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STAKEHOLDER ANALYSIS ON THE REVITALIZATION OF RURAL HOMESTEAD IN CHINA

Abstract: With the acceleration of China's modernization process, the role of rural homestead in social and economic life is gradually changing from the function of security to the function of assets. It is of great significance to the research on how to make the homestead live, to excavate the property attribute of the homestead, to solve the contradiction between the supply and demand of land resource utilization in our country, and to ensure the reasonable demand for land for rapid urbanization and industrialization. Three categories of stakeholders, this paper introduces the related and analyzed its interests, and thus concluded that the advantages disadvantages in policies and regulations, and give appropriate advice.

Key words: homestead, stakeholders, interests.
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Introduction

At present, the management of rural homestead is somewhat chaotic，it violates the principle of intensive use of land resources.Because of the "bullwhip effect" of the implementation of relevant policies, there is still a phenomenon of "more than one house" in rural homestead.But the homestead lacks the reasonable circulation mechanism, the recessive circulation phenomenon is also more common (Ho P, 2001). In addition, due to the development of urbanization, many rural labor forces have transferred to non-agricultural areas and moved to cities, leaving their homestead in rural areas idle, resulting in inefficient use of land and a certain amount of waste.The Central Government No. 1 document in 2019 proposes to deepen the reform of rural land system, strive to complete the confirmation, registration and certification of homestead use right in 2020, and steadily and cautiously promote the reform of rural homestead system (Kong X et al., 2018). Now the land right confirmation work has been basically completed, how to reform and improve the rural land system, so as to further revitalize the idle rural homestead, has become an important topic to be

studied.According to the notice of the Ministry of agriculture and rural areas of the people's Republic of China on "actively and steadily carrying out the work of rural idle homestead and the activation and utilization of idle residence" put forward in October 2019, it is required to explore the activation and utilization of rural idle homestead on the basis of maintaining the legitimate rights and interests of farmers' homestead according to law and strictly regulating the management of homestead with the goal of improving the utilization rate of rural land resources and increasing farmers' income The effective ways and policy measures of land and idle housing provide strong support for stimulating rural development vitality and promoting rural revitalization.The key tasks include: selecting the reactivation mode according to local conditions, supporting the cultivation of reactivation subjects, encouraging the innovation of reactivation utilization mechanism, steadily promoting the demonstration of reactivation utilization, and standardizing the reactivation utilization behavior according to law (Bański J et al., 2010).

However, the whole rural social security system is not perfect compared with the urban social security system, so the homestead still exists mainly for the implementation of the security function, which limits the property income that farmers can obtain.In today's rapid development of urbanization on how to improve the utilization efficiency of rural land is a problem to be solved, the homestead function change can activate its value and it is worthy of research topics, so this article from the land safeguard function and property value on the choice of research of the homestead progressive revitalize, puts forward related Suggestions strategy, put forward reference for solving the problem of housing land idle path.

Ⅱ. Theoretical preparation

The research on homestead is a hot topic at home and abroad. The research on the evolution of homestead system, property right of homestead, transfer of homestead and transaction of homestead is quite sufficient. In addition, there are also studies on the influencing factors of homestead activation and how to activate it (Northam R M, 1971). However, there are still differences among scholars about the reform direction and operation mode of homestead in the future. For example, whether the homestead trading market should be opened, how to find the diversified transfer mode of homestead, and how to belong to the homestead property rights (A Pagano M and M.BowmanA, 2000). The idea of gradual activation of homestead includes three aspects. The first is to promote the improvement of property function of homestead. The second level of meaning is to adapt measures to local conditions, step by step; The meaning of the third level is to realize the trading power of homestead in the future, so as to achieve the invigorating effect (Wasilewski A, et al., 2004).

Homestead revitalization involves many stakeholders. How to achieve win-win results through appropriate policy design and management model is the purpose of this paper (ZHANG Bo et al., 2006). Rural incremental revitalize the multiple stakeholders involved in the main responsibility and behavior analysis, including farmers, pure farmers, delelopment into the city farmers and village collective organization, the grassroots government, provincial government, the central government, and the new agriculture in the body of the professional investors, family farms, farmers cooperatives, agricultural industrialization leading enterprises (Sorauf F J, 1957).

Ⅲ.Behavior analysis of key stakeholders and their interest demands

It can be seen from the above analysis that there are three types of key stakeholders, namely the central government as the subject of administrative management, the farmers as the subject of rights, and the grass-roots cadres who not only have the administrative function of implementing central policies but also represent the nature of rights owned by rural collectives.

A. Central government.

The central government is one of the key stakeholders in the homestead reform, because in the homestead reform, the central government has stood in the leading position, playing an overall and leading role; In addition, the influence of the central government on the homestead reform is often enforced through the promulgation of laws, regulations and policy documents. Therefore, the demand of the central government for homestead reform can be immediately concerned. As for the initiative, the government has stressed to comprehensively promote rural revitalization strategy, improve the level of farmers' income and life protection, and land reform is the important part in the strategy of rejuvenating the country, moreover, the homestead revitalize and bonus release do to improve the farmers' property income, and promote national economy further development, so the central government also plays a big role in land reform.

There are two opinions about the goal of the central government's decision-making behavior: one is that the goal of the central government's behavior should be to maximize the public welfare of the whole society. They believe that since the central government is the highest authority of the whole society and the natural representative of the public interests of the whole society, the central government should take the maximization of the public welfare of the whole society as its behavioral goal. The other is that the goal of the central government is to maximize its own interests. They believe that the central government is also a "rational economic man", and their actions are no exception to the pursuit of the maximization of their own interests (Zhang Y, 2018).

But, although the central government officials have their own interests more often they tend to state affairs, from farmers, agriculture and rural development and overall goal of national economy to the design of related system and reform path, relying on strong power to the government for protection, to control the process of institutional change and guide . In this study, think that the social and public interests and the national people's welfare should be the central government's main consideration, although in real life, the government to serve their country as a whole, its essence is composed, as officials of the "rational man" in the process of the exercise of power on behalf of the government will consider their own benefits in the policy, but from a macro perspective, the central government is still real social benefit maximization and the existence of social stability as the highest goal.

Faced with the goal of maximizing social benefits, the central government mainly has two choice strategies in formulating policies on homestead reform, that is, to strictly control the homestead trade or gradually relax the homestead trade policy. In the process of selection, the central government will generate the following two interest appeals:

First, political effects and social stability. The central government, as the central institution of the whole country, coordinates all the affairs of the state. In the formulation and implementation of policies, it will bring certain political influence, including political authority, political reputation and political support to the central government. In the process of land reform, for example, the early stage of the implementation of the homestead exit policy at present only in some pilot areas on a trial basis in order to guide the homestead, but has not unified, in view of the nature of the country's homestead exit policies and rules, this is because the housing land ownership stability involves until now is still the most of the peasant in our country, if any errors or contradictions in the process of implementing policy, will lead to the broad masses of farmers groups, so will no doubt to the central government's political authority and political prestige and political support very serious negative effect, and this effect cannot eliminate in the short term, Therefore, the political effect and social stability are important factors that the central government will consider in the practice of homestead reform (Shiyin C, 2007).

Second, food security and the ecological environment. In recent years, in order to vigorously develop industry and promote urbanization and promote rapid economic growth, a large number of ecological land resources have been used for industrial and urban construction. Moreover, due to the effect of environmental regulation in cities, some industrial enterprises turn to the countryside, but all kinds of wastes are directly discharged into the countryside without reasonable treatment. This series of behaviors leads to ecological and environmental problems such as reduced forest coverage, soil erosion, sandstorms, and pollution of rural water resources and land resources. According to xi's "two mountains" saying, the withdrawal of homesteads to be used as farmland or forest land to ensure food security and ecological and environmental security is also the desired outcome at the central government level.

In general, the interests of the central government are mainly concerned with the well-being of the people, improving the efficiency of the allocation of land and resources, so as to improve the efficiency of land use, ensure political stability and national security, promote economic and social development, and maintain the security of food production and the protection of the ecological environment. Therefore, the central government not only needs to maintain the existing homestead system to maintain the stability of rural society, but also needs to accelerate the process of marketization and capitalization of rural land to enhance the vitality of rural development and increase the income of farmers' land property. If the transaction control of homestead is relaxed and the marketization of rural homestead is carried out, the central government should first consider whether the free transfer of homestead will have an impact on the stability of rural society if the rural social security system is not sound enough. Second, whether the liberalization of rural homestead market will impact the state-owned construction land market, which will reduce the central government's ability to control the land valve and regulate the land market. But from the view point of the whole society public welfare maximization, under the trend of the future urban and rural integration, carry out marketization of house-site in the countryside, can reduce the land circulation of transaction cost, reduce the homestead invisible market, to achieve the optimal allocation of rural collective construction land, and enhance the vitality of rural development, reflect the homestead property dividends, thereby promoting the economic development of countryside and even the society as a whole.

B. farmers.

The farmers said that the important subjects with the right to the use of the homestead, under the current situation of rapid economic development and a large number of farmers leaving the land and the countryside, to obtain the right to trade the homestead and realize the function of the homestead property has become the appeal of these farmers, and this appeal has gradually been paid attention to by the government; And farmers until now is still the most broad groups in our country, in promoting the land in the process of the reform of the system is easy to appear "olson, the dilemma of collective action", is the result of the farmers is larger scale of the "free rider" behavior, thus it is difficult to unity for common action. In addition, the low degree of organization of farmers in China also determines that the political

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influence of farmers' interest groups is weak, so it is insufficient to promote the reform of homestead system.

Since ancient times, farmers and land have a natural connection, land is the most basic means of livelihood and production factors on which farmers rely for survival, and land rights and interests are the concentrated embodiment of farmers' fundamental interests. Homestead is the most important property of farmers. How to dispose of the right to the use of homestead, how much income can be obtained and how to guarantee the future life are also the most important things that farmers care about in the reform. Peasant groups are the promoters and beneficiaries of the reform of homestead system, and they are eager to gradually enjoy the right of income and disposal of homestead through the reform of homestead system. However, as this group is in a weak position in the whole social and political system and has weak negotiation and game ability, it needs the support and incentive from external resources.

Farmers' land transaction and exit as an important subject, their individual characteristics determine the focus will not be a political interests and the interests of the ecological security, food security and social responsibility, they pay more attention to the housing land can in trading after the earnings or can obtain compensation standard and the future security of life. In the current policies of the central government to guide the withdrawal of homesteads, the emphasis is on respecting the will of farmers, not forcing them to "go upstairs", but on protecting their basic rights and interests. Therefore, as far as farmers themselves are concerned, their strategy choices are mainly based on the economic benefits they can obtain, including the following two considerations: trade (exit) or temporary wait and see. And farmers out of house sites focus on the interests of the mainly includes the following two aspects: firstly, the primary consideration, and farmers is the land compensation standard of quitting, house-site in the countryside as a safeguard farmers' life needs of residential land, once out, face to find and establish residence problem, so in this case the general farmers tend to get as much as possible the economic compensation, in order to ensure the homestead after the life needs. If the compensation standard formulated by the government can basically meet the economic interest demand of farmers when promoting the withdrawal of homestead, then the basic conditions for promoting the withdrawal of homestead are achieved. Social security, the other is the root of the land as farmers living in the countryside, also bear the function of a certain amount of social security, if the government is just compensation should be made to exit the homestead, the farmer subsequent relocation housing (including facilities), employment, public service and the correlative need not make corresponding arrangements, farmers life to ensure there is greater

uncertainty in the future, is bound to affect the tendency of farmers in land reform or exit option.

C. Grassroots cadres:

Grassroots cadres are also key stakeholders. On the one hand, in the process of implementing the homestead system reform, grassroots cadres can obtain the local construction land index through the withdrawal of homestead to develop the local economy. In addition, as the policy implementation representative of the superior government, grassroots cadres have an undoubted influence on the homestead reform. On the other hand, grassroots cadres are not only an important link between the higher government and ordinary farmers, but also representatives of local collective organizations, representing the interests of local farmers. Therefore, their relevant interest appeals can be responded to and paid attention to by the higher organizations in a timely manner.

By the secretary of the plant within the system, such as outside the system of cadres and ordinary village cadres have the feature of double identity of grassroots cadres, it is on the one hand, the central government in the local representatives of interests and policy practitioners, belongs to the administrative subject, on the other hand, it represents the village collective organization of regular village public affairs, and to obtain relevant rights and interests of farmers is it represents as part of the rights of the subject. Around the implementation of the land policy according to experience, no matter in the earlier law and policy of land transfer and how to restrict trading, or the use of land in the current land reform and exit ways how to compensate and encourage, if hope to all the farmers initiative policy "), "but not using its right to use house sites to earn profits or take the initiative to give up on the land to the risk of losing our home security, are not realistic, at this time will need to actively cooperate with and carry out the central government issued at the grass-roots level of policy, in the reasonable and lawful manner the relationship between the farmers and the government, And to encourage farmers to cooperate with the implementation of the reform policy. For example, when implementing the homestead withdrawal policy, the grass-roots government will pay corresponding compensation to the homestead owner according to the specific local conditions at that time. In some areas (such as tianjin and chongqing, etc.), it pushes farmers to withdraw by means of replacement of housing and social security.

From the perspective of grassroots cadres, their interest appeals mainly lie in the following two aspects:

First, political promotion. The selection and appointment of local government officials mainly depend on the central government, so it is particularly important for local government officials to gain the trust and support of the central government. In order to obtain the opportunity of political promotion, local

government officials should try to cooperate with the implementation of central policies to maximize the implementation effect, or try to develop the regional economy and ensure the continuous growth of regional economy to maximize their performance. Therefore, from this perspective, the local government may transfer the withdrawn homestead index into the new index of urban construction land, which can be used to develop the local economy and meet the demand of urban construction for space. Homestead exit policy implementation needs a lot of money at the same time, one of the important cost is out of the farmer's compensation, the compensation includes not only cash compensation, also involves the losing land farmers social security, public services and employment(Macmillan DC, 2000), as a result, local governments can also through the implementation of land out of the construction land index for all or part of, through the project development or land transfer money to balance the cost of compensation for farmers, developing the economy at the same time, expand the economic dimension, taxes, increase financial income. However, local governments at all levels, as the administrative organs of the central government, need to consider the requirements of the central government for maintaining the ecological environment. As the main body of the withdrawal of homestead, local governments should also cooperate with the implementation of the follow-up policies of the central government, sorted out the abandoned homestead and restored it to cultivated land, garden land, grassland or forest land, so as to protect the local ecological environment and meet people's demand for a good living environment, so as to safeguard the interests of the central government.

Second, the pursuit of individual leisure preference, grassroots cadres as an important link between the government and farmers, playing a role in connecting the preceding and the following. While carrying out the central policy, we should also deal with farmers all year round. Due to the policy of the central government has stressed effectiveness and efficiency of "the last kilometer", and therefore to farmers by the government cadres at the grass-roots level often faces pressure at work, moreover, farmers understand the policy itself is a difficulty, so for cadres at the grass-roots level, not only propaganda work time is longer, and in order to work smoothly and continuously adjust and maintain friendly relations with farmers, overall in the working environment is relatively hard, but in this case, the economic benefits of cadres at the grass-roots level is not necessarily can have larger growth, so out of preferences and pursuit for leisure time, It is also possible for grassroots cadres to cope with central policies, thus gaining more time to relax and avoiding conflicts with farmers over the implementation of some inappropriate policies.

Therefore, the strategic choice of local government officials mainly includes the following

two aspects: first, through actively implementing the central government's policies, in order to meet the requirements of the central government to pursue political promotion and maximize their performance; Second, considering the pressure of life and work, they may also resist or adapt the central government's policies through various explicit or covert ways, that is, passively implement the central government's policies, so as to reduce the pressure at work or avoid the impact with farmers, as well as obtain more leisure benefits.

Ⅳ. results and policy recommendations

To formulate reasonable incentive and punishment measures for cadres at the grass-roots level. In order to enable grassroots cadres to actively cooperate with work, the central government should increase the punishment for grassroots cadres who fail to carry out their work as required, and also increase the reward for grassroots cadres who actively cooperate with policy implementation and achieve work results, and make it greater than the leisure benefits grassroots cadres can obtain when they passively treat their work. According to the reality, facing compared to grassroots cadres working environment and working pressure and the current lack of incentive for its wages actually deeper effect, so as to make the grassroots of the existence of difficult to implement the policy of the phenomenon of negative confrontation, in the penalty at the same time, more should consider is how to improve the level of motivation.

Formulate reasonable incentive and punishment measures for farmers. Reasonable exit rewards and compensation and questionable transactions fines is also one of the key factors that affect farmers decision-making, policy implementers should be undertaken before the compensation standard and policy fully research, understand the different parts of the level of economic development, urban real estate transactions, different location of different use value, etc., for house sites in different parts of the exit or formulate corresponding compensation scheme, satisfy farmers expect of land income, housing, medical treatment, after the withdrawal homestead farmers old-age security problems such as life. Rewards and punishment will and compensation standard, according to the actual situation to set reasonable limits, to can not only meet the incentive and guide farmers to actively participate in land reform, to revitalize the need of the policy implementation, and to consider the bear ability of the government, as far as possible the government's policy to reduce costs, improve administrative efficiency, guarantee efficient and orderly implementation of land reform policies, for rural economic development. In this paper, the central government, grassroots cadres and farmers in the interests of an agreement to choice of the strategy, has experienced a complex game process, the government needs to provide a certain amount of

reward and compensation funds to guide farmers involved in land deal, that is to make the central government to adopt strategies gradually relax and grassroots cadres actively implement the policy, farmers choose deals, including government compensation benefits greater than the peasant households choosing on expectations of future earnings, then reached their expected income of farmers will be decided to participate in the homestead transactions. Through the role of resource allocation in the market, the main body of land use can obtain the right of land management through trade with farmers, and cooperate with farmers to form a community of interests, which can promote the economical and intensive use of land, and the local government can also obtain better economic development benefits. The role of the central government in this process mainly lies in the fact that by gradual deregulation policy, to "demand-supply" equilibrium and construction land index management mode innovation provides a certain space, make the homestead back room index can be used for urban construction land expansion, and thus access to land dividends, give local governments to actively implement the central policies, promote the power of land reform work(Davis J, et al., 2000).

We will strengthen the standardized management of the rural construction land market and limit the life and use of rural land circulation. Under the condition that the scope of transfer of homestead is gradually relaxed, the government should crack down on the illegal trade of homestead and control the amount of legal trade, so as to maintain the stability of the countryside and even the whole society, and reduce the social unrest cost caused by the gradual liberalization of homestead trade. At the same time, we should standardize the use of land circulation, promote the efficient and intensive use of land, and promote the full release of dividends from the reform of homestead. Homestead policy itself plays a crucial role in maintaining the stability of rural areas and even the whole society. China clearly stipulates that homestead can only be transferred and traded within the village collective organization, especially restricting non-agricultural urban population to purchase homestead in rural areas(Bittner C, et al.,2013). Through the reform and revitalization of homestead, the government hopes to sort out abandoned rural land and centralize land management, improve land use efficiency, and improve local economic and ecological development. Illegal trade in homestead or improper use after trade will bring obstacles to government control of land(Wanyi Z, 2014). For example, if the homestead after the transaction is used as the new construction land, it will not only fail to release the effective land use space, but also lead to the increase of the later withdrawal cost due to the further development and construction of the homestead, which is not conducive to the land consolidation and development. Therefore, on the basis of determining the right of homestead, the government should establish a standardized trading place, provide an information circulation platform and improve the trading process. Relevant laws should be formulated to protect the rights and interests of both parties and reasonable tax measures should be formulated to regulate the trading and use of homestead. For the illegal homestead trading behavior, the government should seriously investigate and punish, improve the relevant laws and regulations, give certain punishment to the illegal trading behavior, as far as possible to prevent the occurrence of this situation.

