbonate, the mass of one mole is 84 g / mol, that is:

$A_{r\,Na}$ =23 g/mol; $A_{r\,H}$ =1g/mol; $A_{r\,O}$=16 g/mol; $A_{r\,C}$=12 g/mol

$Mr(NaHCO_3)$=23+1+12+(16x3)=23+1+12+48= 84 g/mol

According to the molecular formula of sodium carbonate salt, the mass of one mole is 106 g / mol, that is:

$Mr(Na_2CO_3)$=(23x2)+12+(16x3)=46+12+48=106 g/mol

The volume of 1 mole of any gas (here CO2) under normal conditions is equal to MV=22.4 liters, this volume is called the molar volume.

The above data show that when 84 g/mol of soda is heated and decomposed under normal conditions, 106 g/mol of sodium carbonate and 22.4 liters of carbon dioxide are released.

ATTENTION! Calculate how many grams of sodium carbonate and how much carbon dioxide is released under normal conditions when 8.4 g of sodium carbonate, that is, soda, is heated and decomposed. Arrange the results in the order shown in the table 1 below.

Table 1.

Name, chemical formula and mass of the heated substance	The name of the formed salt and its mass (g / mol)	Name and volume of gas emitted under normal conditions (liters)	Name and chemical formula of other manufactured products
Baking soda, sodium bicarbonate $NaHCO_3$ 84 g/mol	sodium carbonate Na_2CO_3 106 g/mol	Carbon dioxide CO_2 22,4 liter	water H_2O

Baking soda, Sodium hydrogen carbonate NaHCO₃ 8,4 g/mol	?	?	-

During the implementation of this task, the reader will first of all receive information about the high importance of the use of soda in everyday life, and the food industry and medicine are unthinkable without the use of soda. They learn the name of soda as a chemical substance, its chemical formula, the equations of reactions of its decomposition into substances when heated. By determining the correct answer to the control questions, compiled using the information from the above question, the student will be able to fully understand the technique of making bread products and the essence of the stages of the baking process.

Based on STEAM-education, in the field of natural and economic sciences, to demonstrate the relevance of the acquired knowledge, skills and abilities of students in everyday life, conducting educational research, setting up experiments, aimed at educating their creative abilities in design, developing their interest in creating news . Practical exercises, laboratory work, independent performance and creative, creative thinking, instilling in the minds of the younger generation to work with complex practical problems, is considered one of the main tasks facing the teacher. It serves to increase scientific awareness and practical competencies.

In the process of studying the subject of chemistry, students will gain an understanding of the composition of substances, the distinction between chemical terms, human activities and chemical processes occurring in nature. Students study the differences between chemical compounds, the chemical basis of natural systems, the interdependence of the structure and composition of substances. The skills of careful handling of chemicals, household chemicals and conducting experiments based on them are being formed.

COMPETENCE OF SCIENTIFIC AWARENESS. - knows, represents and understands the essence of various natural objects, phenomena and processes based on theoretical knowledge; explains and applies in practice natural phenomena and processes observed in everyday life, based on the acquired knowledge, skills and competencies related to the terms, concepts and general laws of natural science; observes events, conducts research, experiments and measures the necessary quantities with the help of tools (stopwatch, scales, tape measure, thermometer, etc.), makes calculations; analyzes and sorts information given in various sources of information, uses them for educational purposes and understands the opinions expressed in the process of communication, thinks independently and creatively; aware of the socio-economic, scientific and technical news taking place in society, and can creatively develop their activities; knows the role of natural and other resources in the life of society and their significance in personal activities; explains the positive and negative impact of man on the environment and can indicate the causes of global and regional environmental problems; puts forward ways and ideas for solving environmental problems, expresses his opinion; knows the theoretical and practical foundations of health and a healthy lifestyle.

PRACTICAL COMPETENCE - is able to find the necessary information from various information sources, apply it in personal and professional activities; applies knowledge, skills and abilities obtained from the natural sciences to solve problems that arise in personal, professional and social activities; observes safety rules and uses various equipment wisely; mobilizes his practical skills for the sustainable development of his life and the area where he lives; are able to direct available opportunities and resources to innovative activities and make a positive contribution to the well-being of people; realizing the unity of man and nature, effectively uses nature and natural resources; eliminates and preserves factors that have a negative impact on the environment and ecology, and adheres to a healthy lifestyle in its activities; thinks creatively and logically in his daily activities, consciously plans his intellectual development, can control and evaluate the results of his educational activities.

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EFFECT OF A 6-WEEK AEROBIC EXERCISE PROGRAMME ON BLOOD PRESSURE AMONG MEN WITH HYPERTENSION

Abstract: The study examined the effects of a 6-week aerobic exercise on systolic and diastolic blood pressure (BP) of male participants with hypertension in Owerri Recreation Centre (Club) of Imo State. Two research questions/hypotheses guided the study. In the trials; 35 male hypertensive members constituted the population of the study, and 20 volunteers were used as the sample size of the study. The instrument used for the study was Sphygmomanometer model DM-500 for blood pressure by the two health experts who conducted the experiment for the period of ten weeks. Descriptive statistics and Analysis of Covariance (ANCOVA) were employed as the statistical techniques. The data set of the study was first subjected to assumptions associated with ANCOVA, which are normality via Kolmogorov-Smirnov and Shapiro-Wilk statistics, homogeneity of regression slopes via parallelism test statistic, and homogeneity of error variance via Levene's statistic; and the three assumptions were met. The findings of this study indicated that the aerobic exercise programme significantly reduced systolic and diastolic BP of male members with hypertension, of Owerri Recreation Club from 142.50 to 121.67 with a mean difference of 20.83mmHg and 95.83 to 82.50 with a mean difference of 13.33 mmHg respectively. The hypotheses that there is no significant effect of a 6-week aerobic exercise programme on the diastolic and systolic BP of male members with hypertension, of Owerri Recreation Club of Imo State were rejected ($p < 0.05$). Based on the findings, the researcher made some vital recommendations among others that: seminars and workshops should be sponsored by big industrial establishments concerning health and fitness in order to enlighten their executives the importance of engaging in exercises for heath fitness and productivity achievement.

Key words: Aerobic exercise programme, systolic blood pressure, diastolic blood pressure, male hypertensive members, ANCOVA.

Language: English

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Introduction

The health status of an individual or a population is usually influenced by a number of factors otherwise referred to as determinants of health or risk factor to health. According Abdo et al. (2019), the determinants of health comprise a range of personal, economic, social and environmental factors that determine both the health of an individual and population. Paucity of some of these factors lead to the development of some disease conditions which could be acute or chronic, one of such diseases that currently pose health challenges globally, and is influenced by these determinants is the cardiovascular disease (CVD).

According to WHO (2018), the greatest common non-communicable disease that is responsible globally for an estimated 17.8 million deaths in the year 2017, in which at least more than three quarters are low income and middle-income countries is known as the CVD. According to Aminde et al. (2017), an estimated one million deaths were attributable to CVD in West Africa alone, which constituted 5.5% of all global CVD related deaths and 11.3% of all deaths in Africa. They further stated that the majority of CVD is caused by risk factors such as insufficient physical activity, abnormal cholesterol level, hypertension, obesity and diabetes mellitus.

However, hypertension is said to be the major driver of CVD in West Africa with a prevalence of 14.5%.

The weight of passing around blood on the dividers of blood vessels is known as the BP. Utilized without encourage detail, "blood pressure" more often than not alludes to the weight in expansive courses of the systemic circulation. BP is as a rule communicated in terms of the systolic weight (most extreme amid one heart beat) over diastolic pressure (least in between two heart beats) and is measured in millimeters of mercury (mmHg), over the encompassing barometrical weight (Ogedegbe & Pickering, 2010).

Hypertension is one of the major global health problems that have a strong association with expanded hazard of coronary course malady, myocardial dead tissue, kidney infection, stroke and death. BP is the weight of blood against the internal dividers of the blood vessel, changing totally different parts of the body amid diverse stages of withdrawal of the heart and beneath diverse conditions of wellbeing. Hypertension is set in if BP level is more than $\frac{120}{80}$ mmHg (SBP >120 mmHg and/or DBP > 80 mmHg).

According to Kylasov and Gavrov (2011), exercise is physical movement that's arranged, organized, monotonous which enhances the standard of physical wellness and by and large wellbeing and wellness. It is undertaking as a result of various reasons, improving development and advancement, avoiding maturing, reinforcing muscles and the cardiovascular framework, sharpening athletic abilities, weight misfortune or upkeep, making strides wellbeing conjointly for satisfaction (He et al., 2018). Numerous individuals prefer exercising outdoors so as to congregate in groups, socialize, and improve the quality of well-being (Okeke et al., 2020). Recreation Club is an environment whereby activities are carried out at leisure hours willingly (Eno et al., 2020). Aerobic simply means how one's body makes use of oxygen to adequately satisfy energy requirements in the course of exercise. Aerobic exercise is any physical venture that makes one sweating, makes one to be breathing harder, and makes one's heart beats more than at rest.

The case of hypertension is rising throughout the world at an alarming degree, even as the lives of people are increasingly strenuous. Hypertension is now a condition within the common populace and it is the number one hazard figure for cardiovascular infection and stroke around the world. Numerous individuals live with hypertension undetected, and live with this lifted blood weight for a long time some time recently it is analyzed. Blood weight regularly rises and falls all through the day, and it can cause well being issues in the event that it remain stall for a long time.

The increasing levels of hypertension all over the world and its predominance cannot be disregarded or taken as an individual's issue. Aerobic is one of the

Nigerian exercises which contribute significantly in the treatment of patients with hypertension. Owerri Club is one of the Recreation Clubs with members in Imo State. In this Club, members voluntarily participate in various activities in order to promote health. A high percentage of these persons are hypertensive, even though they participate in Clubs' activities. It has been observed that aerobic exercise does not have any effect on hypertensive patients, while some concluded that it has a significant reduction. It is based on these mixed observations that this study is embarked on. So the question is: what is the effect of a 6-week aerobic exercise programme on systolic and diastolic BP of male members with hypertension, in Owerri recreation club of Imo State?

Hence, the study examined the effects of a 6-week aerobic exercise programme on systolic and diastolic blood pressure as a CVD associated risk factor among male members with hypertension using Owerri Recreation Club.

Materials and Methods

The researcher employed randomized pretest-posttest control group design. It is an efficient technique for assessing the impact of an intervention on two-randomized groups (Treatment and control) and also decreases chances of confounding variables. It is commonly employed in studies relating to behavioural sciences. The advantage of such a design is that it is simple and randomizes the differences among the sample items (Kothari and Garg, 2014). The use of control group helps to discount many alternative explanations for the effect of treatments. The pre-test post-test control group design also known as the classic controlled experimental design involves both a treatment and a control group (Thomas, Nelson and Silverman, 2015). Hence, this design was employed because when a control group is used, any changes observed post-test will be attributed only to the effect of the Aerobic exercise training program.

The aerobic exercises were administered to the participants in the evening of every training day at 4.30pm in Owerri Recreation Centre (Cub). All the participants were briefed on the rules and nature of aerobic. They are to have eaten food at least 3 hours before the commencement of the exercise. The training sessions were three times per week between Mondays to Saturdays. Two aerobic experts who have mastered the various aerobic exercises were used to demonstrate/teach the participants. The researcher used two health experts who measured the systolic and diastolic blood pressure of the participants. The two aerobic experts trained, monitored and corrected the participants where necessary during the 2-week training sessions, and the main 6-week aerobic exercise programme. In the first day of the first week, the baseline values of resting systolic blood pressure and resting diastolic blood pressure of the 12

volunteered Experimental group participants were taken. Thereafter, the exercise was carried out.

The data collected from the aerobic exercise were compiled and analyzed using a statistical tool known as Analysis of Covariance (ANCOVA) in order to achieve the objectives of the study.

Results

Table 1: Data for Blood Pressure for Male Hypertensive Members

S/N	Group	SBP Pretest	SBP Posttest	DBP Pre	DBP Post
1	Treatment	140	130	100	90
2	Treatment	160	140	90	80
3	Treatment	130	100	80	70
4	Treatment	150	130	100	90
5	Treatment	140	120	90	80
6	Treatment	130	110	80	70
7	Treatment	130	100	90	70
8	Treatment	140	120	100	90
9	Treatment	140	120	100	80
10	Treatment	140	120	100	90
11	Treatment	170	150	110	80
12	Treatment	140	120	110	100
13	Control	140	140	100	100
14	Control	150	140	110	110
15	Control	140	140	100	100
16	Control	130	130	90	90
17	Control	120	120	80	80
18	Control	130	120	90	80
19	Control	160	160	110	110
20	Control	150	150	100	100

Test of Assumptions for the BP Data

Table 2: Normality Assumption for SBP

	Group	K-S[a]			S-W		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest	Control	.196	8	.200*	.931	8	.521
	Treatment	.212	12	.143	.932	12	.397

Result in Table 2 reveals that normality assumption is met considering the results (p-values) of both Kolmogorov-Smirnov (K-V) and Shapiro-Wilk (S-W).

Table 3: Homogeneity Assumption of Regression Slopes for Systolic Blood Pressure

Source(S)	SS	df	MS	F	Sig.	Partial Eta Squared
Corrected Model(CM)	4509.487[a]	3	1503.162	58.587	.000	.917
Intercept(I)	63.866	1	63.866	2.489	.134	.135
Group(G)	49.896	1	49.896	1.945	.182	.108
Pre-test(P)	3156.596	1	3156.596	123.030	.000	.885
Group * Pre-test(G*P)	13.233	1	13.233	.516	.483	.031
Error(E)	410.513	16	25.657			
Total(T)	332600.000	20				
Corrected Total(CT)	4920.000	19				

The homogeneity assumption is met since p-value is 0.483, which implies that covariate by treatment interaction is not significant statistically.

Table 4: Homogeneity of Variance Assumption for Systolic Blood Pressure

Levene's Test			
F	df1	df2	Sig.
.216	1	18	.648

The null hypothesis of equal error variances is not rejected, $F(1, 18) = 0.216$, $p = 0.648$. The data set for this study met the assumption of homogeneity of variances. This implied that other results could confidently be reported.

Table 5: Normality Assumption for Diastolic Blood Pressure

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group1	Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest1	Control	.249	8	.155	.875	8	.168
	Treatment	.198	12	.200[*]	.894	12	.134

The result in Table 5 shows that the normality assumption is met considering the results (p-figures) of both KV and SW.

Table 6: Homogeneity Assumption of Regression Slopes for Diastolic Blood Pressure

Source(S)	SS	df	MS	F	Sig.	Partial Eta Squared
Corrected Model(CM)	2438.473[a]	3	812.824	27.008	.000	.835
Intercept(I)	.040	1	.040	.001	.971	.000
Group1(G1)	20.859	1	20.859	.693	.417	.042
Pretest1(P1)	1530.973	1	1530.973	50.871	.000	.761
Group1 * Pre-test1(G1*P1)	52.693	1	52.693	1.751	.204	.099
Error(E)	481.527	16	30.095			
Total(T)	157800.000	20				
Corrected Total(CT)	2920.000	19				

The homogeneity assumption is met since p-value is 0.204, which implies that covariate by treatment interaction is not significant statistically.

Table 7: Homogeneity of Variance Assumption for Diastolic Blood Pressure

Levene's Test			
F	df1	df2	Sig.
2.111	1	18	.163

The hypothesis of equal error variances is not rejected, $F(1, 18) = 2.111$, $p = 0.163$. The data set for this study met the assumption of homogeneity of variances. This implied that other results could confidently be reported.

Research Question 1

To what extent is the effect of a 6-week aerobic exercise on the systolic blood pressure of male hypertensive members of Owerri Recreation Club?

Table 8: Descriptive Summary Results

Test	N	$\bar{x}$	SD	MD
Pre-test		142.50	12.15	
	12			20.83
Post-test		121.67	14.67	

Key: MD = Mean Difference

The output shows that the mean and standard deviation for systolic blood pressure before the treatment is 142.50 ± 12.15 and 121.67 ± 14.67 after treatment, with a mean deviation of 20.83. This reveals a reduction of 20.83 mmHg after the exercise.

Testing of Hypothesis One

There is no significant effect of a 6-week aerobic exercise programme on the systolic blood pressure of male hypertensive members of Owerri Recreation Club of Imo State.

Table 9: ANCOVA Summary Results for SBP (n = 20)

S	SS	df	MS	F	Sig.	Partial Eta Squared
CM	4496.254[a]	2	2248.127	90.191	.000	.914
I	73.816	1	73.816	2.961	.103	.148
P	3292.920	1	3292.920	132.107	.000	.886
G	1631.245	1	1631.245	65.443	.000	.794
E	423.746	17	24.926			
T	332600.000	20				
CT	4920.000	19				

The result in Table 9 shows a p-value of 0.000 (p < 0.05). This implies that there is significant effect of a 10-week aerobic exercise programme on the SBP of male hypertensive members.

Research Question 2

To what extent is the effect of a 10-week aerobic exercise on the diastolic blood pressure of male hypertensive members of Owerri Recreation Club?

Table 10: Descriptive Summary Results

Test	N	$\bar{x}$	SD	MD
Pre-test		95.83	9.96	
	12			13.33
Post-test		82.50	9.65	

The output shows that the mean and standard deviation for diastolic blood pressure before the treatment is 95.83 ± 9.96 and is 82.50 ± 9.65 after treatment, with a mean deviation of 20.83. This reveals a reduction of 13.33 mmHg after the exercise.

Testing of Hypothesis Two

There is no significant effect of a 6-week aerobic exercise programme on the diastolic blood pressure of male hypertensive members of Owerri Recreation Club of Imo State.

Table 11: ANCOVA Summary Results for DBP (n = 20)

S	SS	df	MS	F	Sig.	Partial Eta Squared
CM	2385.781[a]	2	1192.890	37.960	.000	.817
I	1.495	1	1.495	.048	.830	.003
P1	1478.281	1	1478.281	47.042	.000	.735
G1	715.915	1	715.915	22.782	.000	.573
E	534.219	17	31.425			
T	157800.000	20				
CT	2920.000	19				

The result in Table 11 shows a p-value of 0.000 (p < 0.05). This implies a significant effect of a 10-week aerobic exercise programme on the DBP of male members with hypertension.

Discussion of the Findings

The data set of the study was first subjected to assumptions associated with ANCOVA, which are normality via Kolmogorov-Smirnov and Shapiro-Wilk statistics, homogeneity of regression slopes via parallelism test statistic, and homogeneity of error variance via Levene's statistic; and the three assumptions were met. The findings of the study indicated that the aerobic exercise programme significantly reduced systolic and DBP of male members with hypertension in Owerri Recreation Club from 142.50 to 121.67 with a mean difference of 20.83mmHg and 95.83 to 82.50 with a mean difference of 13.33 mmHg respectively. The hypotheses that there is no significant effect of a 6-week aerobic exercise programme on the diastolic and SBP of male members with hypertension, in Owerri Recreation Club of Imo State were rejected (p< 0.05).

Conclusion

In conclusion, the study revealed that the effect of a 6-week aerobic exercise programme on blood pressure as a CVD associated risk factor among men hypertensive members of in Owerri Recreation Centre of Imo State significantly decreased systolic and diastolic blood pressure. There was a significant difference between the mean post-test systolic blood pressure and diastolic blood pressure of the subjects in both the Experimental and Control Groups in the 10-week aerobic exercise. There is a great decrease from a mean systolic blood pressure and diastolic blood pressure of 141.50 ± 12.26 and 96.50 ± 9.88 before the 6-week aerobic exercise to a mean value of 128.00 ± 16.09 and 88.00 ± 12.40 respectively after the 6-week aerobic exercise. All these decrease are statistically significant at (p = 0.000).

Recommendations

The following recommendations are made:
1. Aerobic exercise, being an active and acceptable form of physical activity for hypertensive patients, should be incorporated into strategies for the improvement of cardio-respiratory fitness and reduction of possible development of any form of/or more cardiovascular diseases
2. Corporate bodies should sponsor workshops on fitness and health, to enlighten their members on the need for exercise in order to achieve fitness and productivity. Different types of exercises should be discussed.
3. Further studies should confirm the claims of this study as regards the effectiveness of Aerobic exercises in the management of hypertension, probably using a larger sample size, and also administering the same exercise to other CVD associated risk factors such as diabetes mellitus, obesity, etc.

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REACHING AN OPTIMAL SOLUTION TO A TRANSPORTATION PROBLEM INVOLVING A CONCAVE COST FUNCTION

Abstract: *The work is on reaching an optimal solution to a transportation problem involving a concave cost function with specific objectives to develop a new approach for solving optimization problems of a transportation problem in a concave case; demonstrate the effectiveness of the new approach using real life examples from published works, and comparing the self developed approach with the existing method. One Least Cost Row Column Difference Method (OLCRCDM) was employed to obtain the initial basic feasible solution. The transportation concave simplex technique was modified for a better solution and its steps were clearly stated in this study. Four numerical examples were employed to demonstrate the effectiveness of the developed technique in this study. The results revealed that out of the four numerical problems, the existing Karush-Kuhn-Tucker (KKT) procedure of Modified Distribution (MODI) method could not produce optimality point in the first example with North West Corner Method (NWCM) and Vogel Approximation Method (VAM) as a means of obtaining the IBFS, but the self developed did using OLCRCDM to obtain the IBFS and it yielded an optimal value of N253,000 with an optimal solution as z_{12}=13, z_{22}=5, z_{23}=8, z_{31}=11, and z_{33}=4. The remaining three examples were successfully solved with both the existing Karush-Kuhn-Tucker (KKT) procedure of MODI method and the new technique with optimal values of N377,000, GH¢ 236,000 and N509,000 respectively, but the new technique proved to be more efficient as it produced minimum number of iteration to optimality. The four problems were solved with Wolfram Mathematica and Anaconda Python programming softwares and the results agreed with the results obtained from the developed approach.*

Key words: *Concave Cost Function, OLCRCDM, Transportation Problem, Karush-Kuhn-Tucker, Optimal Solution, Proposed Algorithm.*

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Introduction

Profit and cost is what virtually everyone deems interested in employing, using any efficient resources to optimize; hence various forms of transportation models are in existence. There are different kinds of transportation problems which are applied in the business world and the primary aim of a transportation problem is to find a means of moving this transfer of goods at a minimized total cost (Mostafa et al, 2022; Kaur & Kumar, 2011). In describing the transportation

problem in its conventional form, the assumption is that an informed decision maker has an understanding on the value of transportation cost, demand and supply; hence, unpredictability is a common occurrence in real life circumstances.

This study is channeled to tackle a transportation problem in a concave cost function using a new approach. However, there are some factors that are responsible for the cost of goods, and some of them are transport, raw materials' costs and labour. This implies that the cost of raw materials is directly proportional to the cost of the goods, and the pricing system is also affected when there is a significant variation in the transportation cost (Rudi et al, 2016). The cost of goods per unit shipped is assumed to be constant irrespective of the quantity shipped from a given source to a defined destination; but the cost sometimes may not be constant in actuality. Sometimes, quantity discounts are feasible for large shipments in such a way that the marginal cost of transporting a unit might approach a specific pattern (Minken & Johansen, 2019).

Transportation problem involving a concave cost function, simply means a nonlinear transportation problem; indicating a scenario whereby volume discounts are being available for bulk shipments. In this case, the cost function of the transportation problem is separable, and the marginal cost (cost per unit of goods shipped) decreases as the shipment volume increases, so it generally assumes a concave structure. It will increase due to the increase in the total cost per additional unit of goods shipped (Haruna et al, 2012). Discounts may be directly related to the

unit of commodity or may have the same rate for a particular amount. Thus, the discount may be either directly associated to the unit commodity or have the equivalent rate for some quantity. However, if the discount is directly associated to the unit commodity, then the resulting cost function becomes continuous and possesses continuous first partial derivatives.

Transportation Problem via Concave Cost Functions

Volume discounts may be available for bulk shipments. In this case, the cost function of the transportation problem is separable, and the marginal cost (cost per unit of goods shipped) decreases as the shipment volume increases, so we generally assume a concave structure. It will increase due to the increase in the total cost per additional unit of goods shipped (Haruna et al, 2012). However, If the discount is directly associated to the unit commodity, then the resulting cost function becomes continues and possesses continues first partial derivatives.

Given a function that is differentiable
$$K: \mathbb{R}^{nm} \rightarrow \mathbb{R}$$

The nonlinear transportation problem when the discount is directly related to the unit commodity is defined mathematically as stated in Equation (1)

$$\left. \begin{array}{l} Minimize\ K(Z) \\ Subject\ to: AZ = b \\ \qquad\qquad Z \geq 0 \end{array} \right\} \qquad (1)$$

where

$$Z = \begin{pmatrix} Z_{11} \\ Z_{12} \\ \vdots \\ Z_{mj} \\ \vdots \\ Z_{mn} \\ Z_{11} \\ Z_{21} \\ \vdots \\ Z_{in} \\ \vdots \\ Z_{mn} \end{pmatrix}; \quad b = \begin{pmatrix} S_1 \\ S_2 \\ \vdots \\ S_m \\ D_1 \\ D_2 \\ \vdots \\ D_n \end{pmatrix}; A = \begin{pmatrix} 1 & 1 & 1 & \cdots & 1 \\ 1 & 1 & 1 & \cdots & 1 \\ 1 & 1 & 1 & \cdots & 1 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

Nonlinear Transportation Tableau

The nonlinear transportation tableau is defined as shown in Table 1.

Table 1: Nonlinear Transportation Tableau

	1	2	...	j	...	n		
1	$\dfrac{\partial K(\bar{Z})}{\partial Z_{11}}$	$\dfrac{\partial K(\bar{Z})}{\partial Z_{12}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{1j}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{1n}}$	S_1	R_1
2	$\dfrac{\partial K(\bar{Z})}{\partial Z_{21}}$	$\dfrac{\partial K(\bar{Z})}{\partial Z_{22}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{2j}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{2n}}$	S_2	R_2
⋮	...	...	...	...	...	⋮	⋮	⋮
i	$\dfrac{\partial K(\bar{Z})}{\partial Z_{i1}}$	$\dfrac{\partial K(\bar{Z})}{\partial Z_{i2}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{ij}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{in}}$	S_i	R_i
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
m	$\dfrac{\partial K(\bar{Z})}{\partial Z_{m1}}$	$\dfrac{\partial K(\bar{Z})}{\partial Z_{m2}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{mj}}$	...	$\dfrac{\partial K(\bar{Z})}{\partial Z_{mn}}$	S_m	R_m
	D_1	D_2	...	D_j	...	D_n		
	T_1	T_2	...	T_j	...	T_n		

Where $\bar{Z}$ is the current basic solution

Solution Steps to Transportation Problem in the Concave Case (Self Developed)

Initialization

Obtain the initial basic solution via One Least Cost Row Column Difference Method (OLCRCDM).

Iteration

Step 1: Obtain $\dfrac{\partial f(\bar{z})}{\partial z_{B_{ij}}}$ for the occupied cells

using the equation

$$\frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} = \frac{\partial}{\partial z_{B_{ij}}}\left[k_{ij}z_{ij} - p_{ij}z_{ij}^2\right] at\ \bar{z} \qquad (2)$$

Step 2: Obtain $\dfrac{\partial f(\bar{z})}{\partial z_{ij}}$ for the unoccupied cells

using the equation

$$\frac{\partial f(\bar{z})}{\partial z_{ij}} = \int_0^1 (k_{ij} - 2p_{ij}z_{ij})dz_{ij} \qquad (3)$$

$$= k_{ij}z_{ij} - p_{ij}z_{ij}^2\Big|_0^1$$

$$\therefore \frac{\partial f(\bar{z})}{\partial z_{ij}} = k_{ij} - p_{ij} \qquad (4)$$

Step 3: Obtain

Determine the values of r_i and t_j from the equation,

$$\frac{\partial w}{\partial z_{B_{ij}}} = \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} - t_j + r_i = 0 \Rightarrow \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} = t_j - r_i \ (5)$$

Where z_{Bij} are the basic variables

Step 4: The reduced cost for the non-basic variables is obtained using the formula;

$$\frac{\partial w}{\partial z_{ij}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}}dz_{ij} - \int_{r_i}^{t_j} dz_{ij} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}}dz_{ij} - t_j + r_i \qquad (6)$$

If $\int_0^1 \dfrac{\partial f(\bar{z})}{\partial z_{ij}}dz_{ij} - t_j + r_i \geq 0$

for all z_{ij} – non basic, stop, $\bar{z}$ is KKT point. Otherwise go to step 5.

Step 5: Compute

$$\frac{\partial w}{\partial z_{kl}} = \left\{\int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}}dz_{ij} - t_j + r_i\right\} \qquad (7)$$

z_{kl} will enter the basic. Allocate $z_{kl} = \theta$ where θ is found as in the linear transportation case.

The constraints are satisfied when the allocations are adjusted.

The variable to be left say z_{Bkv}, is determined, while the variable which is basic that turns to zero first is z_{Bkv} while making the adjustment. Obtain the new variables for the basic, and move to step 1.