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ISSUES OF MODERNIZATION OF THE GRODNO ELECTRICAL SUBSTATION 110/10(6) kV «ZANEMANSKAYA»

Abstract: This article is intended to consider current equipment, namely, power transformers used in the operation of the 110/10(6) kV Zanemanskaya electrical substation. This issue is necessary for consideration during the planned modernization of the aforementioned substation.
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ВОПРОСЫ МОДЕРНИЗАЦИИ ГРОДНЕНСКОЙ ЭЛЕКТРИЧЕСКОЙ ПОДСТАНЦИИ 110/10(6) кВ «ЗАНЕМАНСКАЯ»

Аннотация: Данная статья направлены для рассмотрения текущего оборудования, а именно, силовых трансформаторов, используемых при работе электрической подстанции 110/10(6) кВ «Занеманская». Этот вопрос является необходимым для рассмотрения при проведении запланированной модернизации вышеупомянутой подстанции.
Ключевые слова: подстанция, электричество, модернизация.

Введение

История человечества неразделимо связана с историей изобретения новых методов преобразования энергии, а также с освоением ее новых источников, что в конечном итоге привело к значительному энергопотреблению в современном мире.

На данный момент энергетика является основой для обеспечения развития научно-технического прогресса, и интенсификации производства, тем самым повышая ее эффективность. Также энергетика является базой для развития всех отраслей промышленности, реально показывающих прогресс общественного производства. Следует отметить, что во всех промышленно развитых странах темпы развития энергетики всегда опережали темпы развития любых других отраслей.

Специфической особенностью электроэнергетики является то, что не существует возможности накопления ее продукции для последующего использования, поэтому производство электрической энергии напрямую соответствует потребляемому количеству и по объемам, с учетом потерь, и во времени. Данная особенность является предметов исследований

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ученых, так как решение данного вопроса привело бы к серьезному упрощению электрических систем.

Электрическая энергия в промышленности используется как для приведения в действие различных механизмов, так и непосредственно в технологических процессах разного рода. Большое количество данного типа энергии потребляется электрифицированным железнодорожным транспортом, что дает человеку ряд преимуществ, начиная от повышения пропускной способности дорог и заканчивая повышением денежной экономии за передвижение на значительные расстояния. Электрическая энергия в быту является основой обеспечения комфортабельности жизни людей. Уровень развития электроэнергетики напрямую отражает уровень развития производительных сил человечества.

Электроэнергетическая система Республики Беларусь представляет собой развивающуюся высокоавтоматизированную систему электрических сетей и станций, которые объединены общим режимом работы и единым централизованным диспетчерским управлением. Весь потенциал белорусской электрической системы представлен 22 крупными электростанциями, а также около 7 тысяч километров системообразующих и почти 250 тысяч километров распределительных линий электропередач высокого напряжения.

Одной из основных составных частей электроэнергетической системы являются электрические подстанции.

Подстанция «Занеманская» напряжением 110/10(6) кВ предназначена для электроснабжения части коммунально-бытовых потребителей Октябрьского района города Гродно, а также таких производственных объектов, как предприятие «Конте» и табачная фабрика. Намеченная реконструкция данной подстанции приведет к оптимизации ее рабочей мощности, что даст возможность для рационального использования вырабатываемой энергии, а также ввода к питанию новых потребителей и увеличению потребления мощностей, как рядовыми бытовыми потребителями, так и производственными объектами, что даст потенциал для их дальнейшего развития.

Питание подстанции планируется производить по ответвлению от воздушных линий 110 кВ подстанция Южная – подстанция Фолюш по старой схеме присоединения. Модернизации подлежит внутренняя схема электрических соединений. В частности, планируется замена трансформаторов.

Пропускная способность дорог позволяет доставить крупногабаритное оборудование на подстанцию.

В настоящий момент на подстанции 110 кВ «Занеманская» установлены два силовых трансформатора: 1) напряжением 110/10/6 кВ, мощностью 25 МВА с выключателем в цепи 110 кВ; 2) напряжением 110/35/6 кВ, мощностью 16 МВА с выключателем в цепи 110 кВ. Питание потребителей производится от трех секций шин: две секции по 6 кВ и 10 кВ питается от первого трансформатора, третья секция 6 кВ – от второго трансформатора. Вывод 35 кВ у второго трансформатора не используется, оборудование от него отключено.

Трансформаторы – это сердце любой подстанции. Вопрос модернизации невозможно обойти без рассмотрения ее текущего оборудования. Установленные силовые трансформаторы отражают роль подстанции в энергетической системе.

Первым является трансформатор ТРДН-25000/110 (рис.1) – силовой масляный трехфазный двухобмоточный трансформатор с регулированием напряжения под нагрузкой и системой охлаждения «Д», предназначенный для работы в электрических сетях общего назначения 110 кВ. Данное устройство применяется для преобразования электрической энергии переменного тока класса напряжения 110 кВ в электрическую энергию класса напряжения 6 или 10 кВ низшего напряжения. Трансформатор рассчитан на работу в районах с умеренным климатом на открытом воздухе.

Рисунок 1 – Трансформатор ТРДН-25000/110 на ПС-110 «Занеманская».

Общие технические характеристики трансформаторов ТРДН-25000/110 приведены в таблице1.

Таблица 1. Технические характеристики трансформаторов ТРДН-25000/110

Номинальная мощность трансформатора, кВА	25000
Схема и группа соединения обмоток	Yн/Δ-Δ-11-11
Напряжение на стороне ВН, кВ	115
Напряжение на стороне НН, кВ	11(6,3)
Напряжение короткого замыкания (ВН-НН), %	10,5
Ступени регулирования РПН в нейтрали ВН	±9×1,78%
Потери короткого замыкания, кВт	120
Ток холостого хода, %	0,5
Потери холостого хода, кВт	22
Коэффициент трансформации	600-400-300-200/5А
Полная масса, кг	49 200
Габаритные размеры: длина (L)х ширина(B)х высота (H), мм	5960 x 4300 x 5380
Полный срок службы, лет	25

Данный трансформатор имеет остов с трехстержневой шихтованной магнитной системой, собранной из листов холоднокатаной электротехнической стали. Обмотки из медного провода цилиндрические, размещены на стержнях остова концентрически. Линейные и нейтральный вводы ВН снабжены трансформаторами тока. Система охлаждения трансформатора имеет четыре радиатора. Бак трансформатора колокольного типа с нижним разъемом снабжается арматурой для заливки, отбора проб, слива и фильтрации масла, подключения системы охлаждения и вакуум-насоса. Регулирование напряжения под нагрузкой осуществляется переключающим устройством в нейтрали обмотки

ВН в пределах ±9×1,78% номинального напряжения.

Вторым силовым трансформатор является масляный трехфазный трехобмоточный типа ТДТН-16000/110 (рис.2), который предназначен для преобразования электрической энергии переменного тока класса напряжения 110 кВ в электрическую энергию класса напряжения 35 кВ среднего напряжения и класса напряжения 6 или 10 кВ низшего напряжения.

Рисунок 2 – Трансформатор ТДТН-16000/110 на ПС-110 «Занеманская».

Общие технические характеристики трансформаторов ТРДН-25000/110 приведены в таблице2.

Таблица 2. Технические характеристики трансформаторов ТДТН-16000/110

Номинальная мощность трансформатора, кВА	16000
Схема и группа соединения обмоток	$Y_н/Y_н/\Delta$ -0-11
Напряжение на стороне ВН, кВ	115
Напряжение на стороне СН, кВ	38,5
Напряжение на стороне НН, кВ	11(6,6)
Напряжение короткого замыкания (ВН-НН), %	17,5
Напряжение короткого замыкания (ВН-СН), %	10,5
Напряжение короткого замыкания (СН-НН), %	6,6
Ступени регулирования РПН в нейтрали ВН	±4×2,52%
Потери короткого замыкания, кВт	100
Ток холостого хода, %	0,6
Потери холостого хода, кВт	19
Полная масса, кг	45 500
Габаритные размеры: длина (L)х ширина(В)х высота (Н), мм	6340 x 4230 x 5390
Полный срок службы, лет	25

Трансформатор имеет остов с трехстержневой шихтованной магнитной системой, собранной из листов холоднокатаной электротехнической стали. Обмотки алюминиевого провода, цилиндрические, размещены на стержнях остова концентрически. Линейные вводы ВН, СН, нейтральный ввод ВН снабжены трансформаторами тока. Система охлаждения трансформатора обеспечивает работу с помощью радиаторов. Бак трансформатора с

верхним разъемом снабжается арматурой для заливки, отбора проб, слива и фильтрации масла, подключения системы охлаждения и вакуумного насоса. Регулирование напряжения под нагрузкой (РПН) осуществляется переключающим устройством в нейтрали обмотки ВН в пределах ±9×1,78% номинального напряжения. Трансформатор изготовляется: без устройств перекатки; с устройствами перекатки - поворотными каретками с ребордой. Колея для продольного перемещения 1524 мм, для поперечного - 2000 мм.

В данной работе было рассмотрено оборудование, а именно силовые трансформаторы, использующиеся в данный момент на гродненской подстанции 110/10(6) кВ «Занеманская». Данное изучение было проведено в целях ознакомления со старым оборудованием, которое необходимо обновить согласно программе модернизации.

Изучение старого оборудование помогает точнее разобрать роль и значение рассматриваемой подстанции, что даст неоценимую помощь при проведении реконструкции.

Необходимо отметить, что физическая и моральная старость всего оборудования, в частности рассмотренного, и вызывает необходимость проведения мероприятий по модернизации ПС-110 «Занеманская».

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OYBEK'S POETRY THROUGH ANALYSES OF REPRESENTATIVES OF OYBEK STUDIES SCHOOL

Abstract: *The present article reveals the peculiar style of Oybek, the representative of Uzbek poetry. The scientist and researchers' views have thoroughly examined in the paper. The author approached to the analyses of critics and the followers of Oybek studies in elucidating the rich content of Oybek's poetry. The impressiveness and the imaginative character of Oybek's poetry are deeply studied.*

Key words: *skill, Oybek studies, word, critics, image, Obek's poetry, character, social environment*

Language: *English*

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Introduction

The unique writer, poet and historian Oybek has made a great contribution to the development of Uzbek literature of the 20th century. He is not only a great writer, but a poet of delicate taste, who has a great talent to ornate the feelings in a poem like pearls in a necklace. Oybek's poetry, with its diversity, takes its own place in Uzbek literature. The inimitableness of his style is also reflected in the poems. He describes the feeling and state so delicately that the reader strives to preserve the feelings of a lyric hero, which, undoubtedly, exposes the perfection of the image. One of his first poems is "The Sound of Music". The researchers of Oybek studies Bakhtiyor Nazarov and Naim Karimov claim that the first poems of Oybek are hard to think of as poetry, the content of his initial poems urged people to be compassionate to nature and animals, which gradually are growing. In the collection of poems 'Chimiyon Book" he mentioned that he was born again as a true poet [1,228].

The study of Oybek poetry by literary critics is as diverse and varied as his poetry. Matyakub Kushjonov carefully studied the work of Oybek, and it will be right, if we say that he analyzed more the poetic works of the writer.

If we first consider Oybek's poetry based on the study of Khomil Yakubov, who analyzed his writings from the point of view of his time, we should pay attention to the fact that he examined Oybek's poetry in the years of his studying at technical secondary school. Analyzing his poems, the poet says that his creation reflects a pessimistic spirit and narrow personal feelings. The following poem illustrates this idea:

Rangpar bo'ydoq yigitcha,
Yashardi xayollarning,
Falsafiy shamollarning
Qanotlarida ikki....[7,10]
(Red-faced single man,
With his dreams
Of the philosophical winds
On the wings two…)

Khamil Yakubov asserted that the poems included in the first collection of Oybek's poems "Feelings" were also of pessimistic character. Oybek's poem "Who owns the earth", written in 1925, devoted to the innovations in the water and land resources, where he cursed the "owls" plaguing the peasant's labour:

Yer ustida oqdi ko'p qon,
Ko'p bukchaydi mazlum dehqon.
Va bir to'da, boyqushlardi-
Yerda yayrab qanot qoqqan [7,12].
(A lot of blood flowing over the earth,
An oppressed peasant was hunching much,
While there was a bunch of owls,

Who freely straighten the wings.)

From the analyses it is clear that the critic was unable to express his true thoughts in the poem and had to express it in such a way. That is, he had to adapt to the social environment of that time.

In fact, Khamil Yakubov has not been able to portray the oppressors that have plagued the lives of the poor peasants, and to say that the owls depict the riches, who do not appreciate the work of peasants. As he analyzes this poem, the writer expresses his joy in welcoming the land allotting to peasants:

Parchalandi u tuzilish,
Yuzin ochdi tekis turmush.
Ezilganlar endi yo'qdir,
Ustingizda dahshatli musht[7,12].
(That system was broken,
The life became free,
The oppressed no longer exist,
A terrible fist on you.)

As a continuation of our above comments, if Khamil Yakubov's book were written during the period of independence, the critic would have analyzed the fact that the land could be used and that the farmer was always crushed, and the terrible fist could tell the truth.

He points out that Oybek had grown up slowly as a poet. He cites the following: " The collection of poems "Feelings of Oybek", "Melodies of mind", "Torture" by Oybek had been published. The poems, included in these collections, show that the young poet indefatigably propels forward and strives to the sunshine"[7,6].

The critic then gave the examples that Oybek poems acquired the optimistic character, his views on the life had changed, which was seen in the poems, his struggle for life determined his position:

Kurashadi ikki to'lqin,
        Qarab turaymi?
Yosh tarixning temir qo'lin-
        Ketga buraymi?
Yo'q...bolg'alar, o'roq safi
        ila boraman.
Yong'in, kurash, janglar sari
        Ko'krak ochaman.
(Two waves are fighting,
        Will I wait?
The Iron Hand of Young History
        Should I turn back?
No…hammer, sickle row
         I will go with you.
Fire, fighting, battles,
         I open my chest to you.)

His lyrical poetry grows and glorifies peoples' love for life and free life:

Bir o'lkaki, tuprog'ida oltin gullaydi,
Bir o'lkaki, qishlarida shivirlar bahor.
Bir o'lkaki, sal ko'rmasa, quyosh sog'inar,
Bir o'lkaki, g'ayratidan asabi chaqnar.
Baxt toshini chaqib, bunda kuch guvillaydi.

(A country that thrives on its soil with gold,
In one country, where spring whispers in winter.
A country that, if does not see a little, will miss the sun,
A country where the zeal of the lightning flashes.
A power in the striking sound of the stone of happiness.)

Analyzing the poetry of Oybek, Khamil Yakubov focuses on the poet's personality and mentality, on growing feelings and perceptions, on occasionally changing social influences, on revealing the character of a lyric hero. Later, as Oybek's poetry becomes sublime, so did the thoughts of the critic.

The development of Oybek studies cannot be imagined without Naim Karimov. In his opinion, after Chulpan Oybek revealed that the finger metre had a great importance towards aruz. He enriched the Uzbek poetry with musical- rhythmic tones and turned into the language with delicate ornaments. He revealed the spiritual world of a lyric hero with so many poetic and artistic means that it became clear that the poet learnt not only from Chulpan, but also Pushkin in expressing a series of lyrical feelings and experiences" [2,6].The critic sees Oybek's poetry in colors. The profoundness, the virginity, brilliance and the extraordinary elegance of the poetic language have become the peculiar features of Oybek's poetry:

Sen g'urubning oltin qo'llaridasan,
Tabassuming, Quyosh, so'nar ohista.
Dala va qirlardan tiniqlik uchar,
Suvlar oynasiga shom qora surkar,
Xayolning men sokin cho'llarida
(You are in the golden hands of the sunset,
Your smile, the Sun is fading slowly.
The tranquility comes from the steeppes and hills,
The twilight turns dark the mirrors of the waters,
In the quiet desert of my mind.)

In his view, Oybek describes this sunset in fine paints in the poem. Critics say that Oybek does not resort to blatant words and colorful paintings, judging the creation of human images. The critic says that the poem by Oybek, written in 1931 to his late mother: "this poem, composed of 14 points, should be called a poem" [2,6], which is shown in the following lines:

Qahraton qish....Sovuq....Titrar qo'llaring....
Tutolmas ignani...O'lik bir kecha
Iliq nafaslari so'ngan tangacha
Yotqizgach bizlarni, ochib kitobing-
O'qirding ichingda....
(Cold winter… Cold…Hands shiver with cold…
Needle cannot be held… A dead in the night
Until the warm breaths are fading
After putting us in bed, opening the book
You were reading to yourself…)

He skillfully expressed the mother's portrayal which is impossible to depict in the poem due to the space and time.

Thus, Oybek was able to depict the symbol of a mother in one poem. The poem by Oybek "Remembering the mother" was highly appreciated by the critic. He claimed that this is a sample of a lyric epic poem in the style of Oybek. The critic enriches his views with Khamid Olimjon's description: "It is necessary to say that Khalim Olimjon calls his friend a poet in the prose, and prose writer in the poetry"[2,8].

The creator of Ferghana School of Literary Criticism Yuldash Solijonov, a critic of his own words and style, studied Oybek's works with scrupulosity. The scientist highly appreciates Oybek's creating portrait and clear images. He called Oybek an innovator who took prose to the level of lyrical poetry, a psychologist who penetrated the heart, the master of the poetic image that penetrates the delicate strings of the heart[6].

A.Sabrdinov is one of the scientists who carefully studied Oybek's creativity. He has done research work on "Word and image in Oybek poetry". At the same time, the monographs and manuals "Studying Oybek's life and creativity in 5th and 9th grades", "Studying Oybek's life and creativity in school" were published. "Oybek Musa Tashmuhammad's son lived and worked in difficult times. Naturally, his works have the influence of the historical period, the socio-political and spiritual environment of that period. Oybek is not only a great writer, but his beautiful poetry also occupies a place in the treasury of Uzbek literature"[5,4].

He carefully analyzes Oybek's poetic skills. The scientist considers Oybek's inimitable skill in the use of specific words. The idea of Oybek's poetry, word and portrait, landscape image, role of word in image representation are analyzed on the examples of the combination of words and tone. Referring to the portrait of the girl in the poem "The Victim of Love", we see that the poet used eyelashes to portray the beauty of the girl, or in the poem "Mashrab" he used the artwork to illustrate his appearance, and through depiction of the appearance we can also see the scenes of that period.

Sochlari patila, ko'zlari maxmur,
Ko'zlarda sachraydi qora, kuchli nur.
Saraton quyoshi, qish izg'irini
Ishlamish yuzlarning ma'no, sirini..
Davlati-qalb she'ri va eski tanbur.
Kulohdan toshardi jingalak sochi,
Mag'rur va ko'rkamdi har qachon boshi.
Tashir ham qish, ham yoz bir qo'sqi pustin,
(Unda qolmagandir yamoqsiz o'rin)
Belida kattakon bir nosqovog'i[5,10].
(The hair is shaggy, eyes are bulging,
Black, strong light scattering in the eyes.
Summer sun, winter storm
Making the secret and sense of the faces.
The state is the poetry of the heart and the old tanbur.