Numerical Problems

Example 1

Unilever Nigeria Plc located in Apapa Ikeja, produces and sells the products as indicated in Table 2:

Table 2: Market Segment Analysis

	MARKETS SEGMENTS			SUPPLY
	P	Q	R	
Omo washing powder	5	4	6	13,000
Blue Band margarine	7	6	5	13,000
Vaseline	9	11	8	15,000
DEMAND	11,000	18,000	12,000	

The company's percentage discount as a policy is presented in the Table 3:

Table 3: Company's Percentage Discount

	P	Q	R
Omo washing powder	0.03	0.015	0.04
Blue Band margarine	0.02	0.03	0.05
Vaseline	0.035	0.05	0.03

Source: Okenwe (2018)

The basic feasible solution, which was obtained using One Least Cost Row Column Difference Method (OLCRCDM) is $Z_{12} = 13$, $Z_{22} = 5$, $Z_{23} = 8$, $Z_{31} = 11$, $Z_{33} = 4$, which results in a transportation cost of $= (0, 13, 0, 0, 5, 8, 11, 0, 4)$, in Thousands.

$$\bar{z} = (z_{11}, z_{B12}, z_{13}, z_{21}, z_{B22}, z_{B23}, z_{B31}, z_{32}, z_{B33})$$

The total transportation cost is

$13000(4) + 5000(6) + 8000(5) + 11000(9) + 4000(8) = ₦253000$

Due to the discount given to each box as a result of large volume of transporting from source i to destination j, the formulation of the transportation problem in nonlinear form is:

$$Min.\sum_{i=1}^{3}\sum_{j=1}^{3} k_{ij} z_{ij}$$

$$S.t. \quad z_{11} + z_{12} + z_{13} = 13$$
$$z_{21} + z_{22} + z_{23} = 13$$
$$z_{31} + z_{32} + z_{33} = 15$$
$$z_{11} + z_{21} + z_{31} = 11$$
$$z_{12} + z_{22} + z_{32} = 18$$
$$z_{13} + z_{23} + z_{33} = 12$$

Where

$$k_{11}z_{11} = 5z_{11} - p_{11}z_{11}^2, \ k_{12}z_{12} = 4z_{12} - p_{12}z_{12}^2, \ k_{13}z_{13} = 6z_{13} - p_{13}z_{13}^2, \ k_{21}z_{21} = 7z_{21} - p_{21}z_{21}^2$$
$$k_{22}z_{22} = 6z_{22} - p_{22}z_{22}^2, \ k_{23}z_{23} = 5z_{23} - p_{23}z_{23}^2, \ k_{31}z_{31} = 9z_{31} - p_{31}z_{31}^2, \ k_{32}z_{32} = 11z_{32} - p_{32}z_{32}^2$$
$$k_{33}z_{33} = 8z_{33} - p_{33}z_{33}^2$$

Due to the discount given to each box as a result of large volume of transporting from source i to destination j, then the cost function (k_{ij}) is indicated as:

$$k_{11}z_{11} = 5z_{11} - 0.03z_{11}^2, \ k_{12}z_{12} = 4z_{12} - 0.015z_{12}^2, \ k_{13}z_{13} = 6z_{13} - 0.04z_{13}^2, \ k_{21}z_{21} = 7z_{21} - 0.02z_{21}^2$$
$$k_{22}z_{22} = 6z_{22} - 0.03z_{22}^2, \ k_{23}z_{23} = 5z_{23} - 0.05z_{23}^2, \ k_{31}z_{31} = 9z_{31} - 0.035z_{31}^2, \ k_{32}z_{32} = 11z_{32} - 0.05z_{32}^2$$
$$k_{33}z_{33} = 8z_{33} - 0.03z_{33}^2$$

The first derivations of the cost function k_{ij} are given as:

$$k_{11}z_{11} = 5 - 0.06z_{11}, k_{12}z_{12} = 4 - 0.03z_{12}, k_{13}z_{13} = 6 - 0.08z_{13}, k_{21}z_{21} = 7 - 0.04z_{21},$$

$$k_{22}z_{22} = 6 - 0.06z_{22}, k_{23}z_{23} = 5 - 0.1z_{23}, k_{31}z_{31} = 9 - 0.07z_{31}; k_{32}z_{32} = 11 - 0.1z_{32}, k_{33}z_{33} = 8 - 0.06z_{33}$$

For the occupied cells, the first derivations at $\bar{z}$ are obtained using Equation (2) as:

$$\frac{\partial f(\bar{z})}{\partial z_{12}} = 3.61; \frac{\partial f(\bar{z})}{\partial z_{22}} = 5.7; \frac{\partial f(\bar{z})}{\partial z_{23}} = 4.2; \frac{\partial f(\bar{z})}{\partial z_{31}} = 8.23; \frac{\partial f(\bar{z})}{\partial z_{33}} = 7.76$$

For the unoccupied cells, the integration of the first derivations of the non-basic variables $\left[\int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} \right]$ is obtained using Equation (3) as follows:

$$\frac{\partial f(\bar{z})}{\partial z_{11}} = \int_0^1 (5 - 0.06z_{11})dz_{11} = 5z_{11} - 0.03z_{11}^2 \Big|_0^1 = 5 - 0.03 = 4.97$$

$$\frac{\partial f(\bar{z})}{\partial z_{13}} = \int_0^1 (6 - 0.08z_{13})dz_{13} = 6z_{13} - 0.04z_{13}^2 \Big|_0^1 = 6 - 0.04 = 5.96$$

$$\frac{\partial f(\bar{z})}{\partial z_{21}} = 6.98; \frac{\partial f(\bar{z})}{\partial z_{32}} = 10.95$$

Now using Equation (5), we find

$$\frac{\partial w}{\partial z_{B_{ij}}} = \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} - t_j + r_i = 0 \Rightarrow \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} = t_j - r_i$$

Thus,

$$t_2 - r_1 = 3.61; t_2 - r_2 = 5.7; t_3 - r_2 = 4.2; t_1 - r_3 = 8.23; t_3 - r_3 = 7.76$$

$r_1 = 1$ (Number of basic cells in row one) and from the equations above; we have

$$r_1 = 2, r_2 = -1.09, r_3 = -4.65$$

$$t_1 = 3.58, t_2 = 4.61, t_3 = 3.11$$

The computation for the reduced costs of the non-basic variables is obtained using Equation (6) as follows;

$$\frac{\partial w}{\partial z_{ij}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - \int_{r_i}^{t_j} dz_{ij} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - t_j + r_i. \text{ That is}$$

$$\frac{\partial w}{\partial z_{11}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{11}} dz_{11} - t_1 + r_1 = 2.39; \quad \frac{\partial w}{\partial z_{13}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{13}} dz_{13} - t_3 + r_1 = 3.85; \quad \frac{\partial w}{\partial z_{21}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{21}} dz_{21} - t_1 + r_2 = 2.31;$$

$$\frac{\partial w}{\partial z_{32}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{32}} dz_{32} - t_2 + r_3 = 1.69$$

Since all the non-basic variables of the reduced costs are positive, then the optimality point of $\bar{z}$ is reached, with a minimum cost of transportation as ₦253000.

Example 2

Bottling company in Imo State, Owerri plant, Nigeria, a distributor of different categories of drinks (Fanta, Coke, Sprite) in different market segments as indicated in Table 4.

Table 4: Categories of Drinks (Fanta, Coke, Sprite) in Different Market Segments

	MARKETS SEGMENTS					s_i
	Mbaise	Orlu	Aba	Umuahia	Afikpo	
Fanta	14	8	11	12	8	11,000
Coke	12	10	7	15	11	17,000
Sprite	10	9	14	13	15	11,000
d_j	6,000	7,000	9,000	10,000	7,000	

The policy of the company allows percentage discounts as shown in Table 5.

Table 5: Policy of the Company's Allowable Percentage Discounts

	Mbaise	Orlu	Aba	Umuahia	Afikpo
Fanta	0.01	0.04	0.02	0.04	0.02
Coke	0.03	0.01	0.02	0.013	0.03
Sprite	0.02	0.04	0.03	0.02	0.03

Source: Osuji et al (2014)

The basic feasible solution, which was obtained using One Least Cost Row Column Difference Method (OLCRCDM) is

$$Z_{14} = 4, Z_{15} = 7, Z_{22} = 7, Z_{23} = 9, Z_{24} = 1, Z_{31} = 6, Z_{34} = 5$$

which results in a transportation cost of

= (0, 0, 0, 4, 7, 0, 7, 9, 1, 0, 6, 0, 0, 5, 0), in Thousands.

$$\bar{z} = (z_{11}, z_{12}, z_{13}, z_{B14}, z_{B15}, z_{21}, z_{B22}, z_{B23}, z_{B24}, z_{25}, z_{B31}, z_{32}, z_{33}, z_{B34}, z_{35})$$

The total transportation cost is

$4000(12) + 7000(8) + 7000(10) + 9000(7) + 1000(15) + 6000(10) + 5000(13) = ₦ 377,000$

Due to the discount given to each box as a result of large volume of transporting from source i to destination j, the formulation of the transportation problem in nonlinear form is:

$$Min. \sum_{i=1}^{3} \sum_{j=1}^{5} k_{ij} z_{ij}$$

$S.t.$

$$z_{11} + z_{12} + z_{13} + z_{14} + z_{15} = 11$$
$$z_{21} + z_{22} + z_{23} + z_{24} + z_{25} = 17$$
$$z_{31} + z_{32} + z_{33} + z_{34} + z_{35} = 11$$
$$z_{11} + z_{21} + z_{31} = 6$$
$$z_{12} + z_{22} + z_{32} = 7$$
$$z_{13} + z_{23} + z_{33} = 9$$
$$z_{14} + z_{24} + z_{34} = 10$$
$$z_{15} + z_{25} + z_{35} = 7$$

where

$$k_{11}z_{11} = 14z_{11} - p_{11}z_{11}^2, \ k_{12}z_{12} = 8z_{12} - p_{12}z_{12}^2, \ k_{13}z_{13} = 11z_{13} - p_{13}z_{13}^2, \ k_{14}z_{14} = 12z_{14} - p_{14}z_{14}^2,$$

$$k_{15}z_{15} = 8z_{15} - p_{15}z_{15}^2, k_{21}z_{21} = 12z_{21} - p_{21}z_{21}^2, \ k_{22}z_{22} = 10z_{22} - p_{22}z_{22}^2, \ k_{23}z_{23} = 7z_{23} - p_{23}z_{23}^2,$$

$$k_{24}z_{24} = 15z_{24} - p_{24}z_{24}^2, k_{25}z_{25} = 11z_{25} - p_{25}z_{25}^2, k_{31}z_{31} = 10z_{31} - p_{31}z_{31}^2; k_{32}z_{32} = 9z_{32} - p_{32}z_{32}^2,$$

$$k_{33}z_{33} = 14z_{33} - p_{33}z_{33}^2, \ k_{34}z_{34} = 13z_{34} - p_{34}z_{34}^2, k_{35}z_{35} = 15z_{35} - p_{35}z_{35}^2$$

Due to the discount given to each box as a result of large volume of transporting from source i to destination j, then the cost function (k_{ij}) is indicated as:

$$k_{11}z_{11} = 14z_{11} - 0.01z_{11}^2, \ k_{12}z_{12} = 8z_{12} - 0.04z_{12}^2, \ k_{13}z_{13} = 11z_{13} - 0.02z_{13}^2, \ k_{14}z_{14} = 12z_{14} - 0.04z_{14}^2,$$

$$k_{15}z_{15} = 8z_{15} - 0.02z_{15}^2, k_{21}z_{21} = 12z_{21} - 0.03z_{21}^2, \ k_{22}z_{22} = 10z_{22} - 0.01z_{22}^2, \ k_{23}z_{23} = 7z_{23} - 0.02z_{23}^2,$$

$$k_{24}z_{24} = 15z_{24} - 0.013z_{24}^2, k_{25}z_{25} = 11z_{25} - 0.03z_{25}^2, k_{31}z_{31} = 10z_{31} - 0.02z_{31}^2; k_{32}z_{32} = 9z_{32} - 0.04z_{32}^2,$$

$$k_{33}z_{33} = 14z_{33} - 0.03z_{33}^2, \ k_{34}z_{34} = 13z_{34} - 0.02z_{34}^2, k_{35}z_{35} = 15z_{35} - 0.03z_{35}^2$$

The first derivations of the cost function k_{ij} are given as:

$$k_{11}z_{11} = 14 - 0.02z_{11}, \ k_{12}z_{12} = 8 - 0.08z_{12}, \ k_{13}z_{13} = 11 - 0.04z_{13}, \ k_{14}z_{14} = 12 - 0.08z_{14}, k_{15}z_{15} = 8 - 0.04z_{15},$$

$$k_{21}z_{21} = 12 - 0.06z_{21}, \ k_{22}z_{22} = 10 - 0.02z_{22}, \ k_{23}z_{23} = 7 - 0.04z_{23}, \ k_{24}z_{24} = 15 - 0.026z_{24}, k_{25}z_{25} = 10 - 0.06z_{25},$$

$$k_{31}z_{31} = 10 - 0.02z_{31}; k_{32}z_{32} = 9 - 0.08z_{32}, \ k_{33}z_{33} = 14 - 0.06z_{33}, \ k_{34}z_{34} = 13 - 0.04z_{34}, k_{35}z_{35} = 15 - 0.06z_{35}$$

For the occupied cells, the first derivations at $\bar{z}$ are obtained using Equation (2) as:

$$\frac{\partial f(\bar{z})}{\partial z_{14}} = 11.68; \frac{\partial f(\bar{z})}{\partial z_{15}} = 7.72; \frac{\partial f(\bar{z})}{\partial z_{22}} = 9.86; \frac{\partial f(\bar{z})}{\partial z_{23}} = 6.64; \frac{\partial f(\bar{z})}{\partial z_{24}} = 14.97; \frac{\partial f(\bar{z})}{\partial z_{31}} = 9.76, \frac{\partial f(\bar{z})}{\partial z_{34}} = 12.8$$

For the unoccupied cells, the integration of the first derivations of the non-basic variables $\left[\int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} \right]$ is obtained using Equation (3) as follows:

$$\frac{\partial f(\bar{z})}{\partial z_{11}} = \int_0^1 (14 - 0.02z_{11})dz_{11} = 14z_{11} - 0.01z_{11}^2 \Big|_0^1 = 14 - 0.01 = 13.99$$

$$\frac{\partial f(\bar{z})}{\partial z_{12}} = \int_0^1 (8 - 0.08z_{12})dz_{12} = 8z_{12} - 0.04z_{12}^2 \Big|_0^1 = 8 - 0.04 = 7.96$$

$$\frac{\partial f(\bar{z})}{\partial z_{13}} = 10.98; \frac{\partial f(\bar{z})}{\partial z_{21}} = 11.97; \frac{\partial f(\bar{z})}{\partial z_{25}} = 10.97; \frac{\partial f(\bar{z})}{\partial z_{32}} = 8.96, \frac{\partial f(\bar{z})}{\partial z_{33}} = 13.97; \frac{\partial f(\bar{z})}{\partial z_{35}} = 14.97$$

Now using Equation (5), we find

$$\frac{\partial w}{\partial z_{B_{ij}}} = \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} - t_j + r_i = 0 \Rightarrow \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} = t_j - r_i$$

Thus,

$$t_4 - r_1 = 11.68; t_5 - r_1 = 7.72; t_2 - r_2 = 9.86; t_3 - r_2 = 6.64; t_4 - r_2 = 14.97; t_1 - r_3 = 9.76; t_4 - r_3 = 12.8$$

$r_1 = 2$ (Number of basic cells in row one) and from the equations above; we have

$$r_1 = 2, r_2 = -1.29, r_3 = 0.88$$
$$t_1 = 10.64, t_2 = 8.57, t_3 = 5.35, t_4 = 13.68, t_5 = 9.72$$

The computation for the reduced costs of the non-basic variables is obtained via the formula in Equation (6) as;

$$\frac{\partial w}{\partial z_{ij}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - \int_{r_i}^{t_j} dz_{ij} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - t_j + r_i. \text{ That is}$$

$$\frac{\partial w}{\partial z_{11}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{11}} dz_{11} - t_1 + r_1 = 5.35; \quad \frac{\partial w}{\partial z_{12}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{12}} dz_{12} - t_2 + r_1 = 1.39; \quad \frac{\partial w}{\partial z_{13}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{13}} dz_{13} - t_3 + r_1 = 7.63;$$

$$\frac{\partial w}{\partial z_{21}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{21}} dz_{21} - t_1 + r_2 = 0.04; \quad \frac{\partial w}{\partial z_{25}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{25}} dz_{25} - t_5 + r_2 = -0.04; \quad \frac{\partial w}{\partial z_{32}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{32}} dz_{32} - t_2 + r_3 = 1.27$$

$$\frac{\partial w}{\partial z_{33}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{33}} dz_{33} - t_3 + r_3 = 9.5; \quad \frac{\partial w}{\partial z_{35}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{35}} dz_{35} - t_5 + r_3 = 6.13$$

$$Min.\left(\frac{\partial w}{\partial z_{ij}}\right) = \frac{\partial w}{\partial z_{25}} = -0.04$$

The existence of negative figure for the reduced cost implies non-optimality. Thus, the Table 6 is readjusted as indicated in step 5.

Hence, z_{25} enters the basis, and after adjustment of the values, z_{24} was removed from the basic.

Table 6: Adjustment of Table to Obtain the Leaving Variable

| Sources | Markets | | | | | s_i | r_i |
	Mbaise	Orlu	Aba	Umuahia	Afikpo		
Fanta	14 (5.35)	8 (1.39)	11 (7.63)	12 + 4	8 − 7	11000	2
Coke	12 (0.04)	10 7	7 9	15 1 −	11 (-0.04) +	17000	-1.29
Sprite	10 6	9 (1.27)	14 (9.5)	13 5	15 (6.13)	11000	0.88
d_j	6000	7000	9000	10000	7000		
t_j	10.64	8.57	5.35	13.68	9.72		

The leaving variable is the minimum figure among the corners with a minus sign for the basic variables in the loop. Therefore, the leaving variable is z_{24} since it has a minimum figure of 1. This implies that the corners with a plus sign would be increased by 1, while the corners with a minus sign would be reduced by 1. The Table is adjusted to produce the next Table as shown in Table 7:

Table 7: Summary of Table after Obtaining the Leaving Variable

Sources	Markets					s_i
	Mbaise	Orlu	Aba	Umuahia	Afikpo	
Fanta	14	8	11	12 (5)	8 (6)	11000
Coke	12 (7)	10 (9)	7	15	11 (1)	17000
Sprite	10 (6)	9	14	13 (5)	15	11000
d_j	6000	7000	9000	10000	7000	

The basic feasible solution at the conclusion of this level of iteration becomes;

$$\bar{z}^2 = (z_{11}, z_{12}, z_{13}, z_{B14}, z_{B15}, z_{21}, z_{B22}, z_{B23}, z_{24}, z_{B25}, z_{B31}, z_{32}, z_{33}, z_{B34}, z_{35})$$

The total transportation cost is

$$5000(12) + 6000(8) + 7000(10) + 9000(7) + 1000(11) + 6000(10) + 5000(13) = ₦\,377,000$$

The first derivations of the cost function k_{ij} are given as:

$$k_{11}z_{11} = 14 - 0.02z_{11}, k_{12}z_{12} = 8 - 0.08z_{12}, k_{13}z_{13} = 11 - 0.04z_{13}, k_{14}z_{14} = 12 - 0.08z_{14}, k_{15}z_{15} = 8 - 0.04z_{15},$$
$$k_{21}z_{21} = 12 - 0.06z_{21}, k_{22}z_{22} = 10 - 0.02z_{22}, k_{23}z_{23} = 7 - 0.04z_{23}, k_{24}z_{24} = 15 - 0.026z_{24}, k_{25}z_{25} = 11 - 0.06z_{25},$$
$$k_{31}z_{31} = 10 - 0.02z_{31}; k_{32}z_{32} = 9 - 0.08z_{32}, k_{33}z_{33} = 14 - 0.06z_{33}, k_{34}z_{34} = 13 - 0.04z_{34}, k_{35}z_{35} = 15 - 0.06z_{35}$$

For the occupied cells, the first derivations at $\bar{z}$ are obtained using Equation (2):

$$\frac{\partial f(\bar{z})}{\partial z_{14}} = 11.6; \frac{\partial f(\bar{z})}{\partial z_{15}} = 7.76; \frac{\partial f(\bar{z})}{\partial z_{22}} = 9.86; \frac{\partial f(\bar{z})}{\partial z_{23}} = 6.64; \frac{\partial f(\bar{z})}{\partial z_{25}} = 10.94; \frac{\partial f(\bar{z})}{\partial z_{31}} = 9.76; \frac{\partial f(\bar{z})}{\partial z_{34}} = 12.8$$

For the unoccupied cells, the integration of the first derivations of the non-basic variables $\left[\int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} \right]$ is obtained using Equation (4) as follows:

$$\frac{\partial f(\bar{z})}{\partial z_{11}} = \int_0^1 (14 - 0.02z_{11}) dz_{11} = 14z_{11} - 0.01z_{11}^2 \Big|_0^1 = 14 - 0.01 = 13.99$$

$$\frac{\partial f(\bar{z})}{\partial z_{12}} = \int_0^1 (8 - 0.08z_{12}) dz_{12} = 8z_{12} - 0.04z_{12}^2 \Big|_0^1 = 8 - 0.04 = 7.96$$

$$\frac{\partial f(\bar{z})}{\partial z_{13}} = 10.98; \frac{\partial f(\bar{z})}{\partial z_{21}} = 11.97; \frac{\partial f(\bar{z})}{\partial z_{24}} = 14.99; \frac{\partial f(\bar{z})}{\partial z_{32}} = 8.96; \frac{\partial f(\bar{z})}{\partial z_{33}} = 13.97; \frac{\partial f(\bar{z})}{\partial z_{35}} = 14.97$$

Now using Equation (5), we find

$$\frac{\partial w}{\partial z_{B_{ij}}} = \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} - t_j + r_i = 0 \Rightarrow \frac{\partial f(\bar{z})}{\partial z_{B_{ij}}} = t_j - r_i$$

Thus,

$$t_4 - r_1 = 11.6; t_5 - r_1 = 7.76; t_2 - r_2 = 9.86; t_3 - r_2 = 6.64; t_5 - r_2 = 10.94; t_1 - r_3 = 9.76;$$

$$t_4 - r_3 = 12.8$$

$r_1 = 2$ (Number of basic cells in row one) and

from the equations above; we have

$$r_1 = 2, r_2 = -1.18, r_3 = 0.8$$

$$t_1 = 10.56, t_2 = 8.68, t_3 = 5.46, t_4 = 13.6, t_5 = 9.76$$

The computation for the reduced costs of the non-basic variables is obtained via the formula in Equation (6) as;

$$\frac{\partial w}{\partial z_{ij}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - \int_{r_i}^{t_j} dz_{ij} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{ij}} dz_{ij} - t_j + r_i. \text{ That is}$$

$$\frac{\partial w}{\partial z_{11}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{11}} dz_{11} - t_1 + r_1 = 5.43; \frac{\partial w}{\partial z_{12}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{12}} dz_{12} - t_2 + r_1 = 1.28; \frac{\partial w}{\partial z_{13}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{13}} dz_{13} - t_3 + r_1 = 7.52;$$

$$\frac{\partial w}{\partial z_{21}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{21}} dz_{21} - t_1 + r_2 = 0.23; \frac{\partial w}{\partial z_{24}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{24}} dz_{24} - t_4 + r_2 = 0.21; \frac{\partial w}{\partial z_{32}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{32}} dz_{32} - t_2 + r_3 = 1.08;$$

$$\frac{\partial w}{\partial z_{33}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{33}} dz_{33} - t_3 + r_3 = 9.31; \frac{\partial w}{\partial z_{35}} = \int_0^1 \frac{\partial f(\bar{z})}{\partial z_{35}} dz_{35} - t_5 + r_3 = 6.01$$

Since all the non-basic variables of the reduced costs are positive, then the optimality point of $\bar{z}^2$ is reached.

Total cost for transportation = 5000(12) + 6000(8) + 7000(10) + 9000(7) + 1000(11) +6000(10) + 5000(13) = ₦ 377,000

Example 3 extracted from Abdul-Salam (2014) and Example 4 extracted from Opara et al. (2015) are solved via the same method as illustrated in Examples one and two, and their results are presented in Table 8, along with the results of others.

Table 8: Summary of Results for the Four Practical Examples Used

		NWCM	LCM	VAM	Proposed
Example 1	IBFS	270,000	261,000	270,000	253,000
	No. of Iteration to Optimality	Not determined	2	Not determined	1
	Optimal Solution	Did not produce Optimal	$z_{12}=13$, $z_{22}=5$, $z_{23}=8$, $z_{31}=11$, $z_{33}=4$	Did not produce Optimal	$z_{12}=13$, $z_{22}=5$, $z_{23}=8$, $z_{31}=11$, $z_{33}=4$
	Optimal Value	Not determined	253,000	Not determined	253,000
	Wolfram Mathematica Optimal Solution	$z_{12}=13, z_{22}=5, z_{23}=8, z_{31}=11, z_{33}=4$			
	Anaconda Python Optimal Solution	$z_{12}=13, z_{22}=5, z_{23}=8, z_{31}=11, z_{33}=4$			
	Optimal Value	**253,000**			

Example 2

IBFS	454,000	384,000	381,000	377,000
No. of Iteration to Optimality	5	4	2	2
Optimal Solution	z_{14}=4, z_{15}=7, z_{21}=1, z_{22}=7, z_{23}=9, z_{31}=5, z_{34}=6	z_{14}=5, z_{15}=6, z_{22}=7, z_{23}=9, z_{25}=1, z_{31}=6, z_{34}=5	z_{14}=4, z_{15}=7, z_{21}=1, z_{22}=7, z_{23}=9, z_{31}=5, z_{34}=6	z_{14}=5, z_{15}=6, z_{22}=7, z_{23}=9, z_{25}=1, z_{31}=6, z_{34}=5
Optimal Value	377,000	377,000	377,000	377,000
Wolfram Mathematica Optimal Solution	$z_{14} = 5, z_{15} = 6, z_{22} = 7, z_{23} = 9, z_{25} = 1, z_{31} = 6, z_{34} = 5$			
Anaconda Python Optimal Solution	$z_{14} = 5, z_{15} = 6, z_{22} = 7, z_{23} = 9, z_{25} = 1, z_{31} = 6, z_{34} = 5$			
Optimal Value	**377,000**			

Example 3

IBFS	420,000	264,000	236,000	236,000
No. of Iteration to Optimality	5	2	1	1
Optimal Solution	z_{12}=7, z_{13}=8, z_{21}=10, z_{22}=3, z_{24}=12, z_{31}=10	z_{12}=7, z_{13}=8, z_{21}=10, z_{22}=3, z_{24}=12, z_{31}=10	z_{12}=7, z_{13}=8, z_{21}=10, z_{22}=3, z_{24}=12, z_{31}=10	z_{12}=7, z_{13}=8, z_{21}=10, z_{22}=3, z_{24}=12, z_{31}=10
Optimal Value	236,000	236,000	236,000	236,000
Wolfram Mathematica Optimal Solution	$z_{12} = 7, z_{13} = 8, z_{21} = 10, z_{22} = 3, z_{24} = 12, z_{31} = 10$			
Anaconda Python Optimal Solution	$z_{12} = 7, z_{13} = 8, z_{21} = 10, z_{22} = 3, z_{24} = 12, z_{31} = 10$			
Optimal Value	**236,000**			

Example 4.4

IBFS	605,000	517,000	513,000	517,000
No. of Iteration to Optimality	6	2	2	2
Optimal Solution	z_{12}=8, z_{15}=5, z_{23}=12, z_{25}=4, z_{31}=9, z_{32}=2, z_{41}=1, z_{44}=14	z_{12}=8, z_{15}=5, z_{23}=12, z_{25}=4, z_{31}=9, z_{32}=2, z_{41}=1, z_{44}=14	z_{12}=4, z_{15}=9, z_{21}=4, z_{23}=12, z_{31}=5, z_{32}=6, z_{41}=1, z_{44}=14	z_{12}=8, z_{15}=5, z_{23}=12, z_{25}=4, z_{31}=9, z_{32}=2, z_{41}=1, z_{44}=14
Optimal Value	509,000	509,000	509,000	509,000
Wolfram Mathematica Optimal Solution	$z_{12} = 8, z_{15} = 5, z_{23} = 12, z_{25} = 4, z_{31} = 9, z_{32} = 2, z_{41} = 1, z_{44} = 14$			
Anaconda Python Optimal Solution	$z_{12} = 8, z_{15} = 5, z_{23} = 12, z_{25} = 4, z_{31} = 9, z_{32} = 2, z_{41} = 1, z_{44} = 14$			
Optimal Value	**509,000**			

Conclusion

The study developed an algorithm that can be used to solve transportation problem in a concave function. Four real life examples extracted from different authors of published works were employed successfully to demonstrate the effectiveness of the new approach as the results obtained are in agreement with the results obtained from using programming software packages. Comparison of the results obtained from the new approach with that of the existing algorithm showed that the new approach is more effective than the existing algorithm as it was able to solve a problem that the existing algorithm could not solve as was revealed in example one of this study, and also it is faster to optimal solution based on the number of iterations to optimality.

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THE ROLE AND SIGNIFICANCE OF NATIONAL VALUES IN ADOLESCENT EDUCATION

Abstract: *This article highlights the importance of national values and their various manifestations in the education of adolescents. At the same time, the impact of today's global processes on our spirituality is the cause of changes in national traditions and values are analyzed with concrete examples.*

Key words: *adolescent education, family, national values, upbringing, parental relations, family strength, community strength, manners.*

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Introduction

Huge changes in the life of society such as innovative processes, digital television, radio, and the position of the press are progressing day by day, and as a result, they can affect to national values, customs, and traditions. Every society is interested in the further development and value of traditions among the people.

The president of the Republic of Uzbekistan Shavkat Mirziyoev stated that "We will mobilize all the strength and capabilities of our state and society so that our young people can become independent thinkers, have high intellectual and spiritual potential, become people who are not inferior to their peers in any field on a global scale, and become happy" [1, 14] - his thoughts are giving strength to all of us in raising the young generation to become mature and perfect based on national values.

National value is manifested in an inextricable connection with the history, way of life, spirituality, and culture of the nation. The term Qadriyat is derived from the Arabic word Qadr, which means valuable, or useful. Value is a set of material, cultural and spiritual factors that serve to satisfy personal and social needs manifested in natural and social life.

In fact, it is one of the main tasks in order to educate a real person, by instilling love and respect for one's people with their values, traditions, language, and culture in the young generation based on the principles of legality.

"When we talk about value, we should understand the set of nature and society's benefits and events that serve the interests and goals of the nation, people, and social groups, which are important for people and humanity" [2, 198]. National values appear inextricably linked with the nation's history, way of life, spirituality, and culture.

If children grow up in such families, they can be passionate about beauty, mentally fresh, full-hearted, curious about life, and ready to live a calm, peaceful family life. In the East, instilling national values into the minds and hearts of children begins with the family.

Nowadays, the global process affects the spirituality of the people and causes changes in national customs and values. Values such as traditions, ceremonies and holidays, which have been formed over the centuries and are passed down from generation to generation as a priceless heritage, serve as an important factor in instilling the national idea in the minds of young people.

"Value is a concept that is used to show the universal, social-ethical, cultural-spiritual significance of certain events in reality" [3], "It is known that values are different in their nature. Natural, material, spiritual, socio-political, moral values stand out among them. Nevertheless, the highest of values is a person himself, his life, right and will, healthy and prosperous life. "Glorification of human dignity and honor is an important factor in the purification and development of our society" [4].

Our national values are the core of our spirituality, the unique achievements of our people, and their high moral qualities. As we all know, restoring and improving national values, knowing our identity, and creating a system of spiritual values are our main important task.

The system of values, which is an expression of the national values of the Uzbek people and their connection has been formed under the influence of the history of our nation, the changes of time, various social and political processes. Our national values were formed in connection with the features of origin and territorial space of the nation. The social development of the fraternal nations continued to be inextricably linked with the development of their national-territorial values.

The traditions and customs formed by the people are of historical importance, and with the passage of time, they become stable, refined and become a value for humanity. Also, the role of the family, neighborhood, village elders and elders is important in improving traditions, ceremonies and customs.

Traditions express the mentality of each nation, people, and people in the form of family joy or mourning ceremonies and celebrations. All of them focused on virtue, humanity, and goodness, and they change in form and content with the change of society and the demand of the times. Some traditions rise to the level of spiritual value. In particular, the holiday "Navruz" is one of the national and spiritual values of the people of the East [5]. So, in order for customs and traditions to reach the level of value, they must go through certain stages and take a deep place in the hearts and minds of the people.

National values ensure the well-being of our family life. It is important to instill them in the minds of children in the family, they are scientific and technical, educational, intellectual, medical service, national heritage, culture, art, literature, language, folk crafts, etc. National values are manifested in the nation's language, customs, history and other forms.

In "The Book of Perfection", "From among the infinite number of things and events that surround a person, including national spirituality, those that have special importance and value for a specific person or social group, or a specific nation, or the whole of humanity, are called values" [6]. - puts forward the opinion. National values are to live as a community in the life of our people, to be friends and good neighbors in peace and harmony, to live in close cooperation, to know the feelings of family, neighborhood, country, Motherland as sacred, to respect parents, residents of the neighborhood, and relatives, and to love the mother tongue. , to love her, to respect the elders, to respect the younger ones, to respect and value the female race, to be patient and hardworking, to be honest, to be kind and so on.

National values are divided into natural, economic, socio-political, spiritual and moral types. In particular, by teaching children in the family, national-spiritual and moral values are also inculcated. The essence and importance of each value is determined as a result of knowledge of the phenomena of nature, society and the spiritual world, scientific conclusions, influence on social and spiritual development.

Also, in the family, it is very important for parents to try to improve their speaking ability in their interactions with their children, and to explain their thoughts by giving dialogues, proverbs, proverbs, and life examples in accordance with moral standards. "Who does education?" "where is it done?" The first answer to the question: - home education. This is Mother's duty. Secondary school and madrasa education. "This is the duty of the father, teacher, mudarris and the government" [7]. Therefore, the purest feelings, the first life concepts and imaginations of a person are formed and appreciated primarily in the family through the love and sweet words of parents.

According to the results of a sociological study conducted in this direction, "Can a sudden change in values be the reason for conflict situations in families today?" 76% of the respondents answered "Yes, values are disappearing in the family nowadays", 14% answered "No values have anything to do with it", and 10% answered "Values change is a natural thing".

Therefore, it can be seen from the above results that most of the respondents understood that conflict situations in the family can lead to the loss of our national values in the era of globalization.

Also, to the question "Which values prevail in Uzbek families", 37% of respondents said "kindness", 10% "love", 5% "wealth", 15% "respect for elders", 13% "gratitude". , and 20% answered "others". So, it can be seen from the above results that the importance of kindness in Uzbek families is high.

It is understandable from the research that it is necessary to promote these values among the younger generation in order to prevent the loss of values and to maintain them at the required level. In order to inculcate national values in the minds of children, parents should responsibly promote more compassionate issues. Because the extent to which these values will be preserved in the future depends on the parents and the young generation.

Migration has a negative impact on national values in the family. Because the presence of parents

in migration can have a negative impact on all aspects of the child's education and can cause depression, which in some way affects the change in family values.

"How does the migration process affect the change of values in Uzbek families?", - 72% of the participants said, "When parents go to another country, no one takes care of their children's upbringing, and values disappear by themselves", and 16% said, "Migration has nothing to do with values", "Parents can educate their children from a distance", 12% said "I have trouble answering".

No one can take the place of parents in maintaining family values. In order to preserve such values as compassion, mercy, humanity, love, purity, and honesty in Uzbek families, it is necessary to bring teenagers to the level of modern needs, relying on innovative technologies of education. If these values are preserved in the family, children will build families based on these values in the future. The environment in the family is formed based on the relations between the family members, and the mutual relations in the family create the basis for the strengthening of national values.

Paternal love is a hereditary, spiritual value embedded in human blood, veins, and cells. A child who is raised by his father will have his place in life. The responsibility of the father is high both in raising a girl and in raising a boy.

The survey participants were asked, "What role do you think the father has in raising children?" 61% said "Parent education is very important for a child", 8% said "It doesn't matter whether the father or mother educates, the main thing is that the child should be educated", 27% said "The social adjustment of the child is easy through the father". A child who receives father's education will have his own place in life", and 4% answered that "mother cannot give education that father gives".

The importance and role of Islam in the development of our national values is very great, and it has enriched our national values. In particular, the humanistic ideas brought by Islam had a significant impact on the improvement of the spiritual values of our people. Through Islam, the system of religious values in the lives of the peoples of Central Asia was renewed, and many thinkers and encyclopedists came from our land. Also, this religion caused the creation of many architectural monuments and cities according to its creativity.

96% of respondents answered the question "How important is the role of Islamic values to resolve conflict situations in the family" and 4% said "I don't understand Islamic values". Therefore, 96% of the respondents answered that the role of Islamic values is important in resolving conflict situations. Of course, in addition to these thoughts, Islam is the most perfect religion, it relies on goodness, goodness and justice.

The participants of the survey were asked, "Do families prioritize Uzbek national values or Islamic values?" What is the difference between them?' 66% of the respondents said that "national and Islamic values are embedded in Uzbek families", 15% said that "Islamic values are superior", 12% said that "there is no difference between national and Islamic values", 7% and it can be seen that he answered "National values are superior".

So, this does not mean that the role of Islamic religious values in families is low. Because the values of Islam are mixed with our national values. There is another important thing to be taken into account, that it can be said that the specialists in the field of preparing young people for family life will achieve a positive result if they carry out their activities based on the values of the national and Islamic religion.

Therefore, the ideas and instructions of the Islamic religion, which have become our national value, are inextricably linked with the natural-historical development, social life, way of life, past, future, culture, spirituality, customs, traditions, language, region where it was created, etc. of our nation. It was manifested in various forms with our national values, in an organic relationship with each other, and formed a unique system of national values. In this system, the values that ensure the natural-historical unity - single faith, kinship, cultural-spiritual closeness, past and spiritual heritage, a feeling of the motherland, etc. are stable. Some of our Islamic values, which are part of our national values, were formed in connection with people's places of residence and living conditions.

Educating the young generation in the spirit of spiritual values, appreciating the teachings, wise words, and thoughts of scholars, learning, and applying them in life expands the youth's thoughts and outlook. Today's youth is the foundation of the future. Therefore, it is necessary to raise them as mature, perfect, patriotic children who will be selfless for the peace and development of the country.

National values are the formation of an independent thinker, morally sound, perfect person, protection of society from the influence of foreign and alien ideas, formation of high moral qualities such as patriotism, humanitarianism, respect for the law, devotion to the country, faith and honesty in the minds of multi-ethnic Uzbek people.

Conclusions

It can be concluded that in the Uzbek family, family relations are regulated on the basis of national values, therefore, every person must take this into account. Later, in order to prevent the loss of values in the family, it is necessary to understand what the foundation of the family is built on.

The following can be cited from the above analysis:
- Nowadays, family values are partially disappearing as a result of conflicts in some families. The longer the

conflict in the family continues, the more it can lead to the loss or depreciation of our national values.

- Kindness in Uzbek families shows the dominant aspect of the issue. At the same time, other types of value are mentioned, for example, "love", "wealth", "respect for elders", "gratitude" and others. So, it shows that kindness has a high place in the opinion of which values prevail in Uzbek families.

- In order to eliminate conflict situations in the family, it is necessary to mention the place of Islamic values. Because resolving conflict situations through Islamic issues is more effective.

- National and Islamic values are ingrained in Uzbek families. It was found that there is a perception that there is no difference between national and Islamic values when Islamic values prevail.

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PHILOSOPHICAL ANALYSIS OF THE PHENOMENON OF READING CULTURE

Abstract: *In this article, the author conducts a socio-philosophical study of the phenomena of the surrounding reality that have an impact on the consciousness and behavior of the individual. In particular, the structure of the philosophical category "culture of reading", its purpose, functioning, ways of influencing the spiritual and moral life of a person are analyzed. The relationship of reading culture as a philosophical concept with the real environment, society and other social phenomena has been studied. The ways of emergence of reading culture in human phylogeny and ontogenesis are considered. The importance of the role of reading culture in the evolution of modern society is indicated.*

Key words: *culture of reading, social philosophy, reading, spiritual and moral values of the individual, development of society, social phenomena.*

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Introduction

The phenomenon of reading culture is one of the main components in the upbringing of a harmonious person – a person who reflects, is spiritual and moral, thinks freely and independently, is in spiritual harmony with himself, with other people and the world around him. Conducting a socio-philosophical analysis of the phenomenon of reading culture, it is important to take into account the dialectical unity of socio-historical knowledge, presented in the form of book culture, as a link between epochs and generations, and the unique sinleness of the personality itself with its spiritual and moral basis.

It should be noted that the analysis of the study from the position of social philosophy implies the need to identify the connection, influence and impact of culture, in this case, its subsystem – the culture of reading, as a social phenomenon – on the consciousness and behavior of the individual, the formation of a spiritual and moral image, identification and determination of further strategies

in introducing the younger generation to the process of cognition in modern conditions. Along with the book, the connecting link between generations, between the triad: man – society – nature, is the phenomenon of reading itself, which, in turn, has also been modified and developed in the course of the evolution of mankind.

Reading as a socio-cultural phenomenon is a system conditioned by social influence and personal, individual characteristics of the person himself. This system includes the reader as an open and developed unit of society, the level of culture of society, the development of state institutions (library, school, other educational institutions, family, local authorities), mass media (television, Internet, verbal texts). In short, it is an information culture that closely interacts with a person and influences on him. The fundamental determinant that ensures the stability of this complex is the regeneration of various individual reader interests and needs of the young reader

(cognitive, spiritual, informational, entertainment, and so on).

The socio-historical features of its existence, including the sacred one, also promote the socio-philosophical study of the phenomenon of reading culture. Reading is a cultural process, on the one hand, and on the other hand, reading is a phenomenon that contributes to the development and enhancement of the culture of the people themselves and, accordingly, the society in which they live. Reading, being a part of the reader's culture, plays a huge role in the formation of personality, human culture, inner peace and spiritual and moral maturation. The culture of reading is a part of the general culture, which includes the worldview, intelligence, knowledge and feelings of the reader, providing a deep perception of the work. First of all, the development of a reading culture is based on an interest in reading. Reading, especially at a young age, plays a huge role in the formation of cultural values, spiritual and moral attitudes, finding oneself in this world.

In the philosophical context, the culture of reading is a characteristic and special way of forming and expanding universal cultural activity, manifested in the results of spiritual and material practice, in the structure of social norms, relations and organizations, spiritual values, in the complex of people's relations to the outside world, to others and to oneself.

The main part.

The analysis of research works shows that a large number of scientists consider the culture of reading as part of the culture of the individual or as part of the universal culture. Thus, S. Palamar presents the essence of the concept of "reading culture" as "a complex of knowledge, skills and feelings of the reader, which includes a conscious choice of reading topics, its consistency with the aim of full and deep perception and assimilation of what is read" [1, p. 412].

Since the 90s of the twentieth century, the results of many scientific studies show that today the reading priorities of high school students, college students and students have changed dramatically. The informational and entertaining functions of reading dominate over the educational, ethical and aesthetic functions. The quality of reading has also changed: thoughtful, spiritually developing reading has given way to fluent, superficial, practical and "lumpy". The increasing influence of the Internet is beginning to influence the consciousness, thinking and reading culture of modern youth more and more. [2, p.57], [3, p. 204].

The majority of respondents to social surveys emphasize the importance of using electronic resources in the process of reading, which greatly accelerates finding the necessary information than searching for a paper book in libraries and bookstores. In particular, scientists themselves began to widely use computer devices for conducting scientific work and deriving scientific results, and also began to exchange information through the Internet, which turned out to be much cheaper, faster and easier. [4, p.137]

On the one hand, the culture of reading is considered one of the components of the general human culture, on the other hand, it is an integral part of information culture, which in turn is part of universal culture. In reference books and dictionaries, information culture as a whole is described as "a complex of knowledge, skills, abilities and reflexive attitudes in interaction with the information environment" [5, p. 352.]

A number of researchers studying modern reading consider the culture of reading and reading culture as two components of the general culture as a whole. However, the role of the culture of book reading (the culture of reading textual information) is attributed to the initial and basic factor in the formation of the entire culture, confirming the fact that the information culture that appeared in the evolutionary process later book and reader culture, "absorbs" the culture of reading in a wide layer. [6, p. 155;], [7, p. 208], [8, p. 63]

The culture of reading should be understood as "an integral part of the general culture of the individual, characterizing the degree of development and realization of the essential forces of a person, his abilities and talents for mastering the cultural potential of written texts based on traditional and innovative information technologies and determining the effectiveness of socio-cultural interaction of the individual in the modern information environment" [9, p.37].

In fact, it is the culture of reading that is the potential resource and means that creates "the relationship of the growing information flow and effective work with information sources" [9, p.23]. Due to the development of the reading culture of society and in particular the "unit" of society – the individual, the development of the information space itself and the entire culture as a whole is carried out.

In the twenty-first century, the needs of readers have changed significantly. Social and economic changes around the world have significantly changed the way of life of the population. The amount of free time of young people has decreased or is not being used rationally. Due to the increase in the intensity and duration of work, reading for parents and adults has become concomitant, not requiring much effort, and for young people it is purely business or, conversely, superficial, easy – detective stories, love and entertainment novels, digest news of various sites. But it should be noted that reading activity depends not only on socio-economic, civil and political factors, but also on the individual psychological qualities of the personality itself. Social influence plays a significant role in reading activity, but the internal attitudes that

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have emerged as a result of training and upbringing, implicit theories of reading that have formed in his mind and create a positive or negative image of reading, personal representations, needs, interests of a person largely regulate the specifics of reading behavior, the choice and taste of certain literature, active inclusion in social and spiritual life of society.

According to research on the prospects of reading, 53.3% of respondents are confident that in the future television and the Internet will displace reading; 35.9% of respondents believe that over time the prestige and authority of reading will decrease; 18.4% of respondents believe that reading will be the prerogative of low-income segments of the population; 13.2% of respondents believe that everyone will read less; and only 2.3% noted that those people who have retained an interest in reading will read, regardless of external reasons and public opinion. [10, p. 41]

According to G. Palnueva, reading is a special culture-forming mechanism, a way of developing special qualities. [11, p. 223]

Reading expands the reader's life experience, pushes the boundaries of his existence, alleviates to overcome his own limitations. However, reading is different from reading. Not every reading contributes to the realization of life goals, finding the way, only conscious and voluntary reading of highly artistic literature leads to the expansion and growth of inner freedom, the disclosure and realization of hidden creative abilities. According to N. Stefanovskaya, "reading is an individual free act that does not tolerate external regulation." [12, p. 118]

Also, the main theory that creates and organizes reading behavior is educational, as a way of obtaining information and knowledge; reading, as spiritual communication, contributing to moral enrichment and finding an answer to the question of finding the meaning of life and personal development. N. A. Narochinskaya contradicts this approach: "Unfortunately, young people now draw information and vision of the world from television programs, the Internet; people's horizons are narrowing more and more, sometimes becoming childish" [13, p.195].

Recent studies show that the value status of reading has transformed in the minds of young people, which, in the context of the escalation of screen culture, began to be perceived as a relic, archaism. Culture of reading. as an appearance and phenomenon, it became endangered, which could not alarm the entire intellectual community. Our task is to develop an algorithm for overcoming negative tendencies in the decline in the level of reading culture. Reading is an act of life, and literature is one of the spiritual tools of the movement to discover oneself in the actual test of life [14, p.178].

The twenty–first century is the century when information, intellectual and human capital becomes the main foundation and platform for the development of society. The state, school, public organizations, family, parents are the main tools in the formation of culture, intelligence and morality of a developing personality. It is through books, using examples of high classical works, that teachers point out negative and positive tendencies that affect the formation of a personality. Today, young people – high school students, students, working and unemployed youth – should be ready for intensive work on themselves, be in constant creative search, be able to work and process large amounts of information, own several types of activities. [15, p. 28]

Readers' topics in the social sciences and humanities have existed since their origin: in medieval Europe - since the period of early Christians and disputes about sacred books, in Russia – since the Enlightenment of the eighteenth century, when the formation of book culture began. In Central Asia, the beginning of the appearance of the first writing, and hence reading, are the prophetic writings of Zarathustra (the inspirer of Ahura Mazda) in the Avesta in the seventh-eighth centuries BC and later, in the seventh century AD, the holy, handwritten book in Arabic - the Koran – becomes the main book for all Muslims to read.

In the development of reading culture in society, in our opinion, there is a misconception that with the advent of modern information and communication systems, in the form of radio, television, satellite communications, people's interest in the reading process has decreased. Certainly, the development of new types of media limited the field of the book sphere, but it was the mass media, which served to increase interest in the process of reading book products.

The correct perception of progressive actions, continuous self-education, the formation of a reader's culture as the basis of a spiritual and moral understanding of a young person in modern conditions of public life is an important topic of modernity.

As M. Khairullaev writes: "In the treatise "On the Virtues of Sciences and Arts", Al-Farabi emphasizes the infinity of the process of cognition of nature, understanding the course of cognition as an ascent from ignorance to knowledge, from cognition of the effect to perception of the cause.[16, p. 35]

The Prophet Muhammad also said: "The pursuit of knowledge is the duty of every Muslim and Muslim woman." [17]

Yu.Melentyeva writes that "there is a lack of deep philosophical understanding of the current situation in reading; philosophical understanding of new phenomena in the field of reading. <… >. The almost complete absence of a philosophical view of these phenomena and the philosophical basis for their understanding negatively affects scientific approaches to the study of reading in the framework of other sciences." [18, from 133]

Conclusion.

In conclusion, it should be emphasized that the socio-philosophical analysis of the culture of reading suggests considering this philosophical category from the position of "understanding the states and processes of people's life in society"[19, p. 5].

Yes, indeed, the phenomenon of reading culture is a social phenomenon. It is a product of communication, interaction and relationships of people in society. Along with, social philosophy, being an integral part of Philosophy, like no other science, having a unique integrative view of the world of being of people as a whole, is able to maximally reveal the whole multifaceted essence of the phenomenon of reading culture and its influence on the formation of spirituality, consciousness and behavior of a young person. It (social philosophy) studies not only the connections and relations of society with other areas (spheres) of real reality, for example, man and nature, but also explores the peculiarities of the manifestation of the vital activity of people themselves in this society. As a consequence, here is the object of social philosophy (society as a way and result of people interacting with each other and with the world around them) and the essence of the phenomenon of reading culture (as a result of interaction and relationships of people and a means of cognition of the world) – coincide. Other social sciences record only individual properties and aspects of social life, while social philosophy strives for a holistic comprehension of objectively true reality. "Its task, writes V. Solovyov, is not one side of the existing, but the whole existing, the whole universe in the fullness of its content and meaning; it seeks not to determine the exact boundaries and external interactions between the parts and particles of the world, but to understand their inner connection and unity". [20, p. 422]

Social philosophy "strives to give an impeccable and coherent overall picture of the holistic world of people's social life, to identify the integrative properties of various social processes." [21, p.8]. The phenomenon of reading culture is an indicator showing the level of development of a given society (for example, the level of literacy of the population) and a catalyst that spurs and accelerates the development of social processes.

It is worth mentioning that "culture, like society, is integral, that humanitarian and technological, humanitarian and natural-scientific forms of culture are interconnected, that *damage in the humanitarian field will sooner or later affect damage in mathematics and physics."* [22, p.140.] Information processes in society, the latest digital technologies, means of communication, the laws of the market economy, the commercialization of culture will inevitably lead to the deformation of spiritual and moral values in almost all layers of society, and as a result – the transformation of the general, centuries–old structure of culture itself.

Belittling the role of reading culture in any society – developed or just developing – will necessarily affect the dynamic and especially the content aspects of the development of society itself. Society is a living organism that develops dialectically according to its specific laws. The general frenzied technologization of society without "looking" into the future and taking into account the consequences can lead to irreversible and tragic events, such as, for example, the terrifying ecological state of our planet.

As R. Bradbury said, "Stuff people's heads with numbers, stuff them with harmless facts until they feel sick, nothing, but they will think that they are very educated. They will even have the impression that they are thinking, that they are moving forward, although in fact they are standing still. Moreover, people will be happy, because the "facts" with which they are stuffed are something unchangeable. However, do not give them such slippery stuff as philosophy or sociology. God forbid if they start to draw conclusions and generalizations." [23, p. 68]

Artificial intelligence, high technologies gradually, facilitating human work and sometimes completely replacing it, atrophy a person's ability to THINK, to reflect. And the day is not far off when Homo Sapiens will be replaced by a "tiktok" surrogate, "the crown of nature", "the culmination of centuries-old human evolution", "the result of natural selection", unable to remember the multiplication table without a calculator and unable to imagine his life without Google and other search engines.

Knowledge of the laws of nature, society, consciousness and personality behavior contribute to the understanding and implementation of the transition of knowledge from external, superficial to essential, deep, which in turn makes it possible to determine and regulate the mechanisms and connections of individual aspects of reality, identify tendencies and changes in the development of phenomena and processes of being. The culture of reading, as a philosophical category, as a substructure of culture and a social phenomenon that appeared as a result of society and develops this society, is not a goal, but a means to development and cognition.

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Issue   **Article**

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A MATHEMATICAL MODEL OF A MACRO-LEVEL OF AN ELECTROTHERMAL SYSTEM

Abstract: *A mathematical model of a macro-level of an electrothermal system has been obtained as part of a unified approach to development of a working mathematical model. The electrothermal system includes one or more thermistors, connected in series, with a negative temperature coefficient of resistance. The developed working mathematical model has the desired properties to a sufficient extent. The use of such a mathematical model allows expedient use of mathematical modelling capabilities, and lowers costs and time spent on studies of the electrothermal system under consideration.*

Key words: *NTC thermistor, working mathematical model, properties of mathematical models, principles of mathematical modeling.*

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МАТЕМАТИЧЕСКАЯ МОДЕЛЬ МАКРОУРОВНЯ ЭЛЕКТРОТЕПЛОВОЙ СИСТЕМЫ

Аннотация: *В рамках единого подхода к построению рабочей математической модели получена математическая модель макроуровня электротепловой системы. Электротепловая система включает один или несколько последовательно соединенных терморезисторов с отрицательным температурным коэффициентом сопротивления. Построенная математическая модель в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности. Применение такой модели сокращает затраты времени и средств на проведение исследования, позволяет рационально использовать возможности математического моделирования.*

Ключевые слова: *терморезистор с отрицательным ТКС, рабочая математическая модель, свойства математических моделей, принципы математического моделирования.*

Введение

В обширной учебной и научной литературе рассмотрены технические характеристики терморезисторов с отрицательным температурным коэффициентом сопротивления (ТКС), принципы их работы и способы расчета схем с такими терморезисторами. Примеры успешного практического использования терморезисторов с отрицательным ТКС известны в различных областях человеческой деятельности.

Целью настоящей работы является построение в рамках единого подхода рабочей математической модели макроуровня электротепловой системы. Электротепловая система включает один или несколько последовательно соединенных терморезисторов с отрицательным ТКС.

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Зависимость сопротивления R такого терморезистора от его температуры T обычно описывают выражением (см., например, [1; 2]), которое имеет вид

$$R(T) = r \exp\left[\beta\left(T^{-1} - T_0^{-1}\right)\right],$$

где r — сопротивление терморезистора при $T = T_0$; β — коэффициент, постоянный для данного экземпляра терморезистора. Однако в сравнительно узком диапазоне температур можно считать, что

$$R(T) = \frac{r}{1 + \beta(T - T_0)T_0^{-2}}.$$

Единый подход к построению рабочей математической модели, которая в достаточной мере обладает нужными свойствами применительно к конкретному исследованию, изложен в работах [3; 4]. Некоторые свойства математических моделей сформулированы, например, в [5; 6]. В работе [7] приведен пример построения математической модели, в достаточной мере обладающей нужными свойствами применительно к исследованию, некоторые результаты которого опубликованы в работах [8–10]. Особенности внедрения единого подхода к построению математических моделей рассмотрены, например, в [11; 12].

2. Постановка задачи

Рассмотрим один или несколько последовательно соединенных терморезисторов с отрицательным ТКС. Пусть T_i — температура i-го терморезистора, которая не зависит от пространственных координат, причем $T_i \le T^*$, $1 \le i \le n$. Температура T_i в начальный момент времени t_0 равна T_0. На поверхности терморезистора площадью S_i происходит конвективный теплообмен с окружающей средой, температура которой равна T_0, коэффициент теплоотдачи известен и равен α_i. Для сравнительно узкого диапазона температур от T_0 до T^* считаем, что

$$R_i(T_i) = \frac{r_i}{1 + \beta_i(T_i - T_0)T_0^{-2}},$$

$$C_i(T_i) = c_i\left[1 + \gamma_i(T_i - T_0)\right],$$

где $R_i(T_i)$ и $C_i(T_i)$ — сопротивление и полная теплоемкость i-го терморезистора; r_i и c_i — сопротивление и полная теплоемкость i-го терморезистора при $T_i = T_0$; β_i и γ_i — положительные постоянные величины. Разность электрических потенциалов на полюсах i-го элемента равна

$$U_i = \frac{r_i I}{1 + \beta_i(T_i - T_0)T_0^{-2}}, \qquad (1)$$

где I — сила постоянного электрического тока.

Пусть в рамках проводимого исследования представляет интерес разность электрических потенциалов

$$U = \sum_{i=1}^{n} U_i. \qquad (2)$$

Построим рабочую математическую модель макроуровня объекта исследования, которая в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

3. Решение задачи при $n = 1$

Пусть электротепловая система включает только один терморезистор с отрицательным ТКС, т. е. $n = 1$. Тогда для решения поставленной задачи выстроим иерархию математических моделей макроуровня данного объекта исследования и определим условия, при выполнении которых можно с относительной погрешностью не более заданного значения δ_0 найти искомую величину U_1.

Если разность $T_1 - T_0$ достаточно мала, то согласно (1) найдем искомую величину по формуле

$$U_0 = r_1 I. \qquad (3)$$

Определим условия, при которых применима полученная формула. Для этого рассмотрим установившийся процесс теплообмена. В этом случае мощность тепловыделения в материале терморезистора равна тепловому потоку, отводимому от терморезистора, т. е.

$$R_1(T_*) I^2 = \alpha_1(T_* - T_0) S_1,$$

где T_* — установившееся значение температуры терморезистора. Из полученного равенства легко найти

$$T_* = T_0 + \frac{T_0^2}{2\beta_1}\left(-1 + \sqrt{1 + \frac{4\beta_1 r_1 I^2}{\alpha_1 S_1 T_0^2}}\right),$$

а затем определить установившееся значение искомой величины

$$U_* = \frac{2 r_1 I}{1 + \sqrt{1 + 4\beta_1 r_1 I^2 \alpha_1^{-1} S_1^{-1} T_0^{-2}}}, \qquad (4)$$

причем для данного диапазона температур

$$\frac{r_1 I^2}{\alpha_1 S_1(T^* - T_0)} \le 1 + \beta_1(T^* - T_0)T_0^{-2}. \qquad (5)$$

Для относительной погрешности величины U_0 запишем

$$\delta(U_0) = \left|\frac{U_1 - U_0}{U_1}\right| = \frac{U_0}{U_1} - 1 \le \frac{U_0}{U_*} - 1.$$

При выполнении неравенства

$$\frac{U_0}{U_*} - 1 \le \delta_0$$

можно с относительной погрешностью не более δ_0 использовать формулу (3) для нахождения искомой величины. Следовательно, при выполнении неравенства

$$U_0 \le (1 + \delta_0) U_* \qquad (6)$$

математическая модель макроуровня (3) в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Затем определим условия, при которых применима математическая модель (4). Для этого рассмотрим неустановившийся процесс теплообмена. В этом случае изменение температуры терморезистора во времени t описывает обыкновенное дифференциальное уравнение первого порядка

$$C_1(T_1)\frac{dT_1}{dt} = R_1(T_1)I^2 - \alpha_1(T_1 - T_0)S_1,$$

а начальное условие имеет вид

$$T_1(t_0) = T_0.$$

Учитывая, что

$$U_1 = \frac{U_0}{1 + \beta_1(T_1 - T_0)T_0^{-2}},$$

сформулируем задачу Коши

$$\frac{c_1 r_1 I T_0^2}{\beta_1 U_1^2}\frac{dU_1}{dt} = \frac{\alpha_1 S_1 r_1 I T_0^2 - \alpha_1 S_1 U_1 T_0^2 - \beta_1 I U_1^2}{\gamma_1 r_1 I T_0^2 - \gamma_1 U_1 T_0^2 + \beta_1 U_1},$$
$$U_1(t_0) = r_1 I. \qquad (7)$$

Тогда найдем момент времени

$$t_1 = t_0 + \frac{c_1}{\alpha_1 S_1}\left[\frac{\gamma_1 T_0^2}{\beta_1}\left(\frac{U_*}{r_1 I} - 1 + \delta_0\right)\frac{r_1 I}{U_*} + \right.$$
$$+ \left(\frac{r_1 I}{2r_1 I - U_*} + \frac{\gamma_1 T_0^2}{\beta_1}\frac{r_1 I - U_*}{2r_1 I - U_*}\frac{r_1 I}{U_*} - 1\right) \times$$
$$\times \ln\left(2 - \frac{U_*}{r_1 I} - \delta_0\right) - \left(\frac{r_1 I}{2r_1 I - U_*} + \right.$$
$$\left. \left. + \frac{\gamma_1 T_0^2}{\beta_1}\frac{r_1 I - U_*}{2r_1 I - U_*}\frac{r_1 I}{U_*}\right)\ln\left(\frac{r_1 I}{r_1 I - U_*}\delta_0\right)\right],$$

для которого

$$U_1(t_1) = \frac{U_*}{1 - \delta_0}.$$

Очевидно, что при $t \ge t_1$

$$\delta(U_*) = \left|\frac{U_1 - U_*}{U_1}\right| = 1 - \frac{U_*}{U_1} \le \delta_0,$$

а значение U_* можно с относительной погрешностью не более δ_0 считать равным $U_1(t)$. Следовательно, можно с относительной погрешностью не более δ_0 использовать формулу (4) для нахождения искомой величины. Это

позволяет сформулировать следующее утверждение об использовании математической модели (4).