Curly hair beside the ears,
Proud and beautiful is head.
Winters and summers in one coat,
(Not a place for patches there)
And a large tobacco pouch on the waist.)
The scientist claims that through the image of Mashrab he is referring to his wandering life and the fact that he can walk on the thorns as on the weeds. Analyzing the Oybek's poetry, he says that the poetry of the 30s is more of a psychological character, and that of the 60s is more devoted to external events. Akbarali Sabirdinov says that impressiveness in Oybek's poetry has grown and can provide with the national charm[4]. The scientist's dissertation for the degree of Candidate of Philology "Word and image in Oybek's poetry," also contains an inexhaustible features, which were not analyzed before. In the dissertation the structure of his poems, thoughts, feelings and music in Oybek's poetry, national and artistic features are revealed.

Ulugbek Khamdam, a brilliant representative of the literature of the independence period, is also one of the authors who contributed to the Oybek Studies School. In 1997 he conducted a research on the topic "The problem of pure lyricism in Uzbek poetry of 30s" (on the example of Oybek poetry). The researcher Bakhtiyor Nazarov asserted that the critical works by Naim Karimov, Ozod Sharafiddinov and Ibrahim Gafurov revealed the matter of the "pure lyrics" not so profoundly and aimed at uncovering the essence and meaning of "pure lyricism" in Oybek's poetry.

The scientific novelty of the research is also the fact that Oybek's "pure lyric" was specifically studied. The aim is to observe Oybek's poetry of 30s as an aesthetic phenomenon rather than as a work of social influence. At the same time, the researcher's conclusion that the poetry cannot be completely free from social life is true. According to the researcher, poetry always brings joy and sadness. The result of the feelings can be ended in full satisfaction. "This poem begins with sorrow and ends in grief. However, from the wild rocks a basket of white flowers can grow":

Tog'lar havosining feruzasidan
Mayin tovlanadi butun niholi
Vahshiy qoyalarning ajib ijodi:
Yuksakda raqs etar bir tup na'matak,
Quyoshga bir savat gul tutib xursand!
From the turquoise of the mountain air
Softly the sprout displays with colours
Amazing creature of the wild cliffs:
A brier is dancing on high,
Happy to hold a basket of flowers to the Sun!
The poet is, in fact, a rare work of the world, like a brier. He was also born on a rocky crag, suffering from pain…... finally he gave a basket of white flowers to the Sun as if giving the bunch of delicate feelings to the world"[3].

The researcher takes a new approach to the analysis of Oybek's poem "Brier rose" and shows

himself as a brier rose. And the white flower is the creation of a stone. He thinks the beauty of the flower was due to the atrocities of the rock. What a beautiful analysis…

In our opinion, "Brier rose" is the best example of Oybek's poetry. It is our duty to seek beauty only from this poem. Not objecting to the above mentioned Ulugbek Khamdam's comments, "This poem begins with sorrow and ends in grief" we are giving our own analyses:

Nafis chayqaladi bir tup na'matak
Yuksakda, shamolning belanchagida.
Quyoshga ko'tarib bir savat oq gul,
Viqor-la o'shshaygan qoya labida.
(A delicate shake of a brier rose
On the high, in the swing of the wind.
A basket of white flowers in the sun,
On the lips of the rock, drooping.)

The brier rose is a wild thorny bush. The wind is also cold. Nevertheless, the poet begins the poem in a positive mood through the description of the swinging brier rose. In order to provide the wind with the positive quality the poet put the cradle sacred for our mothers, associating a brier rose in the swing of the wind with swinging cradle. Though situated on a rock surrounded by dignity, it is not satisfied with it and strives for greater heights, that is, gift her beauty to the sun. It is the eternal complexity and tenderness of the human heart.

Nafis chayqaladi bir tup na'matak..
Mayin raqsiga hech qoniqmas ko'ngil,
Vahshiy toshlarga ham u berar fusun.
So'nmaydi yuzida yorqin tabassum,
(Delicately is shaking a bush…
Not satisfying with the soft dance,
And it gives the fowls to the wild stones.
With a smile on its face,)

He describes the bush in such a way that even the most sensitive creature cannot be satisfied with its dance. Though the hard stones under the feet, the face kept smiling. In this case, we can say that the poet points to the idea that we should not break the people's heart.

Yonoqlarni tutib oltin bo'sa-chun
Quyoshga tutadi bir savat oq gul!

Poyida yig'laydi kumush qor yum-yum.
Nafis chayqaladi bir tup na'matak....
Giving the golden kiss on the cheeks
A basket of white flowers to the Sun!
Silver snow is crying at the feet.
Delicately is shaking the brier.

The human heart always seeks for good, when it holds its cheeks like gold in the sun, holds his tender feelings above the human, when a basket of white flowers is given to the Sun, in order to please the people there are a thousand of people.

Shamol injularni separ chashmadak,
Boshida bir savat oq yulduz-chechak,
Nozik salomlari naqadar ma'sum!
Tog'lar havosining feruzasidan
(The wind is spreading the pearls as the flowers,
A basket of white stars on the head,
How delicate greetings are!
From the turquoise of the mountain air.)

The wind scatters the pearls, as a drop of water, with a basket of white star-shaped flowers, the human tries to nourish from the beauty of nature. The delicate greetings are the wonders of nature.

The displaying with different colours of the sprout is a man's value to the creatures of the world, a wonderful creation of the wild cliffs is the appreciation of human power and self-awareness, dancing high and with the joy of flowering in the sun. The poem is perfectly finished with a glimpse of the superiority of the human heart, and the beauty of the victory is not lost.

In the results of the dissertation of Ulugbek Khamdam the 30 years of Oybek's poetry can be called art, while in the poetry after 40s the social spirit prevails. The first reason of the impressiveness of Oybek's poetry is the description of the scenes of the nature; while the second reason is that that the other creators could not freely create the works on different themes.

Oybek's poetry is one ocean; the critics' analyses are on the shores of the ocean. As deep and enigmatic the ocean bottom is, so is Oybek's creativity. We believe that the new generation of researchers will find a way to uncover the mysteries of the ocean.

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ASSESSMENT OF THE ADEQUACY OF THE ANESTHETIC AID FOR LOWER LIMB OPERATIONS

Abstract: On the basis of carried out comparative analysis the author considers that lidocaine spinal anesthesia in combination with hydrochloride morphine in the dose of 0,07-0,08 mg proved to be the method of choice of anesthesiology preparation in traumatic and orthopedic operations; it provides good analgesia and hemodynamic stability in adequate independent breathing of patient during the operation for the account of subarachnoid component as well as smooth early postoperative period with adequate analgesic component for the account of local anesthetic in combin

Key words: Spinal anesthesia, analgesia, lower limbs, pelvis area, MVL in the elders, traumatic orthopedic operations.

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ОЦЕНКА АДЕКВАТНОСТИ АНЕСТЕЗИОЛОГИЧЕСКОГО ПОСОБИЯ ПРИ ОПЕРАЦИЯХ НА НИЖНИХ КОНЕЧНОСТЯХ

Аннотация: На основании проведенного сравнительного анализа автор полагает, что методом выбора анестезиологического пособия при травматических и ортопедических операциях является спинальная ане-

стезия лидокаином в сочетании с гидрохлоридом морфина в дозе 0,07-0,08 мг, которая обеспечивает хорошую анальгезию и стабильность гемодинамики при адекватном самостоятельном дыхании больного во время операции за счет субарахноидального компонента, а также стабильное течение раннего послеоперационного периода с адекватным анальгетическим компонентом за счет местного анестетика в комбинации с наркотическим анальгетиком.

Ключевые слова: Спинальная анестезия, аналгезия, нижние конечности, области таза, ИВЛ у пожилых, травматические ортопедические операции.

Введение

В последнее время расширяются показания для оперативных вмешательств у травматологических больных (ТБ) в раннем постшоковом периоде. В частности, устранение функционирующих очагов патологического процесса путем остеосинтеза костей и других хирургических операций становится необходимым условием, определяющим успех дальнейшего лечения травматической болезни. В первые сутки после операции пациенты испытывают интенсивный болевой синдром, сопровождающийся эмоциональным дис-комфортом, гемодинамическими и респираторны-ми нарушениями [5, 10, 11]. В связи с этим адекватность раннего послеоперационного обезболивания связывают со снижением общего числа осложнений, как в раннем, так и в позднем послеоперационном периоде.

При некоторых обстоятельствах, характерных для экстренного контингента больных значительно повышается риск осложнений анестезии, который даже может превышать анестезиологический риск самой операции [4,9,12]. Поэтому в последние годы анестезиологии при операциях на органах малого таза и нижних конечностях отдают предпочтение регионарной анестезии [2,7, 3, 14]. Возможности современной анестезиологии, техническое и медикаментозное обеспечение, совершенствование современной регионарной анестезии (РА) позволяют в той или иной мере решать эти проблемы ТБ [13].

Цель: сравнительная оценка методов общей и регионарной анестезии при операциях по поводу травм области таза и нижних конечностей.

Материалы и методы.

Исследования выполнялись у 101 больного, находивщихся в отделении травматологии АФ РНЦЭМП в период с 2008 по 2015г. Больным проводились травматологические операции в области таза и нижних конечностей.

Среди оперированных преобладали лица пожилого и старческого возраста (от 61 года до 78 лет – 54,9%, возрастная группа от 36 до 60 лет составила 40,7%). Пациенты молодого возраста (от 21 года до 35 лет) встречались всего в 4,4% случаев от общего числа.

Большинство пациентов имели сопутствующую соматическую патологию. Наиболее часто встречались заболевания сердечно-сосудистой системы: ИБС (18), атеросклеротический кардиосклероз, постинфарктный кардиосклероз (8), нарушения ритма у

13 больных, гипертоническая болезнь у 45 больных. 17 человек страдали хроническими обструктивными заболеваниями легких: бронхиальной астмой, эмфиземой, пневмосклерозом. У некоторых пациентов была и такая патология, как ожирение, ревматоидный полиартрит, сахарный диабет, анемия.

Все пациенты в предоперационном периоде были обследованы и условно разделены на 4 группы.

В 1-группе (27 больных) использовали многокомпонентную эндотрахеальную анестезию: индукция фентанил, барбитураты в общепринятых расчетных дозах. Поддержание анестезии: седуксен — 0,3—0,6 мг/кг (10—20 мг), фентанил — 4—6 мкг/кг (0,005% от 10 до 16 мл), дроперидол (0,25% от 6 до 13 мл), кетамин 1—3 мг/кг (100—150 мг). Миоплегию осуществляли ардуаном 0,06—0,1 мг/кг (от 6 до 10 мг). Вентиляцию проводили смесью 0_2:N_2O = 1:2. По окончании оперативного вмешательства проводили вентиляцию до восстановления самостоятельного адекватного дыхания и про-буждения. С целью послеоперационного обезболивания парентерально вводили 2% промедол - 20 мг, кетонал - 30 мг, 1% димедрол - 10 мг, седуксен - 10 мг.

Пациенты 2-й группы (16 больных) были оперированы в условиях эпидуральной анестезии (пункция эпидурального пространства на уровне L_{II}-L_{III}, L_{IV}-L_V, одноразовыми наборами "Portex" G18 с последующей катетеризацией эпидураль-ного пространства в краниальном направлении на 4 см). Тест-доза — 2% лидокаин — 5 мл (100 мг). В качестве основного анестетика использовали амидные анестетики: бупивакаин 0,5% раствор в дозе 100 мг. В раннем послеоперационном периоде обезболивание достигалось эпидуральным введением 5 мл (25 мг) 0,5% рас-твора бупивакаина через катетер.

Пациентам 3-й группы (36 больных) оперативное вмешательство было выполнено в условиях субарахноидальной анестезии. Люмбальную пункцию выполняли на уровне L_{III} - L_{IV} иглой "Portex" G-22-25. Интратекально использовали 0,5% бупивакаин спинальный — 3—4 мл (15—20 мг). Адекватный спинальный

блок развивался через 5—8 мин. С целью обезболивания в послеоперационном периоде применяли методики парентерального введения наркотических анальгетиков в комбинации с НПВС, антигистаминными, седативными препаратами (2% промедол — 1 мл (20 мг), кеторол — 30 мг, 1% димедрол — 1 мл (10 мг), седуксен — 10 мг).

В 4-ю группу (22 больных) вошли пациенты, оперированные в условиях спинальной анестезии, - лидокаин в сочетании с гидрохлоридом морфина в дозе 0,07-0,08мг, (наркотический анальгетик с целью потенцирования анальгетического эффекта местного анестетика).

При необходимости и потребности в дополнительных средствах для обезболивания использовали препараты для седации у пациентов (2—4-я группы). Адекватность интраоперационной анестезии оценивали с помощью комплекса клинических критериев и мониторинга систолического (АДсист), диастолического (АДдиаст), среднего (АДср) артериального давления, по изменению частоты сердечных сокращений (ЧСС), пульсоксиметрия (S_PO_2), термометрии.

Все больные после операции поступали в отделение послеоперационной реанимации и находились под динамическим мониторингом. Оценку состояния больных и качества послеоперационного обезболивания осуществляли с помощью комплекса клинических критериев и мониторинга уровня сознания. Уровень седации оценивали по шкале седации Ramsay: I уровень — пациент взволнован, нетерпелив; II уровень — пациент бодрствует, спокоен, ориентирован, сотрудничает с врачом; III уровень — пациент в сознании, но реагирует только на команды; IV уровень — пациент дремлет, но реагирует на прикосновение или громкий звук; V уровень — больной спит, медленно и вяло реагирует на тактильные стимулы или громкий звук; VI уровень — спит и не реагирует на раздражители. Об интенсивности послеоперационной боли в динамике судили по шкале вербальных оценок (ШВО): 0 — боли нет;

1 — слабая боль при движении, в покое отсутствует; 2 балла — умеренная боль при движениях, слабая в покое; 3 балла — сильная боль при движении, умеренная в покое; 4 балла — нестерпимая боль [6].

Все вышеперечисленные показатели фиксировались накануне операции (I этап), во время анестезии (II этап), в начале операции (III этап), во время выполнения основного этапа операции (IV этап), по окончании операции (V этап).

Результаты исследований и их обсуждение. Метод общей анестезии как анестезиологическое пособие больным 1-й группы применяли в тех случаях, когда проводниковые методы были противопоказаны. Опасности и осложнения общей анестезии с ИВЛ у пациентов пожилого и старческого возраста общеизвестны и ограничивают возможности выбора данного метода анестезии у пациентов старших возрастных групп и соматически отягощенных пациентов. В таблице 1 представлены показатели гемодинамики на этапах оперативного вмешательства у больных 1-й группы. У пациентов отмечалась относительно стабильная гемодинамика до основного этапа операции. Однако в основном этапе операции наблюдалось статистически значимое, по сравнению с исходным состоянием, снижение АДсист со 141±3,41 до 92±4,24 мм рт. ст. и урежение ЧСС с 82±3,43 до 68±3,13 в 1 мин вплоть до окончания операции. Изменения в сторону улучшения сатурации кислорода не носили достоверного характера. Главными недостатками общей анестезии у больных этой категории являются: значительное угнетение гемодинамики и выраженный болевой синдром на фоне постнаркозной седации в раннем послеоперационном периоде. Купирование выраженного болевого синдрома осуществлялось введением наркотических анальгетиков и препаратов других групп, что требовало обязательного мониторинга дыхания и гемодинамики.

Таблица 1. Показатели гемодинамики на этапах эндотрахеальной анестезии у пациентов 1-й группы (М±m).

Показатель	I этап	II этап	III этап	IV этап	V этап
АДсист мм.рт.ст	141 ±3,41	132±3,23	124±3,11	92±4,24*	97±3,42*
АДдиас мм.рт.ст	89±2,62	72±2,21	73±2,24	59±2,35*	54±2,13*
АДср. мм.рт.ст	104±3,33	92±3,21	90±3,15	70±3,25*	68±2,75*
ЧСС уд/мин	82±3,43	76±2,32	72±3,65	68±3,13*	63±2,14*
SpO_2	94±1,63	96±0,81	96±0,72	96±0,84	96±0,42

ЧДДмин	14±0,12	13±0,41	13±0,92	12±0,53	14±0,32
Обём внутривенной инфузии, мл					3,150±311
кровопотеря					155±4,12
Диурез,мл/ч					42±4,12

Примечание. - *р < 0,05 по сравнению с исходными показателями.

У пациентов 2-й группы, оперированных в условиях эпидуральной блокады, через 5-7 мин появлялось общее беспокойство, возбуждение. В связи с этим возникала необходимость внутривенного добавления кетамина, фентанила, дормикума. На фоне дополнительного введения препаратов для анестезии наблюдались статистически достоверные изменения гемодинамики с тенденцией к относительной гипотензии на всех этапах операции.

В результате введения препаратов центрального действия и углубления анестезии у 2 пациентов старшей возрастной группы развились нарушения дыхания, которые потребовали интубации трахеи и проведения ИВЛ. К концу интраоперационного периода гипотензия становилась выраженной (табл. 2). Изменения гемодинамики купировали увеличением скорости инфузионной терапии и введения вазоконстрикторов.

Таблица 2. Показатели гемодинамики на этапах эпидуральной анестезии у пациентов 2-й группы (M±m).

Показатель	I этап	II этап	III этап	IV этап	V этап
АД$_{СИСТ}$ мм.рт.ст	144 ±3,24	123±3,32*	124±3,36*	104±3,46*	87±3,72*
АД$_{ДИАС}$ мм.рт.ст	87±2,42	70±1,84*	71±2,37*	55±2,26*	48±2,31*
АДср. мм.рт.ст	106±3,81	87±3,05*	88±3,82*	71±3,79*	61±3,49*
ЧСС уд/мин	82±3,74	71±3,42*	68±2,63*	76±2,85*	64±2,62*
SpO$_2$	94±1,12	96±0,73	96±0,92	94±1,34	96±0,83
ЧДДмин	14±0,43	15±0,16	12±1,21	11±0,31	11±0,93
Объём внутривенной инфузии, мл					3,900±194
кровопотеря					112±4,12
Диурез,мл/ч					46±4,23

Примечание. - *р < 0,05 по сравнению с исходными показателями.

Нарастающая гипотензия через 6-8 ч применения седативных препаратов и анальгетиков также требовала увеличения объема инфузионно-трансфузионной терапии. У части больных наблюдались явления дискомфорта и диспепсии.

У всех больных 3-й группы на всех этапах операции сохранялся адекватный сенсорно-моторный блок, не требовавший дополнительного введения анальгетиков. Гемодинамические показатели были достаточно стабильными,

дыхательных нарушений не наблюдалось. С целью обеспечения комфорта проводили седацию дормикумом, общий расход которого не превышал 5 мг за операцию. Интраоперационный период протекал при относительно стабильных показателях гемодинамики, но так же, как и в других группах, наблюдались значимое снижение показателей артериального давления и урежение частоты сердечных сокращений и брадикардия (табл. 3).

Таблица 3. Показатели гемодинамики на этапах спинальной анестезии у пациентов 3-й группы (М±m).

Показатель	I	II	II	IV	V
АД$_{сист}$ мм.рт.ст	139 ±3,21	125±3,25	122±2,43*	118±3,38*	81±3,83*
АД$_{диас}$ мм.рт.ст	82±3,62	74±2,27	67±3,82*	68±2,77*	56±2,64*
АД$_{ср.}$ мм.рт.ст	101±2,89	91±2,68	85±3,12*	84±2,36*	64±2,64*
ЧСС уд/мин	78±3,44	71±3,34	68±3,24*	68±3,35*	59±3,31*
SpO$_2$	94±0,16	96±0,37	96±0,21	96±0,62	95±0,16
ЧДДмин	14±0,28	16±0,65	14±0,41	13±0,74	16±0,37
Обём внутривенной инфузии, мл					3,600±240
кровопотеря					116±11
Диурез,мл/ч					43±3,66

Примечание. - $^*p < 0,05$ по сравнению с исходными показателями.

Анальгезия при применении субарахноидальной анестезии на всех этапах операции была достаточной, но после операции болевой синдром у больных этой группы был выраженным. Лечение осуществлялось точно так же, как и в 1-й группе, — наркотическими и ненаркотическими анальгетиками в общепринятых дозах. Обеспечить адекватную послеоперационную анальгезию было достаточно сложно.

Пациентам 4-й группы проводили спинальную анестезию лидокаином в сочетании с гидрохлоридом морфина в дозе 0,07-0,08 мг (наркотический анальгетик с целью потенцирования анальгетического эффекта местного анестетика). При этом спинальный компонент предназначался для интраоперационного периода, а наркотический аналгетик - для послеоперационной анальгезии. В данной группе не наблюдалось технических трудностей в проведении метода. Спинальный блок развивался и протекал подобно тому, что имел место у пациентов 3-й группы, не требовалось потенцирования, с целью создания комфорта больным на интраоперационном этапе проводили лишь внутривенную поверхностную седацию дормикумом, расход которого не превышал 5 мг. Гемодинамические показатели также характеризовались снижением АД и ЧСС, оставаясь стабильными в течение всей операции (табл. 4). Стабильность гемодинамических показателей позволила снизить объем интраоперационной инфузионной терапии, исключить из ее состава коллоиды.

Таблица 4. Показатели гемодинамики на этапах спинальной анестезии морфином пациентов 4-й группы (М±m).

Показатель	I	II	II	IV	V
АД$_{сист}$ мм.рт.ст	152 ±3,84	133±3,82*	122±3,34*	121±1,23*	122±2,35*
АД$_{диас}$ мм.рт.ст	88±3,73	73±3,84*	64±3,64*	62±3,55*	66±3,14*
АД$_{ср.}$ мм.рт.ст	109±3,24	93±3,31*	83±3,95*	81±2,35*	84±3,24*
ЧСС уд/мин	81±3,95	78±3,22	73±3,61*	71±3,42*	72±2,56*
SpO$_2$	94±1,52	96±0,87	97±0,63*	97±0,52*	97±0,63*
ЧДДмин	14±0,38	14±0,25	14±0,32	14±0,16	13±0,34
КЩР: pH				7,39	7,42
pCO$_2$				38	37
pO$_2$				82	84
Обём внутривенной инфузии, мл					1,820±117
кровопотеря					111±12
Диурез,мл/ч					44±2,97

Примечание. - $^*p < 0,05$ по сравнению с исходными показателями.

Наиболее адекватным методом послеоперационного обезболивания зарекомендовал себя метод, использованный у пациентов 4-й группы (табл. 5). Однократное введение лидокаина (2мг/кг) в сочетании с морфином (0,07-0,08 мг) обеспечивало быстро развивающуюся, адекватную, продолжительную 24-72 ч. анальгезию без угнетения гемодинамики. Дыхание и SpO_2 были адекватными, пациенты пребывали в поверхностной седации (уровень II), в состоянии эмоционального покоя и комфорта.

Таблица 5. Показатели гемодинамики в раннем послеоперационном периоде (М±m)

Показатель	2-я группа	3-я группа	4-я группа
АД$_{СИСТ}$ мм.рт.ст	102 ±3,72	98 ±3,62*	119 ±33,84
АД$_{ДИАС}$ мм.рт.ст	55±2,85	58±2,56	83±2,22
АДср. мм.рт.ст	70±3,25	71±3,05	95±3,83
ЧСС уд/мин	78±3,94	90±4,82*	64±3,62
ЧДДмин	14±2,36	13±3,23	13±2,64
SpO$_2$	94±1,32	92±1,81	94±1,61
Степень седации	II	IV	II
Кратность введения анальгетика	1 - 2 раза анестетик через эпидуральный катетер	2-3 раза внутримышечно	однократно
ШВО, баллы	1-2	2-3	0-1

Примечание: *$p < 0,05$ по сравнению со 2-й группой,*
**$p < 0,05$ по сравнению с 3-й группой*

Проведенные исследования показали, что комбинированная общая анестезия не обеспечивает стабильности гемодинамики во время операции, особенно в момент основного этапа операции. Общая анестезия относительно противопоказана больным с выраженной сопутствующей патологией сердечно-сосудистой и дыхательной систем, имеет такие недостатки в раннем послеоперационном периоде, как посленаркозная депрессия и выраженный болевой синдром. Многие авторы говорят о явном преимуществе при операциях на нижних конечностях региональных методов анестезии [6,7].

Эпидуральная анестезия обладает недостаточным обезболивающим интраоперационным эффектом в силу особенностей иннервации коленного сустава и неодинакового действия местного анестетика на различные типы чувствительных волокон (А, В и С) крупных нервов L_v—S_I и S_{II} [1, 8].

В целом этот вид анестезии достаточно эффективный, но требует добавления седативных препаратов. Субарахноидальная (спинальная) анестезия обеспечивает адекватную анальгезию в период операции, но не в ближайшем послеоперационном периоде. Для купирования послеоперационной боли требуется применение анальгетиков (наркотических и НПВС), которые могут вызвать у пациентов преклонного возраста нарушения дыхания и гемодинамики. Однократное введение лидокаина (2мг/кг) в сочетании с морфином (0,08-0,1 мг/кг) при спинальной анестезии в большинстве случаев отвечала всем требованиям адекватного обезболивания интра- и послеоперационного периода, не сопровождалась существенными гемоди-намичсскими нарушениями, болевой синдром в послеоперационном периоде либо отсутствовал, либо был незначительным. Продленная аналгезия является эффективным методом купирования острой боли после операции с низким риском развития побочных эффектов и высоким качеством обезболивания. Эта методика абсолютно показана у пациентов с высоким риском развития сердечно-сосудистых осложнений после травматичных ортопедических операций [1, 5].

С целью улучшения качества послеоперационного обезболивания без увеличения частоты побочных эффектов к местным анестетикам оправдано добавление опиоидных анальгетиков. В таблице 5 представлена сравнительная оценка показателей гемодинамики у пациентов обследованных групп в раннем послеоперационном периоде, из которой видно, что у больных после спинальной анестезии

отмечаются статистически достоверно более выраженные гипотензия и снижение Sp0₂, по сравнению с эпидуральной и спинальной - лидокаин в сочетании с гидрохлоридом морфина - анестезией.

У больных после эпидуральной анестезии отмечается выраженная седация (уровень IV), связанная с продленным действием введенных для интраоперационного потенцирования препаратов. Наиболее благоприятные показатели гемодинамики отмечены у пациентов 4-й группы на фоне седации II уровня.

Заключение

На основании проведенного сравнительного анализа мы полагаем, что методом выбора анесте-зиологического пособия при травматичных ортопедических операциях является спинальная анестезия лидокаином в сочетании с гидрохлоридом морфина в дозе 0,07-0,08 мг, которая обеспечивает хорошую анальгезию и стабильность гемодинамики при адекватном самостоятельном дыхании больного во время операции за счет субарахноидального компонента, а также стабильное течение раннего послеоперационного периода с адекватным анальгетическим компонентом за счет местного анестетика в комбинации с наркотическим анальгетиком.

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EXPRESSION OF THE MODUS BY PARALINGUISTIC MEANS

Abstract: This article is dedicated to illuminating the ways of expressing modus with the help of paralinguistic means in communication. Moreover, the role and functions of the nonverbal modus in the speech process are also examined in the article.

Key words: language functions, representative, appellative, expressive, modality, subjective attitude, nonverbal modus, paralinguistic means.

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Introduction

From ancient times, language has become an integral part of society. The phenomenon of language, which is considered as a means of communication between people, is being studied today by connecting such concepts as consciousness and thought, folk culture, personality and society, human psychology. In this case, the connection of the language with other spheres imposes on it many more tasks, in addition to communication.

In linguistics, the term *language function* is used in relation to the phenomenon that determines the functions and importance of language. In many scientific literatures, language function is understood as the result of the interaction of people by means of verbal means, as well as the exchange of information that occurs as a result of communication. It is also recognized separately that language acts as a fictional sign in the human mind. [3, 24 c.] German linguist and psychologist Karl Buhler who studied the process of speech on a semantic level, argued that the language performs representative, appellative and expressive [3, 24 c.] functions during speech activity. According to the theories of structural linguistics, the elements that make up a word, a part of the language system, are called signs. In order for the linguistic element to have the "character status" [3, 24 c.], it is necessary that it can enter into a semantic-syntactic connection in the process of exchanging information with such components of speech as a speaker, listener and subject, phenomenon. And in the connection in which it is formed, the language interprets a message through the sign (imagination) with a nominative character about a subject or phenomenon and performs a representative task in this way; with the help of the built-in relationship between the speaker and the sign, the speaker expresses his inner feelings, as a result of which, with the help of linguistic means, an expressive function is performed; when the character is expressed in the form of an address to the listener, the appellative function is performed in the language. Since the classification of language functions of Karl Bühler is based on the realized connection between the components of speech and sign, some linguists describe the term language function as "relationship", which is formed by language. It turns out that through the introduction of the language into the "relationship" [5] with the components of speech, the meaning in speech in the form of a message, an emotion and an appeal finds its expression. Also, when the above-mentioned functions are performed, not only the message about the subject in the language, the emotions of the speaker and the speaker's address to the listener find their expression, but they also reflect objective and subjective relation to objective world, people, things and phenomena. Through speech,

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objective and subjective relations expressed in relation to the external world and people are summarized in the science of linguistics in the name of modality.

Materials and Methods

Modality as a phenomenon with a relational basis is divided into objective and subjective ones. The objective modality is applied to information based on facts and phrases having a neutral coloring of the content. This type of relation is mainly inherent in the representative function of speech. The term representativity in linguistics means "to be a full-fledged representative of someone or something, as well as to be expressed in the case of choosing one of the common, wide-coverage characteristics"[4]. The essence of the term representativity is directly related to the denotative structure of the word. Any word in the language consists of a certain denotative structure. Therefore, the concept, which expresses the term representativity, must logically acquire the same status as a denotative structure. By pronouncing a word, its lexical meaning is represented in consciousness, i.e.- understood, imagined. By this feature, the fact that it has a denotative meaning itself expresses the essence of the representative function. And the appellative [9] and expressive [4] functions of the linguistic means acquire a subjective modal meaning due to the fact that the speaker is associated with the speech activity of the subject and his

emotions. From the above it is known that during the implementation of appellative or expressive functions through speech there is a pragmatic connection between the content of the syntactic unit and the speaker. This manifests not only person's subjective positive or negative attitudes, views, emotions, but also it reflects the culture of the people to whom the speaker belongs.

Subjective modality reflects the speaker's personal attitude towards the meaning of the sentence or the objective universe. In modern linguistics, this type of modality is denoted by the term modus. Till present, many scientific studies have been carried out within the framework of the concept of modus. In most scientific studies performed in World linguistics, the expression of the phenomenon of modus through linguistic means has been studied to a different extent. In particular, we can see that issues related to the history and general theory of the concept of modus[1], the phenomenon of modus can be expressed in semantic[2], grammatical levels[3] within the framework of the text and studied from the point of view of artistic theories[4]. Despite the fact that significant work has been done in the area of research involving the modus phenomenon, the issue of the fact that modus meanings can be expressed not only through linguistic means, but also through the use of paratil and extralinguistic means remains aside from the point of view of researchers. Also, the issue of the division of the modus phenomenon into types, like any

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phenomena that exist in the language system, has not yet been sufficiently recognized in scientific research. Hence, it remains one of the pressing problems of the sphere to pay attention to the fact that the modular meaning in speech is expressed both within the framework of speech and in the study of the composition of the text by linguistic means, as well as by paralinguistic means. Thus, according to the criteria of the means by which the subject expresses the relationship, the phenomenon of modus is divided into external or internal, linguistic or non-linguistic types.

Paralinguistics as a new direction in linguistics appeared in the first half of the twentieth century. The field of paralinguistics is engaged in the research of non-verbal means, which complement verbal speech, provide interpretation, transmit a certain level of information, serve to express an opinion. Despite the fact that the functions and object of this sphere are clear, it still does not have a universal basis. Till present, different views on this issue have been put forward by scientists of linguistics. Some Russian linguists [7] claim that phonological means enter the sphere of paralinguistics. In the scientific literature, two different types of paralinguistic means are distinguished. The first group of them is made up of phonational means. They are described as paralinguistic means, which are put on top of the segments of speech [1, 8]. And the second group of paralinguistic means is gestures and mimics. Thus, paralinguistic means are non-verbal components that compensate for linguistic means in the process of communication, give additional meaning to the lexical meanings of words, they cannot completely compensate for the place of verbal means. They include phonological instruments, gestures, body movements, mimics associated with the pronunciation of units, such as speech speed, tempo, rhythm, tone, intonation.

In the process of communication, if one of the main tasks of the language is to learn what the word is going about, it is learned how this speech is spoken in the paralinguistic aspect. It basically studies articulation, melody, height, speed, mimics, gestures and movements of speech. In addition to speech-related information, paralinguistic means carry in themselves certain information about the person who uses them. For example, only one speed of speech can tell which continent or nation a person is a representative of. "Language owners who belong to the Indo-European language families are considered the fastest speaking nations in the world. Nations that belong to the Indo-European language family have the ability to pronounce from 200 to 500 syllables within a minute" [10]. The goal of high-speed speaking is to express one's own opinion in a short time to the extent that the content is completed, understandable and at the same time in accordance with the rules of speech etiquette. The speed of speech is positively assessed by society. But this is not an absolute case. That is, in some nations, it is not acceptable to speak quickly. In particular, speaking very quickly according to the etiquette of communication in the Uzbek people is a sign of haste, dullness. Also, speaking without hurry means respect, expressed in relation to his interlocutor. Hence, the paralinguistic means are the means by which speech is monitored, along with the phonological features of speech, also reflect some information about the speaker and sometimes the speaker's attitude to the interlocutor.

Also, paralinguistic means can express the mood of the speaker, the attitude that is formed due to this state, the modus, not less than linguistic means. There are cases when a person cannot manage, cannot cope with communication, directly expose a person's feelings, his mental state. This is automatically formed as a subjective attitude of the human mind with respect to the situation. In oral speech, such a relationship is manifested by the behavior of a person, his sign, "in written speech is expressed with the help of certain linguistic units. So, in each language there are a number of verbs that denote gestures, they are referred to as sign verbs by semantics" [8, 10].

Бу гапдан кейин Анварнинг кўзларига инсоф нури қайтиб, юзига қизиллик югурди. (Тоҳир Малик. Шайтанат. 22 б.) (After this sentence, the light of mercy returned to Anwar's eyes, and **redness ran to his face**. (Takhir Malik. The Devilhood. p22.)

Лаблари титради. Бинойи кийинган, хушсурат бу йигит кириб келганида табиббошининг тош юраги юмшаган эди. Бу қора йигит кўзларини сал сузиб қараса, унча мунча аёл зоти дош беролмай қоларди. Олти йилдан бери беваликнинг тахир ошидан безган табиббоши учун биргина шундай қараш етарли эди. Аммо "Асадбекнинг истаги билан келдим", деган гапдан баданига муз югурди. ... Рангининг бўзаргани, лабларининг титраши газабдан эмас, қўрқувдан эди. (Тоҳир Малик. Шайтанат 17 бет.) (The color of the healer **was pale**. **His lips shook**. **The stone heart of the healer was softened** when this well-dressed, good-looking young man came in. If this black guy flirted a little, a woman could not stand. For the healer, who has been tired of widowhood for six years, such a look was enough. But from the saying "I came with Asadbek's desire," **ice ran on his body.** ... The paleness of his face, the trembling of his lips were not from anger, but from fear. (Takhir Malik. The Devilhood. p17)

The modus of joy is represented by a verb that points to *юзига қизиллик югурди (redness ran to his face)*. And the feeling of fear is manifested with the help of such expressions as *ранги бўзарди (pale)*, *лаблари титради (lips shook)*. In the text, they are observed as a modus in relation to the mentioned sentence or event. Joy, fear moduses are manifested in each person in different ways. *Eyes piercing, lips*

trembling, falling sound timbre when speaking, body shaking, head twisting are in the list.

Одамлар ажратмаганда бу хотин мулла Норқўзини ғажиб ташлар эди. Мулла Норқўзи, оғзини ушлаганча четланди. Хотини эшик ёнида деворга суянганича турар, ранги мурданикидай, ўзи қалтирар эди. (А.Қаҳҳор. Майиз емаган хотин. 36 б.) (*If the people did not separate, this wife would gnaw the mullah Norkozi. Mullah Norkozi was expelled while holding his mouth. His wife was standing next to the door leaning against the wall, pale, and trembling.* (A. Kakhor. The woman who did not eat raisins. p36.)

When describing the emotive modus, in artistic texts, the linguistic and paralinguistic types of modus are used. In the example presented above, one can see a change in the attitude of the physician to Elchin. The positive attitude that appeared when he first saw Elchin was given by the fact that the phrase *тош юраги юмшаган эди (stone heart was softened)* was used in the past tense, the phrase *баданига муз югурди (ice floated on his body)* to express the fear that arose when he knew that he was the man of Asadbek. The repetition of the phrases of he was *ранги бўзарди* (pale), *лаблари титради* (his lips shook) at the beginning and in the middle of the paragraph, as well as the completion of the paragraph with the word of fear serves to more brightly describe the modus of fear. This means that the use of both linguistic and paralinguistic means in texts of the artistic genre contributes to a more pronounced expression of the inner senses of the personages and modus as a reaction to these senses. In the text, modular meanings are united under a single purpose, they serve to uncover the idea of the text, to realize the author's intent in the text. It also plays an equally important role in the linguistic modus, as well as in the paralinguistic modus.

In the effective completion of communication, it is very important for participants to express their relationship with the help of such paralinguistic tools as mimics, gestures and kinetics.

Кумринисо Собирахонга кўз қисиб:

- Ўйин-кулгумизнинг боши Бахрихоннинг тўйи бўлади, - деди. (А.Қаҳҳор. Хотинлар. 92 б.) (Kumriniso winked at Sobirakhon: "The head of our entertainment, Bakhrikhon, will get married soon", she said. (A. Kakhor. The *women.* p92))

Хотинининг чеҳраси очилиб кетди-да, бурилиб кетар экан, қизларга хос шўхлик билан айланиб, деди:

- Бир нарсангизни бузиб қўйдим, айтсам уришмайсизми? ... (А.Қаҳҳор. Майиз емаган хотин. 35 б.)

(His wife's mood boosted up, he said, turning around with the girls' typical flair:

- I broke something, if I say, will not you scold at me? ... (A. Kakhor. The woman who did not eat raisins. p35))

Hence, the fact that a person has a positive or negative attitude is a decisive factor in the continuation or completion of speech activity. We can also see how much a personal relationship plays a big role in the process of speech activity when it comes to the inclusion of symbolic signs, smileys, photos, etc., which are available in mobile and electronic communication exchange tools such as SMS, chat, messengers. How important is the smile, facial expression, body movements during the exchange of direct communication, in the process of virtual communication, these symbolic signs also occupy such an important place.

Summary

Thus, paralinguistic means "make speech more compact, perform the function of speech compensation". Most importantly, they represent a person's attitude towards the object world, the context in which he is the subject of speech, which in linguistics is called non-verbal modus. Non-verbal modus serves to open the character of the heroes, at the same time, to ensure the colorfulness of the artistic text with its appellative, expressive and representative functions.