Утверждение 1. Если не выполнено условие (6), то математическая модель макроуровня (4) при $t \ge t_1$ в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Разработка новой математической модели при формировании иерархии математических моделей объекта исследования может привести к уточнению найденных ранее условий применимости построенных математических моделей. Действительно, используя математическую модель (7), можно уточнить условие применимости формулы (3). Для этого найдем момент времени

$$t_1^* = t_0 + \frac{c_1}{\alpha_1 S_1}\left[\left(\frac{\gamma_1 T_0^2}{\beta_1}\frac{r_1 I - U_*}{2r_1 I - U_*}\frac{r_1 I}{U_*} + \right.\right.$$
$$+ \frac{r_1 I}{2r_1 I - U_*} - 1\right)\ln\left(1 + \frac{U_*}{r_1 I}\delta_0\right) -$$
$$- \frac{\gamma_1 T_0^2}{\beta_1}\delta_0 - \left(\frac{\gamma_1 T_0^2}{\beta_1}\frac{r_1 I - U_*}{2r_1 I - U_*}\frac{r_1 I}{U_*} + \right.$$
$$\left.\left. + \frac{r_1 I}{2r_1 I - U_*}\right)\ln\left(1 - \frac{U_*}{r_1 I - U_*}\delta_0\right)\right],$$

для которого

$$U_1(t_1^*) = \frac{U_0}{1 + \delta_0}.$$

Очевидно, что при $t \le t_1^*$

$$\delta(U_0) = \left|\frac{U_1 - U_0}{U_1}\right| = \frac{U_0}{U_1} - 1 \le \delta_0,$$

а значение U_0 можно с относительной погрешностью не более δ_0 считать равным $U_1(t)$. Следовательно, можно с относительной погрешностью не более δ_0 использовать формулу (3) для нахождения искомой величины. Это позволяет сформулировать утверждение об использовании математической модели (3).

Утверждение 2. Если выполнено условие (6) или $t \le t_1^*$, то математическая модель макроуровня (3) в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Тогда применительно к построенной иерархии математических моделей данного объекта исследования справедливо следующее утверждение об использовании математической модели (7).

Утверждение 3. Если не выполнено условие (6), то математическая модель макроуровня (7) при $t_1^* < t < t_1$ в достаточной мере обладает

свойствами полноты, адекватности, продуктивности и экономичности.

4. Решение задачи при $n \geq 1$

Пусть электротепловая система включает один или несколько последовательно соединенных терморезисторов с отрицательным ТКС. Для решения поставленной задачи используем полученные результаты при $n = 1$. Они позволяют легко построить иерархию математических моделей макроуровня объекта исследования и определить условия, при выполнении которых можно с относительной погрешностью не более заданного значения δ_0 найти искомую величину U.

Если разности

$$T_1 - T_0, \ldots, T_n - T_0$$

достаточно малы, то согласно (1) найдем искомую величину по формуле

$$U_0 = \sum_{i=1}^{n} r_i I. \qquad (8)$$

Определим условия, при которых применима полученная формула. Для этого рассмотрим установившийся процесс теплообмена. В этом случае согласно (4) и (5) установившееся значение величины U_i найдем по формуле

$$U_i^* = \frac{2r_i I}{1 + \sqrt{1 + 4\beta_i r_i I^2 \alpha_i^{-1} S_i^{-1} T_0^{-2}}},$$

причем для данного диапазона температур

$$\frac{r_i I^2}{\alpha_i S_i (T^* - T_0)} \leq 1 + \beta_i (T^* - T_0) T_0^{-2}. \qquad (9)$$

Тогда установившееся значение искомой величины равно

$$U_* = \sum_{i=1}^{n} U_i^*. \qquad (10)$$

Для относительной погрешности величины U_0 запишем

$$\delta(U_0) = \left| \frac{U - U_0}{U} \right| = \frac{U_0}{U} - 1 \leq \frac{U_0}{U_*} - 1.$$

При выполнении неравенства

$$\frac{U_0}{U_*} - 1 \leq \delta_0$$

можно с относительной погрешностью не более δ_0 использовать формулу (8) для нахождения искомой величины. Следовательно, при выполнении неравенства

$$U_0 \leq (1 + \delta_0) U_* \qquad (11)$$

математическая модель макроуровня (8) в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Затем определим условия, при которых применима математическая модель (10). Для этого рассмотрим неустановившийся процесс

теплообмена. Тогда согласно (7) приходим к задаче Коши

$$\frac{c_i r_i I T_0^2}{\beta_i U_i^2} \frac{dU_i}{dt} = \frac{\alpha_i S_i r_i I T_0^2 - \alpha_i S_i U_i T_0^2 - \beta_i I U_i^2}{\gamma_i r_i I T_0^2 - \gamma_i U_i T_0^2 + \beta_i U_i},$$

$$U_i(t_0) = r_i I, \qquad (12)$$

где $1 \leq i \leq n$, и найдем момент времени

$$t_i = t_0 + \frac{c_i}{\alpha_i S_i} \left[\frac{\gamma_i T_0^2}{\beta_i} \left(\frac{U_i^*}{r_i I} - 1 + \delta_0 \right) \frac{r_i I}{U_i^*} + \right.$$

$$+ \left(\frac{r_i I}{2r_i I - U_i^*} + \frac{\gamma_i T_0^2}{\beta_i} \frac{r_i I - U_i^*}{2r_i I - U_i^*} \frac{r_i I}{U_i^*} - 1 \right) \times$$

$$\times \ln \left(2 - \frac{U_i^*}{r_i I} - \delta_0 \right) - \left(\frac{r_i I}{2r_i I - U_i^*} + \right.$$

$$\left. + \frac{\gamma_i T_0^2}{\beta_i} \frac{r_i I - U_i^*}{2r_i I - U_i^*} \frac{r_i I}{U_i^*} \right) \ln \left(\frac{r_i I}{r_i I - U_i^*} \delta_0 \right) \right],$$

для которого

$$U_i(t_i) = \frac{U_i^*}{1 - \delta_0}.$$

Очевидно, что при $t \geq t_i$

$$\delta(U_i^*) = \left| \frac{U_i - U_i^*}{U_i} \right| = 1 - \frac{U_i^*}{U_i} \leq \delta_0,$$

а значение U_i^* можно с относительной погрешностью не более δ_0 считать равным $U_i(t)$. Пусть $t_* = \max_{1 \leq i \leq n} t_i$, тогда легко показать, что при $t \geq t_*$

$$\delta(U_*) = \left| \frac{U - U_*}{U} \right| = \frac{\sum_{i=1}^{n} (U_i - U_i^*)}{\sum_{i=1}^{n} U_i} \leq \delta_0.$$

Следовательно, можно с относительной погрешностью не более δ_0 использовать формулу (10) для нахождения искомой величины. Это позволяет сформулировать следующее утверждение об использовании математической модели (10).

Утверждение 4. Если не выполнено условие (11), то математическая модель макроуровня (10) при $t \geq t_*$ в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Уточним условие применимости формулы (8), используя математическую модель (2), (12). Для этого найдем момент времени

$$t_i^* = t_0 + \frac{c_i}{\alpha_i S_i} \left[\left(\frac{\gamma_i T_0^2}{\beta_i} \frac{r_i I - U_i^*}{2r_i I - U_i^*} \frac{r_i I}{U_i^*} + \right. \right.$$

$$+ \frac{r_i I}{2r_i I - U_i^*} - 1 \right) \ln \left(1 + \frac{U_i^*}{r_i I} \delta_0 \right) -$$

$$-\frac{\gamma_i T_0^2}{\beta_i}\delta_0 - \left(\frac{\gamma_i T_0^2}{\beta_i}\frac{r_i I - U_i^*}{2r_i I - U_i^*}\frac{r_i I}{U_i^*}+\right.$$
$$\left.+\frac{r_i I}{2r_i I - U_i^*}\right)\ln\left(1-\frac{U_i^*}{r_i I - U_i^*}\delta_0\right)\Bigg],$$

для которого

$$U_i\left(t_i^*\right)=\frac{r_i I}{1+\delta_0}.$$

Очевидно, что при $t \leq t_i^*$

$$\delta\left(r_i I\right)=\left|\frac{U_i - r_i I}{U_i}\right|=\frac{r_i I}{U_i}-1\leq\delta_0,$$

а значение $r_i I$ можно с относительной погрешностью не более δ_0 считать равным $U_i\left(t\right)$. Пусть $t^* = \min\limits_{1\leq i\leq n} t_i^*$, тогда легко показать, что при $t \leq t^*$

$$\delta\left(U_0\right)=\left|\frac{U - U_0}{U}\right|=\frac{\sum\limits_{i=1}^{n}\left(r_i I - U_i\right)}{\sum\limits_{i=1}^{n}U_i}\leq\delta_0.$$

Следовательно, можно с относительной погрешностью не более δ_0 использовать формулу (8) для нахождения искомой величины. Это позволяет сформулировать утверждение об использовании математической модели (8).

Утверждение 5. Если выполнено условие (11) или $t \leq t^*$, то математическая модель макроуровня (8) в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Тогда применительно к построенной иерархии математических моделей данного объекта исследования справедливо следующее утверждение об использовании математической модели (2), (12).

Утверждение 6. Если не выполнено условие (11), то математическая модель макроуровня (2), (12) при $t^* < t < t_*$ в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

5. Результаты

При выполнении неравенства (9) из сформулированных утверждений вытекают три следствия, которые позволяют выявить рабочую математическую модель макроуровня объекта исследования.

Следствие 1. Если выполнено условие (11) или в рамках проводимого исследования $t \leq t^*$, то математическую модель макроуровня (8) считаем рабочей.

Следствие 2. Если не выполнено условие (11), то математическую модель макроуровня (10) при $t \geq t_*$ выбираем как рабочую.

Следствие 3. Если не выполнено условие (11), то математическую модель макроуровня (2), (12) при $t^* < t < t_*$ считаем рабочей.

6. Заключение

Таким образом, в рамках единого подхода сформулированы применительно к данному исследованию утверждения. Они позволяют установить рабочую математическую модель макроуровня рассматриваемой электротепловой системы. Построенная математическая модель в достаточной мере обладает свойствами полноты, адекватности, продуктивности и экономичности.

Очевидно, что применение такой математической модели не только сокращает затраты времени и средств на проведение исследования, но и позволяет рационально использовать возможности математического моделирования.

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Issue   Article

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UBAYDULLAH IBN MAS'UD BUKHARY'S CONTRIBUTION TO THE SCIENCE OF FIQH

Abstract: This article is about the contribution of Ubaidullah ibn Mas'ud Bukhari to the science of jurisprudence and his special abilities and talents in jurisprudence, which differ from other scholars of jurisprudence, as well as the importance of his scientific works, especially in jurisprudence, in relation to other works of jurisprudence. jazziness, that is, ease of understanding and memorization, was made the main topic. It contains information about the fact that Allama was born in the family of a prominent and famous jurist, and that Allama was influenced by his teachers and the city of Bukhara to become so perfect in fiqh.

Key words: Ubaidullah ibn Mas'ud Bukhari, jurisprudence, Tajush-Sharia, Sodrush-Sharia, Kirman, Sherabod, Sharhul Wiqaya, Hidaya, Mukhtasar ul Wiqaya, Nuqaya.

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Introduction

By the 9th-12th centuries, Mawaraunnahr cities reached the highest levels of their development in all spheres. In the sources, it was also recognized as "Renaissance". Most of the rare sources that show that Islam is a high doctrine were also created in these centuries.

However, at the beginning of the 13th century, the Mongols occupied all of Mawaraunnahr. Due to the burning of the city, the opening of river basins, the flooding of residential areas, the execution of scientists, the deportation of artisans to distant Mongolia as a labor force, and the forced recruitment of people fit for war into the ranks of their armies, the region led to a sharp decrease in the population. This situation is caused by the shortage of sciences that are the basis of social development in the region and of jurisprudence works that set the daily life of the population to certain standards. Among the Islamic sciences, jurisprudence was the factor that regulated these matters, prevented social conflicts among the population and prevented economic stratification. Therefore, the attention of the population to this field has increased.

However, the intellectuals of the people, that is, scholars and scholars, and their works were damaged by the Mongol invasion, and the common people could not read them. The daily life of that time began to feel the need for scholars of jurisprudence who applied miracles in this field. After all, the consequences of the Mughal invasion and the tax-paying common people began to demand rare works of jurisprudence that could be read with less time.

Mawaraunnahr, which has been a center of knowledge and enlightenment since ancient times, has begun to restore its potential. Ubaidullah ibn Mas'ud Bukhari was one of the encyclopedic scholars with such a high scientific potential.

It is no exaggeration to say that this person made an indescribable contribution to the field of jurisprudence for his time. Imam received from his grandfather Mahmud bin Sadrush-shari'a, Imam Tajush-shari'a. Sadrush received Sharia from his father, his father was also nicknamed Sadrush Sharia, and he also received knowledge from his father, Jamaluddin al-Mahbubi. This one was received from Sheikhul-Imam Mufti Imamzada, who received it from a teacher named Imaduddin, who received it

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from his father Shamsul-Aimma az-Zarnujari, who received it from al-Sarakhsi, from Imam al-Sarakhsi al-Hilwani, and he from the father of Ali of Nasaf. This breed received it from Muhammad ibn Fazl, and he received it from al-Subazmuni, and he received it from Abu Abdullah ibn Abu Hafs al-Kabir [3, p.176].

Ubaidullah ibn Mas'ud gathered the scientific works left by his ancestors and collected elegant monuments, and later shortened the work written by his grandfather and made it concise. The chain of study of jurisprudence of this generation goes back to the famous Bukhara jurist Abu Abdullah ibn Abu Hafs Kabir [2, p.200].

His full name is Ubaydullah Sodrush shari'a al-Asghar ibn Mas'ud ibn Tajush shari'a Makh-mud ibn Sodrush shari'a Ahmad ibn Jamaluddin Ubai¬dullah al-Mahbubi al-Bukhari. Direct rational assessment of this scholar is definitely related to the science of jurisprudence. In particular, regarding the definition of the science of Fiqh.

The word "fiqh" in the dictionary means detailed understanding, that is, understanding something to its subtle parts. In the term of Shariat, "Fiqh is said to be used to derive legal rulings from Shariah evidence."

When we say "shar'i evidence" in this definition, we mainly mean the Holy Qur'an and the Sunnah of our Prophet Muhammad, may God bless him and grant him peace.

"Far'i rulings" means the opposite of the original, that is, shahabcha, of minor importance. In the Sharia, it is the rulings that include prayers and treatment. Also, our Prophet, may God's prayers and peace be upon him, highly valued being a jurist in religion in his hadith.

عَنْ مُعاوِيَةَ رَضِيَ الله عَنْهُ عَنِ النَّبِيِّ صَلَّى اللهُ عَلَيْهِ وَسَلَّمَ قَالَ: مَنْ يُرِدِ الله بِهِ خَيْرًا يُفَقِّهْهُ ففي الدِيْن. رَوَاهُ الأَرْبَعَةِ

It is narrated from Muawiya, may Allah be pleased with him:

"The Prophet, peace be upon him:

They said: "Whoever Allah wills good, He makes him a jurist in religion."

Four of them narrated.

Derived from the word "Fiqh", the science that ensures the understanding of the rulings of Sharia to the smallest detail is also called "Fiqh". A person with such scientific qualifications is called a "faqih". From the above definitions and hadiths, it is clear that a person who is a jurist in religion is a very deep and broad person against the world. It is known that his contribution to the social relations and economic affairs of the people of his time and today is incomparable. At the same time, he is serving the Islamic sciences [12, p.50] with his works that provide solutions to scientific debates and problematic questions of his time and even today.

There is not much information about Alloma's life compared to his scientific work. The reason for this is the political and social disunity of the Chigatai tribe at that time, as well as some historical reasons.

One word can be said about this, as a means of the scholar's scientific creativity and written works: His grandfather, Imam Tajush Sharia Mahmud bin Sodrush, became a famous scholar as a result of Sharia education. The dangerous situation prevailing in Bukhara at that time forced the family of Sodrush Sharia to move to the direction of Khurasan, that is, to the city of Kirman. Ubaidullah ibn Mas'ud continued his education there under the hands of his grandfathers.

According to sources, his grandfather died in the city of Kirman. Later, he left Kirman and came to Herat, one of the major centers of Khorasan at that time, and continued his scientific activities there. His heart always wanted to return to his motherland, Bukhara.

Imam Sodrush Shariah Ubaydullah ibn Mas'ud al-Bukhari was born in the city of Bukhara, in a family that was a source of knowledge and education, and raised mature jurisprudents in its bosom. The reason is: Ubaidullah ibn Mas'ud's lineage goes back to the great companion Ubadah ibn Somit, may God bless him and grant him peace.

It is for this reason that he is given the ratio of "Ubadi". According to the famous Indian scholar Abdulhay Laknavi about the lineage of Ubaydullah ibn Mas'ud, Sayyid Ahmad-at-Tahawi's student al-Mawla Abdulmo'min ad-Dimyoti "Taoliqu-l-anwar ala durri-l-mukhtar" ("Durru-l-mukhtar" in his work entitled "bright borders to his book"), he attributes his lineage to the companion Ubada ibn al-Samit. Among other things, he writes as follows: "In the series of our teacher Syed Murtaza Husayn" I saw that Sadrush Sharia's surname is mentioned as follows: Ubaidullah ibn Masud ibn Tajush Sharia Mahmud ibn Sadrush Sharia Ahmad ibn Jamaluddin Abdulmakarim Ubaidullah ibn Ibrahim ibn Ahmad ibn Abdulmalik. Umar ibn Abdullahziz ibn Muhammad ibn Mahbub ibn al-Walid ibn Ubada ibn as-Samit al-Ansari al-Mahbubi is. Also, our teacher said that he saw his surname in "History of Bukhara". [1, p.197] The ratio of "beloved" also goes back to one of his grandfathers.

Ubaidullah ibn Mas'ud, known by the nickname of Sadru-sh-Sharia, is considered the shining star of Hanafi jurisprudence. His grandfather was Mahmud ibn Sadru-sh-shari'a, who became famous by the nickname of Taju-sh-shari'a. We know that in some sources "Sodrush-shari'a al Asghar" comes with the nickname "Little Sodrush-shari'a".

The nickname of that person's great-grandfathers is Sodrush-Shariya because of their lineage. For this reason, the great grandfather was called "Sodrush-shari'a al Akbar" - "Big Sodrush-shariy'a", and the grandson was called "Sodrush-shariy'a al Asghar" - "Little Sodrush-shariy'a".

In some sources, the two are also distinguished as "Sodrush-shari'a the first" and "Sodrush-shari'a the second". But the nickname Sodrush-shari'a was

mainly used in relation to Ubaydullah ibn Mas'ud al-Bukhari, may God bless him and grant him peace.

He matured under the upbringing of his grandfather, mastered Eastern philosophy, theology and natural sciences, became known as a great scholar in jurisprudence, and became one of the famous and prolific scholars of the Hanafi School [11, p.5].

In terms of the chain of teachers of Imam Sadrush Sharia, Ubaydullah ibn Mas'ud Bukhari reaches Abu Hanifa, may God bless him and grant him peace. In the following order:

1. Grandfather Tajush shariya Mahmud ibn Sodrush-shariya.
2. Great-grandfather Ahmad ibn Jamaluddin.
3. Jamaluddin Ubaidullah al Mahbubi.
4. Sheikh Imam Mufti Imamzadeh.
5. Sheikh Imoduddin.
6. Shamsul Aimma Zaranjari.
7. Imam Sarakhsi.
8. Imam Halvani.
9. Abu Ali Nasafi.
10. Imam Mahmud ibn Fazl.
11. Imam Subazmuni.
12. Abdullah bin Abu Hafs Kabir.
13. Imam Muhammad ibn Hasan Shaibani.
14. Imam Abu Hanifa.

It can be seen from the series of teachers that Imam Sodrush-Shariya was one of the prominent scholars of Ubaydullah ibn Mas'ud al-Bukhari's era, especially usul fiqh, furu'ul fiqh, khilaf, jadal, hadith, nahw, lug. Those who were leaders in such sciences as horse, literature, science of speech, logic.

Imam Sodrush-Sharia Ubaydullah ibn Mas'ud al-Bukhari authored several books. They are as follows:

1. "Al-Vishah".
2. "Ta'dilul Ulum".
3. "Sharhul Viqaya".
4. "Al Muqaddimotul Arba'a".
5. "Ash-Shurut wal Mahozir".
6. "At-Tanqih".
7. "At-Tawziyh".

Imam Ubaydullah ibn Mas'ud is one of the famous usul al-fiqh scholars of the Hanafi school. The books of this imam called "At-Tanqih" are among the most respected books in the field of usul al-fiqh. As soon as Imam ibn Mas'ud started writing these books, his friends and brothers copied from his manuscript one after another.

As a result, the work was distributed before it was completed. Some mistakes were made in the transfer. When Imam ibn Mas'ud became aware of this, he wrote a commentary on "At-Tanqih" entitled "At-Tawziyh fiy halli ghawamiz at-Tanqih". This book is an important work written by combining the Shafi'i and Hanafi directions in the science of Usul, and it has been commented by major scholars.

8. "Summary of the incident".

The work "Mukhtasar al-Wiqaya" which is famous in the science of fiqh [10, p.4537] and is currently taught as a textbook in madrasahs is one of the second most famous titles of your work "Nuqaya Mukhtasari Wiqaya". Now we will dwell on this a little information. He commented on "Wiqayatu-r-Rivaya" written by his grandfather in Arabic and called it "Sharhu-l-Wikaya".

This book is the best and most comprehensive review. After that, realizing that some students are not able to master the book "Wiqayatu-r-Rivaya", he selected the most necessary issues from it and made it "An-Nuqaya" ("Brief description") or "Mukhtasaru-l-Wikaya". he called.

In the introduction to the work, the author himself writes about this:

"My grandfather Mahmud ibn Sadru-sh-shari'a compiled the book "Wiqayatu-r-riwaya fi masoili-l-Hidaya" so that I could learn the science of jurisprudence well. The people of the time have not seen another book with such wonderful words, clear and complete content as this book. I realized that some of the students are not able to study and master this book, so I selected the necessary issues and published this "Abridged Book". Anyone who wants to study and memorize the issues mentioned in Al-Hidaya, should try to study the book "Wiqaya" (the book authored by my grandfather). A person who is in a hurry and has little time should try to study this "Mukhtasar" ("Mukhtasaru-l-viqaya") that I have written.

Also, the works entitled "Al-Muqaddimotu-l-arba'a" ("The Four Introductions"), "Ta'diylu-l-ulum wa-sh-shurut..." have gained great attention and fame. came

According to the information given by Zarkali, the book entitled "Al-Vishah" ("Neck Ornament") in the field of "Ma'ani" (Relating to Literature) belongs to his pen [1, p.197].

The famous Indian scientist Abdulhai Laknavi, the author of "Mukhtasaru-l-Wiqaya" called Ubaydullah Ibn Mas'ud "the Imam accepted by all, the guardian of Sharia laws, the teacher and reducer of the original and Far'i (physical) problems, the intellectual and the transferable) scientist, jurist, scholar of fiqh methods, logician, muhaddis (hadith scholar), commentator, linguist, writer, mutakallim, possessor of great dignity and high status, overflowing with knowledge and manners, majd "He was the one who inherited the dignity from his ancestors" [3, p. 11].

Sadru-sh-shari'a second Ubaydullah ibn Mas'ud died in 1346. It is a place near Sherabad, Bukhara city, where almost all his relatives are buried.

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REFERENCE DATA OF PRESSURE DISTRIBUTION ON THE SURFACES OF AIRFOILS HAVING THE NAMES BEGINNING WITH THE LETTER P

Abstract: *The results of the computer calculation of air flow around the airfoils having the names beginning with the letter P are presented in the article. The contours of pressure distribution on the surfaces of the airfoils at angles of attack of 0, 15 and -15 degrees in conditions of the subsonic airplane flight speed were obtained.*
Key words: *airfoil, angle of attack, pressure, surface.*
Language: *English*
Citation: Chemezov, D., et al. (2023). Reference data of pressure distribution on the surfaces of airfoils having the names beginning with the letter P. *ISJ Theoretical & Applied Science, 02 (118),* 48-61.
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Scopus ASCC: 1507.

Introduction

Creating reference materials that determine the most accurate pressure distribution on the airfoil surfaces is an actual task of the airplane aerodynamics.

Materials and methods

The study of air flow around the airfoils was carried out in a two-dimensional formulation by means of the computer calculation in the *Comsol Multiphysics* program. The airfoils in the cross section were taken as objects of research [1-32]. In this work,
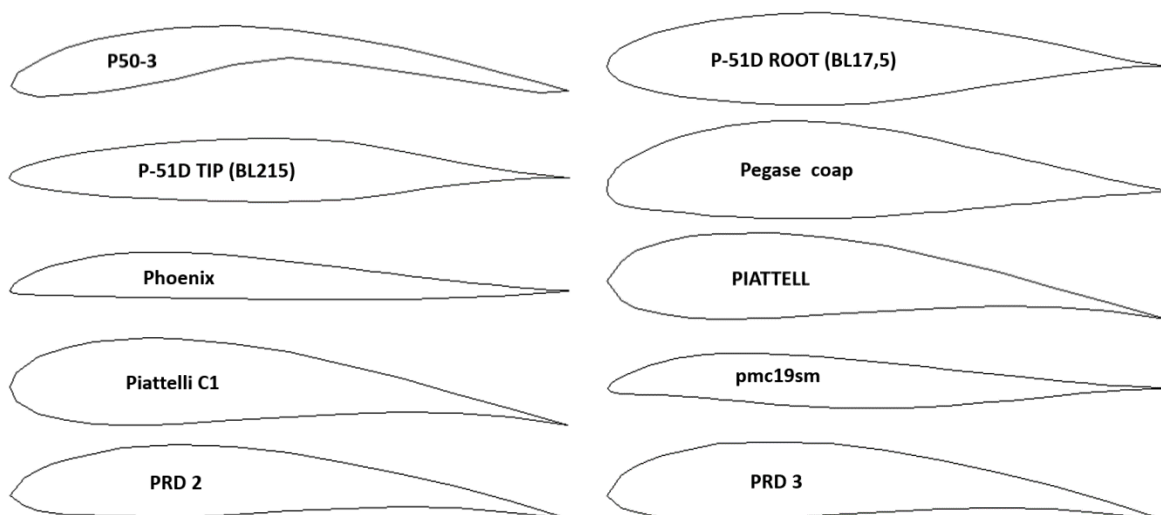
the airfoils having the names beginning with the letter *P* were adopted. Air flow around the airfoils was carried out at angles of attack (α) of 0, 15 and -15 degrees. Flight speed of the airplane in each case was subsonic. The airplane flight in the atmosphere was carried out under normal weather conditions. The geometric characteristics of the studied airfoils are presented in the Table 1. The geometric shapes of the airfoils in the cross section are presented in the Table 2.

Table 1. The geometric characteristics of the airfoils.

Airfoil name	Max. thickness	Max. camber	Leading edge radius	Trailing edge thickness
P50-3	9.7% at 20.0% of the chord	9.5% at 50.0% of the chord	1.1731%	0.0%
P-51D ROOT (BL17,5)	16.52% at 38.9% of the chord	1.26% at 68.3% of the chord	1.6258%	0.0%
P-51D TIP (BL215)	11.42% at 46.3% of the chord	1.3% at 46.3% of the chord	0.4064%	0.0%
Pegase coap	17.36% at 34.3% of the chord	3.65% at 31.1% of the chord	2.8912%	0.268%
Phoenix	8.19% at 27.5% of the chord	2.78% at 25.0% of the chord	0.3739%	0.252%
PIATTELL	15.21% at 20.0% of the chord	7.82% at 30.0% of the chord	2.672%	0.0%
Piattelli C1	15.47% at 25.0% of the chord	7.82% at 30.0% of the chord	2.8693%	0.0%
pmc19sm	9.19% at 34.2% of the chord	2.12% at 17.5% of the chord	0.5464%	0.198%
PRD 2	12.97% at 30.0% of the chord	6.73% at 40.0% of the chord	1.805%	0.0%
PRD 3	13.63% at 30.0% of the chord	7.2% at 40.0% of the chord	2.0895%	0.0%
PRD 4	12.48% at 30.0% of the chord	6.24% at 30.0% of the chord	1.2478%	0.0%
Profil 374 Dicke 10,92%	10.9% at 36.2% of the chord	2.23% at 41.3% of the chord	0.6706%	0.0%
Profil 387 Dicke 9,06%	9.03% at 28.9% of the chord	3.79% at 39.3% of the chord	0.6641%	0.0%
PROFILE12A 9,00%	8.99% at 34.4% of the chord	1.8% at 34.4% of the chord	0.5536%	0.0%
PROPFAN CRUISE MISSILE WING	8.19% at 40.0% of the chord	1.33% at 50.0% of the chord	0.3085%	0.261%
PSU 90-1	12.53% at 34.1% of the chord	2.43% at 49.5% of the chord	0.9386%	0.0%
PSU-90-125WL	12.53% at 34.1% of the chord	2.43% at 49.5% of the chord	0.9386%	0.0%
PT40	11.59% at 27.1% of the chord	2.88% at 41.6% of the chord	3.7397%	0.2704%
PWINGLET	12.58% at 34.2% of the chord	2.44% at 49.7% of the chord	1.1175%	0.044%

Note:
Piattelli C1 (F. Piattelli (Italy));
PRD 2, PRD 3, PRD 4 (G. Dorio (Italy)).

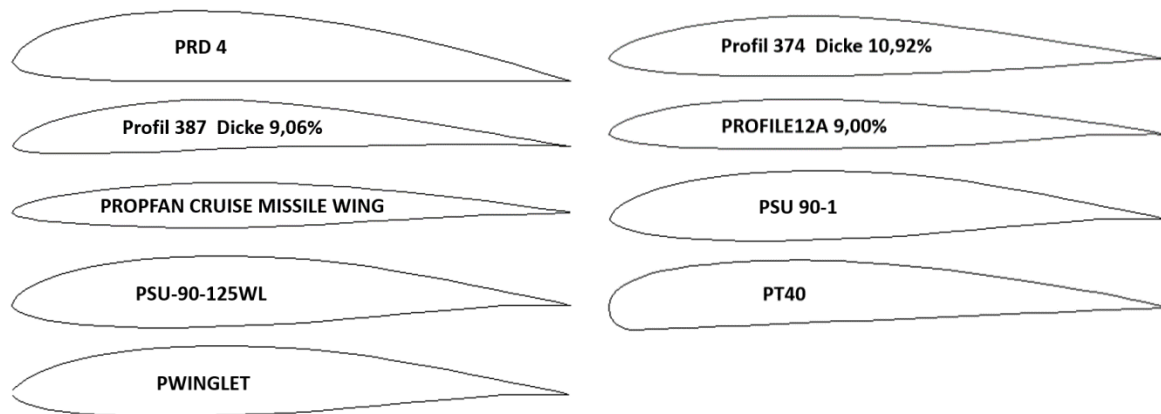**Table 2. The geometric shapes of the airfoils in the cross section.**

PRD 4

Profil 374 Dicke 10,92%

Profil 387 Dicke 9,06%

PROFILE12A 9,00%

PROPFAN CRUISE MISSILE WING

PSU 90-1

PSU-90-125WL

PT40

PWINGLET

Results and discussion

The calculated pressure contours on the surfaces of the airfoils at different angles of attack are presented in the Figs. 1-19. The calculated values on the scale can be represented as the basic values when comparing the pressure drop under conditions of changing the angle of attack of the airfoils.