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STRAIN INTENSITY OF THE STEEL PIPE UNDER THE ACTION OF EXTERNAL TENSILE, COMPRESSIVE AND COMBINED LOADS

Abstract: *Comparison of stress state of the steel pipe under the action of constant pressure applied to the outer and inner cylindrical surfaces (separately and simultaneously) was performed in the article. The values of the steel strain intensity coefficient were calculated at the ratio of D/d=0.7 (the inner diameter of the pipe to the outer diameter).*

Key words: *the pipe, pressure, stress, strain, material.*
Language: *English*
Citation: Chemezov, D., et al. (2020). Strain intensity of the steel pipe under the action of external tensile, compressive and combined loads. *ISJ Theoretical & Applied Science, 02 (82),* 30-35.

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Introduction

The pipes are used in various industries (moving liquid and gaseous substances over the certain distance, torque transmission and material saving in mechanics, etc.). The pipe material under the action of various loads (including combined loads) is subjected to compression, tensile, bending, torsion [1-10], etc. Since the pipe in the cross section has the ring shape, it is necessary to enter the ratio of the inner diameter to the outer diameter for the calculations.

Let us consider the process of fluid flow under pressure in the cylindrical pipe. Pressure resulting in material tensile acts on the inner walls of the pipe. Excessive pressure acting on the outer diameter of the pipe (the pipe that is subjected to plastic deformation or the pipeline that is under water) leads to compression of material. Strain intensity of the pipe material at the action of these loads will be different.

The models of stressed and deformed states of the pipe material at the action of one or two loads at the same time can be obtained after solving the dynamic problem in the explicit statement. Comparison of stress-strain state of material will allow us to draw the conclusion about the most rational scheme of the pipe loading.

Materials and methods

The research of stress-strain state of the pipe at the action of various loads was performed in the modules of the Ansys program (Explicit Dynamics and Autodyn). The pipe fragment model had the outer diameter (d) of 40 mm and the inner diameter (D) of 28 mm. Constant pressure P of 1 MPa was applied to the various surfaces of the pipe fragment model. The duration of the load action was 3 seconds. The pipe loading schemes are presented in the Fig. 1.
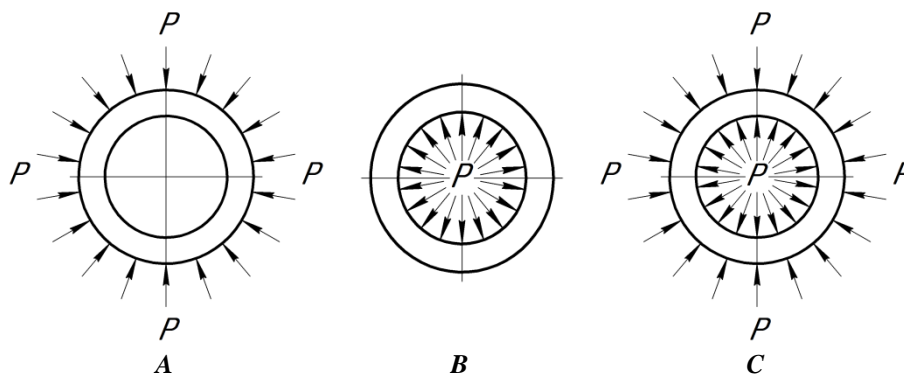

Figure 1 – The steel pipe loading schemes: *A* – the first scheme (pressure acting on the outer surface), *B* – the second scheme (pressure acting on the inner surface), *C* – the third scheme (pressures acting on the outer and inner surfaces).

The model of the pipe fragment was made of structural steel with the following properties: density – 7850 kg/m^3, coefficient of thermal expansion – 1.2×10^{-5}, specific heat – 434 J/(kg×K), thermal conductivity – 60.5 W/(m×K), resistivity – 1.7×10^{-7} Ohm×m, compressive yield strength – 250 MPa, tensile yield strength – 250 MPa, tensile ultimate strength – 460 MPa, Young's modulus – 2×10^5 MPa, Poisson's ratio – 0.3, bulk modulus – 1.6667×10^5 MPa, shear modulus – 76923 MPa, relative permeability – 10000, strength coefficient – 920 MPa, strength exponent – -0.106, ductility coefficient – 0.213, ductility exponent – -0.47, cyclic strength coefficient – 1000 MPa, cyclic strain hardening exponent – 0.2.

The simulation was performed when the following conditions: maximum energy error – 0.1, time step safety factor – 0.9, linear artificial viscosity – 0.2, quadratic artificial viscosity – 1, viscous coefficient – 0.1, static damping – 0, geometric strain

limit – 1.5. The deformation process was simulated at the temperature of 22 °C.

Results and discussion

The color contours that characterize intensity of stress-strain state of the pipe material were distributed after the calculation on the volume of the fragments models. Stress state of the pipe material under the action of considered loads is presented in the Figs. 2 – 4.

Pressure acting on the outer diameter of the pipe leads to maximum von Mises stress, which is distributed in the volume of the surface layer of the hole. The volume stress of the surface layers of the hole is 1.3 times more than the volume stress of the surface layers of the outer diameter at the first loading scheme. Minimum stress of the pipe material is observed when two loads are applied simultaneously. The uniform distribution of almost the same value of material stress indicates the rational scheme of the pipe loading.
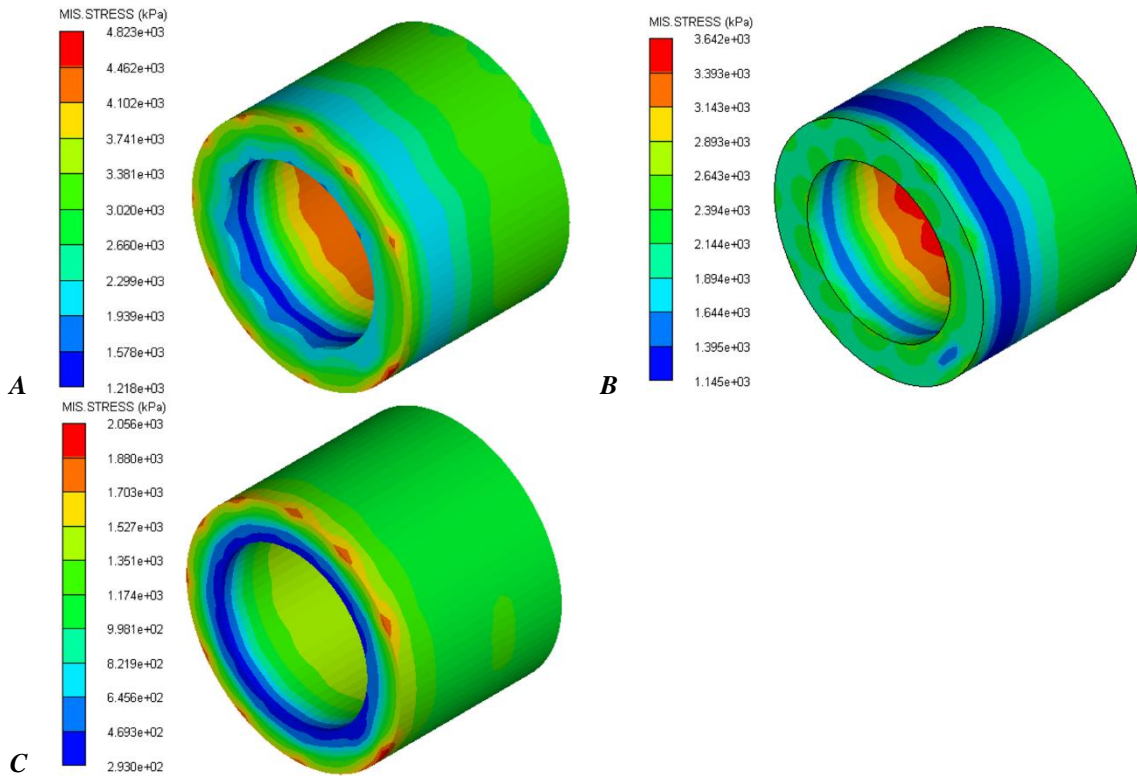
Figure 2 – Von Mises stress of the pipe material at pressure: the first scheme (*A*), the second scheme (*B*) and the third scheme (*C*).
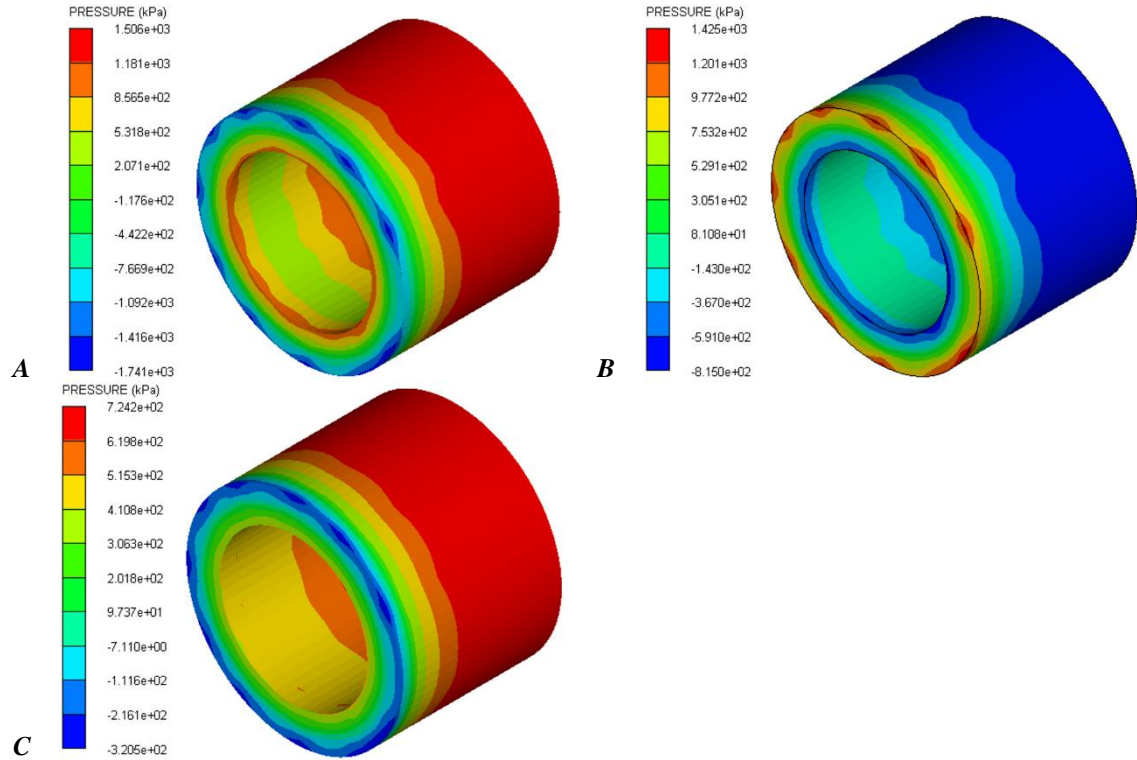

Figure 3 – Tensile and compressive stress of the pipe material at pressure: the first scheme (*A*), the second scheme (*B*) and the third scheme (*C*).
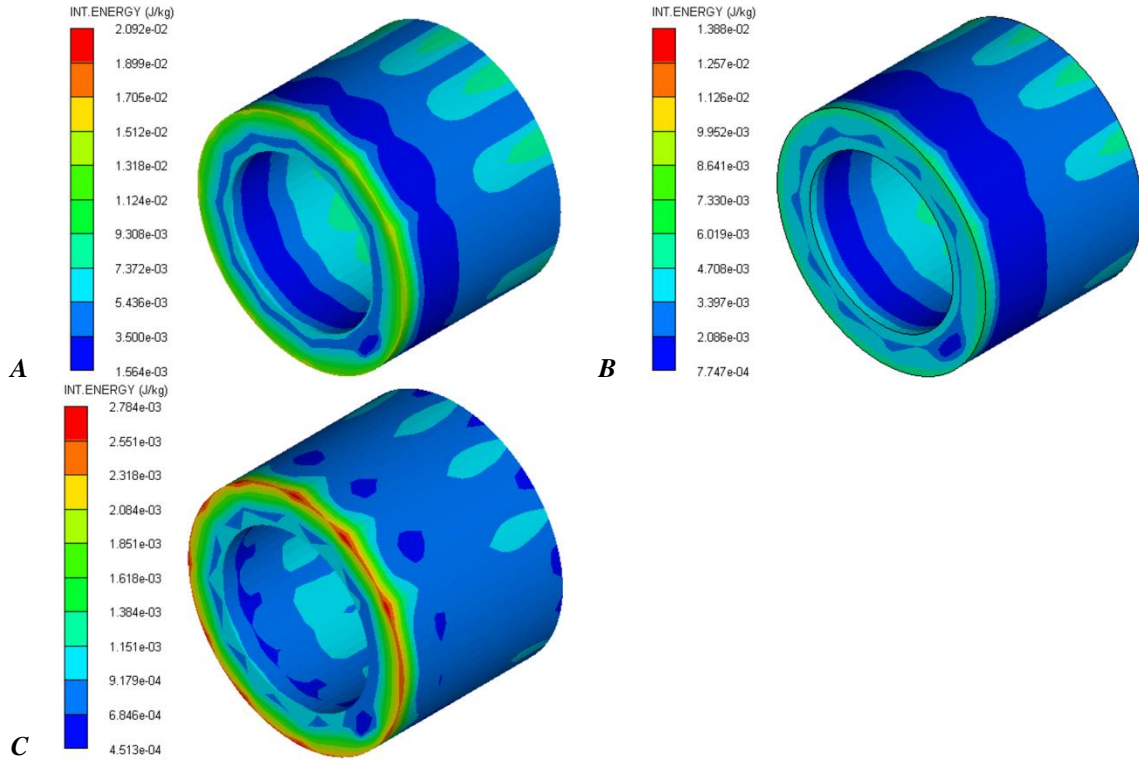
Figure 4 – Internal energy of the pipe material at pressure: the first scheme (*A*), the second scheme (*B*) and the third scheme (*C*).
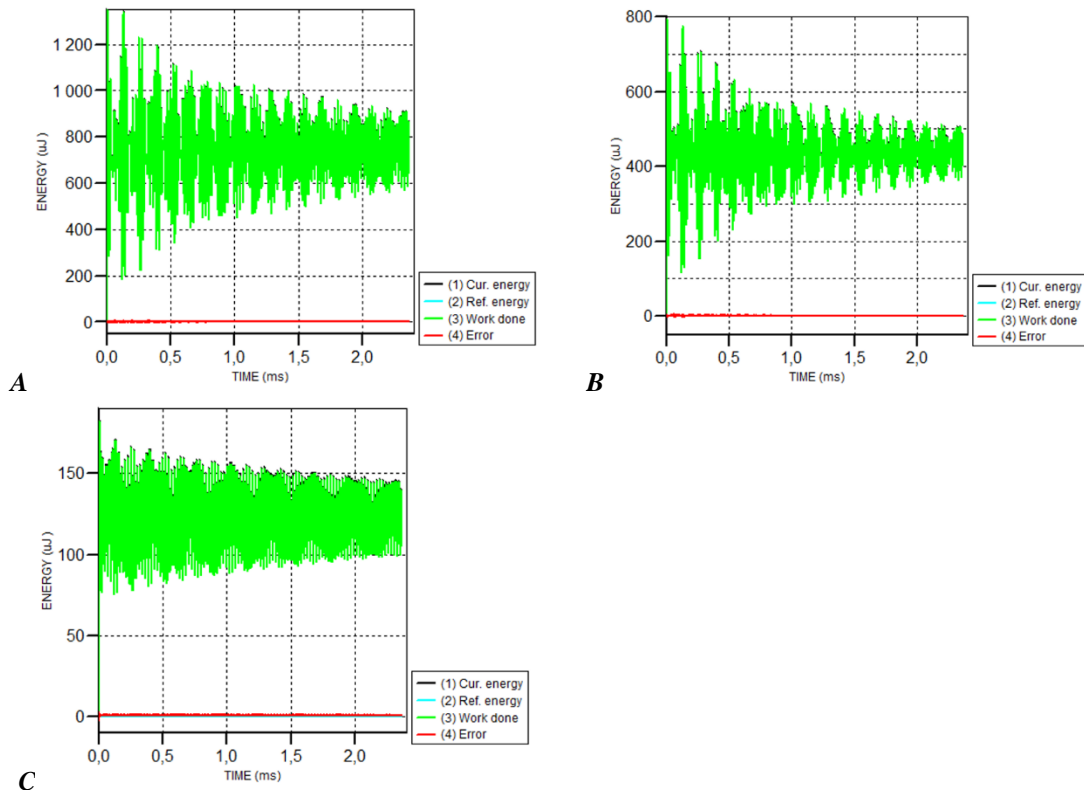

Figure 5 – Energy of work done during plastic deformation of the steel pipe: *A* – the first scheme, *B* – the second scheme, *C* – the third scheme.

The pipe material is subjected to compression and tensile, respectively, at the first and second loading schemes. The strain distribution of the pipe material is the same in both cases. The action of two

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loads simultaneously only leads to compression strain of the pipe material.

Work of external forces causes plastic strains without destruction of material. Acting radial loads lead to internal energy bursts in the axial direction of the loose section of the steel pipe.

Changing energy of work done during plastic deformation of the steel pipe is presented in the Fig. 5.

Energy of work done decreases (occurrence of plastic strains of material) with increasing application time of constant load for all the considered schemes.

The simultaneously action of loads leads to decreasing the energy range of work done, since these pressures balance each other.

The calculated values of the material strain intensity coefficient at the action of pressure on the outer or inner surfaces and the simultaneously action of pressure on the outer and inner surfaces of the pipe are presented in the table 1. Steel destruction occurs at the strain intensity coefficient of 0.68. Elastic strains occur during deformation of steel by no more than 0.2%.

Table 1. The values of the strain intensity coefficient of the pipe material at D/d=0.7.

The number of the loading scheme	1	2	3
The value of the strain intensity coefficient	0.253	0.312	0.142

Conclusion

1. The action of pressure on the outer cylindrical surface of the pipe leads to maximum stress of material. Simultaneously application of loads on the outer and inner surfaces of the pipe is accompanied by the uniform distribution and stress decreasing of 2.4 times, compared to the first loading scheme.

2. The strain intensity coefficients of the steel pipe at *D/d=0.7* are defined: in the conditions of pressure application on the outer surface – 0.253, in the conditions of pressure application on the inner surface – 0.312, in the conditions of pressure application simultaneously on the outer and inner surfaces – 0.142. The estimation of the calculated values of the coefficient indicates significant plastic strain of the pipe, which was loaded according to the second scheme.

3. The outer and inner layers of the pipe material are subjected to 85% compression strain when application of two loads simultaneously.

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SOUND INSULATION OF ENCLOSING STRUCTURES OF BUILDINGS AND MONUMENTS

Abstract: *In the article given of definition of a theoretical method of calculation of air noise of layers thin enclosing structures.*
Key words: *Enclosing structures, calculation, sound insulation, layers, thin.*
Language: *English*
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Scopus ASCC: 2215.

Introduction

Nowadays, people are always under the influence of noise. The noise mainly generated from roads, railways, air traffic, while indoors a large part of the din arises from the ventilation system, computers, television set and so on. All these noises combine to create a sound environment in which we live. The impact of noise, unlike other environmental problems, is a continuing problem and particularly observed in cities. Cities contain the largest concentration of people, where there are large buildings. All the places that need good acoustics, they should be fully functional. In standard of living,

we spend almost 75-85 percent of our time indoors, where a lot of surface noise greatly enhanced.[1]

Currently, the thin protecting designs, which occupy to 30% of the surface area of protections, possess the smallest sound insulation. Thus, noise from the premises penetrates into the environment, mainly thin enclosing structures.