19 airfoils of various configurations were considered. A common characteristic of all airfoils was that they were asymmetrical.

It can also be noted that the maximum thickness of the airfoil was determined for Pegase coap, and the minimum thickness was determined for Phoenix and PROPFAN CRUISE MISSILE WING. At the same time, it should be noted that the greatest thickness values were determined up to the middle of the length of the airfoil in the cross section from the leading edge.

The maximum and minimum camber values of the airfoils are 9.5% and 1.26% for P50-3 and P-51D ROOT (BL17,5), respectively.

The largest and smallest leading edge radii of 3.7397% and 0.3085% were also determined for the PT40 and PROPFAN CRUISE MISSILE WING airfoils, respectively.

The trailing edge thickness for most of the considered airfoils is 0.0%. The maximum trailing edge thickness was determined for the PT40 airfoil.

Applying the geometric characteristics of the airfoils analyzed above, we will compare the results of computer calculations to determine the aerodynamic characteristics of the wings in conditions of horizontal flight and maneuvers of the airplane.

High drag values reduce the aerodynamic characteristics of the airplane wing. Therefore, it is necessary to analyze the maximum and minimum calculated values of pressures on the leading edge of the airfoils exposed to intense air flows at angles of attack of 0, 15 and -15 degrees.

Pressure in a small range from 6.43 to 6.6 kPa is created on the leading edge of the airfoils during horizontal flight. At the same time, the most favorable flight conditions were determined for the Phoenix airfoil.

During the airplane climb, large negative pressures act on the upper part of the leading edge of the airfoils. The pressure value varies in the range from -15.3 to -79.1 kPa. The higher pressure values act on the leading edge of thin and medium-thick airfoils. However, the PROPFAN CRUISE MISSILE WING airfoil demonstrates good aerodynamic characteristics during the airplane climb. This airfoil is an exception to the above conclusion. Maximum design pressure is subjected to the PROFILE12A 9,00% airfoil.

Large negative pressures act on the lower part of the leading edge of the airfoils during the airplane descent. The pressure value varies in the range from -9.62 to -64.4 kPa. Thus, it can be concluded that during the airplane descent, the wings are subjected to pressure on average 38% less than during climb. The Profil 387 Dicke 9,06% airfoil demonstrates good aerodynamic characteristics during the airplane descent. The maximum design pressure is subjected to the PWINGLET airfoil.

Based on the analysis carried out, it is possible to draw a conclusion on this chapter. The medium-thick and small values of the radii of the airfoils, such as PROPFAN CRUISE MISSILE WING and Profil 387 Dicke 9,06%, contribute to the reduction of drag.
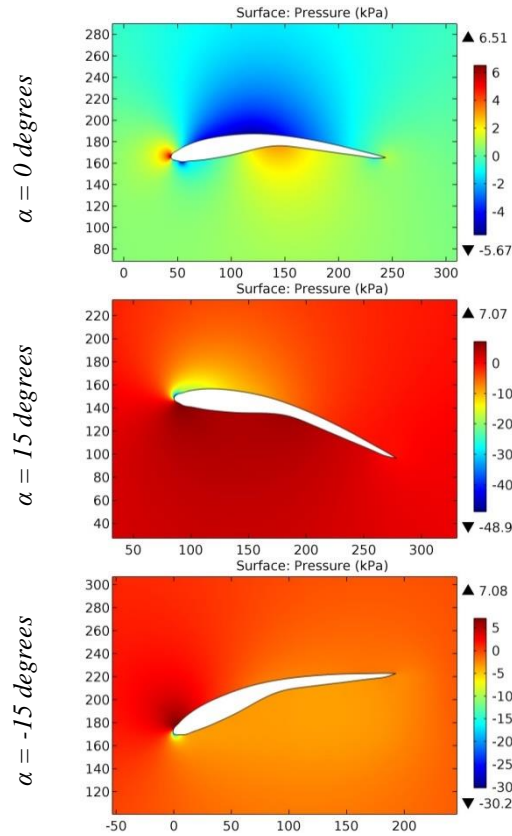
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Figure 1. The pressure contours on the surfaces of the P50-3 airfoil.
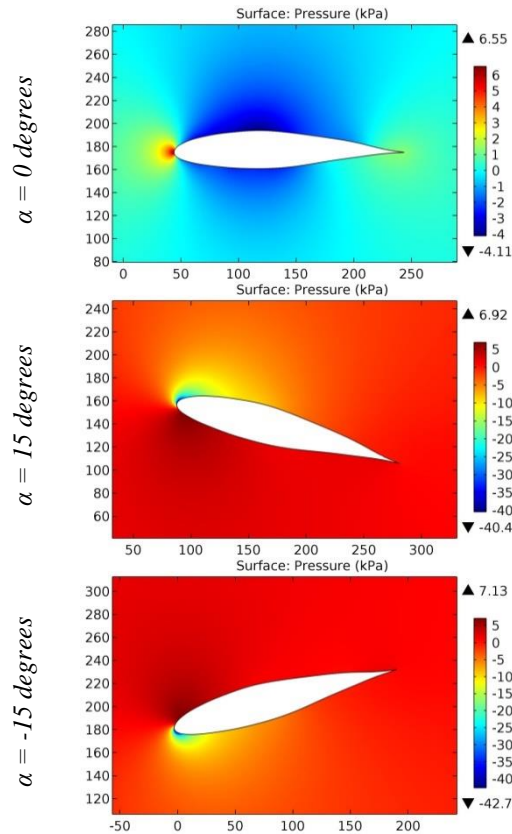
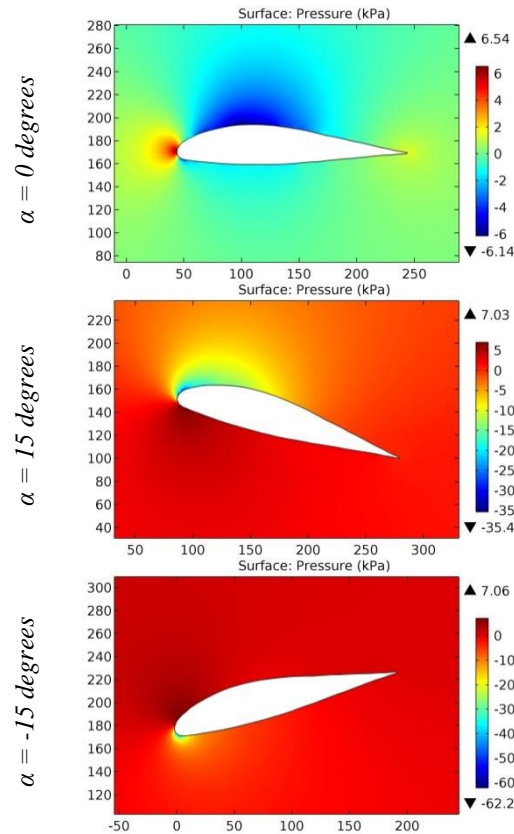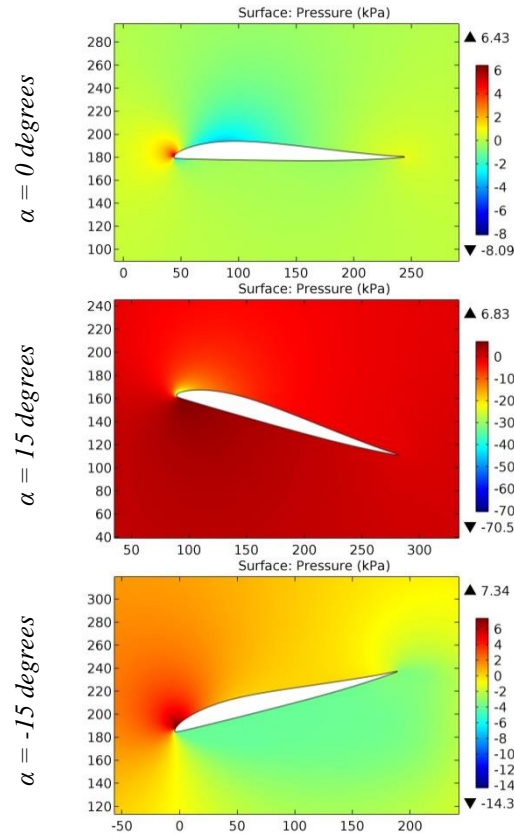**Figure 2. The pressure contours on the surfaces of the P-51D ROOT (BL17,5) airfoil.**

Figure 3. The pressure contours on the surfaces of the P-51D TIP (BL215) airfoil.

Figure 4. The pressure contours on the surfaces of the Pegase coap airfoil.

Figure 5. The pressure contours on the surfaces of the Phoenix airfoil.
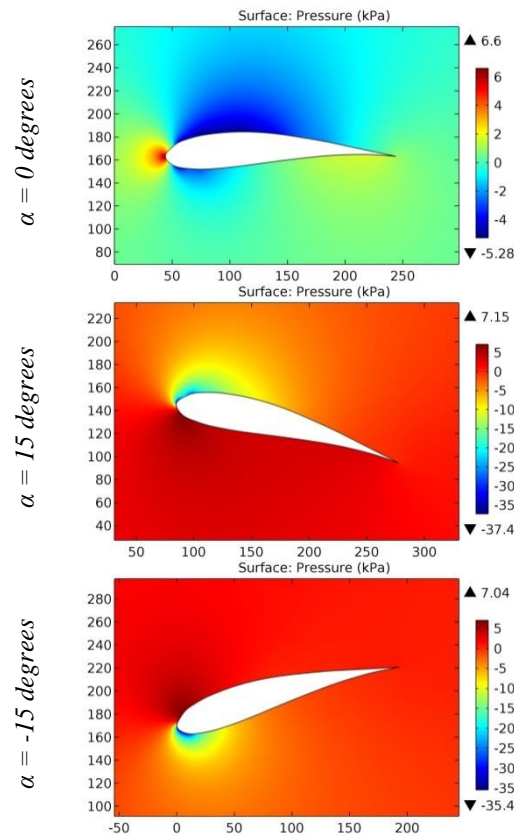
Figure 6. The pressure contours on the surfaces of the PIATTELL airfoil.
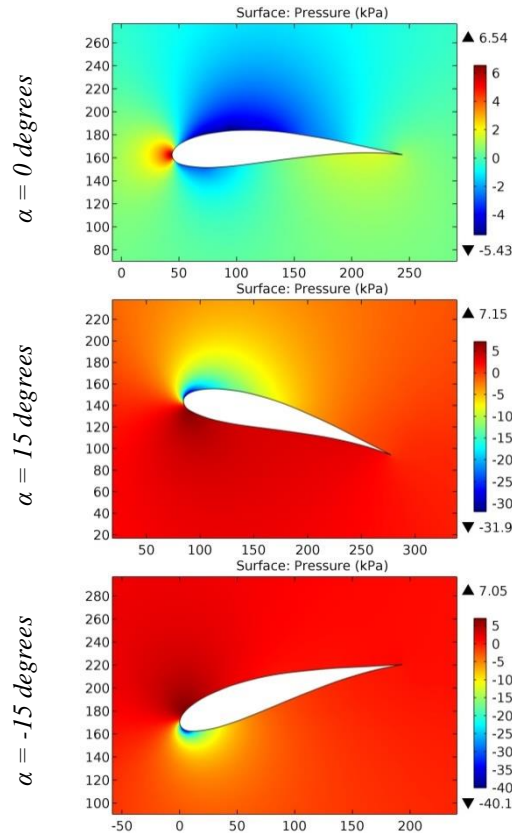
Figure 7. The pressure contours on the surfaces of the Piattelli C1 airfoil.
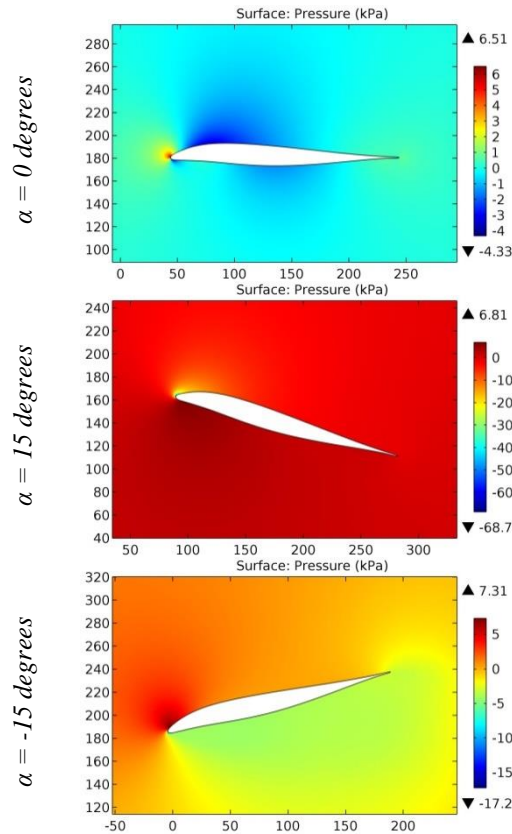
Figure 8. The pressure contours on the surfaces of the pmc19sm airfoil.

Figure 9. The pressure contours on the surfaces of the PRD 2 airfoil.
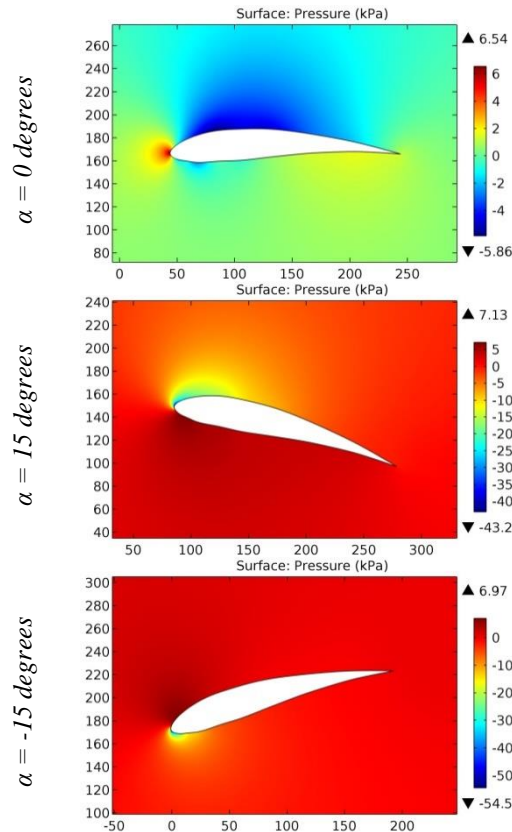
Figure 10. The pressure contours on the surfaces of the PRD 3 airfoil.
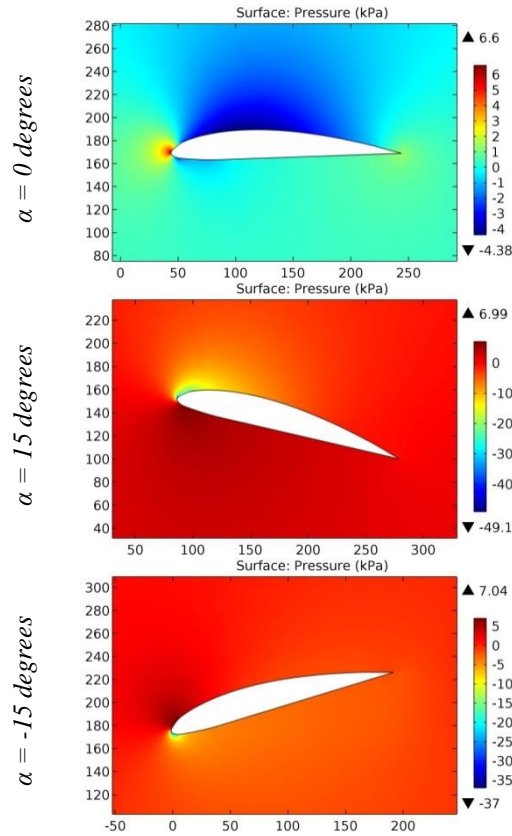
Figure 11. The pressure contours on the surfaces of the PRD 4 airfoil.
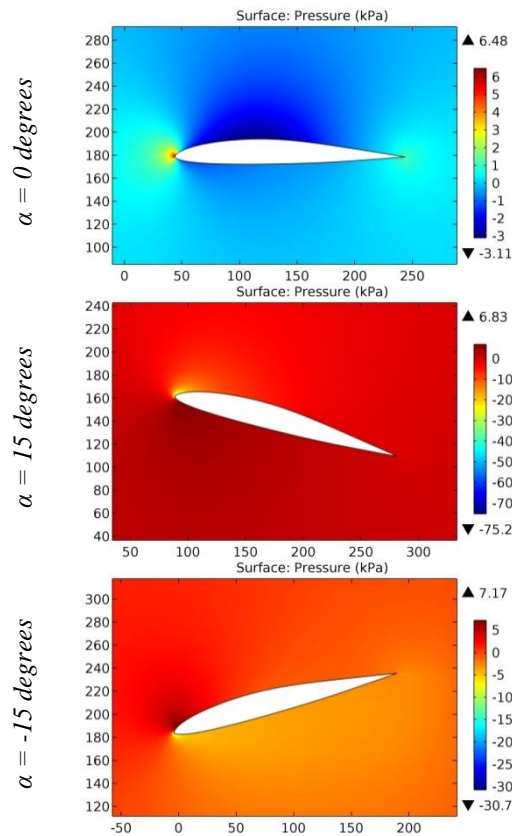
Figure 12. The pressure contours on the surfaces of the Profil 374 Dicke 10,92%.
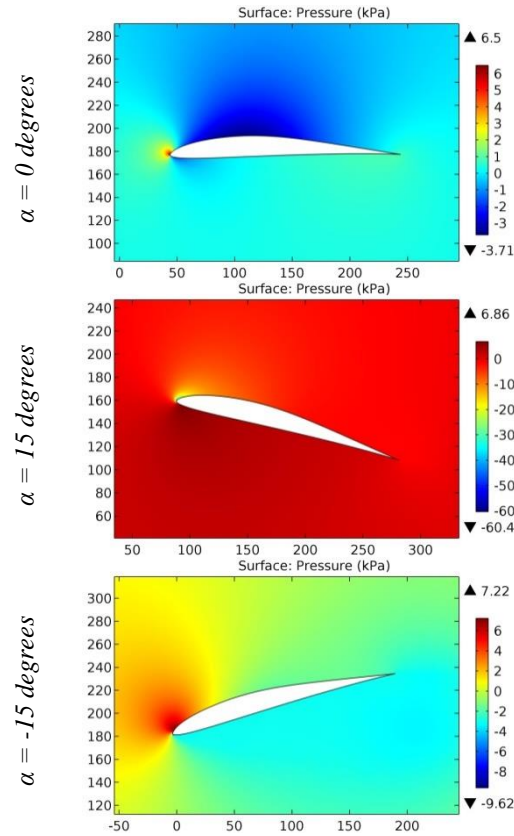
Figure 13. The pressure contours on the surfaces of the Profil 387 Dicke 9,06%.
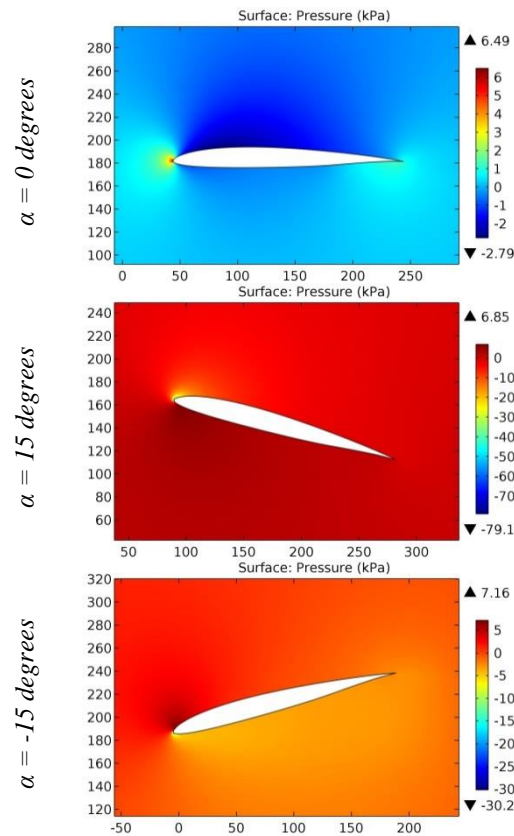
Figure 14. The pressure contours on the surfaces of the PROFILE12A 9,00%.

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Figure 15. The pressure contours on the surfaces of the PROPFAN CRUISE MISSILE WING.
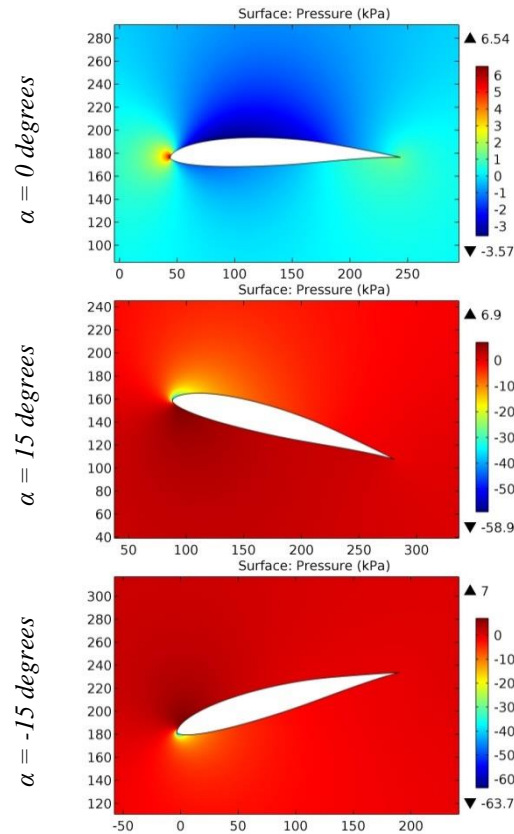
Figure 16. The pressure contours on the surfaces of the PSU 90-1 airfoil.
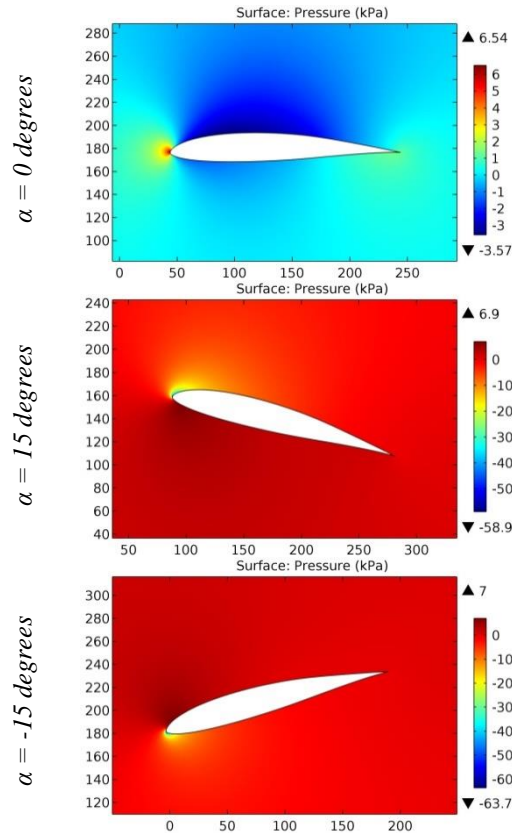
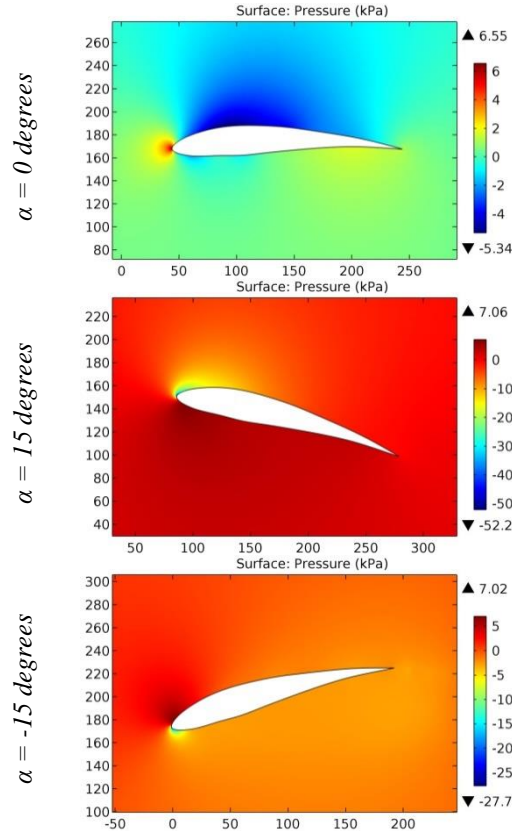**Figure 17. The pressure contours on the surfaces of the PSU-90-125WL airfoil.**
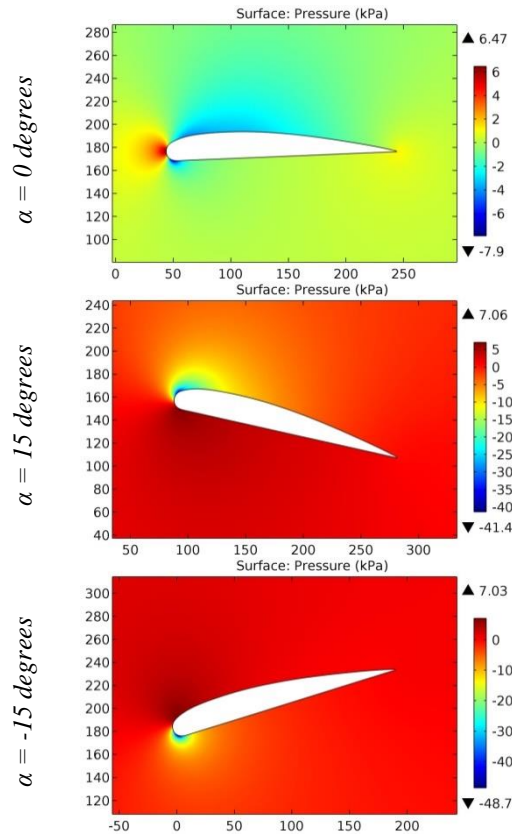
Figure 18. The pressure contours on the surfaces of the PT40 airfoil.
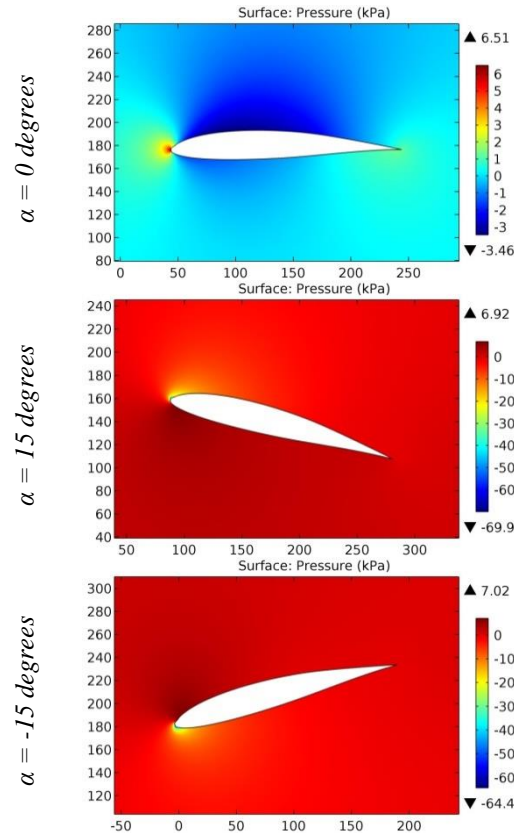
Figure 19. The pressure contours on the surfaces of the PWINGLET airfoil.

Conclusion

According to the pressure distribution gradients calculated in a two-dimensional formulation, it is possible to imagine the nature of resistance of the edges and surfaces of airfoils of the wings in the air flow during the airplane movement. Analysis of the calculated values of pressures on the leading edge showed that thin and medium-thick airfoils are subjected to greater drag during climb than during descent with a similar geometry of the wing in the cross section.

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Issue   **Article**

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THE SIGNIFICANCE OF TECHNICAL MEASURES IN THE STRUCTURING OF CORRELATIVE LEARNING OF FOREIGN LANGUAGE

Abstract: This article is about that technologies used in the educational process, it is more correct to call them not educational or pedagogical, but teaching. Some researchers consider technology a form of implementation of a methodology, others believe that the concept of technology is broader than a method.

Key words: methodology, technology, implementation, institutions, education.
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Scopus ASCC: 3304.

Introduction

Nowadays English language is very important. The interactive methods of foreign language teaching is not only new or mysterious, new techniques but also new forms, new principles, new approaches, new methods in teaching process. Interactive training encourages and gives learners to create comfortable condition of learning, also learners feel their successfulness, develop creativity, communicative abilities. The term "educational technology" is pretty widespread, however, it is rather arbitrary. It should be noted that technologies used in the educational process, it is more correct to call them not educational or pedagogical, but teaching. Attention should be paid to that the concept of "pedagogical technology" denotes methods of work in the field of training and education. Therefore, the concept of "teaching technology" is broader than the concepts technology of education and technology of education. Currently, in the conditions of changes in the education system, the teaching methodology is undergoing significant changes associated with the change in the goals of education, the development of the federal State educational Standard of a new generation based on competence-based approach. In connection with these circumstances, there is a need for new pedagogical

research in the field of teaching methods, the search for innovative means, forms and methods of teaching related to the development and implementation of modern educational technologies in the educational process. Pedagogical literature is characterized by abundance of terms that characterize various pedagogical technologies, such as: teaching, traditional, educational technology, programmed learning technology, problem learning technology, proprietary technology and many others. [1.27]. Initially, many teachers did not distinguish between the concepts of pedagogical and teaching technology. The term pedagogical technology was used exclusively to training, and the technology itself was understood as learning with the help of technical means. At present, pedagogical technology is understood as a sequential system of teacher's actions, associated with the solution of pedagogical problems, or as a planned and consistent implementation in practice of a pre-designed pedagogical process. The most famous authors of modern teaching technologies abroad are J. Carroll, B. Bloom, D. Bruner, etc. Domestic theory and practice of implementation of technological approaches to learning are reflected in the scientific works of P.Ya. Galperin, Yu.K. Babansky, P.M. Erdnieva, V.P. Bespalko.