Aim of research

Based on this, one of the main tasks of thin walling is a theoretical method of calculating the determination of air noise sound insulation elements according to NR 2.01.08-96 "Noise of protection". This issue is covered in more detail in the reference

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manual to "design of sound insulation of enclosing structures of residential and public buildings". However, the method of determining the theoretical method of calculating the air noise of two-layer thin surrounding structures is not available [2,3,4,5].

NR mentioned reference in the matter of development of thin walling leads his theoretical and practical method for single layer thin walling airborne noise, limiting the overall requirements to its content, which determines the relevance of the topic of this study.

Based on the above, that the conduct of scientific research on the theme "sound insulation of two – layer thin surrounding structures of buildings" is in the theoretical and practical relationship is very relevant and timely.

The object of the study is a thin double-layer surrounding structures of buildings in the Republic of Uzbekistan.

The purpose of the scientific research will be to develop the theoretical and practical provisions of two-layer thin building envelopes, specifically, in the creation of a theoretical method of calculation.

In accordance with the set goal, the following tasks will be solve in the research work:
- theoretical and methodological approaches and provisions to the formation of double-layer thin enclosing structures in Uzbekistan and abroad were studied on printed and dissertation sources;
- factors determining technical parameters of two-layer thin protecting designs are revealed and structured;
-classification by external and internal construction and technical parameters of positions of two-layer thin protecting designs and degree of their influence on rational use of resources will be carried out;
- graph-analytical model of calculation of two-layer thin protecting designs will received;
- technical parameters of two-layer thin protecting designs providing noise isolation according to requirements of norms will be defined;
- program of the automated calculation of two-layer thin protecting designs will be developed and

recommendations on its use in practice of design are made.

The methods of use. To solve the problems in the thesis will be use in a complex of theoretical and empirical methods, including: in the review part of the methods of scientific analysis, synthesis, in the construction of the working hypothesis - hypothetical-deductive, abstraction, idealization, in the justification of the method of two - layer thin enclosing structures-graph-analytic modeling, information technology. When writing the thesis text, attention will be paid to strict adherence to the dialectical law of the party (structural and temporal), correct definition of concepts. As a means of research in scientific work will be used information, mathematical and linguistic means of research. In General, the presentation of dissertations will pay attention to the internal connection of logical constructions, enhanced by the use of accepted grammatical and stylistic turns of speech of the scientific language

The information and normative basis of the research will be based on the legal acts of the Republic of Uzbekistan, standards and guidance documents of the state Committee of Architecture of the Republic of Uzbekistan, materials published in scientific monographs and periodicals, as well as own calculations of the dissertation.

Rationale we have developed a theoretical method tailored to the requirements of norms in construction will be determined by the theoretical importance and its use in the design phase of a thin two-layer enclosing structures, which would represent a practical significance of the scientific research

Conclusion

The scientific novelty of the work determined by the author's development to substantiate the theoretical and methodological provisions and practical recommendations for the formation of the mechanism of automated calculation of noise insulation of two-layer thin surrounding structures of buildings.

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MODERN METHODS OF ENERGY CHECKUP OF BUILDINGS AND STRUCTURES

Abstract: This article discusses improve energy efficiency and implement global energy conservation measures and improvements by providing concrete evidence of successful performance-enhancing activities from which the economic benefits become apparent.
Key words: Audit, development, efficiency, energy, implementation, monitoring, methods.
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Introduction

The main reason for the need to improve energy efficiency and the implementation of global energy conservation measures is the depletion of natural resources and greenhouse gas emissions. Limited energy, one way or another, affects all states and has become a global problem.

The change in attitude to the use of energy resources is associated with high energy intensity of products. This problem, in turn, entails such consequences as the inefficiency of the economy, the lack of competitiveness of products, low sales on world and domestic markets, export costs, the closure of inefficient enterprises, etc.

Energy efficiency monitoring is initially used to document the current situation. Once a review is received — for example, data from 6 months to one year — you can set complex, but realistic goals to increase efficiency, while continuing to track progress toward your goals. In turn, more data will lead to a better understanding of the energy characteristics of the plant and the development of further goals. This is a well-known procedure known as "Monitoring & Targeting".

Monitoring & Targeting (M & T) is a management approach that helps companies eliminate waste and reduce the current use of energy (and other supplies) by providing timely and relevant information. It also provides an incentive for further improvement by providing concrete evidence of successful performance-enhancing activities from which the economic benefits become apparent.

Similar approach can be adopted for monitoring and managing emissions, although the concept of "goals" is somewhat different here. A reasonable goal is to monitor the level of emissions established by relevant regulations, and many enterprises will strive to fulfill their obligations, rather than reduce emissions further. This can ensure regulatory compliance, although it may well be possible to increase profits by further reducing emissions. Each case must be considered individually, as the situation will vary from enterprise to enterprise.

The implementation of a monitoring and targeting system includes two main functions:
• continuous monitoring of energy use;
• Investing in energy efficiency measures.

Management information from effective monitoring and targeting can improve both performance and quantification of these improvements.

Management information is a vital element in successful monitoring and targeting.

The types of savings that have been achieved through successful monitoring and targeting with minimal or zero investment are improved working

methods, improved maintenance schedules and staff training.

Along with cost savings, systematic monitoring and evaluation of energy consumption can lead to higher product quality and higher productivity, as well as lower maintenance and waste costs. Effectively implement a monitoring and targeting system, some costs will be required. Actual cost depends on the details of the monitoring that will be carried out.

The goal of a good M&T system should be:

• Establishment of a consumption model over the past period of time;

• comparison of current consumption with data from previous consumption and (or) standards;

• setting future energy goals;

• comparison of actual consumption with goals;

• determination of consumption trends.

The energy audit methodology includes the following levels of energy audits:

• preliminary energy audit (pre-audit);

• energy audit of the first level - calculation of energy consumption and costs;

• energy audit of the second level - an in-depth examination of energy technology systems and the industrial enterprise as a whole, calculation of energy flows.

Pre-audit aims to assess the need for an audit.

To do this:

• assessment of the share of energy costs in the total costs of the enterprise (electricity, heat, fuel, water, etc.);

• identification of the dynamics of changes in the share of costs for the last 2-3.

If the share of energy consumption is:

• 5-10%, then an energy audit can not be carried out so far;

• 11-15%, then an energy audit is necessary;

• 16–20% or more, an energy audit should be carried out urgently.

An energy audit of the first level has the following objectives:

• determine the structure of energy consumption and the structure of energy use;

• identify and present to the enterprise management the potential for energy conservation;

• identify areas where energy is wasted or wasted;

• prioritize future work;

• identify and prove to the management of the enterprise the feasibility of conducting an in-depth examination.

The energy audit of the second level has the following objectives:

find opportunities for implementation energy saving projects;

evaluate their technical and economic effectiveness;

combine recommendations and technical solutions for rational energy use and energy saving in one system;

create prerequisites for the preparation of a comprehensive long-term plan for the implementation of energy conservation at the enterprise.

Preliminary audit serves to draw up an energy audit program. At this stage, the main characteristics of the enterprise are determined - the range of products, the composition of energy resources consumed, the production structure, the number of employees, the composition of the main equipment and buildings, the operating mode, management structure, etc.

Preliminary audit stages:

• acquaintance and initial conversation with top managers;

• familiarization with the company;

• analysis of energy supply agreements concluded by the enterprise.

In the process of conversation with the first managers of the enterprise, it is necessary to identify those who make decisions, obtain initial information about the enterprise, obtain information about the amount of energy consumption in the cost of products, determine the goals of energy-saving measures; to allocate responsibility for the energy audit work carried out at the enterprise and to clarify the list of persons with whom it is necessary to work in the process of energy audit.

Acquaintance with the enterprise includes: inspection of the enterprise; study of power supply schemes; energy accounting systems and production technological schemes.

At this stage, it is necessary to clearly determine the available information on energy use at the enterprise, assess the degree of its reliability, highlight the part that will be used in energy audits.

It is necessary to identify the most energy-intensive units, technological cycles and the places of the most probable losses of energy resources.

At the end of the preliminary stage, an energy audit program is drawn up, which is agreed with the enterprise management and signed by two parties. When compiling the program, the opinion of the surveyed enterprise on the order and priority of work at various sites is taken into account.

The main types of work:

• familiarization with the enterprise, collection and analysis of information available at the enterprise that is useful for energy audits;

• identification of potential energy saving potential at the enterprise.

The main stages of energy audit of the first level:

1) collection of primary information,

2) analysis of energy and economic indicators of the industrial enterprise,

3) selection of audit objects,

4) preparation of a conclusion on the main results of the primary energy audit.

At the preliminary stage, both the survey organization and the surveyed enterprise participate in the collection of information. Information is recorded in standard forms.

Throughout the energy audit, information is collected in accordance with the developed program. Sources of information are:

• interviews and questionnaires of management and technical personnel;

• power supply and energy metering schemes;

• reporting documentation on commercial and technical accounting of energy resources;

• invoices from energy suppliers;

• daily, weekly and monthly load schedules;

• data on the volume of production, prices and tariffs;

• technical documentation for technological and auxiliary equipment (technological systems, specifications, operating cards, regulations, etc.);

• reporting documentation on repair, commissioning, testing and energy-saving measures;

• promising programs, feasibility studies, project documentation for any technological and organizational improvements approved by the enterprise development plan.

The company must provide all the necessary information for work for at least the last 3 years. In this case, the surveyed company is responsible for the accuracy of the information provided.

The composition of the primary information:

• general information about the enterprise;

• actual reporting data on energy use and output in the base year and for the last 3 years (by months);

• list of basic energy technology equipment;

• technical and energy characteristics of installations;

• technical and economic characteristics of energy carriers used at the enterprise;

• information about the sources of electricity, heat, water, compressed air, fuel, etc.

Analysis of energy and economic indicators of the enterprise:

• quantitative characteristics of production over the past 3 years by month;

• the cost of production, including the cost of fuel, electric and thermal energy, water at the time of the survey and for the last 3 years by month;

• energy intensity of products;

• specific energy intensity of products by months;

• specific energy costs for major products by month;

• the average annual number of employees, including production and managerial personnel, energy service personnel, etc.

It is necessary to find out the share of which energy resources in total consumption is the most significant, the use of which energy resources should be paid attention to, first of all. Information on energy consumption should show the share consumption of various energy resources at the enterprise and their costs. Information on prices should include the price per unit of fuel and the tariff (if used). Components of prices and differences in prices should be noted.

When considering the structure of tariffs for energy resources, it is necessary to take into account all factors that ultimately determine how much an enterprise pays for energy resources: price changes during the year; tariff structure; differentiated tariff rates; penalties and other payments.

The most complicated is usually the structure of electricity tariffs, which depends on the type of consumer consumption. To assess the potential savings in electricity consumption, you must obtain the following information:

• what is the capacity of each electricity input;

• what is the total power of the connected load;

• what are the load profiles - daily and annual;

• what is the average power factor;

• Is reactive power compensation available?

• What is the general structure of power consumption (engines, lighting, technological processes, etc.).

To assess the efficiency of energy use and the visibility of the information provided, various types of unit costs can be obtained: the average cost of energy and energy; marginal cost; unit cost of energy in an energy carrier; unit cost of useful energy.

At the end of the first familiarization phase, energy auditors should have an idea of the enterprise and the main technological processes, as well as the following information:

• the total cost of the enterprise's costs for energy, water, sewage and sewage, etc.

• cost structure for energy carriers;

• seasonal changes in consumption and value;

• price structure for each energy resource.

This information will give a clear picture of the current situation with energy use at the enterprise and the opportunity to identify priority areas for further work.

The objectives of the energy audit of the second level:

• determination for each energy resource of the most significant consumers in terms of costs and consumption;

• distribution of consumption of each energy resource by main consumers (development of energy balances);

• development of measures to reduce energy consumption.

To achieve your goals you must:

• conduct a survey of the enterprise;

• draw up diagrams of technological processes;

• make a list of key energy consumers;

• calculate the energy consumption of each of the main energy consumers;
• analyze the work of key consumers.

When examining the enterprise, you must:
• identify energy flows to and from processes;
• determine the flows of raw materials and products;
• establish flows of losses and waste;
• establish production operating modes and key figures at the enterprise (the key people in the enterprise are process plant operators, supervisors and technologists, product managers).

Conclusion

Consequently, collection of statistical data and primary information, which includes:
• annual and monthly production of primary and secondary products for both the current and previous 3 years;
• annual and monthly consumption and consumption of energy resources;
• specific norms for the production unit;
• fund of working time and shift;
• sources of heat, electricity, water, gas, water, compressed air, etc .;
• schemes of heat, water, gas, electricity and air supply systems, etc. enterprises and individual divisions;
• indicators of energy consumption in existing forms of statistical and in-plant reporting;
• measures to improve energy efficiency and their implementation over the past 3 years;

• state of accounting and rationing of the consumption of heat and electric energy, water, etc .;
• availability of passports for energy-intensive equipment;
• availability of secondary energy resources, including low potential ones, and their use;
• availability of an energy passport of the enterprise.

Process flow charts are a diagram showing the main steps through which materials pass sequentially from the initial state to the finished product.

The diagrams should show the places of supply and use of energy resources, marked the processing of materials, waste disposal in the process.

It is possible to identify the main consumers on the basis of a conversation with the staff, studying the schemes of technological processes, equipment certificates and bypassing the enterprise.

The largest consumers of electricity are usually
• electric furnaces;
• heating, ventilation and air conditioning systems;
• compressed air compressors
• technological pumps;
• vacuum pumps;
• hydraulic pumps;
• equipment for mixing and heating liquids;
• lighting systems.
The main major fuel consumers are usually:
• steam and hot water boilers;
• furnaces for various purposes;
• fluid heaters;
• heating systems.

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INVESTIGATION OF SOME PHYSICOCHEMICAL PROPERTIES OF INFLAMMABLE SHALE OF AZERBAIJAN

Abstract: *This article explores some of the physicochemical properties of inflammable shale in Azerbaijan: Khinalig, Lekbatan, Shekihan, Big Siyaki, Small Siyaki, Kechallar. The analysis of Fisher, Chayden elemental composition of shale, resin and solid residue, a technical analysis of shale, the chemical composition of kerogen and the mineral part of shale was determined. It was determined that all of studied shales are sulphurous.*

Key words: *inflammable oil shale, resin, solid residue, moisture, volatile content, ash, calorific value, organic carbon, extract.*

Language: *Russian*

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ИССЛЕДОВАНИЕ НЕКОТОРЫХ ФИЗИКО-ХИМИЧЕСКИХ СВОЙСТВ ГОРЮЧИХ СЛАНЦЕВ АЗЕРБАЙДЖАНА

Аннотация: *В данной статье исследованы некоторые физико-химические свойства горючих сланцев Азербайджана месторождений: Хыналиг, Лекбатан, Шекихан, Большой Сияки, Малый Сияки, Кечалляр. Проведен анализ Фишера, найден элементный состав сланцев, смолы и твердого остатка, проведен технический анализ сланцев, определены химические свойства керогена и минеральной части сланцев. Показано, что все исследуемые сланцы являются сернистыми.*

Ключевые слова: *горючих сланцы, смола, твердый остаток, влажность, содержание летучих, зола, теплота сгорания, органический углерод, экстракт.*

Введение

УДК 662.67.66092.174.3:541:1

Горючие сланцы являются альтернативным источником сырья. Запасы их по всему миру составляют около 650 трлн. тонн.

Резолюцией ООН 33/148 горючие сланцы включены ресурсы. От других твердых топлив они отличаются высоким атомным соотношением Н/С: для нефти оно равно 1,9; для угля – 0,5, для горючих сланцев – 1,7. В горючих сланцах содержатся минеральные примеси: кальцит, кварц, полевые шпаты, пирит, соединения серы и кислорода и др.

Месторождения горючих сланцев Азербайджана расположены в основным в

Clarivate Analytics indexed

восточной части республики, на склонах Главного Кавказского хребта, потенциальные запасы которых оцениваются примерно 0,5 млрд. тонн [1].

Впервые исследованиям с целью выделения органических продуктов были подвергнуты сланцы месторождения Джангичай, Ханагях и Диаллы [2]. Нами были продолжены исследования Азербайджанских сланцев. Были исследованы сланцы месторождений Большой Сияки, Малый Сияки, Хыналыг, Лекбатанский, Шекиханский и Кечалляр.

Для определения потенциального содержания потенциального содержания смол в горючих сланцах используют анализ Фишера, который проводится на стандартной установке ISO – 647 [3]. Результаты анализа Фишера представлены в таблице 1.

Таблица 1. Результаты анализа Фишера

№	Продукты	Содержание					
		Хыналыг	Лекбатан	Шекахан	Большой Сияки	Малый Сияки	Кечалляр
1	Смола	3,88	20,147	5,52	13,02	12,89	27,9
2	Твердый остаток	82,82	66,453	79,98	70,3	71,3	61,92
3	Декомпозиционная вода	0,9	3,2	1,4	2,2	1,42	1,6
4	Газ+потери	12,4	10,2	13,1	14,47	14,39	8,58

Элементный анализ сланцев проводили по методике ASTMD – 3178 [4].

В таблице 2 приведены результаты элементного анализа сланцев, смолы и твердого остатка. По результатам элементного анализа определено количество общего углерода. Смола в основном состоит из углерода и водорода, некоторого количества азота и органической серы.

Таблица 2. Результаты элементного анализа

№	Наименование	C	H	N	S
	Сланцы				
1	Большой Сияки	29,25	3,02	0,96	1,61
2	Малый Сияки	22,51	2,60	0,92	1,59
3	Хыналыг	19,2	2,15	0,9	1,9
4	Лекбатан	30,2	3,12	0,85	2,9
5	Шекихан	20,3	2,7	0,89	1,25
6	Кечалляр	22,8	2,53	0,91	3,1
	Смола из				
1	Большой Сияки	79,2	11,1	1,25	1,2
2	Малый Сияки	78,3	11,18	1,14	1,53
3	Хыналыг	77,2	10,8	1,1	1,0
4	Лекбатан	78,1	11,4	1,26	1,65
5	Шекихан	77,5	11,05	1,18	0,9
6	Кечалляр	77,6	11,29	1,23	1,55
	Твердый остаток				
1	Большой Сияки	17,1	1,2	0,87	1,1
2	Малый Сияки	17,21	1,08	0,88	1,02
3	Хыналыг	16,3	1,03	0,89	1,04
4	Лекбатан	17,65	1,06	0,91	1,34
5	Шекихан	17,4	1,22	0,88	0,9
6	Кечалляр	17,25	1,24	0,9	1,62

Как видно из данных таблицы 2 твердый остаток беден водородом: соотношение углерода к водороду примерно составляет ~17:1, для смолы это соотношение равно ~7:1.

Нами проводился технический анализ сланцев. Определялись плотность, влажность, содержание летучих, золы, органического углерода, теплота сгорания.