Teaching technology is characterized by number of features:

- clear, consistent pedagogical, didactic development of training and education goals;

- structuring, ordering, consolidation of information to be assimilated;

- complex application of didactic, technical, including computer, teaching and control means;

- strengthening, as far as possible, the diagnostic functions of training and education;

- guarantee of a sufficiently high level of education quality

The technology should be distinguished from the teaching methodology. The problem of distinguishing between technology and methodology is still controversial. Some researchers consider technology a form of implementation of a methodology, others believe that the concept of technology is broader than a method. As a solution to this problem, the following can be proposed: the technology and the methodology are systematic, one ideal technology has a rigidly defined system of prescriptions leading to the goal, different words the technology is instrumental. The methodology, in own turn, provides for a variety of ways to implement theoretical provisions and does not imply a guarantee of achieving the goal, that is, it does not have high instrumentalities. The instrumental nature of educational technologies means the elaboration and specific actions, starting with the setting of goals, the certainty of stages, steps, operations leading to the goal. It is this property that ensures the reproducibility of the technology and the guarantee of the result. The level of development of instrumentalities can serve as a sign, on the basis of which, in a didactic system, it is possible to detect the degree of its approximation either to technology or to a methodology. Non-traditional technologies are characterized by an intensive presentation of material, an active position and a high degree of independence of students, the presence of self-control and self-correction. Unconventional technologies have features effective traditional teaching. That is why it would be appropriate to call unconventional technologies modern. [2.87]

Currently, the subject of pedagogical technology in general is a field of knowledge that covers the scope of practical interactions between the teacher and students. In any activities organized on the basis of clear goal-setting, systematization. Thus, on the one hand, teaching technology is a set of methods and means of processing, presentation, change and presentation of educational information, On the other hand, it is a science About the methods of the teacher's influence on students In the learning process Using the necessary technical or informational means. Teaching technology is interconnected with pedagogical excellence. The pedagogical skill of the teacher consists to select the necessary content, apply the best methods and teaching tools in accordance with program and the set educational objectives. Perfect mastery of pedagogical technology and there is pedagogical skill. One and the same technology can be carried out by different teachers, but it is in the peculiarities of its implementation that their pedagogical skill is manifested. Currently, in the educational process, modern teaching technologies are used in order to implement the cognitive and creative activity of students. Modern technologies provide the opportunity to improve the quality of education and more effectively use study time. Modern educational technologies are focused on individualization, distance and variability of the educational process, academic mobility of students, regardless of age and level of education. Many experts identify the current stage in the development of education as a transition from traditional mass media (books, films, television) to new information technologies. Innovative pedagogical technologies are interconnected, are interdependent and constitute a certain didactic system aimed at fostering such values as honesty, benevolence, empathy, mutual assistance and providing the educational needs of each student in accordance with his individual characteristics.

Thus, in the context of a change in the concept of teaching methods, the creation of new, modern teaching technologies is a prerequisite for increasing motivation and increasing students' interest in the subject being studied, in this case, in a foreign language, as well as the effectiveness of the learning process in general. Changes that are made into the learning process due to a lot technological progress: the development of computer technology and mobile devices, the benefits of which will consider further. In recent years, the use of mobile devices such as mobile phones and tablet computers has not only become widespread, but has been maximized, especially among the young generation. A modern man cannot imagine his life without such devices. Thus, some schools and higher education institutions choose to avoid using mobile phones, impose bans and restrictions. However, the use of mobile devices can be useful not only in the domestic life but also in the academic. Universities around the world have found and appreciated the benefits of mobile devices. They let students and other website visitors find University news and other useful resources on their mobile screens. [3.67]

In many foreign colleges and universities, mobile devices are used to facilitate and speed up help on educational issues. For example, there is the possibility of instant information retrieval from the library about the availability of the necessary books. Also, in many educational institutions, students are provided with access to a media player, to provide the opportunity to view video lectures and other educational materials.

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ON THE ISSUE OF DEVELOPING A CULTURE OF INTERETHNIC RELATIONS IN KARAKALPAKSTAN

Abstract: *This article is devoted to the study of the culture of interethnic relations in the South Aral Sea region and serves to deepen knowledge about the historically established forms of interaction and coexistence of the peoples who have lived here for centuries. Historiographic analysis of the problem indicates that in modern Uzbekistan this issue is again becoming relevant as a scientific problem. The formed multinational environment allows the peoples of Karakalpakstan to actively interact, while the process of interaction has deep historical roots. During the years of independence of the Republic of Uzbekistan, such a form of mutual enrichment of cultures as national cultural centers was improved, allowing the national groups inhabiting the Republic of Karakalpakstan to raise the level of intensity of interaction. The culture of interethnic relations is the basis on which rises the true goal of state policy aimed at preserving the cultural and other characteristics of each people in the new conditions. Practical steps in this direction are the organization of national holidays, the performance of creative teams, the holding of scientific conferences and literary meetings.*

Key words: *interethnic relations, tolerance, nation, national cultural centers, multinationality, interethnic harmony, Karakalpakstan.*

Language: *Russian*

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К ВОПРОСУ РАЗВИТИЯ КУЛЬТУРЫ МЕЖНАЦИОНАЛЬНЫХ ОТНОШЕНИЙ В КАРАКАЛПАКСТАНЕ

Аннотация: *Данная статья посвящена изучению культуры межнациональных отношений в Южном Приаралье и служит углублению знаний об исторически сложившихся формах взаимодействия и общежития народов, обитающих здесь испокон веков. Историографический анализ проблемы указывает, что в современном Узбекистане данный вопрос вновь приобретает свою актуальность как научная проблема. Сформировавшаяся многонациональная среда позволяет народам Каракалпакстана активно взаимодействовать, при этом процесс взаимодействия имеет глубокие исторические корни. В годы независимости Республики Узбекистан была усовершенствована такая форма взаимообогащения культур как национально-культурные центры, позволяющие национальным группам, населяющим Республику Каракалпакстан поднять уровень интенсивности взаимодействия. Культура межнациональных отношений является той основой, на которой возвышается истинная цель государственной политики, направленной на сохранение культурных и иных особенностей каждой народа в новых условиях. Практическими шагами в этом направлений является организация национальных праздников, выступление творческих коллективов, проведение научных конференции и литературных встреч.*

Ключевые слова: *межэтнические отношения, толерантность, нация, национальные культурные центры, многонациональность, межнациональное согласие, Каракалпакстан.*

Введение

Культурные взаимоотношения народов Южного Приаралья прослеживается на протяжении тысячелетий, была обусловлена не только территориальной близостью и взаимовлиянием, но и сходными природно-климатическими условиями и тем, что весь регион периодически подпадал под влияние общих культурно-исторических процессов. Культура народов данного региона исторически складывалась на территории Хорезмского оазиса и имеет тысячелетнюю историю. Народы региона во многом были традиционно близки как в социально-экономическом, так и в культурном отношений.

Важно отметить, что установление межнационального согласия и толерантности стало одним из крупных достижений независимого Узбекистана. Республика Каракалпакстан как его составная часть является ярким примером многовекового сосуществования различных народностей и этнических групп. В настоящее время в республике проживают свыше 1817,5 тысяч человек (2017 год). Структуру населения составляют преимущественно каракалпаки и узбеки, имеются крупные диаспоры казахов, туркменов, русских, а также украинцев, корейцев, татар и др. Это сложное полиэтническое сообщество формировалось веками и имеет глубокие корни межнациональных отношений и межэтнического взаимопонимания и общежития, проецированные на современный этап развития независимого Узбекистана и Каракалпакстана.

Научное изучение данной проблемы прослеживается во многих научных трудах ученых Узбекистана и Каракалпакстана. Вопросы межнациональных отношений в узбекистанской историографии освещены в исследованиях таких авторов, как У.Абдуллаев, М.Бобоходжаев, Д.Бобожонова, О.Ата-Мирзаев, В.Гентшке, Р.Муртазаева, К.Расулов, Н.Тугова, С.Шермухамедов, К.Ханазаров, Б.Исоков, Р.Назаров, О.Мусаев, Л.Сабирова и др. [1-26].

При обращении к исследованиям, посвященным вопросам изучения межнациональных отношений в Республике Узбекистан, необходимо особо отметить работу Р. Муртазаевой. В ее труде «Ўзбекистонда миллатлараро муносабатлар ва бағрикенглик» (Межнациональные отношения и толерантность в Узбекистане), анализируются исторические этапы формирования полиэтничности в Республике Узбекистан, при этом особый акцент делается на воспитании молодежи в духе межэтнической толерантности. Подобная постановка проблемы неслучайна, так как «для осуществления демократических реформ, проведения эффективной национальной политики, методологически важное значение имеет внимательное изучение того, как меняются межэтнические отношения между молодыми людьми» [27].

Исследование О. Мусаева, посвящено основным принципам политики Правительства Узбекистана по стабилизации межнациональных отношений, деятельности общественных организаций и фондов в этой сфере, факторам укрепления межнациональных отношений, социально-философским особенностям их развития. «В полиэтничном государстве существует объективная необходимость объединения межнациональных отношений вокруг определенной идеи, идеологии», - отмечает О.Мусаев. В своих исследованиях ученый высказывает мысль о том, что лидерские качества титульной нации проявляются в руководящей воле, построении демократического государства, основанного на верховенстве закона, уважающего новые модернистские универсальные ценности, в убеждении представителей всех наций и народов в своей национальной идее, национальной идеологии» [28].

Исходя из новой концепции подготовлен и опубликован 3-х томник «Ўзбекистоннинг янги тарихи» (Новая история Узбекистана) [29]. В работе «Қорақалпоғистоннинг янги тарихи. Қорақалпоғистон XIX асрнинг иккинчи ярмидан XXI аср бошигача» [30] (Новая история Каракалпакстана. Каракалпакстан во второй половине XIX в. – начале XXI вв.), освещено политическое, социально-экономическое и культурное положение нашего народа.

Одной из значительных работ узбекских ученых, выполненных на основе междисциплинарного подхода, является «Ўзбекистоннинг энг янги тарихи» (Новейшая история Узбекистана) [31]. В V главе книги, автором которой является Р. Назаров, рассматривается проблема национальной политики и межнациональных отношений в Узбекистане, исследуются теоретико-методологические, историко-демографические, правовые, международные, этнолингвистические, этнокультурные аспекты этой проблемы.

Результатом фундаментальных междисциплинарных исследований каракалпакских ученых стала работа «Қарақалпақстан тарийхы (1991-2015 жыллар)» (История Каракалпакстана (1991-2015 гг.) [32]. В книге наряду с тем, что раскрывается политическая, социально-экономическая и культурная жизнь в Республике Каракалпакстан, уделяется внимание социально-демографическим проблемам в транзитный период.

В книгах и статьях академика С. Камалова, затрагиваются вопросы развития государственности в Каракалпакстане, важность провозглашения суверенитета Республики Каракалпакстан в составе Узбекистана, а также формирование крепких дружеских отношений между узбекским и каракалпакским народами с древнейших времен [33-34]; прошлое и настоящее, проживающей в Каракалпакстане корейской диаспоры, сходства и различия в традициях корейцев и каракалпаков, культурное сотрудничество между ними, освещено в книгах Л. Хван [35-36]; процесс охвата многонационального народа системой образования, история становления и развития системы образования, отражены в исследованиях Р. Уразбаевой; история развития каракалпакско-русских взаимоотношений показаны в статье Ж.Айтмуратова [37]; межнациональные отношения в республике Каракалпакстан, история их изучения анализируются в статьях Б. Кошанова [38-39]; влияние экологического кризиса Приаралья на жизнь народов региона нашли отражение в исследовании Б. Бекимбетова [40]; история национальной культуры освещена в работе Л. Уразовой [41]. Важное значение в изучении истории межнациональных отношений имеют исследования географа Г.А. Ходжаевой, посвященные проблемам миграций [42-44].

Обзор научных исследований по истории межнациональных отношений, свидетельствует о том, что в каракалпакстанской историографии данная проблема нашла отражение в научных исследованиях фрагментарно.

Независимость открыла новые возможности и перспективы научной разработки важных вопросов развития в сложных условиях глобализации. Сегодня особую актуальность приобретает сохранение и дальнейшего укрепление межнационального согласия и толерантности в обществе. Это один из факторов перехода к новому этапу развития – дальнейшего укрепления основ демократического государства и гражданского общества. Как отметил Президент Республики Узбекистан Шавкат Мирзиёев на встрече, посвященной 25-летию образования Республиканского интернационального культурного центра, «царящая в нашей республике атмосфера дружбы и сплоченности – важнейший фактор мира и стабильности, повышения эффективности проводимых реформ, роста авторитета Узбекистана на международной арене».

В новейший период истории Каракалпакстана стало объективной необходимостью решение проблем укрепления межнационального согласия, взаимопонимания и взаимодействия, сохранения и углубление добрых традиций дружбы между народами, веками обитавшие древнюю землю Приаралья. Эта задача предполагает разработку новой системы социальной технологии формирования культуры межнациональных отношений, предусматривающей повышение уровня правовой культуры в обществе, обеспечение оптимальной этнической социализации личности, предоставления равных возможностей для развития языка, культуры, традиций и обычаев, духовного мира каждой нации, каждой личности. Это и другие определяющие меры были изложены в Указе Президента Республики Узбекистан 19 мая 2017 года «О мерах по дальнейшему совершенствованию межнациональных отношений и дружественных связей с зарубежными странами», в частности, был сформирован Комитет по межнациональным отношениям и дружественным связям с зарубежными странами при Кабинете Министров Республики Узбекистан.

В контексте вопроса укрепления межнациональных отношений большое значение имеет деятельность национальных культурных центров республики – общественных структур, представляющие различные диаспоры, которые вносят большой вклад в установлении стабильности и сохранения мира и добрососедства в регионе. Гарантом широкого и свободного участия представителей всех национальных диаспор в государственной, экономической, общественной и культурной жизни страны является Конституция Республики Узбекистан, где подчеркнуто, что народ Узбекистана составляют все его граждане, независимо от их национальности. Они имеют одинаковые права и свободы и равны перед законом без различия пола, расы, национальности, языка, религии, социального происхождения и общественного положения. Еще в начале 1990-х годов в республике были зарегистрированы более десятка национально-культурных центров, а сегодня в Каракалпакстане функционируют Русский культурный центр, Республиканский казахский культурный центр, Ассоциация корейцев Каракалпакстана, Туркменский национальный культурный центр, Каракалпакское отделение Украинского культурного центра «Славутич» и др.

Весомый вклад в укрепление межнациональных отношений вносит и Казахский культурный центр, который располагает несколькими филиалами, которые также принимают активное участие в общественной и культурной жизни страны. Встречи со студентами, учащимися лицеев и колледжей, школ стало доброй традицией, как и проведение массовых мероприятий. Большой зрительский интерес вызывает телевизионная передача «Алтын аймақ» на казахском языке, выходящая на

Каракалпакском телевидении. К сожалению, бездействует народный театр «Бескала», перестала выходить газета «Достык уни». Лишь в последнее время идет некоторое оживление в деятельности культурного центра – недавно прошло первое состязание акынов на казахском языке – «Айтыс» на сцене Каракалпакского Государственного музыкального театра им. Бердаха.

В целом, формирование культуры межнациональных отношений в регионе в контексте актуальных проблем современности имеет не только исторические корни, но и на сегодняшнем этапе идет активный процесс их дальнейшего укрепления. В то же время он требует активной работы по продвижению новых проектов, интенсивного сотрудничества в рамках международных и региональных программ.

Каракалпакстан является одной из многонациональных республик, которая входит в состав независимого Узбекистана. По состоянию на начало 2017 года население Каракалпакстана составляет 1817,5 тысяч человек, из низ почти 32% каракалпаки, столько же узбеков, а также казахи, корейцы, русские, татары и др., одним словом, сегодня наша республика - один из самых многонациональных субъектов Узбекистана.

Проблема межнациональных отношений является актуальной не только в последнее время, она интересовала людей всегда. Каракалпакстан является ярким примером мирного сосуществования разных наций и народностей, здесь сложился своеобразный культурный плюрализм — это показатель успешной адаптации человека к чужой культуре без отказа от своей собственной культуры. Успешное приспособление человека одной национальной культуры наравне с его собственной национальной культурой в условиях Каракалпакстана имеет много примеров. Так, полиэтническое сообщество в этом регионе формировалось веками и имеет глубокие корни межнациональных отношений и межэтнического взаимопонимания и общежития, проецированные на современный этап развития независимого Узбекистана и Каракалпакстана как его составной части. С другой стороны, культура межнациональных отношений в регионе опирается не только на многовековые историко-культурные и духовные корни, но и является результатом дальновидной политики нашего государства в области межнациональных вопросов. В деле построения и развития демократического общества важна роль национальных культурных центров Каракалпакстана. На сегодняшний день в Республике Каракалпакстан зарегистрировано 6 национально-культурных центров. В начале 1990-х годов в республике функционировали более

десятка национально-культурных центров, среди них русский, казахский, корейский, туркменский, украинский и др. Например, Русский культурный центр Республики Каракалпакстан провел ряд мероприятий в городе Нукусе, совместно с рядом учреждений, посвященных празднованию Дня примирения и согласия в Российской Федерации. Туркменский национально-культурный центр Республики Каракалпакстан расположился в Турткульском районе и издавал ежемесячную газету «Мекан». В этом районе наиболее крупная диаспора туркмен и действует несколько школ с туркменским языком обучения. Активно функционировал Казахский культурный центр, при котором был сформирован самодеятельный театр «Бескала», проводились концерты, вечера встреч.

Поистине прав Президент Республики Узбекистан Ш.М.Мирзиёев, который на встрече, посвященной 25-летию образования Республиканского интернационального культурного центра, сказал, что «годы независимости открыли новый этап в межнациональных отношениях в нашей стране. Одним из важнейших приоритетов государственной политики в Узбекистане было определено развитие культуры толерантности и гуманизма, укрепление межнационального и гражданского взаимопонимания и согласия, воспитание молодого поколения на этой основе, в духе любви и преданности Родине. И все это нашло полное воплощение в жизни» [45].

Особенность развития народа Каракалпакстана в том, что для большинства из них присущи общая религия и история, духовные и культурные ценности, нормы поведения и т.д. В то же время, мирное сосуществование разных этнических групп и людей различных национальностей тесно связано с высокой культурой толерантности. Издавна эта территория является центром межэтнических взаимоотношений, веками шел процесс смешивания разных культур, как называл проф. С.П.Толстов, сложился «Аральский узел этногенетического процесса».

Толерантность как важный фактор устойчивости и стабильности общества, является совокупностью правил, норм человеческого общежития в каком-либо государстве с полиэтническим населением, благожелательность, взаимопонимание и взаимопомощь, а также мирное сосуществование на локальной территорий (аул, кишлак, улица), ежедневное общение, восприятие норм поведения и речевой практики.

Современные исследователи выделяют две тенденции развития межнациональных отношений – взаимопроникновение и обособление. В условиях Каракалпакстана

превалирует больше взаимопроникновение через религию, культуру, искусство, фольклор и т.д. Например, в фольклоре каракалпаков, узбеков, казахов достойное место занимает дастан «Алпамыс» - общее достояние для всех народов Центральной Азии. Или же в повседневной жизни люди, мирно сосуществующие в одной махалле или улице постепенно перенимают элементы чужой культуры: нормы поведения, общими становятся обычаи и праздники.

Благодаря неимоверным усилиям государства в Узбекистане и Республике Каракалпакстан сложился прочный климат взаимоуважения и солидарности народов, происходит взаимопроникновение разных культур. Совместное празднование Навруза, религиозных праздников, а также усилия государства по развитию дружеских отношений со странами мира и Центральной Азии – показатель мирных устремлений независимого Узбекистана.

Как указывал Президент Узбекистана Ш.М.Мирзиёёв, в обогащении культуры межнациональных отношений и дальнейшей гармонизации межнациональных отношений в стране ведущую роль играют 137 национальных культурных центров. «Развивая свою самобытную культуру, язык, народные ремесла, они вносят вклад во взаимообогащение культур, укрепление в каждом из нас чувства единой многонациональной семьи» - сказал он [45].

В общественной жизни нашей республики также велика роль разных наций. В Каракалпакстане зарегистрировано несколько национально-культурных центров и религиозных объединений. В начале 2000-х годов в республике функционировали более десятка национально-культурных центров, среди них русский, казахский, корейский, туркменский, украинский и др. Проводимая в области национальная политика декларирует принципы терпимости и уважения по отношению к многообразию культур и вероисповеданий. Признавая, что главным критерием оценки культурного прогресса является сохранение национальной самобытности народов, Каракалпакстане сохраняются и поддерживаются школы с преподаванием, наряду с каракалпакским и узбекским, также на казахском, туркменском, русском языках,

приветствуется выпуск национальных газет. Пока этот вопрос только налаживается, хотя в 1990-е годы Казахский центр выпускал газету «Достык уни», Туркменский культурный центр – газету «Мекан». На русском языке выпускается газета «Вести Каракалпакстана», в основном периодические издания выходят на каракалпакском и узбекском языках.

В перспективе важным направлением в деле укрепления межнациональных отношений являются богатейшие музейные коллекций, которые служат фундаментальной базой для изучения и сохранения национально-культурных традиций. В этом вопросе актуальна организация выставок в музеях Каракалпакстана, посвященных национально-культурным традициям народов, населяющих республику. В аспекте развития туризма интересно было бы развивать музеи под открытым небом «Национальная деревня народов, населяющих Республику Каракалпакстан», создание этнографических поселений, где можно было бы с исторической достоверностью возвести подворья и различные комплексы народов, населяющих Каракалпакстан. Здесь можно организовать национальные праздники, выступать творческие коллективы, проводить научные конференции и литературные встречи.

Сегодня активно идут процессы национального возрождения и национальных культур, объединяя народ Каракалпакстана в единое целое с целью достижения высокого уровня и качества жизни простого человека. Совместно с национально-культурными центрами в республике проводятся и отмечаются праздники - Навруз, Курбан-хаит, Пасха, Масленица, Сэль-наль, Хан-сик и др. [46].

Анализируя работу национальных объединений области, можно сделать вывод, что национальные объединения, с одной стороны, демонстрируют уровень национального самосознания людей, а с другой - являются своеобразным индикатором национальных отношений. Стабильность, взаимопонимание и согласие в межэтнических отношениях по праву считаются общим достоянием населения республики и продолжают оставаться характерной чертой этнополитической ситуации в настоящее время.

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ON THE IMPACT OF TRANSPORT ON THE EFFECTIVE SOCIO-ECONOMIC DEVELOPMENT OF RUSSIAN REGIONS. MESSAGE 1

Abstract: *In the article, the authors proposed a systematic approach to the study of the concept of "movement". We developed a systematic description of this concept, fundamental for the worldview, and determined a place for transport in the traffic system. Transport is a universal tool for the implementation of movement as self-movement, which serves as a sufficient argument to classify transport as a system-forming concept of worldview. It is necessary not only to correct the existing characteristics of transport associated with the limitation of transport by the function of moving goods, but also to supplement it with the function of organizing reality, which well shows its status in the reproduction of the movement of matter. Transport is a universal tool for creating spatial and temporal conditions for development in the system of movement of matter for the spatial and social development of the regions of the Russian Federation. In the article, the authors state: the concept of transport science, the basics of technical knowledge, the development and types of transport, the uniqueness of transport as a sphere of economic activity, the problems of transport, the current state of the development of transport in Russia, the stages of development, as well as the methodology of technical and transport sciences; considered the classical technology of research in technical sciences, the methodology of experimental research in technical sciences, in transport, including its technical operation.*

Key words: *comfort, spatial development, social development, regions of the Arctic Zone and the Far East, regions of the European part and Siberia, movement, the basis for the movement of matter, universality, organization, worldview, «public or social» transport, conceptual thinking.*

Language: *English*

Introduction

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Transport in a new format is considered as a phenomenon that is part of the basis of the systemic organization of reality. An analysis of the existing understanding of transport shows that the restriction of the content of the concept of "transport" by the industry engaged in the transport of goods within the exclusively social reality is in conflict with the initial premise of the definition of transport as a means of movement and the history of human transport, which began before the birth of differentiated production. The traditional understanding of transport as a means of movement within the social life of a person has developed under the influence of the significance of this component of the world for him. Such a limitation of the scope of reality reflected in the content of the concept of "transport" violates the logic of the formation of a scientific concept. The volume of phenomena, fixed by the content of the concept, must be equivalent to the content. If it is argued that "transport" is the subject of the definition, and "movement of goods" is its specific feature, then we must qualify "movement of goods" as a universal action. When the "movement of goods" is reduced to the movement of the totality of products of human activity itself, then the characteristics of transport should also be sequestered. That is, here we should no longer talk about "transport" as such, its universality, but about "public transport", a component of which can be made "individual transport". When the "movement of goods" is reduced to the movement of the totality of products of human activity itself, then the characteristics of transport should also be sequestered. That is, here we should no longer talk about "transport" as such, its universality, but about "public transport", a component of which can be made "individual transport". When the "movement of goods" is reduced to the movement of the totality of products of human activity itself, then the characteristics of transport should also be sequestered. That is, here we should no longer talk about "transport" as such, its universality, but about "public transport", a component of which can be made "individual transport".

The problem is that the logical analysis of the inconsistency of the existing understanding of transport shows the formal side of the imperfection of the definition, while scientific, like philosophical knowledge, requires subject certainty. It is necessary not only to bring the scope of the concept into line with its content, but also to find that in the world of actual existence that is the subject reflected in the construction of the concept, that is, to load the concept with real content so that it works normally in scientific knowledge, thanks to its concreteness.

Positive changes in the quality of goods require qualitative changes in engineering, technology, organization and management of production. Production must improve, which does not mean becoming more costly. Absolutely right, attention was drawn to one phenomenon that usually slips away in the bustle of the problem - the historicity of the economy. The way it is perceived now, the economy has not always been and will never remain. Economic life changes over time, which forces one to tune in to its changing existence. The modern economy is built on a market foundation and the laws of the market dictate its own rules. In the foreground are profit, competition, efficiency, unity of command. How long will this continue? Analysts say the symptoms of a new economic order are already on the rise. The next turn of the economic spiral will also spin around the market core, but the significance of the market will not remain total. The priority of market competition, aggressively marginalizing the "social sector", is not compatible with the prospect of economic development, as evidenced by the steady desire of social democracy in the West to turn the economy on the front for social security, a fair distribution of profits. The new economy is called temporarily "prudent". The current principle: "survival of the strongest, most adapted", will replace "social production partnership - the manager and the manufacturer will become members of the same team. Mass production will give way to an organization corresponding to the implementation of the principle - "the manufacturer makes exactly what the consumer needs." A "thrifty" economy will be focused on resource-saving technologies and environmental friendliness of production. She demanded a new look at the root concepts. Therefore, the philosophy of quality must also change. We must be prepared for the coming events.

The quality of "it is written for generations" to be at the epicenter of both scientific and amateurish reflections at all times. The problem of ensuring the quality of activities is not just universally relevant, it is strategic. The dilemma in relation to quality is reasonable only within the limits of the opposition of the ratio of actions "immediate" and "indirect". The saying "it's all about him" owes its origin to quality. It is possible to "forget" about the problem of quality solely because any fruitful and luminous activity is ultimately aimed at improving quality. Quality is

either "on the mind" or "implied". From the correlation in the dynamics of these projections, quality problems in creative thinking are built into an appropriate schedule that reflects the relevance and profitability of activities aimed at developing production.

The most significant and global in nature are international standards for quality management. The use of modern methods in them allows us to solve not only the problem of improving quality, but also the problem of efficiency and productivity. That is, today the concept of "quality management" is moving into the concept of "quality management".

Thus, solving the problem of increasing the efficiency and competitiveness of the economy, and ultimately the quality of life, is impossible without the implementation of a well-thought-out and competent industrial policy, in which innovation and quality should become a priority.

The results of studies conducted under the UN Development Program made it possible to measure the share of the "human factor" in national and global wealth: 65% of the wealth of the world community is the contribution of human potential, and only a third of the world's wealth comes from natural resources and the production structure. A quality-oriented strategy undoubtedly contributes to the growth of the very role of the subjective factor in the development of production, and to a more complete and comprehensive satisfaction of human needs themselves. The desire to "live according to reasonable needs", as well as the need to "work according to the possibilities", together with the communist ideal, no one dared to openly and officially cancel, realizing the absurdity of denying the essential forces of man. In the "hot" state, the problem of quality is sustainably supported by both the internal forces of active consciousness and external life factors. The highest function of consciousness is cognitive.

It is believed that by knowing nature, its quality, state of quality, quality levels are revealed, embodying new knowledge in production. Post-classical economic thought shifted quality towards consumption, trying to give production a "human face" - a person alienates himself in the production process, but this measure is forced and, in a systemic sense, is temporary, conditional. Labor is a kind of "terrible cauldrons" that Vanya the Fool had to overcome in order to turn into Ivan Tsarevich. And here it is absolutely justified to believe that the main thing in production is the result, not the process. Consumption regulates the market. Therefore, the demands of the market must dominate production. The task of society is to contribute to the development of demand in the market worldwide: to maintain a range of goods, to stimulate price stability, increase purchasing power, improve the quality of goods. E. Deming, calling the "network of deadly diseases" of

modern production, puts in the first place "production planning that is not focused on such goods and services for which the market is in demand." Try to answer him. Production in the transition from industrial to post-industrial society of mass consumption is conceived as a function of the market. And the authors fill these properties of quality with criteria, namely:

- ideology of quality - the prospect of development of production;
- quality management is an integrated approach to solving the problem of quality;
- fashion and technical regulation - components of the quality of manufactured shoes;
- quality systems "ORDERING/5 S" and "THREE" NOT "- not only the basis of stability and production safety, but also a guarantee of quality;
- quality in the market is a paradigm of formation of production that satisfies the needs of the market;
- advertising is always at the service of quality;
- an excursion into the past as a guarantee of quality in the future;
- a model for assessing product quality - these are production priorities;
- forecasting the cost of quality when developing a new range of footwear is the key to its demand and its competitiveness;
- methodology for business visual evaluation of the product - a means of assessing the effectiveness of quality;
- improving the quality and competitiveness of domestic safety footwear;
- on indicators for assessing the quality of footwear - as a tool for the formation of demanded products;
- quality and market: a marriage of convenience and this is indisputable;
- the stability of the work of enterprises is the guarantor of the quality of the shoes they produce - all these aspects together provide a quality revolution that guarantees the manufacturer stable success in the market with unstable demand. The authors analyzed the possibilities of the policy and goals of the enterprise in the field of quality within the framework of the QMS in order to fight for defect-free production, for the reduction of defects and to guarantee consumers the high quality of manufactured products. The use of software for assessing the validity of the choice of innovative technological solutions for the production of priority products by domestic enterprises creates the prerequisites for its demand and competitiveness not only in the domestic market, but, most importantly, in its export. The need to improve the quality management system at domestic enterprises is due to the following important reasons:

firstly, it is an increase in the confidence of potential consumers in the products that will be produced by domestic enterprises;

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secondly, it is an opportunity to significantly strengthen one's position in existing markets, as well as significantly expand spheres of influence by entering new domestic and foreign markets;

thirdly, this is a significant increase in labor productivity of any industrial enterprise, which is expected to introduce a QMS using effective management.

The choice of light industry enterprises as an object for assessing the effectiveness of the socio-psychological factor in the implementation of the QMS is due to the fact that these enterprises are characterized by the presence of highly qualified workers and specialists. Thus, the Policy of goals and objectives of the QMS will be implemented much more professionally and at a lower cost due to three main aspects: employee involvement, process approach and systematic approach. In addition, the personnel of light industry enterprises are more effectively able to realize the goals and objectives of the QMS also because control activities are more professionally carried out to fulfill the following situations: persuasion, execution of delegated powers, creation of conditions for increasing productivity and effective use of the business qualities of employees.

The task of increasing competitiveness is especially urgent for those enterprises that, due to external factors (increased competition due to globalization, the global financial crisis) and internal (inefficient management), have lost their competitive positions in the domestic and foreign markets. In response to negative processes in the external environment, the processes of regionalization and the creation of various network structures are intensifying, one of which is the union of commodity producers and the state.

Main part

The traditional understanding of transport finally took shape in the 19th century, when, reflecting the achievements of the industrial revolution, transport was identified with the technical means of transferring goods for various purposes and moving people. As a result, "transport" was assigned to the sphere of material production, distributing it objectively between technical creativity and economic theory, which was tantamount to a sentence to become the subject of self-supporting activity. Both in the 20 th century and in our time, the official interpretation of transport has remained unchanged, despite radical changes in the functioning of transport, indicating its special significance for social progress, personal development and, possibly, in the future, the preservation of life on Earth, meaning threats from accompanying its movement of cosmic bodies of natural origin.

If the reduction of transport to its technical form of expression can still be justified by the corresponding successes of science and technology, the obvious dominance in the history of transport of artificially created means and devices for changing the position of objects in space-time, then the silence of the influence of the transport factor on the nature of social and natural history can only be qualified as a lag of awareness from the real movement of life.

In Aristotelian logic, concepts are identical not only within the limits of available mental constructions, but also in general terms. Great thinkers are also not without sin, they are mistaken. After two and a half millennia, G. Hegel discovered the historical logic of the concepts themselves, showing that the concepts are dialectical. They are not only loaded with new content, but also change their volume from time to time, and, as a result, look new. "In rational logic (the logic developed by Aristotle, the sophists, the scholastics), the concept is usually considered as a simple form of thinking and, more precisely, as a general idea; as if the concept as such is something dead, empty, abstract," wrote the German philosopher. And clarified:

"Of course, the concept should be considered as a form, but as an infinite, creative form." From the point of view of philosophy, the transformation of scientific, scientific and technical concepts is a natural phenomenon that requires increased attention. One cannot feel modern, much less strive to peer into the future, without realizing the significance of a dialectical approach to concepts, including those that seem perfect.

Philosophy itself has gone through a similar ordeal. Expanding philosophy from Nature to Man, Socrates and Plato, especially the latter, in order to "purify" and "concentrate" on the main thing, separated from it the "philosophy of nature" - "natural philosophy" (nature - philosophy). Subsequently, the more adequate term "natural science" appeared. Over time, under the influence of positivism, it was reduced to "science". Shakespeare's Hamlet says to Horatio: "There are many things around, Horace, that your science could not even dream of." W. Shakespeare used the modern term "philosophy". But already a late translation of the text is presented in the meaning of "science". The term "natural philosophy" is also found in the title of I. Newton's generalizing work "The Mathematical Principles of Natural Philosophy". Only at the turn of the XVII-XVIII centuries. the ingenious physicist came even closer to the term "science".

According to the mechanism of cultural development, concepts are revealed and preserved in encyclopedias. Let's trace the domestic history of the concept of "transport".

The originality of the concept of "transport" is associated with a collective, generalizing type of education. The relevance of the concept and its name have matured with the diversification of transport. It is unlikely that at the time of the existence of two types of technical transport - water and land on biological traction - it was necessary to generalize them. Apparently, the modern history of the concept began

after the advent of railway traffic, that is, closer to the middle of the 19th century. The first of the classics of explanatory (interpretative) literature of Russian origin, the term "transport" was included in his famous Dictionary by V.I. Dahl is a contemporary of the discovery of public steam traction in the country. We read: "Transport frn. transportation of goods, delivery. Convoy, goods or supplies convoy. Transportation, cargo state-owned ship. Transfer of the total, in the account books from page to page. In gambling: transferring the bet to another card. It is mysterious that V.I. Dahl, explaining the term, expanded it sufficiently in socio-cultural terms, citing the financial, reporting office and the practice of card games, which are very popular in society, but ignored the technical transport novelty - the construction and operation of railways. By the end of the 1860s, Russia fully entered the "club" of railway powers.

It can be assumed that the process of the genesis of concepts takes place somehow indirectly, not coinciding in time with the increments occurring in objective reality. Dal lived in Moscow, St. Petersburg, the Baltic States; saw the advantages of rail traffic, was aware of its transport affiliation, but left rail transport out of the brackets of the definition of transport. It is clear from this story that in the formation of a concept and its metamorphoses there may not always be logically and historically justified changes. This is what seems interesting.

Half a century after the publication of the Explanatory Dictionary of V.I. Dahl, Russian culture was enriched by the Encyclopedic Dictionary of F.A. Brockhaus and I.A. Efron. Its authors found themselves in more favorable conditions. By the beginning of the 20th century, all the currently existing types of traditionally understood transport declared themselves. Air was added to the water, land. Steam traction ceased to be the only technical energy, a car was designed with an internal combustion engine, and an electric motor was created. Scientific theory and engineering thought began to approach space transport.

At the same time, Brockhaus and Efron fell into "perestroika" time. They needed to integrate the established experience of transport history and the trends of its continuation in the definition of transport. The choice in such a case is small: either to absorb as many characteristics as possible into the interpretation, or, realizing that you cannot collect everything, limit yourself to a concise explanation that sets the vector of understanding. They took the second path: "Transport, a set of means for the movement of goods, troops, etc." The definition of transport in it cannot be attributed to the merits of the Dictionary, even taking into account the difficulties of an objective order. It seems that the authors decided not to dive into the essence of the transport reality.

20th century made no significant changes to understanding of transport. This conclusion is confirmed by the definition of transport in the Modern Explanatory Dictionary of the Russian Language and the Big Illustrated Encyclopedia, divided into 32 volumes and claiming, not without reason, a qualified scientific analysis of published materials. The first source "corrects" V.I. Dahl. It turns out that the history of the term is not French, it is from Latin (transportãr - to carry, transport). The essence of the definition is the same - "a branch of the national economy associated with the transportation of people and goods." Additionally, the identification of transport with the cargo (batch) assigned to be transported by vehicles is involved.

"Encyclopedia" almost verbatim publishes the definition from the "Dictionary": "Transport, the branch of material production, which is responsible for the transportation of people and goods." Further, modes of transport are distinguished in some detail. There is an attempt to link the differentiation of transport with the quality of natural environments."

Like 300 years ago, transport in the new millennium is entirely reduced to the branch of material production, its analysis is limited to systems of technical and economic reality. Political accents of transport development are subordinated to its technical interpretation. As a technical reality, transport is related to production and is determined based on the interests of economic activity in accordance with the criteria of economic rationality.

It is absurd to doubt that in Modern and Contemporary times transport developed in a technical form and is a part of material production. The question is: how appropriate is it to reduce the phenomenon of transport to this specific form, how does this form relate to the history of transport as a whole? Is it characteristic of part of its history or the entire history of transport? Is it possible, for example, to consider the feat of a warrior who ran a marathon distance in order to fulfill an order and deliver a report of victory as a type of transport service? Formally, everything here is consistent with the definition of transport, except for the mass character of the scale and the traditional production product, but war is a specific material phenomenon directly related to production, therefore, the execution of an order in any form should be attributed to the sphere of production management, production by defeating those who encroach on your well-being and freedom to carry out production. The warrior was formally a vehicle of biological nature, which also does not contradict the interpretation of transport.

Our appeal to the definition of transport in the historical past is explained by the desire to overcome the technical and economic dependence of the development of the theory of transport. The understanding of transport as the most important component of human development and social progress would be facilitated by transport science, but here we find ourselves in a stalemate: in order to understand

transport, we need transport science, and in order to have transport science, we need a scientific understanding of its subject, i.e. transport . The philosophical context becomes more and more obvious, without which one cannot get out of this logical impasse.

Technical transport has radically transformed a person's life, changed the person himself and his attitude to the world. The fears of those who feared that railway construction for absolute monarchies would be worse than the guillotine came true. Monarchs have changed their usual status to decorative and representative, they serve history, demonstrate the inseparable connection of times, reassuring their compatriots. Production has become mass, entangled in its contradictions and attitudes towards natural laws that protect the natural order. Mass production is being formed on a new principle of organization – "lean production". "Humanity is on the verge of a transition to a new civilization - a civilization of quality." Once again, the understanding of democracy as a systemic factor in achieving real harmony between the interests of the individual and society has changed. At first, democracy was slave-owning, - local. The great French bourgeois revolution defined the "three pillars" on which a true - universal democracy should be built: freedom, equality and fraternity. The monopolization of capitalism, the controlled diversification of property, and the dominance of speculative, finance capital have amended the formula of revolutionary democracy. Under the guise of developing democracy, the liberals have simplified the understanding of "equality" and "brotherhood", removing from capital the responsibility for their real embodiment in a society of "equal opportunities" and reducing "brotherhood" to social partnership.

A political excursion into the genesis of democracy is not our goal. This is just a means to promote the main idea of the article: why did everything in life - nature is no exception - changed under the influence of the development of transport, and the very interpretation of transport remained the same, although it has changed considerably over the past time of its very active history? How justified is such conservatism in scientific and philosophical thinking?

Meanwhile, the content and volume of scientific concepts imply their refinement - expansion, narrowing, conditional concretization. So, in the XIX century. "refined" Euclidean geometry, in the XX - Newtonian physics and Darwinian evolutionary theory. These corrections emphasized the objective truth of the teachings, making them even more scientifically built.

"Technical transport" is a product of science and engineering art. Arguments in favor of transforming the concept of "transport" will look more weighty if they include the metamorphosis of the concept of

"engineer", taking as the initial sign of "engineer" what a linguist with a degree in mathematics from Dorpat University V.I. Dal. Recall, according to Dahl, "engineer-scientist builder". Dahl contrasted the engineer with the architect and the architect, but spoke of "engineering as the art of the engineer."

The art of thinking and its implementation in a practical product by an engineer, according to V.I. Dahl, makes the engineer, as a professional, related to artists. IN AND. Dahl was not embarrassed by either the differences in vocational education or the specifics of work. He knew how to "see" at the root and look into the future. In our time, part of the social and economic activity is assigned to the field of engineering work. I.V. Stalin, not without reason, called the writers "engineers of human souls." The ancient Greeks called engineers those who, in their opinion, "deceive nature."

In the classical interpretation, there is no rigid attachment of an engineer, as, for example, transport, to the sphere of material production. An engineer is defined precisely as "scientific builder", i.e. a representative of scientifically equipped labor, aimed at changing the objective reality. Slave-owning democracy was local, but in relation to the free citizens of the polis, it was a professionally tailored political construction. The civil law of Rome still surprises specialists. The version according to which the history of engineering began not with technical, but with social creativity, is quite viable. It is not necessary to call socio-constructors engineers, we will give them the name "pre-engineers". There is a complex history of the concept, however, it is generally recognized. The trajectory of understanding transport, given its scale and functional uniqueness, should not be an exception - to serve as a factor in personal and social development at the same time.

In the sociocultural context, the identification of transport with a component of material production looks like an oversimplification of its understanding, even in general terms. Functions and status must be commensurate. The engineer objectifies the productive component of the social movement. The function of transport is much wider. Transport carries out the movement as such, is included in the movement as a universal factor.

Against the background of the absolutization of the technical understanding of transport, the definition of transport is perceived as confrontational. "Britannic(oh)". It is so unusual that we quote it almost in full: "... transport, in biochemistry, the passage of molecules and particles through cell membranes, acting as selective barriers, allowing some substances to pass through ... and retaining others ... The transport of these vital substances is carried out thanks to multiple systems. Through the membrane "holes" (open channels), diffusion (passive transport) of ions occurs directly into the cell; other ion channels use chemical changes to facilitate the

diffusion of substances across the membrane, "pumps" force solutes to pass through the membrane even if their concentration is higher on the other side (a form of active transport). Primary active transport directly uses the energy released during cellular metabolism.

Authors of articles published in "Britannic(e)", as a rule, are well-known specialists, therefore, in whatever relation to the public understanding of their interpretation of the subject, the attitude towards it must be professional - comprehensively justified. The quality of the shift in the understanding of transport from artificial-technical to natural-natural in the essential analysis is not so high quality. Britannica offers a different perspective, a change in subject, but not functional, orientation.

In principle, understanding the functional essence of transport, there are significantly fewer changes in the approach, although there is a correction here as well. In the traditional, "technical" interpretation, transport is exposed as a means, in Britannic (e) transport tends to be identified with the factor in the implementation of movement. More importantly, Britannic is pushing the historical horizons of transport to the biochemical level. But even in this projection of the definition of transport, the author of the article in Britannic(e) is professionally restrained. At birth. It would be quite logical to consider transport from the standpoint of physical nature, which determines the quality of the movement of matter.

As long as the understanding of transport is opposed to natural reality, natural materials and processes in the scientific research of transport are allowed in an auxiliary, rather than basic quality, the doctrine of transport risks being left without modern scientific understanding. The post-non-classical stage in the development of science is relatively young, many of its features are still in the making, but the growing importance of the effect of synergy of systemic interaction in the sciences of nature, man and society can be judged quite definitely. In this connection, dialectics again comes forward in knowledge, contrary to the desire of the designers of vocational education to push it behind the scenes of the formation of the thinking of future specialists.

There is no transport science in the official international classifications. And it is not clear what exactly it is connected with. Either it has not yet matured enough to meet all the basic requirements of the reality of science; whether its current status of development has not passed the level inherent in applied scientific knowledge obtained by using the achievements of the existing recognized sciences; or someone, in a fit of professional ambition, arbitrarily switched the arrow of transport knowledge from the path to an educational and scientific discipline to the main scientific one. A historical view of how the construction of railway transport, the undisputed

transport leader until the 1950s and 1960s, was "learned" suggests that development impulses were given from outside - from classical mechanics, physicists, metallurgists, chemists.

In a number of European countries actively embarking on the development of railway transport, Russia followed Great Britain, France, Germany, but we were the first to realize the science-intensive process, understood the significance of the scientific foundations of progress in railway construction. DI. Zhuravsky, whose thinking was formed by the outstanding mathematicians and mechanics Guryev, Bunyakovsky, Ostrogradsky, radically changed the approach to the construction of railway bridges; A.P. Borodin built in 1882 the first special locomotive scientific laboratory in Kyiv in the history of locomotive construction and operation of steam traction; NOT. Zhukovsky not only was the author of the theory of wing lift, but also made a significant contribution to the theory and its practical application in railway transport. Let us mention his articles: "On the movement of railway cars and steam locomotives on rails at the inversion", "The operation of the Russian through and American non-through traction device when starting the train from its place and at the beginning of its movement", "Traction force, travel time and tearing forces in the traction device and hitch with a broken, sharply variable profile"; N.P. Petrov deduced formulas for traction calculations. His formulas for the total specific resistance of a steam locomotive, the average working pressure of steam in the cylinders, made it possible to take steam locomotive construction under scientific control; S.P. Syromyatnikov brought, using the latest scientific discoveries, the efficiency of a steam locomotive to 10–10.5% versus 5–6%; A.N. Krylov made a practically revolution in shipbuilding due to the scientific theory of the keel and roll of the ship, etc. The revived railway transport not only required comprehensive scientific support, it also served as a locomotive, enticing scientific progress with its movement. The birth of technically space transport could not have happened before scientific thinking had matured, having reached certain conditions due to the loading with ideas, theories, methodological innovations, technical engineering solutions of "transport science". K.E. Tsiolkovsky was fascinated by the construction of airships no less than by vehicles that made it possible to successfully move in outer space, precisely because he saw the prerequisites for understanding the scientific and technical problems of space exploration in the movement and assembly of air transport vehicles. Where there is space as a problem, there are universal scientific problems of the implementation of human movement in it through technical tools. The size of outer space naturally increases the number of such problems, because the problems of travel time are added to the number of problems related to distances. Time in space is

measured by the lifetime of a person, which makes traditional transportation a meaningless technical means. There are two ways out of this impasse - to design a transport with a speed of "C", or to allow it to use "wormholes" in the structure of world space.Vehicles have learned to conquer time. Each next step on the path of transport progress was moving it into a new natural environment: earth - water - air - airless space. With the change in the "elements", the speed capabilities increased, and with them the horizons expanded, until the movement "stumbled" into the scale of deep space.

The main problemspace transport - not the acceleration of the vehicle, but the dimensions of space, measured by space units, qualitatively different from earthly, human ones. A spacecraft can serve as a passenger or controlled research vehicle only if it becomes like a physical particle with a speed of "C", or, as if a "drill" passes through the barriers of the qualitative structure of outer space, finds passages into parallel space and through it reaches the final goal, essentially reducing the time.

How feasible are these arguments? In the scientific aspect, they are consistent with the modern understanding of time, space and the movement of matter. They also do not contradict the dialectical-materialist interpretation of the structure of objective reality. There remains a scientific and technical perspective. The history of technical transport sets up an optimistic response. However, the decision of the "dispatcher" to light the "yellow" will also cause understanding. The essence of the matter, apparently, is that the technical development of transport - the current state of space is no exception, in the physical context has not yet reached those starting points from which it would be possible to start in the exploration of deep space and the universe as a whole. Separate successful experiments with the use of transport technology should not be absolutized.

The existing technical transport is built on the level of the achievements of mechanics and classical physics, which discovered the laws of the macrocosm - the world of terrestrial material phenomena. Space transport will be physically different. With certain costs, it is fair to call the current transport "mechanical", and the transport of the future - "physical". It will be built on the laws and requirements of mega and micro worlds. He will be even closer to the physical essence of nature, confirming the version that transport is not so much a means as a factor that ensures movement. An artificial mode of transport has a natural prototype, and the time will inevitably come when the "secondary" (artificially created) transport will be similar to the original one.

In both scientific and technical projects, there is an invariant frame of reference - life, health and the socio-cultural essence of a person. In the history of public transport - past, present and future - its human dimension is absolutely significant, that is, it does not allow derogations. Transport is a technical tool for the development of homo sapiens. All other manifestations of transport are also significant for us due to its systemic position in nature, but this is already an indirect connection.

The certainty of transport science should be sought in its subject basis. At one time, technical sciences in the form of an established scientific system were also absent until the 19th century; engineering was taught by "pure" physicists, chemists and mathematicians. Scientists and construction scientists needed to understand the real social scale of technology, its social and humanitarian significance. Technique from the totality of technical devices of various classes had to mature into a technical force that changes the world of human activity and the person himself. The new history of technology was a continuation of the Industrial Revolution, which established the foundations of modern production and democratic relations. Technological progress led to the development of mass production, mass production brought to the fore the development of technology and made technology an actual subject of science. In the 21st century, history repeats itself dialectically, transport again leads the social movement. Transportation science was the second plane of public awareness, while the development of vehicles remained the lot of engineering science in the 19th and most of the 20th centuries. The future of transport is at the intersection of physics and technical sciences, chemistry and technical sciences, biology and technical sciences, cultural studies and science. The role of fundamental natural science is growing in transport progress - this is how the conclusion that science is turning into a direct productive force in the development of society and the individual should be understood.

Transport science in its current form is not a phantom and not a scientific and educational discipline. Its status reflects the prevailing idea of transport. She herself realizes the transition to the science of transport, corresponding to the post-non-classical stage in the history of science. It can be interpreted as "Introduction to Engineering Science". That is why it is so important to define the concept of "transport", in its actual content. F. Engels was right in emphasizing the trend of increasing importance in scientific knowledge of methodology. V.I.'s warning also came true. Lenin that the main burden on philosophy will be in epistemology. The language of technical thinking is a drawing, the language of scientific thinking is a concept. Concepts must correspond to the actual reality and change following the expansion of the boundaries of scientific knowledge.

In the article, the authors set out: the concept of transport science, basic technical knowledge, development and types of transport, the uniqueness of

transport as a sphere of economic activity, problems of transport, the current state of development of transport in Russia, stages of development, as well as the methodology of technical and transport sciences; classical technology of research in technical sciences, methodologies of experimental research in technical sciences, in transport, including its technical operation, are considered. To achieve certain results in his research activities, the researcher must master the "secret" of the method and possess the heuristic technology of scientific thinking. In this he should be helped by the results of research, whose main task is to provide a heuristic form of cognition with a system of strictly verified and tested principles, methods, rules and norms. This system is formed on the basis of objective laws and patterns of reality.

Paradoxically, the methodology of technical sciences is poorly reflected in the specialized literature. Numerous philosophical works focused on expanding the worldview horizons touch upon its issues only in passing, limiting themselves to a historical analysis of the role of natural science in the change of epochs in the creative activity of mankind.

These studies are devoted to the history and methodology of transport science, research technologies in the interests of transport. The key stages in the formation of the Russian transport branch of transport science are given on the basis of the most important achievements of domestic transport scientists, the influence of the most successful developments on the formation of Russian transport is illustrated.

The work reflects the current state of development of transport in Russia. The goals, content, methodology and technologies of research in technical sciences are outlined, the specifics of objects and methods for studying road transport are shown.

As a peculiar form of cognition, science arose in modern times (XVI-XVII centuries) in the era of the formation of capitalist production. Since that time, science begins to develop independently. But it is constantly connected with practice, receives from it tasks and impulses for development, and, influencing the course of practical activity, is objectified, materialized in it.

Science is a form of people's spiritual activity aimed at producing knowledge about nature, society and knowledge itself, with the immediate goal of comprehending the truth and discovering objective laws based on a generalization of real facts and their relationship. Science did not exist at all times and not among all peoples.

Unlike experiential knowledge (empiricism), science is not content only with the question "what", but also asks "why". Using analysis, science moves from the "whole" to the "particular", and vice versa when applying synthesis.

Science uses induction to move from experience and observation to concepts, judgments, and conclusions, and deduction to move from the general to the particular, always testing one with the other.

At the end of the Middle Ages, the concept of "science" began to be replaced by the concept of "natural science". Since then, the possibilities of science have increased dramatically due to the fact that mathematics has become the second of the two main tools, and experiment, discovering and investigating patterns, its first tool. Even Kant judged particular sciences according to the extent to which they used mathematics.

Under the influence of experimental mathematical science, the European outlook changed and its influence on the spiritual life of other countries increased. This strengthening was especially due to the laying of a strict foundation for the technique that arose from medicine.

Further development caused a deeper division of science into specialties. The rationalism of science is based on the principle of the supremacy of reason, faith in the unlimited power of human knowledge. Having conquered science, the scientist went further and has now become the main form of education and upbringing. This turned a scientist into a specialist, and a higher educational institution into a place for training a specialist.

Scientific research is characterized by objectivity, reproducibility, evidence and accuracy. Three of its interrelated levels are distinguished: empirical, theoretical and philosophical. At the first stage, new facts of science are established and empirical regularities are formulated on the basis of their generalization. At the second level, patterns common to a given subject area are put forward and formulated, which allow explaining previously discovered facts and empirical patterns, as well as predicting and foreseeing future events and facts.

Therefore, the main components of scientific research are:

1) formulation of the problem;

2) preliminary analysis of the available information, conditions and methods for solving problems of this class;

3) formulation of initial hypotheses;

4) theoretical analysis of hypotheses;

5) planning and organization of the experiment;

6) conducting an experiment;

7) analysis and generalization of the obtained results;

8) verification of initial hypotheses based on the facts obtained;

9) the final formulation of new facts and laws, obtaining explanations or scientific predictions.

10) implementation of the obtained results in production.

For applied scientific research, an additional stage is allocated - the implementation of the results obtained in production. The structure of scientific research is determined by various combinations of the

listed stages, which can be carried out in a different order with certain repetitions and changes. In some cases, certain steps may be missing.

Classification of scientific research can be done on various grounds. The most common is the division into fundamental and applied, quantitative and qualitative, unique and complex, etc. The mutual imposition of these classifications and their more careful division give a multi-stage classification hierarchy of scientific research.

An analysis of the activities of the institute of science in modern society gives grounds to assert that its main function is the production and multiplication of reliable knowledge, which makes it possible to reveal and explain the patterns of the world around.

Mathematization of science is the basis for improving machines, tools, processes in any production, establishing patterns of interaction between elements of machines, systems, optimizing technological processes and parameters of complex objects. That is why teaching mathematics and physics should be the basis for training engineers in any industry.

Speaking about the role of transport science in the national economy, in the development of production, we emphasize its avant-garde role not only in improving the technology already created, but also in raising new issues that need to be addressed in order to move to a higher level of transport development.

Thus, the improvement of production and even mass production of well-known products is impossible without the use of knowledge contained in the theories of mechanics, chemistry, physics and other sciences.

The knowledge in question is reliable information about the creation, operation and efficiency of the entire transport system.

Scientific knowledge in relation to transport science is a special type of knowledge accumulated by the activities of special representatives of the human society of scientists and characterized, first of all, by the possibility of comparison with some reality of the development of society.

So, the system of transport science includes knowledge about the objective reality studied by technical science, but the system itself can and should be the subject of study. The science that studies it is called the methodology of science. First of all, each science has a "hard core" - reliable knowledge that has been formed over the years. Further, science consists of the "science of the cutting edge", which includes both true, not yet consolidated, and untrue, not yet dead, knowledge. The third part of science that penetrates both the "hard core" and "the science of the cutting edge" is the history of science, which is unimportant from the point of view of particular issues, but significant when it comes to generalizations.

The "hard core" of science consists of:
- factual material drawn from empirical experience;
- the results of its initial conceptual generalization in concepts and other abstractions;
- data-based problems and scientific assumptions (hypotheses);
- laws, principles and theories "growing" out of them;
- philosophical attitudes;
- sociocultural grounds;
- methods, ideals and norms of scientific knowledge;
- thinking style.

Often the structure of knowledge is considered in dynamics: "problem - hypothesis - theory".

A problem is a form of knowledge, the content of which is that which is not yet known by man, but which needs to be known. This is knowledge about ignorance, this is a process between setting and decision.

A hypothesis is a form of knowledge containing an assumption formulated on a number of facts, the true meaning of which is not defined and needs to be proven. Knowledge is probabilistic in nature and requires verification of the grounds. The advancement of a new hypothesis is based on the results of checking the old one, even if they were negative (for example, in physics, the concepts of "phlogiston", "caloric", "ether").

Theory is the most developed part of scientific knowledge, which gives a holistic display of the regular and essential connections of a certain area of reality. Any theory must meet two requirements:
1) consistency (internal and external);
2) falsifiability (providing for the possibility of refutation or experimental verification).

In addition, each theory must have the main elements:
1. Initial foundations - fundamental concepts, principles, laws, equations, axioms, etc.;
2. An idealized object is an abstract model of the essential properties and relationships of the studied subjects);
3. The logic of the theory, aimed at clarifying the structure and changing knowledge;
4. A set of laws and statements derived from the main provisions of a given theory in accordance with certain principles.

The main functions of the theory:
1. Synthetic function - combining individual knowledge into a single, integral system;
2. Explanatory function - identification of causal or other dependencies, connections of a given phenomenon;
3. Methodological function - formulation on the basis of the theory of diverse specific methods, methods and techniques for solving problems;
4. Predictive function - a function that allows

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you to evaluate the strength of the theory;

5. The practical function is the translation of the results of the theory into practice, both in terms of technology (direct production of new products) and intellectual (effective use of theory to create other theories); theory should be a guide to action.

The best theory should:

1. Communicate as much information as possible, i.e. have deeper content;

2. Possess greater explanatory and predictive power;

3. Be logically more rigorous;

4. Be more rigorously tested by comparing predicted facts with observations.

What are the criteria of scientific knowledge, its characteristic features? One of the important distinctive qualities of scientific knowledge is its systematization. It is one of the criteria of scientific character. Scientific systematization is specific. It is characterized by the desire for completeness, consistency, clear grounds for systematization. Scientific knowledge as a system has a certain structure, the elements of which are facts, laws, theories. Separate scientific disciplines are interconnected and interdependent.

The desire for validity, evidence of knowledge is an important criterion of scientific character. Justification of knowledge, bringing it into a single system has always been characteristic of science. There are different ways to justify scientific knowledge. To substantiate empirical knowledge in transport science, multiple checks, access to statistical data, etc. are used. When substantiating theoretical concepts, their consistency, compliance with empirical data, and the ability to describe and predict phenomena are checked.

The main methods of obtaining empirical knowledge in science are observation and experiment.

Observation is such a method of obtaining empirical knowledge, in which the main thing is not to make any changes in the studied reality during the study by the process of observation itself. In contrast to observation, within the framework of an experiment, the phenomenon under study is placed in special conditions. It is important to emphasize that empirical research cannot begin without a certain theoretical attitude. In the course of constructing a theory, scientists use various methods of theoretical thinking. In the course of a thought experiment, the theorist, as it were, plays out the possible behaviors of the idealized objects developed by him.

A mathematical experiment is a modern version of a thought experiment in which the possible consequences of varying conditions in a mathematical model are calculated on computers.

The methods and means used in different sciences are not the same. Differences in the methods and means used in different sciences are determined both by the specifics of subject areas and the level of development of science. However, in general, there is a constant interpenetration of methods and means of various sciences. The apparatus of mathematics is being used more and more widely.

Methods developed in one scientific area can be effectively applied in a completely different area. One of the sources of innovation in science is the transfer of methods and approaches from one scientific field to another.

The question of the structure of scientific knowledge deserves special consideration. It is necessary to distinguish three levels in it: empirical, theoretical, philosophical grounds.

At the empirical level of scientific knowledge, as a result of direct contact with reality, scientists gain knowledge about certain events, identify the properties of objects or processes of interest to them, fix relationships, and establish empirical patterns.

To clarify the specifics of theoretical knowledge, it is important to emphasize that the theory is built with a clear focus on explaining the objective reality of transport operation, describes directly real objects and is characterized by a very specific number of properties.

The theoretical level of scientific knowledge deals with the most abstract ideal objects and theories that describe a specific area of reality on the basis of fundamental theories.

The strength of a theory lies in the fact that it can develop, as it were, on its own, without direct contact with reality. Since in theory we are dealing with an intellectually controlled object, the theoretical object can, in principle, be described in any detail and obtain arbitrarily distant consequences from the initial ideas. If the original abstractions are true, then the consequences of them will be true.