Таблица 3. Технический анализ горючий сланцев

Показатели	Сланцы					
	Хыналыг	Лекбатан	Шекихан	Большой Сияки	Малый Сияки	Кечалляр
Плотность, кг/м^3	2261	2219	2252	2223	2241	2227
Влажность, % масс	2,92	2,81	2,87	2,72	2,76	2,77
Содержание летучих, % масс	20,52	27,5	21,4	29,95	23,48	26,94
Органический углерод, % масс	18,05	28,1	19,06	27,6	21,25	21,09
Зола, % масс	82,8	66,5	79,95	74,64	71,3	61,92
Теплота сгорания, кдж/кг	8750	9930	9565	1014	1017	9825

Далее нами определялся химический состав керогена из исследуемых сланцев. Исходным материалом органического вещества горючих сланцев служила биомасса, преимущественно низших водорослей, в меньшей степени – высших растений и частично животных организмов. При определении химического состава керогена особое место занимают процессы экстракции различными растворителями [5-7]. Из литературных данных [5, 7] известно, что N–метилпирролидон, тетрагидрофуран входят в ряд эффективных растворителей для экстракции твердого топлива. Экстракт не взаимодействует с растворителями, что позволяет характеризовать химический состав керогена. Испытуемый образец горючего сланца измельчается на мельнице и фракция < 250 мкм в течении 10 часов высушивается в атмосфере азота при температуре 105^{0}С. После этого образец сланца помещается в аппарат Сокслета и обрабатывается раствором N-метилпирролидона (1:1) до осветления растворителя. Компонентный состав определяется по свойствам их растворения в гексане и толуоле. В гексане растворяются масла, а в толуоле асфальтены. Для определения количеств алканов ароматических и полярных углеводородов нами использован хроматографический метод. Результаты экстракции сланцев представлены в таблице 4.

Таблица 4. Состав фракций экстрактов

Компоненты	Хыналыг	Лекбатан	Шекихан	Большой Сияки	Малый Сияки	Кечалляр
	% масс	% масс	% масс	% масс	% масс	% масс
1. Экстракт, вт.ч						
а) масла	28,4	71,8	66,9	74,9	72,5	73,8
б) асфальтены	21,2	15,1	15,4	14,9	15,3	14,6
в) карбоиды	18,4	4,6	5,3	5,1	4,4	4,9
2.Компоненты экстракта, масла, в т.ч.	28,4	71,8	66,9	74,9	72,5	73,8
а)алканы	6,9	21,0	19,3	23,7	23,1	23,9
б)ароматические углеводороды	8,6	8,9	7,9	7,5	6,9	7,2
в)полярные углеводороды	12,9	41,9	39,7	43,7	42,5	42,7

В состав горючих сланцев входят минеральные вещества и металлы. В сланцах содержатся молибден, серебро, ванадий, рубидий, тантал, уран и др. Содержание таких веществ иногда значительно и представляет практический интерес для промышленного выделения. В таблице 5 представлен состав минеральной части горючих сланцев.

Таблица 5. Состав минеральной части сланцев

Компоненты	Количество, %					
	Хыналыг	Лекбатан	Шекихан	Большой Сияки	Малый Сияки	Кечалляр
SiO_2	37,4	36,26	36,75	35,89	36,2	35,94
Fe_2O_3	15,9	16,3	17,2	17,62	17,58	16,96
CaO	22,5	21,5	22,35	21,88	22,2	21,3
MgO	0,95	1,2	1,4	1,1	1,3	2,18
K_2O	0,88	1,1	0,97	0,99	1,04	1,92
TiO_2	1,51	1,48	1,53	1,41	1,43	1,56
MnO	1,24	1,1	1,3	1,2	0,97	0,94
CuO	0,46	0,54	0,6	0,39	0,52	0,65
ZnO	0,85	0,92	0,82	0,89	0,77	0,95
SO_3	15,1	14,6	13,7	14,29	13,9	12,9
P_2O_5	1,11	0,98	1,18	1,32	1,219	1,35
CoO	0,08	0,12	0,1	0,04	0,031	0,15
MoO	2,02	3,90	2,1	2,98	2,84	3,2

Таким образом, впервые исследованы физико-химические свойства горючих сланцев шести месторождений Азербайджана: Хыналыг, Лекбатан, Шекихан, Большой Сияки, Малый Сияки и Кечалляр. Проведен анализ Фишера, установлены элементные составы сланцев, образующихся смол и твердых остатков. Определено, что исследуемые сланцы относятся к высокосернистым. Определен состав минеральной части сланцев и химический состав керогена.

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CATALYTIC PYROLYSIS ON AZERBAIJAN ZEOLITS

Abstract: *This works presents research on the catalytic pyrolysis of the fractions 120-230°C and wide vacuum gas oil (350-500°C) obtained from a mixture of Baku oils. Zeolites – mordenite and clinoptilolite were used as catalyst, deposits of which are available in the Republic of Azerbaijan. It have been determined, that the optimum process temperature 650 – 700°C, bye use of modified mordenite $NiCl_2 – 6H_2O$ ethylene yield 40.2% at 700°C and amount of propylene and isomers of the alkane hydrocarbons is increased. Yield of the olefin hydrocarbons by pyrolysis of the fraction 120-230°C is nearly 78-79% and by pyrolysis of the vacuum gas oil – is 35-37%.*

Key words: *pyrolysis mordenite, clinoptilolite vacuum gas oil, catalysit, zeolite, olefin hydrocarbons, pyrocondensate, coke.*

Language: *Russian*

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КАТАЛИТИЧЕСКИЙ ПИРОЛИЗ НА АЗЕРБАЙДЖАНСКИХ ЦЕОЛИТАХ

Аннотация: *В данной работе даны исследования по каталитическому пиролизу фракций 120 – 230⁰С и широкого вакуумного газойля (350 – 500⁰С), полученных из смеси Бакинских нефтей. В качестве катализаторов использованы цеолиты морденит и клиноптилолит, залежи которых имеются в Республике Азербайджан. Установлено, что оптимальной температурой процесса являются 650 – 700⁰С, при использовании модифицированного $NiCl_2·6H_2O$ морденита выход этилена составляет 40,2% при 700⁰С, а при применении клиноптилолита увеличивается количество пропилена и изомеров алкановых углеводородов. Выход олефиновых углеводородов при пиролизе фракции 120 – 230⁰С составляет около 78 – 79 %, а при пиролизе вакуумного газойля 35 – 37%.*

Ключевые слова: *пиролиз, морденит, клиноптилолит, вакуумный газойль, катализатор, цеолит, олефиновые углеводороды, пироконденсат, кокс.*

Введение

УДК 662.67.66092.174.3:541:1

В нефтехимической промышленности основным сырьем являются такие олефиновые углеводороды, как этилен, пропилен, бутены, амилены и пр. Все эти углеводороды в значительных количествах получаются в процессе пиролиза. В настоящее время наибольшее

распространение получил термический пиролиз в трубчатых печах в присутствии водяного пара.

Все усовершенствования этого процесса привели к высокому выходу олефинов и процесс достиг предела своего развития. Поэтому исследования в области каталитического пиролиза в настоящее время приобретают большое значение. Применение катализаторов позволяет уменьшить энергетические затраты, затраты на оборудование и пр.

Процесс каталитического крекинга хорошо изучен, предложено достаточное количество разновидностей реакторно – регенераторного блока, что может послужить основой при выборе реакционной системы для каталитического пиролиза.

Объекты и методы исследований

Цель нашей работы заключается в исследовании каталитического пиролиза углеводородного сырья, для чего необходимо было:

а) выбрать установку для проведения процесса каталитического пиролиза;

б) выбрать и опробовать катализаторы и сырье, которые применялись при исследованиях;

в) исследовать влияние условий проведения процесса на выход продуктов.

В литературе имеются значительное количество исследований по применению цеолитсодержащих катализаторов в процессе каталитического пиролиза, который является жесткой формой крекинга [1-3].

Для исследования нами была собрана лабораторная установка (рис.1). Трубчатый реактор 1 представляет металлическую трубку из нержавеющей стали с внутренним диаметром 15 мм. Он помещался в электрическую печь. Температуру в печи проверяли при помощи термопары.
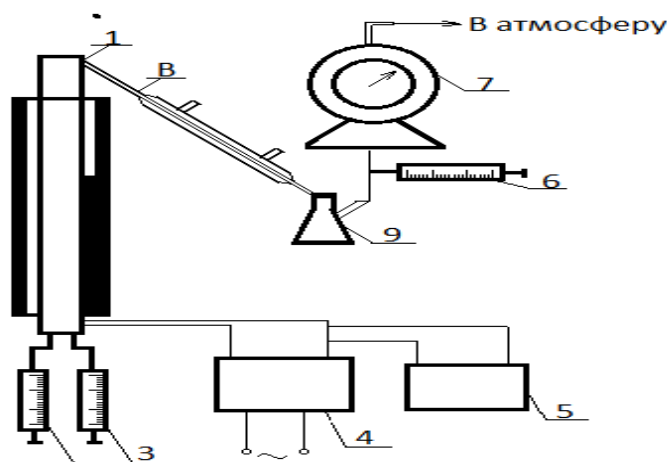

Рис.1. Лабораторная установка в процессе каталитического пиролиза
1- металлическая трубка; 2- печь; 3- термопара; 4,5- показатели;
6-термометр;7- газовый счетчик; 8- холодильник; 9- емкость жидкого продукта;

Поддержание температуры на необходимом уровне проводилось при помощи регулятора температуры.

В месте ввода сырья нами была положена тонкая металлическая сетка, на которую насыпались частицы кварца. Отобранные пробы газа анализировались на хроматографе. В реактор засыпался катализатор.

Исходное сырье подавалось в реактор с заданным расходом. Продукты реакции поступают в холодильник 8, газы проходят в газовый счетчик 7, жидкие продукты в приемник 9.

Катализатор можно регенерировать подачей в реактор воздуха при температуре 600^0C в течении 2 часов.

Константа скорости разложения углеводородного сырья определялась по следующей формуле (4)
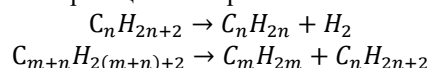
$$К = \frac{1}{\tau} \cdot \frac{х \cdot (1 + \beta х)}{1 - х}$$

где τ – время; х – степень превращения; β – коэффициент, показывающий изменение объема реакционной смеси.

β можно определить исходя из объема на выходе из реактора и на входе:

$$\frac{V}{V_0} = 1 + \beta \cdot х$$

V – объем на выходе; V_0 – объем на входе. Из литературных данных (5) известно, что основными реакциями пиролиза являются:

$$C_n H_{2n+2} \rightarrow C_n H_{2n} + H_2$$
$$C_{m+n} H_{2(m+n)+2} \rightarrow C_m H_{2m} + C_n H_{2n+2}$$

Для этих реакций изменение изобарного потенциала можно рассчитать по следующим формулам (5):

$$\Delta G^0 = 33400 - 500n - 27{,}9T - 1{,}0nT$$
$$\Delta G^0 = 18700 - 500n - 26{,}9T - 1{,}0nT$$

n – число атомов углерода в углеводороде C_nH_{2n+2}.

Анализ уравнений показывает, что разрыв цепи термодинамически произойдет скорее, чем реакция дегидрирования. Выше температуры 297^0С ΔG^0 становится отрицательной, а при 294^0С $\Delta G^0 = 0$. Для реакции дегидрирования $\Delta G^0 = 0$ при температуре 669^0С [6]. При температуре выше 827^0С изобарный потенциал всех предельных углеводородов (кроме CH_4) выше, чем у этилена и поэтому все они могут использоваться как сырье для получения этилена. Все это имеет значение при проведении термического процесса, для которого основными факторами являются температура, время пребывания в зоне реакции. Температура и продолжительность реакций зависимые друг от друга факторы.

Увеличение времени пребывание сырья в реакторе приводит к разложению на углерод и водород. Поэтому время от 0,1 до 4 сек (7).

Проведение экспериментов.

В качестве катализаторов нами были использованы природные цеолиты – морденит и клиноптилолит.

Все цеолиты имеют каркас из тетрагональных слоев (8). Химический состав цеолитов $M_{x/n}(AlO_2)x \cdot (SiO_2)y \cdot zH_2O$, где М – катионы с валентностью n (Na^+, K^+, Ca^{2+}, Ba^{2+}, Sr^{2+}, Mg^{2+}), z – число молекул воды, отношение y/x меняется от 1 до 5 для разных типов цеолитов. Общим для обоих типов применяемых нами цеолитов является наличие трехмерного каркаса, образующего системы полостей и каналов, в которых находятся катионы и молекулы воды.

Клиноптилолиты и морденит широко распространены в природе и являются ценными представителями цеолитов.

Клиноптилолит обладает высокими скоростями обменных реакций.

Морденит и клиноптилолит проявляют высокую термическую стойкость, характеризуются высоким отношением Si/Al.

В настоящее время цеолиты широко используются в качестве катализаторов в процессе каталитического крекинга. Поэтому нами использованы цеолиты добываемые в Азербайджане в качестве катализаторов каталитического пиролиза.

Главной характеристикой катализатора является его активность. Для изучения активности обеих катализаторов мы в реакторе пропускали сырье с постоянной скоростью. Продукты реакции разделялись на компоненты в хроматографической колонке. При последовательном вводе в реактор проб исходного сырья происходило изменение степени превращения, что показывало на изменение активности катализатора.

На рисунках 2 и 3 показано изменение выхода продуктов пиролиза фракции $120 – 230^0$С из смеси Бакинских нефтей, свойства которых представлены в наших предыдущих работах(9).

Активность катализаторов по мере увеличения количества вводимых проб постепенно падала, но через какое – то время достигала стационарного состояния. Пиролиз проводился при температуре 650^0С, время контакта $\approx 2{,}8 – 3{,}0$ сек. Объем вводимой пробы 6 $мм^3$.

На рис. 2 представлены выход непредельных $C_2 – C_4$ при использовании модифицированного солью $NiCl_2 \cdot 6H_2O$ морденита, а на рисунке 3 дан выход $C_2 – C_4$ на природном клиноптилолите.

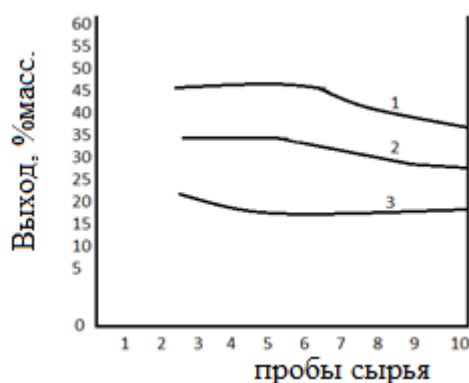**Рис.2. Выход фракций $C_2 – C_4$ на модифицированном мордените**
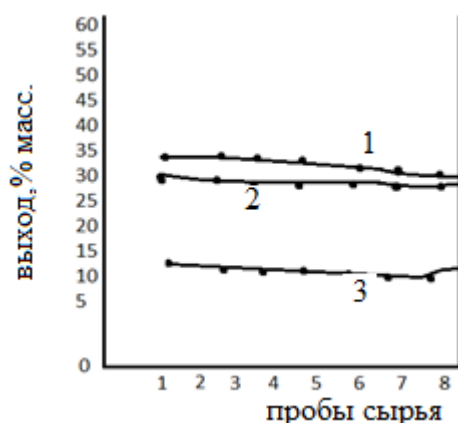**1 – выход этилена; 2 – выход пропилена; 3 – выход $\sum$ бутенов**

Рис.3. Выход фракций $C_2 – C_4$ на природном клиноптилолите
1 – выход этилена; 2 – выход пропилена; 3 – выход $\sum$ бутенов

Как видно из рисунков 2 и 3 активность катализатора постепенно снижается по мере увеличения количеств проб сырья. Но из рисунков видно, что активность катализатора значительна, выходы пропилена, этилена снижаются незначительно, а суммарный выход бутенов увеличивается. В таблице приводится полный компонентный состав газовой пробы каталитического превращения фракции 120 – 230^0C при температурах от 600 до 700^0C.

Таблица 1. Компоненты газовой пробы при каталитическом превращении фракций 120 – 230^0C

Вещество, выход % масс.	Температура, ^0C					
	600	650	700	600	650	700
	на модифицированном мордените			на природном клиноптилалите		
Водород	0,39	0,65	1,95	0,2	0,3	0,1
Метан	2,4	4,05	6,05	1,0	2,3	2,0
Этан	4,6	3,5	5,2	1,2	2,8	1,9
Пропан	11,9	5,1	2,1	4,1	3,9	2,75
Бутан	5,25	3,06	1,75	6,3	4,7	4,2
Пентан	2,95	0,95	0,55	1,9	1,6	1,4
i бутан	6,9	3,05	2,1	7,5	6,8	5,95
i пентан	3,83	2,3	1,4	3,9	3,4	2,8
этилен	21,88	38,54	40,2	30,4	33,5	34,6
пропилен	28,05	28,3	28,4	28,2	28,3	32,4
$\sum$ бутенов	11,85	10,5	10,3	15,3	12,4	11,9
$\sum$ олефинов	61,78	77,34	78,9	73,9	74,2	78,9

Как видно из данных таблицы 1, клиноптилолит больше способствует реакции изомеризации, поэтому наблюдаются большие выходы изобутана и изопентана, чем этана, метана и водорода, также наблюдается увеличение выхода бутенов и пропилена, выход этилена незначительно уменьшается. Общий выход непредельных углеводородов при температурах 650 – 700^0C примерно одинаковый.

Очевидно, что при применении обеих катализаторов, реакция протекает по карбоний – катионному механизму, но в случае применения клиноптилолита этот механизм более ярко выражен. Образование $C_1 – C_2$ по карбоний – ионному механизму невелико и в газе находятся $C_3 – C_4$ и $C_1 – C_2$ в газе при проведении процесса на мордените при температуре 650^0C равно 7,17%, а на клиноптилолите составляет 22,5%.

Так как самым стабильным является третичный карбоний – ион, поэтому при 600^0C количество изобутана и изопентана на мордените составляет 10,73%, а на клиноптилолите 11,4%.

При температуре 700^0C получаются значительные количества этилена, пропилена, бутенов, но метана и этана получается на клиноптилолите значительно меньше, чем при

проведении пиролиза на мордените. Увеличение количества водорода при проведении процесса на мордените показывает, что с ростом температуры начинают играть роль радикальные цепные реакции. В случае применения клиноптилолита реакции все еще протекают по карбоний – катионному механизму. Предсказать схему пиролиза углеводородов является весьма сложной задачей, так как механизм пиролиза высших алканов – это совокупность значительного числа первичных и вторичных реакций. Поэтому можно сказать, что при $600^0С$ преобладает карбоний – ионный механизм реакций, а с повышением температуры до $700^0С$ и выше возрастает радикально – цепной механизм.

Зависимость константы скорости разложения прямогонного бензина от температуры

$$К = 1,61 \cdot 10^6 \exp(-120,8/RT)$$

В таблице 2 даны выхода продуктов пиролиза фракции $120 – 230^0С$ на модифицированном мордените и клиноптилолите.

Таблица 2. Выход продуктов при каталитическом пиролизе фракции $120 – 230^0С$

Вещество, выход % масс.	Температура, $^0С$					
	600	650	700	600	650	700
	на модифицированном мордените			на природном клиноптилолите		
Газ	78,7	80,0	81	78,5	78,55	79,55
Пироконденсат	10,2	9,5	8,9	10,8	10,6	9,8
Тяжелая смола	5,0	4,0	3,2	4,8	4,7	4,2
Кокс	6,1	6,5	6,9	5,9	6,15	6,45
Содержание олефинов в газе	48,62	61,87	63,9	58,0	58,3	62,76

В таблице 3 приведены физико – химические свойства пироконденсата, полученного при проведении процесса каталитического пиролиза на клиноптилолите при температуре $700^0С$ и времени 3 сек.

Таблица 3. Физико – химические свойства пироконденсата

Показатели	Значения
Плотность, ρ_4^{20}, кг/м^3	785
Фракционный состав, $^0С$	
Начало кипения	41
10% перегоняется при температуре	82
50% перегоняется при температуре	135
90% перегоняется при температуре	164
Конец кипения	174
Содержание углеводородов, % масс.	
Парафиновых	0,4
Нафтеновых	80,9
Ароматических	9,1
Непредельных	9,6
Показатель преломления	1,4485

Проведение пиролиза при высоких температурах без подачи водяного пара приводит к уменьшению удельной поверхности катализатора (1,10). Причиной снижения удельной поверхности, видимо, является удаление с поверхности катализатора гидроксильных групп, в результате чего образуется какое – то количество водяного пара. При этом исчезают два протонных центра и образуется один апротонный центр, то есть возникают пары кислота – основание (11).