The empirical and theoretical levels of scientific knowledge are organically linked. The theoretical level does not exist on its own, but is based on data from the empirical level. But it is essential that empirical knowledge is inseparable from theoretical ideas; it is necessarily immersed in a certain theoretical context.

In the history of science, there is a tendency to reduce all natural science knowledge to a single theory, to reduce it to a small number of initial fundamental principles. In the modern methodology of science, the fundamental unrealizability of such information is realized. It is connected with the fact that any scientific theory is fundamentally limited in its intensive and extensive development. A scientific theory is a system of certain abstractions, with the help of which the subordination of essential and non-essential properties of reality in a certain respect is revealed. Science must necessarily contain various systems of abstractions, which are not only not reducible to each other, but cut reality in different planes. This also applies to transport science.

Science is a system of human knowledge about

the objective laws of the development of nature and society, and at the same time it is the activity of people in the course of the development of transport science, there are four trends: accumulation, systematization and use of the knowledge gained.

Integration of science with the progress of transport technology and transport production.

There are three stages in this process:

1. In the XVII-XVIII centuries. the main functions of science are generally considered: empirical (collection, description, establishment and systematization of facts) and theoretical (explanation, generalization and forecasting of trends and patterns), and therefore, science explained only the nature of phenomena that have already found their application in transport, and therefore transport science (if we can talk about transport science in this period) lagged behind the needs of transport (water and horse-drawn).

2. The emergence of specialized transport science, which begins to "catch up" with transport production, solving problems related to the implementation of existing needs in practice. There is a separation of transport science from the production work of transport workers. Invention in transport becomes a special (specialized) type of activity.

3. At the present stage, it is no longer transport science that relies on transport production, but transport production - on transport science. And although transport production still provides transport science with both the tasks to be solved and the means of scientific work, science is ahead of production, predicts and determines its transformations. Along with the empirical and theoretical functions, the functions of searching and substantiating the ways of practical use of scientific achievements in transport are being developed.

4. This trend is manifested in such factors as the growth of the capital-labor ratio of research workers, the automation of information, computing and design work, the increase in the share of materialized labor in the costs of transport science.

At the end of the 19th century, applied (industry) transport science, and then experimental design and design development, specialized, separated from institutions of a general scientific profile. This division of labor led to an increase in its productivity, a reduction in the period separating the promotion of a scientific idea from its implementation to the period of the creative life of one generation (15–30 years).

In the 1970s, implementation was singled out as an independent sphere of application of scientific work in transport, i.e. information services for transport production, technical assistance in the installation, adjustment, operation and improvement of transport systems, consultation and retraining of personnel, transfer of experience. The costs of introducing scientific and technological achievements in transport are usually 8–10 times higher than the

costs of transport science itself. In addition, the research itself becomes more complicated and becomes more expensive. At the same time, the period of their possible use in all types of transport is sharply reduced, because the obsolescence of new technology and the revision of scientific concepts are reduced. Science ceases to be a free resource and turns into an unlimited but expensive resource.

This requires a transition in the transport industry from an extensive one (due to the creation of new scientific institutions, an increase in the number of personnel, and the involvement of resources from other industries) to the intensive development of science. The convergence of the sciences of nature (natural science) and society through their connecting link - the science of technology, including its organization (technology) in a broad sense.

It is at the junction of these two sciences that the most important discoveries occur, the application of which in transport can radically change the prevailing stereotypes.

In the economic practice of domestic transport, the experience of countries that pursued a targeted innovation policy during the 20th century, which was under continuous state protectionism, was very little used. The spread of innovations was very insignificant and, as a result, led to the formation of prerequisites for reducing the incentives for scientific research and for an innovation crisis in domestic transport.

Transport science is among the young in the spectrum of technical sciences, and transport has become its object only since the beginning of the 1930s.

Therefore, the theoretical foundations of technical sciences can be fully considered as the foundation of transport science.

Considering the development of the science of transport in relation to research for vehicles, it is necessary, first of all, to analyze their specifics, associated with their pronounced operational orientation.

When studying transport science in relation to other technical sciences, the following are distinguished:

- the purely operational goals of the research being undertaken;

- operational issues (i.e. operational coloring of the subject of study under study);

- implementation of research and innovative proposals put forward based on their results in the field of transport.

Accordingly, the studies of the transport branch of transport science determine the operational objectives, operational subjects and operational implementation of transport research. When all three characteristic elements of the methodology of the completed study are of a pronounced operational color, they speak of the operational nature of the study, whether it is a commissioned research work or

an exploratory study.

The narrow-branch differences in the transport branch of transport science are entirely limited by the specifics of the transport itself, which is studied by modern transport science. Therefore, we can only talk about the features of scientific research carried out for transport by the methods of transport science, which in turn are due to a combination of the expressed operational problems of the formed socio-economic "order" for specific operational research and the unique nature of the objects of research in transport. This combination underlies the selection of research methods most suitable for transport science, and highlights the considered transport branch of transport science.

In operational research, a number of priority areas can be identified:

1. The study of transport objects and their aspects that directly determine the results of transportation.

2. The study of changes in the operational properties and characteristics of transport objects in the process and under the influence of operation.

3. Research of management processes and functioning of technical and organizational objects, the results of which are potentially realizable in the field of road transport and only as an exception - in industries that directly serve road transport.

In the most general form, the specifics of the methodology of research on transport can be determined by the following provisions:

1. The need to justify the relevance of the study of the operational aspects of the facility in the interests of the operating industry, taking into account its capabilities to implement the expected results.

2. The focus of research is on the study of a small sample of many operated similar objects of different families, manufacturers, duration of operation.

3. The need to confirm the applicability of the results of the study to a set of the same type of operated objects that differ in the spread of properties.

4. Obligation to prepare, based on the results of the study, an innovative project proposal applicable to the entire set of the same type of operated facilities or part of it.

5. The need for an economic justification for the applicability of the project innovation proposal.

The uniqueness of the operational nature of the research object in transport was predetermined by the combination of the production of these objects outside the operating industry under study, the mass operation of hundreds of thousands of objects of the same type, their multidimensionality and a significant spread of characteristics. For the same type of vehicles, spare parts, fuel and lubricants, production and technical base, the indicated spread is significantly higher than for the same type of railway, river or air transport facilities.

Transport is an exploiting sub-industry. Without producing the necessary resources for itself, it consumes the products of other branches of industry and uses the personnel trained for it. Moreover, these industries produce and modernize these products independently, relying mainly on consumer demand, only in isolated cases and only in some respects adjusting their activities based on the results of research by operators.

The activities of transport are focused on meeting the needs for transportation and rational use of the resources consumed in this case. Accordingly, research for transport is much narrower in its goals than in other branches of technical sciences, and even research in the interests of rail or air transport.

In terms of their objectives, research for transport is limited to purely operational issues and industry-specific opportunities for this operating industry to apply the results of scientific activities. As a result, objects for research in the interests of transport are also selected based on the use of its resources for subsequent innovative transformation and taking into account the specifics of the multiplicity and multidimensional nature of these objects. Research, the results of which the transport industry is unable to implement on its own, as a rule, does not receive its long-term direct support and is curtailed regardless of the results.

In the traditional sense, the methodology of science is the doctrine of the methods and procedures of scientific activity, as well as a section of the general theory of knowledge, in particular the theory of scientific knowledge (epistemology) and the philosophy of science. Moreover, the scientific method is understood as an ordered method of cognition, research, bringing the researcher closer to the truth. The system of operations, procedures, techniques, or their description for working with technical means or data, or for establishing facts, is called a technique.

In the applied sense, the methodology of science is a system (complex, interdependent and interconnected set) of principles and approaches of research activity, on which the researcher (scientist) relies in the course of obtaining and developing knowledge within a specific natural science or technical discipline.

In this paper, the methodology of sciences is considered precisely in the applied relation, using the example of one of its branches - the methodology of transport science.

The evolutionary development of the methodology and methods of science is based on tradition, which in turn serves as the foundation. However, it is not so much the methodology of science in its applied meaning that is undergoing development, but the understanding of its applications in the ever-emerging branches of technical sciences. Replenishment of ideas about the methodology of

science and technical sciences in particular is an extremely slow process, in contrast to the replenishment of the amount of knowledge with the flow of new information that science provides. Today, the methodology of science is primarily aimed at solving such problems as:

- analysis of the structure of scientific theories and their functions;

- the concept of scientific law;

- procedures for testing, confirming and refuting scientific theories, laws and hypotheses;

- methods of scientific research;

- reconstruction of the development of scientific knowledge.

Despite the fact that methodological research is carried out on the basis of a wide variety of philosophical schools and trends, their results often do not depend on the philosophical orientation of the researcher and are of universal value.

As you know, the same term "science" refers to the totality of knowledge, and the type of activity, and the very field of scientific activity. As a field of activity, science is usually divided into fundamental and applied. Technical sciences as a whole are referred to the field of applied science.

The volume of funding for civilian scientific research in Russia as a share of GDP, and even more so in absolute terms, is less than 1% of the US figures. The object of research in the technical sciences are man-made technical objects, technologies and their properties. Technical objects are studied by technical sciences, first of all, in relation to their common fundamental aspects:

a) the purpose and effectiveness of the application;

b) structures or organizations;

c) functioning;

d) management;

e) operational properties;

f) the dynamics of health, wear, performance properties as the resource develops and aging in operation;

g) interaction with personnel and the environment.

Until the end of the 19th century, engineering and technical sciences were one and the same. The mass application of technology and industrialization led to the separation of technical sciences and the formation of engineering as a system of independent areas of activity in each of the areas of production and transport. Engineering in each of the industries has become massive. It is engineering that directs practical activity in transport. The authorities and the system of financing only regulate its balance by means of transport and territories.

Engineering (engineering) is looking for the most rational solutions within the framework of already tested, sufficiently confirmed knowledge within the limits allowed by regulatory documents. It

is the normative documents (standards, norms, instructions, SNiP, regulations, technical regulations, guidelines, administrative regulations, registers, rules, registers, charters, etc.) that accumulate knowledge about technical objects.

This knowledge is obtained by the forces of technical sciences as a result of research.

Regulatory document - an official document of the established form, designated in a certain way, approved by the authorized state body within its competence in compliance with the procedure established by law, containing generally binding (or intended for use in a certain area or conditions) norms, designed for an indefinite circle of persons and repeated application. Unlike technical literature, normative documents are a carrier of data that have passed an examination according to state-established procedures and are allowed by state authorities to be used by engineering in practical activities. The role of the state in this case is to ensure the safety of practical activity and its consequences through the adequacy of regulatory documentation.

Differences in research and design methodologies also predetermine differences in their content. In the technical sciences, it is obligatory to work out the goals of the study, while the design goals are set from the outside even before it begins. Research may not be innovative in the broad sense of the term. Research can do without experimental research, and instead of theoretical constructions, include only calculations using known methods.

The applicability and effectiveness of research is almost always limited by the number of developed options for the object, the optimality of the designed object is sought and confirmed only for certain very specific implementation conditions and only for a limited number of possible implementations and executions of the object. The applicability of research results in technical sciences is much wider and is limited only by the limits of the investigated sets of object characteristics in the studied conditions.

A theory is a set of inferences that reflects objectively existing relationships and connections in an object and between the object and the environment.

A strict formal statement of the accepted research hypothesis in technical sciences is the basis of the theoretical part of the research, in which then mathematical models, quantitative descriptions of the studied aspect of the research object are created and studied.

From the point of view of mathematicians, the formal presentation of the accepted hypothesis is just a "mathematization" of the hypothesis, but in technical sciences this "a priori" stage often requires the greatest effort and deepening in understanding the object under study.

The main goal of the absolute majority of theoretical studies is to solve the following problems:

- studying the patterns of the objects under

study;

- study of relationships in the functioning, structure, characteristics and properties of the objects under study;

- modeling of research objects, their characteristics or functioning;

- comparison of the equivalence of possible models of the object under study;

- solving problems of analysis, synthesis and optimization of the parameters of the objects under study, including new ones, synthesized or transformed. When conducting theoretical research, general logical and special methods of cognition are used, and most often in combinations. In one study, the combination of theoretical research methods is individual for each specific scientific problem and researcher. Of the general logical methods, the following methods are most often used:

- comparison - comparison of homogeneous objects according to the features that are essential for this consideration; analysis - the mental or physical division of an integral object into its constituent elements (features, properties, relationships) and the study of these parts, regardless of the whole;

- synthesis - a mental or physical connection of the constituent elements (features, properties, relationships) of an object into a single whole, taking into account knowledge about the constituent elements;

- abstraction - mental abstraction from a number of features (properties) of an object while highlighting other features (properties) that are of interest for solving a specific problem; analogy - the assumption of the similarity of certain properties of different objects based on the similarity of their other properties;

- generalization - the establishment of common features and properties of a group of objects;

- induction - the development of a general conclusion based on private premises;

- deduction - derivation of conclusions of a particular nature on the basis of general premises;

- modeling is the creation and study of a model that replaces the object under study, with the subsequent transfer of the information obtained to the original. The traditional approach to the theoretical study of a technical object, which has already become a classic, borrowed from natural science research, consists in a deterministic analytical description of the considered aspect of this object. The description is built on the basis of known fundamental regularities using the arsenal of the indicated general logical methods (abstraction, idealization, generalization, deduction, etc.) and previously accumulated knowledge about the quantitative and qualitative characteristics of the object. This approach is productive only for sufficiently studied (well-structured) objects, for example, not the most complex objects of theoretical mechanics. But for real, not yet fully studied objects,

By definition, an experiment (lat. experimentum - test, experience) is a method of cognition or a single set experience, the study of an object under controlled and controlled conditions by influencing it with other material objects with the possibility of repeatedly reproducing it when repeating the conditions of the experience. There are no purely experimental studies; in all cases, analysis, determining the goals of an experimental study, formulating a hypothesis, building a quantitative model or justifying a hypothetical expected result of an experiment are performed theoretically and precede each of the experiments. Experiment planning, comprehension and explanation of its results, development of proposals for their practical use also belong to the field of theoretical research. They are inevitably present in one form or another and in different proportions in every work, both "purely" experimental and theoretical, in every research work, or dissertation in technical sciences. After all, theoretical work is inevitably based on the results of previous experiments. In the technical sciences, experiment is of paramount importance.

Measurement - a set of operations performed to determine the quantitative value of the quantity.

The measurement transformation under the conditions of the uniqueness of the measurement equation and the possibility of the existence of its solution can be formally described in relation to the measurement of physical quantities at the macrolevel by the main measurement equation $Q = Nq$, where Q is the measured value; q is the unit of the measured value; N is a numerical value that defines the relationship between Q and q.

Measurement result error (measurement error) is the deviation of the measurement result from the true (actual) value of the measured quantity. The measurement error can be represented as the difference between the measurement result (the value of the physical quantity obtained during the measurement) and the true value of the physical quantity $N = x - Q$, where x is the measurement result (the value of the physical quantity obtained during the measurement); Q is the true value of the physical quantity.

Observations - this is the perception of information by instruments or human senses, ensuring its objectivity and controllability (including due to its repetition).

Survey - direct predominantly quantitative determination of the characteristics of the object under study with the participation or by the method of the researcher.

Tests - a technical procedure for determining one or more characteristics of technical objects in real or simulated conditions in accordance with established requirements, including through the actual application of a technical object for its intended purpose.

Statistical Research- collection and processing of statistical data on homogeneous objects, identification of statistical relationships in their structure, functioning and information exchange.

Expert research. One of the most responsible is the state forensic activity, which includes autotechnical and other engineering and transport expertise as classes.

Forensic examination- this is a study carried out on the basis of a court decision by a specialist (expert) of issues, the solution of which requires special knowledge in the field of science, technology, art, craft, carried out in the manner and within the time limits established by the current procedural regulatory legal acts.

Just as the objects of research in road transport are not homogeneous, the arsenal of methods for their study is also diverse. The objects of transport science are almost always of a multidimensional nature, borderline for different sciences and involved research methods. Therefore, unlike most other technical sciences, almost every study on transport uses the widest range of methods, both theoretical and experimental studies. This fully applies to the application of theoretical research methods in transport. The arsenal of methods for theoretical research of transport science in transport has no other significant differences.

For objects of research into the operation of road transport, a systematic approach is most often used, which is a general scientific methodology for setting tasks in the study of complex objects. In transport science, the role of the systems approach is twofold: it is not only a tool for the most general formulation of the research problem, but at the same time a means of finding the goals of the most rational and productive innovative transformation of the object under study as an improved part of transport. Classification of theoretical research methods in road transport:

a) a systematic approach;

b) statistical and probabilistic method;

c) modeling with the obligatory use of idealization and formalization methods;

d) project method.

e) abstract-logical methods of proof, analysis, synthesis, abstraction, deduction, idealization, ascent from the abstract to the concrete;

f) empirical method.

Usually, one study uses a combination of these methods. The combinations in which these methods are used in each particular study depend on its goals, object, scope, content, and on the preferences of the researcher. But the predominant application in modern transport science has received a systematic approach, a statistical and probabilistic method and modeling, if necessary, used in combination with other specified methods. Experimental studies are of particular importance for transport science.

Due to the specifics of the goals of research in transport, the multidimensionality and variability of the properties of its objects, their study without experiment, as a rule, is not carried out. It cannot be argued that theoretical studies are less significant for motor transport objects than experimental ones, but in comparison with other branches of technical sciences, their ratio in transport science in terms of novelty and volume of new results is more shifted in favor of the experiment. And it is the differences in experimental studies that determine the specifics of the methodology of transport science. The most specific for the applications of transport science in transport are operational observations, statistical studies and measurements. They are used more often than others both separately and in combination with each other and with other methods of experimental research. The same three methods are used more often than others, in particular, on the subject of transport. Research for motor transport, carried out at the intersection of technical sciences, is often carried out using highly specialized research methods unusual for transport science, borrowed from related branches of science, from metallography and gas spectroscopy to psychological tests of personnel. In transport, experimental studies, as a rule, are combined in each scientific work. For example, operational observations and automatic recording of processes are almost always combined with statistical studies and statistical processing of results, and tests with measurements. In one work, 3-5 types of experimental studies are often used in combination.

Operational Observations- a form of data collection on indicators of operation or operational functioning of transport facilities, for example, on production units of existing transport enterprises. Operational observations provide information about the performance, performance consequences, and performance properties of the item under study, including the evolution of these properties as the resource wears out. Operational observations are carried out directly on real production facilities in the process of their commercial use.

Measurements in transport research, as in other branches of technical sciences, they are most typical for the study of technical and technological objects. In the arsenal of methods of transport science, direct and indirect measurements, technical diagnostics and "diagnostic" methods of indirect assessment of the calculated parameters of the properties and states of technical objects and processes that are not available for any measurement are the most widely used. To perform measurements, both mass-produced, metrologically certified and verified universal-purpose measuring instruments, and on-board technical diagnostic tools, and new measuring installations, stands and instruments specially created for a specific study are used.

Significantly less often in the arsenal of experimental methods of transport science, surveys

are used. This is an element, first of all, of expert studies of the state of complex technical, man-machine and industrial technological and organizational objects of transport. As a rule, technical objects are examined in a static state, in a non-operating state, and man-machine and industrial technological and organizational objects - in operating modes or in both states.

Tests of new technology are within the competence of the industry. Transport on its own conducts only operational tests (including comparative operational tests) of new equipment proposed by manufacturers for their operation, including maintenance, repair and diagnostics. Their purpose is limited to obtaining estimates of the degree of applicability and efficiency of the operation of vehicles and equipment in specific operating conditions. Operational tests usually cover a significant portion of the life of the tested objects before decommissioning (or major repairs, if any), but can also be carried out in several stages for each test object, at relatively long intervals of operation. Usually, for performance tests, requirements are preliminarily developed for compliance with which they are planned to be carried out.

Automatic registration It is used in all experimental studies of relatively fast processes, processes that repeat many times, and phenomena and processes hidden from observation. For example, experimental studies of the working processes of engines, brake systems, suspension, electrical equipment and automotive electronic automatic control systems are only feasible with automatic data recording. This fully applies to experimental studies of the working processes of electric and hydraulic drives of garage equipment, painting and drying booths, their electronic components, and the functioning of modern computerized technical diagnostic tools.

Conclusion

The methodology of science is an effective tool for obtaining new knowledge. Figuratively speaking, this is the "technological core" of cognitive activity in science.

Transport science is one of the few branches of technology in which the production and operation of the equipment it uses are divided into two independent production areas with their own scientific and engineering support. Therefore, the methodology of transport science as an operational branch of technical sciences has additional specifics in relation to the specifics of the methodology of technical knowledge.

Transport science is designed not only to ensure the improvement of transport, but also to form the initial requirements and data for the innovative improvement of the products of industries serving transport. In relation to transport, these industries are transport electrical engineering and telematics,

petrochemistry and polymer chemistry, the paint and varnish industry, the production of garage equipment, technical diagnostic tools, etc.

There is no need to hope for a "miraculous transformation" in the understanding of transport and transport science. The current view of transport is rooted in the practice of economic policy, the architecture of economic planning has been laid out for it, in which transport is assigned a "working" place - to be in the "service" of production, but not the locomotive of its promotion. The history of the rise of Rome, Holland, Spain, Portugal, Britain, a little later than Germany, and the historical experience of the Russian State do not teach politicians. Even the birth of space transport has changed little in the political understanding of transport, and as long as political reflection is not built on the basis of general scientific thinking, scientific and philosophical ideas will remain wishes, but not imperatives.

The integration of economic science is realized unilaterally, it loses its specific methodological base, borrowing mathematical methods of analysis. They are certainly fruitful and no one doubts their effectiveness, however, the movement of economic science, in addition to the "quantitative" coast, also has a political one, on which the qualitative guidelines of the movement, regulated by world outlook, are built. Not transport should be subordinated to the development of the economy, but the economy should be developed on the basis of the modern understanding of transport as a system-forming factor in the movement of the world in general and social progress in particular. The history of man as a biological species and social form of human reality testifies that evolution was carried out thanks to the development of living space by mankind, moving first in physical space, and, as their own social space was formed, in it. Civilization is the product of this process. In the new millennium, the significance of space for the improvement of human life is even more relevant, therefore, no matter how high the value of social space is, it is necessary to go beyond this form and consider the problem of spatial development of the world with the help of transport, understood in a broad ideological context, as a priority in politics. And the most practical politics develop not as a systemic reaction to the action of forces from the existing reality of the world, but is built on the basis of the outstanding ability of homo sapiens consciousness to anticipate objective changes in reality. The methodology of science is an effective tool for obtaining new knowledge. Figuratively speaking, this is the "technological core" of cognitive activity in science.Transport science is one of the few branches of technology in which the production and operation of the equipment it uses are divided into two independent production areas with their own scientific and engineering support. Therefore, the methodology of transport science as an operational branch of

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In relation to transport, these industries are transport electrical engineering and telemechanics, petrochemistry and polymer chemistry, the paint and varnish industry, the production of garage equipment, technical diagnostic tools, etc.

Transport science in its current form is not a phantom and not a scientific and educational discipline. Its status reflects the prevailing idea of transport. She herself realizes the transition to the science of transport, corresponding to the post-non-classical stage in the history of science. That is why it is so important to define the concept of "transport", in its actual content. F. Engels was right in emphasizing the trend of increasing importance in scientific knowledge of methodology. V.I.'s warning also came

true. Lenin that the main burden on philosophy will be in epistemology. The language of technical thinking is a drawing, the language of scientific thinking is a concept. Concepts must correspond to the actual reality and change following the expansion of the boundaries of scientific knowledge.

The consciousness of the immensity of Russia comes into our souls also thanks to rail travel. There are countless railway specialties - heat engineering, a specialist in diesel engines, in electromotive traction, in electrical networks, in logistics, signaling, in optimal configuration of trains and control over the weight load on the track; on railway bridges, maintaining crossings in accordance with safety requirements, etc. This is by no means a complete list of those areas where there is thought, professional knowledge and the will of a travel engineer. These professions do not exist on their own. They are linked into a system of successive and complementary areas of activity, where each of them "leads his part" in the orchestra, in the beating of the pulse, in the life of the railway.

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Issue   Article

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THREATS TO INFORMATION AND COMMUNICATION TECHNOLOGIES, INFORMATION SECURITY POLICY

Abstract: The article deals with weaknesses of the object are identified, which do not provide sufficient protection by existing means of counter-impact. Thus, the design and implementation of a security system to ensure effective protection of information in a computer network should be carried out in three stages: risk analysis; implementation of the security policy; security policies.
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Introduction

Information security is a multilateral area of activity, the success of which can only bring a systematic and integrated approach.

Figure 1. Information Security Area

When developing an information security policy, first of all, the protected object and its tasks are determined. Then the degree of enemy interest in this object, possible types of attack and visible damage are assessed. Finally, the weaknesses of the object are identified, which do not provide sufficient protection by existing means of counter-impact. For effective protection, each object must be evaluated in terms of possible threats and types of attacks, the possibility of using special tools, weapons, software and hardware. At the same time, the development of a security policy should take into account issues that ensure the real protection of the permitted object.

Analysis of the above requirements shows that all of them lead to the unhindered use of information processing and transmission devices, prevention of access to information carriers and sabotage. It is advisable to organize a safety system for buildings, structures and mass media in the form of concentric rings with the location of control points when moving from one zone to another.
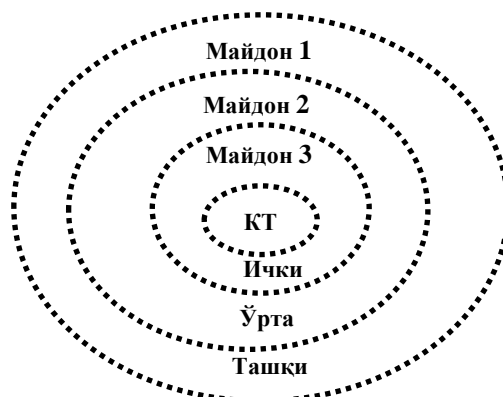
Figure 2. Computer system security system in the building

Field 1. Providing an external security zone of a computer network (CT): physical obstacles, perimeter crossings, non-automatic access control system to the territory.

Area 2. Provision of a medium CT safety zone: video recording of control points with electronic protected doors, exclusion of empty fields.

Field 3. Providing an internal security zone for CT: using a personal computer is only a biometric identification system through a control system. Figure 3 in which biometric identification of fingers, caverns, eye type, vascular marks or speech can be used. On a contractual basis, a special mode is provided for the entry of personnel serving equipment into the facility. After identification, these persons are included in the object accompanied by an observer. In addition, a clear arrival mode, spatial restriction, arrival time, and the nature of the work will be established on them.

Politics usually consists of two parts: general principles and certain rules of operation. General principles determine the approach to Internet security, the rules determine what is allowed and what is unacceptable. Rules can be supplemented with certain procedures and various instructions. Usually, the security policy regulates the use of the main network services and introduces network users to how they can use them. This, in turn, determines the user authentication process.

Thus, the design and implementation of a security system to ensure effective protection of information in a computer network should be carried out in three stages. risk analysis; implementation of the security policy;¬ security policies. At the first stage, weak elements of the computer network will be analyzed, threats identified and assessed, optimal protection tools will be selected. The risk analysis concludes with the adoption of a security policy. The second stage - the implementation of the security policy begins with the calculation of financial costs and the selection of suitable tools for resolving issues. This should take into account such factors as the biased operation of the selected funds, the reputation of the suppliers of funds, the possibility of obtaining complete information about the mechanisms of protection and the guarantees provided. In addition, principles reflecting the basic provisions on information security should be taken into account.

The third stage is the stage of degradation of security policy. The measures taken at this stage require constant control over the penetration of violators into the network, identification of violations in the information facility protection system, accounting for cases of unauthorized use of confidential information. The main responsibility for promoting network security policy lies with the ruler of the system.

To prevent possible falsifications, it is necessary not only to control the protection and use of operating systems, software, but also to identify the types of violators and the methods used by them. A genius hacker is also an adventurer, but more perfect. Based on his beliefs, he chooses certain goals - hosts and resources. His favorite type of attack will be changing the information of the Web server or, very rarely, blocking the operation of attacking resources. With regard to adventurers, hackers publish their successes to a wider audience, usually posting information at a hacker Web site or at the Usenet conference. Professional - Hackers have a clear plan of action and target specific resources. His attacks are well thought out and usually carried out in several stages. First, it collects preliminary information, that is, the type of operating system, the services provided and the protection measures applied. Then he draws up an attack plan taking into account the collected data and even develops appropriate tools. Then he makes an attack, receives secret information and, finally, destroys all traces of his actions. Such an attacker can work in professional, usually well-funded, singles or professional teams.

An unreliable employee creates a problem by his actions, which can be not only a problem, but also more. At the same time, it is difficult to determine its presence. In addition, he will have to eliminate the internal protection of the network, and not external, but only, as a rule, non-specific. However, in this case, the risk of unauthorized use of corporate data by him will be higher than any other person with violations of

intent. Violating information security, being, as a rule, a qualified specialist, computer systems and networks try to learn everything, in particular, about the means of their protection. The range of reasons for forcing unauthorized use of the system is wide enough, from excitement in playing with a computer to feeling responsible for a disgusting manager. This is done not only by entertainment lovers, but also by professional programmers. They get a password through selection, prediction, or through exchange with other hackers. Some of them not only view files, but also become interested in the content of files. This is a serious threat, since in this case it is difficult to separate the hopeless hype from the act committed by malicious intent. Rough management in the field of information security. Rough provision of information security - a set of legislative acts, regulatory legal acts, rules, instructions, manuals that must be carried out in the information system. Currently, both practical and legislative provision of information security is being actively studied. The computer can be considered as an object of aggression, as well as an aggressive tool. If the computer is only an object of aggression, the violation of the law can be assessed through existing norms. If the computer is only a tool, then there will be enough signs of "application of technical means." If distortion of information is associated with the loss of material and spiritual values, this fact is assessed as a crime. Also, if the interests of national security, authorship, criminal liability are connected with this fact, the laws of the Republic of Uzbekistan are directly provided for. Organizational and administrative support of information security. Organizational measures play an important role in creating a mechanism for reliable information protection, since the unauthorized use of confidential information is mainly related not to technical aspects, but to criminal actions, negligence, coldness and obscenity of users and personnel who ignore basic protection rules.

We are also talking about measures to protect information from violations resulting in the loss of information, as well as from the creation or destruction of information without copyright, as well as the confederation of information, the state of its carrier, and measures to prevent unauthorized familiarization with information or its unauthorized copying. In addition, the basic concepts of existing security in relation to information and their classification, information security policy, information security, information protection, classification of risks in relation to information, the model of the violator of information security, categories of violators of information security, depending on the goals and methods of preventing possible falsifications, are covered in detail.

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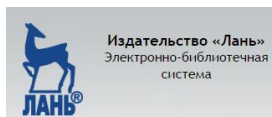
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