Далее для сравнения мы провели каталитический пиролиз вакуумного газойля, выкипающего в пределах $350 – 500^0С$, взятого при перегонке смеси Бакинских нефтей. Суммарное содержание парафино – нафтеновых углеводородов в вакуумном газойле составляет 59% масс.

В таблице 4 представлены результаты пиролиза вакуумного газойля на обоих катализаторах.

Таблица 4. Выход продуктов при каталитическом пиролизе вакуумного газойля (350-500⁰C)

Вещество, выход % масс.	Температура, ^{0}C					
	600	650	700	600	650	700
	на модифицированном мордените			на природном клиноптилалите		
Водород	0,9	1,01	1,09	0,65	0,85	0,96
Метан	7,3	7,5	7,85	5,2	5,6	6,3
Этан	2,8	2,95	3,9	1,8	2,1	2,6
Пропан	1,0	1,2	1,5	0,8	0,7	0,65
Бутан	2,55	1,2	0,65	5,0	4,6	4,3
i бутан	0,85	1,05	1,2	4,5	4,2	4,0
этилен	12,1	8,2	20,1	10,65	17,2	18,7
пропилен	9,9	9,27	8,57	10,10	10,4	10,85
∑ бутенов	9,3	8,9	7,1	9,9	9,3	8,8
Пироконденсат фракция>195^{0}C	14,1	13,7	11,04	14,55	12,8	10,4
	33,3	33,2	23,2	31,0	25,35	21,24
Кокс	5,9	20,09	13,8	6,05	6,9	11,2
Содержание олефинов в газе	31,3	36,3	35,7	31,85	37,1	30,05

Как видно из данных таблиц 1, 2 и 4 при пиролизе вакуумного газойля состав продуктов отличается от состава продуктов полученных при пиролизе фракции 120 – 230^{0}C. Содержание этилена и пропилена снизилось, увеличилось количество жидких продуктов. При пиролизе вакуумного газойля значительно увеличиваются выходы кокса. На рис.4 представлена зависимость выхода олефинов $C_2 – C_4$ от температуры процесса при пиролизе различных фракций.
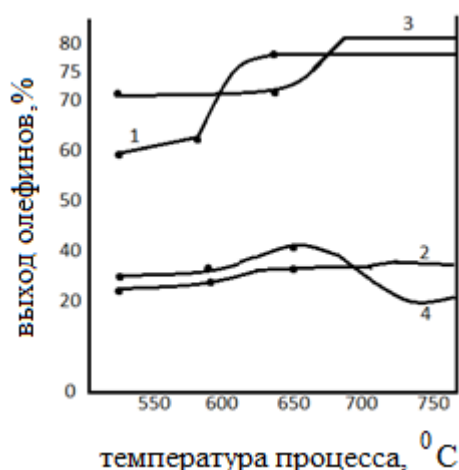

Рис. 4. Зависимость выхода олефинов $C_2 – C_4$ от температуры пиролиза различных фракций на мордените и клиноптилолите
1 – фр. 120 – 230^{0}C на мордените; 2 – широкий вакуумный газойль на мордените;
3 – 120 – 230^{0}C на клиноптилолите; 4 – широкий вакуумный газойль на клиноптилолите;

Как видно из рис. 4 с утяжелением сырья выхода фракций $C_2 – C_4$ уменьшается, что связано с повышенным содержанием в вакуумном газойле ароматических углеводородов. Очевидно, что при пиролизе на тяжелых видах сырья необходимо провести предварительную очистку сырья от сернистых соединений и ароматических углеводородов.

Заключение. В результате исследований каталитического пиролиза на модифицированном солью никеля мордените и природном клиноптилолите (оба цеолита находятся в Азербайджане) установлено, что наибольшие выходы олефинов $C_2 – C_4$ лежат в области температур 650 – 700^{0}C. При пиролизе прямогонной фракции 120 – 230^{0}C при 700^{0}C

получается около 35 – 40% этилена и 28 – 32% пропилена. При пиролизе на клиноптилолите повышается выход пропилена и бутенов. При пиролизе вакуумного газойля (350 – 500⁰C) выход олефиновых углеводородов уменьшается больше, чем в 2 раза и повышается выход жидких продуктов и кокса. При использовании клиноптилолита увеличивается количество изобутана и изопентана.

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INTEGRITY INTO GLOBAL TRADE WITH ATTRACTIVE INVESTMENT PRACTICE IN FREE ECONOMIC ZONES (CASE OF UZBEKISTAN)

Abstract: In the last decades, world economic integration, including trade liberation, financial internationalization and production integration have made a great progress. An increasing number of countries have become involved in the international division of labor free for the purpose of active attraction of foreign investments into the republic creation of economic zones, financial issues of their development study and development of free economic zones in Uzbekistan Problems that have been studied by the analysis and ways to solve them is characterized by Today the economy of Uzbekistan One of the key to achieving sustainable growth is internally efficient use of resources and active attraction of foreign investments. Uzbekistan's economy is integrated into the world economy implement export-oriented economic development policy in our country and export and export of export-oriented products as well as high-tech, import-substituting technologies use of free economic zones for creating new jobs, provide macroeconomic growth in the country.

Key words: Trade liberalization, financial internationalization, production integration, free economic zones, macroeconomic stability.

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Introduction

At a time when today is developing, countries are tomorrow the future of the present and the present employ them for development, the younger generation's future and attracting local and foreign investors trying to be a reformer and adapt to different areas will do. An example of this is free economic zones. Free Economic Zone - economic or external, in accordance with international treaties or special laws preferential tax, finance, customs and other activities Free currency conversion is where legal conditions are introduced. Foreign and to work with local entrepreneurs' production and business infrastructure will be established.

A special international legal status will be introduced in the free economic zones is an integral part of the country, no matter where it is located All practices (creation of firms and companies on land

allocation, import / export of goods, goods). Foreign and local It is designed to attract entrepreneurs and work in them a production and business infrastructure will be established. Free Economic Zones The aim is to attract many new technologies and investments, the creation of an advanced economic space and, thus, the country's economy is a rapid development.

Literature Review

There are numerous theoretical and empirical studies on FEZs. The classic studies discussed trade creation and trade transfer in a cross-national "Free Economic Area" [1]. However, the most studies focus narrowly on the economic effects and roles of EPZs and SEZs in developing and socialist countries [2]. Several studies attempt to provide a theoretical framework to analyze these economic effects, i.e., its

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benefits and costs, based on the standard "2 x 2 x 2" Heck-Ohlin trade model for small countries [3].

Others present a general theory of FEZs [4] or they discuss their structural and spatial evolution [5],[6],[7]. World economic integration and its relation with FEZs will be firstly discussed in order to explain FEZ's dominant role in the world economy and its development trend. A structural and spatial evolutionary model of FEZs on an international level will be developed based on a general definition, a factor system and a systematic typology of FEZs, which will improve the previous studies [8].

The first economist to provide a theory and a model for agglomeration was Alfred Marshall in 1920. Firms tend to cluster near to one another because industrial agglomeration reduces transport costs, hence resulting in "agglomeration economies." Marshall (1920) defined three categories of transport costs: moving goods, labor, and ideas [9]. In other words, there are two key channels through which SEZs can develop networks of economic efficiency and interdependence [10].

Last, the agglomeration of firms in SEZs is expected to lead to technological spillovers. The agglomeration of firms in specialized SEZs promotes Marshall-Arrow-Romer (MAR) externalities (Hu 2007; Rodríguez-Pose and Crescenzi 2008). Concentrating firms within a common industry facilitates industry-related knowledge spillovers among workers and promotes further specialization and industry-specific innovation, leading to firm growth (Henderson 2004). Multisectoral SEZs create an environment for Jacobian externalities (Carlino and others 2001; Rodríguez-Pose and Crescenzi 2008). The diversity of firms and their activities in SEZs enable firms to take advantage of knowledge complementarities and cross-industry transfer of ideas [11],[12],[13],[14],[15].

Method and Materials

In this article author used conceptual theory approach on definition, classification, development history with secondary source data. As a main material can be presented UNICTAD reports, articles form ScienceDirect, Lex.uz and National Statistics Committee sources.

Results

Figure 1. Geographic Footprint on Special Economic Zones

Source: Competitive Industries and Innovation SEZ Database, 2019.

The Competitive Industries and Innovation Program (CIIP) has assembled a database that covers 553 special economic zones in 51 countries across Sub-Saharan Africa (SSA), East Asia & Pacific (EAP), Europe & Central Asia (ECA), Middle East and North Africa (MENA), South Asia (SA), and Latin America & Caribbean (LAC). This SEZ database builds on previous efforts to establish an inventory of SEZs across countries and regions.

Figure 2. Drivers of SEZ Performance, The Conceptual Framework


Source: Special Economic Zones an Operational Review of Their Impacts, Competitive Industries and Innovation Program, The World Bank Group, 2017, p 42.

The first set of factors linked to SEZ performance is related to the set-up and design of the overall SEZ program. The set-up and design include the incentives package, the requirements imposed on firms to benefit from the incentives, and the organizational set-up of the program.

This firsthand information was embedded in the analysis of a) officially published literature in English, German and Chinese about FEZs including solid and comprehensive theoretical and empirical studies as well as b) officially published information of statistical data concerning TEDA, Tianjin and China from 1984 to 2000 to analyze the structures and evolutionary stages of TEDA. Another main source of information used for this study are restricted publications, especially of TEDA (1995–2000), including numerous discussion papers and investigation results about TEDA's development and problems – information, which were especially useful to evaluate TEDA's achievement and problems.

Figure 3. Types and Logical Relation of World Economic Integration
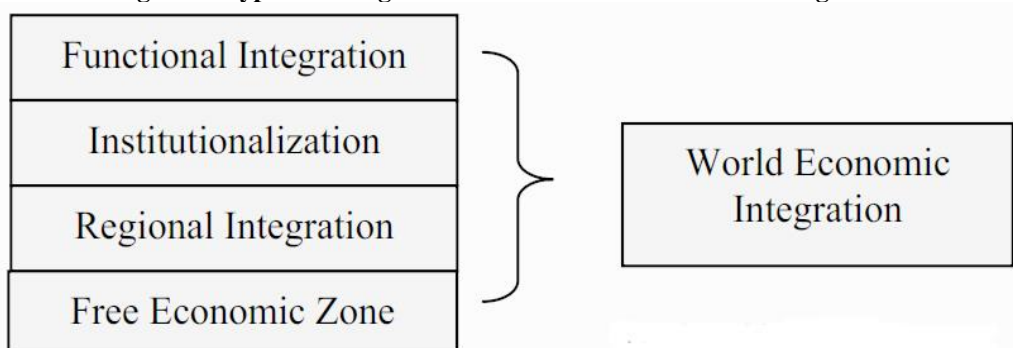
Every region, every level of development, is free economic zones. For example, developing the following are the features of free economic zones in countries (Fig.3):

■ Trade and production, with the tendency to expand the boundaries of the territory activity has a tendency to grow;

■ Separate management in the free economic zones for foreign entrepreneurs the regime is characterized by a continuous liberalization of the economy;

■ large-scale industrial and trade activity in free economic zones diversification, the tendency of complex development;

■ science related to the development of new and high technologies Particular attention is paid to the development of the most demanding production

availability economic entities established in free economic zones

Economy by attracting foreign investment into the national economy to provide growth and deeper integration into the world economy is one of the most important tasks facing the economies of the region. Such free to attract foreign investment into the national economy of the country's creation and further development of economic zones important. Investors are provided with tax benefits and preferences.

Figure 4. The Geographical Locations of Several Cross-National Growth Triangles in the Asia-Pacific Area
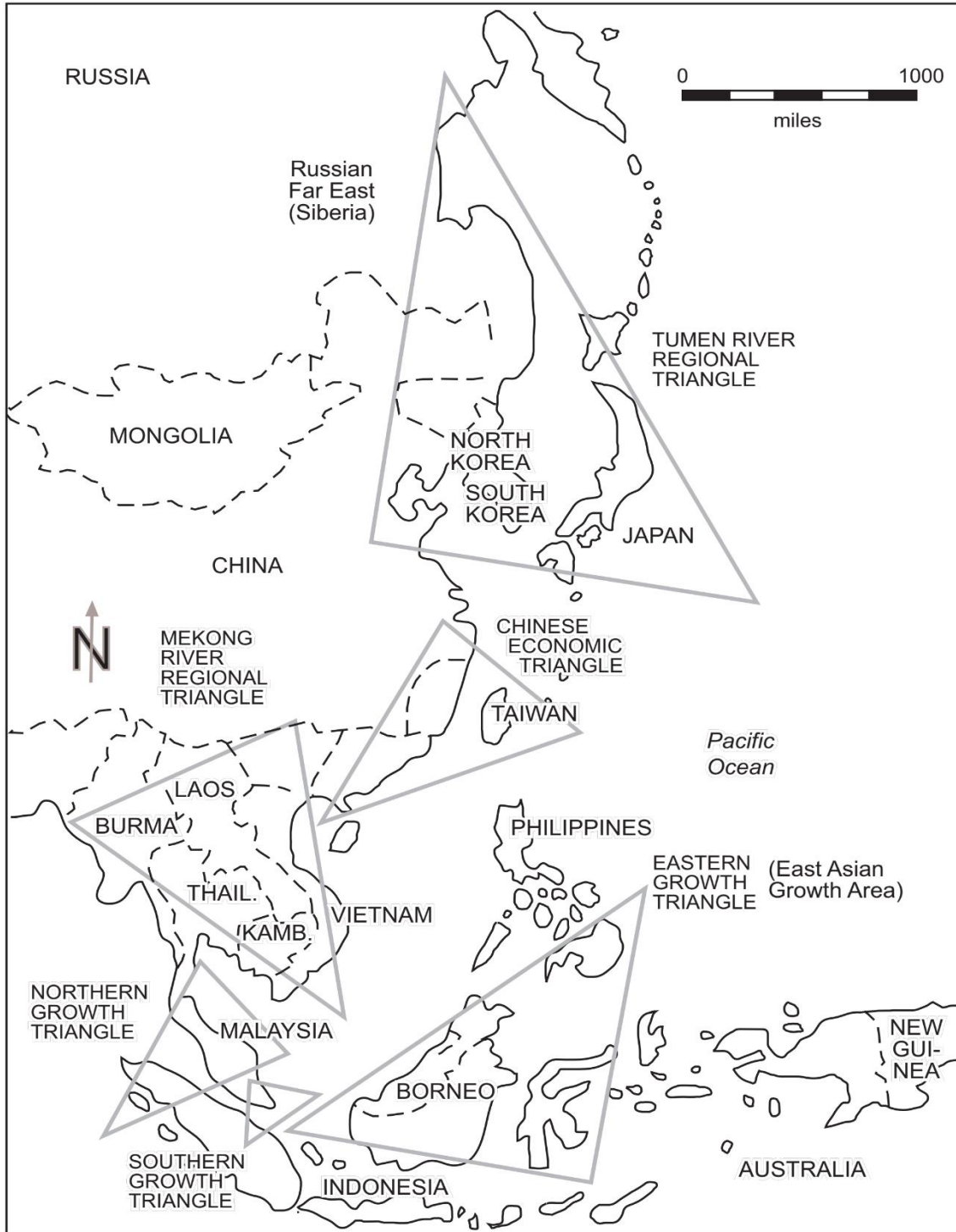
Source: Jones, C. (1993), "Economic Cooperation Zones create new Asian Geometry", In : Christian Science Miotor, No. 1, December, pp. 12-13; Xiangming Chen (1995), "The Evolution of Free Economic Zones and the Recent Development of Cross-National Growth Zones", In: International Journal of Urban and Regional Research, Vol. 19, p. 608.
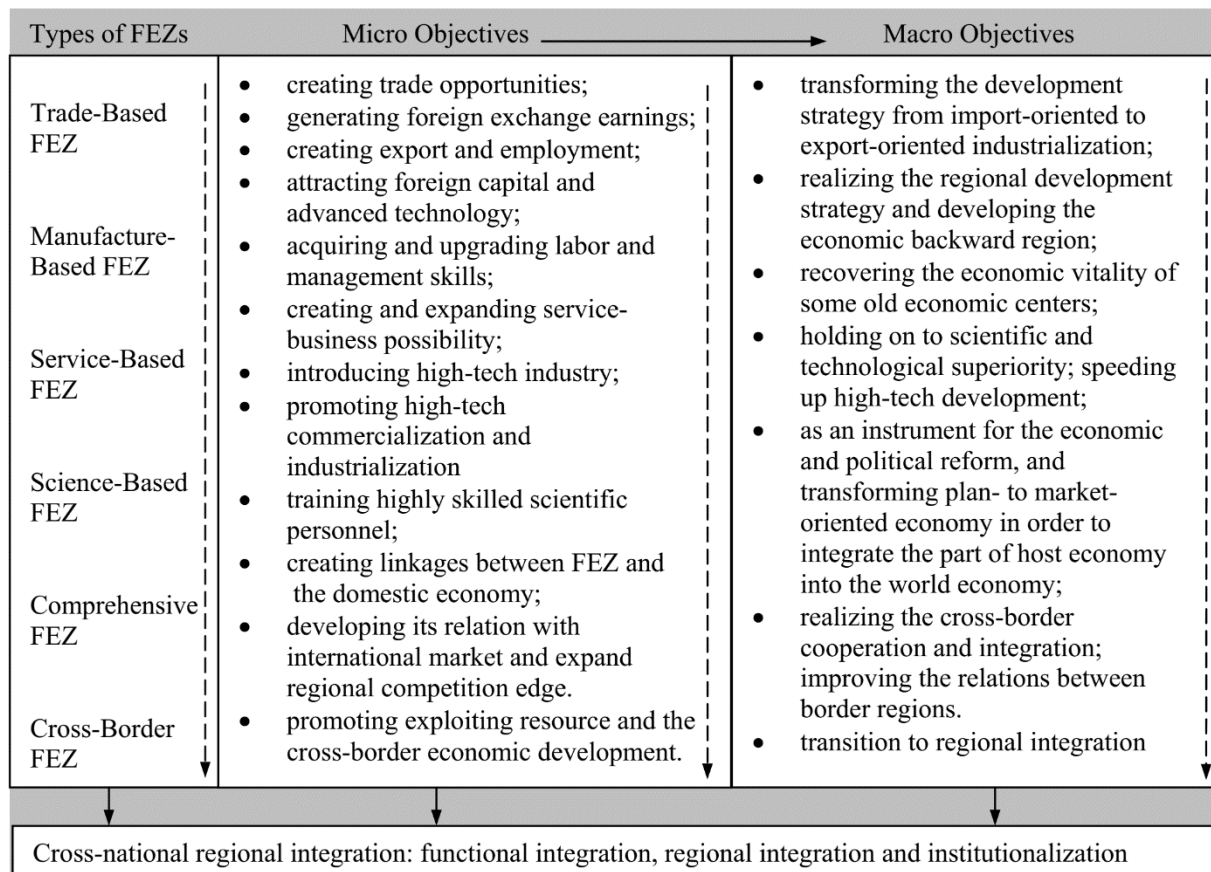
From the above map we can see how triangle relations can affect economic growth of each country. From this point of view, we can suggest importance of the crossroad in our economy for further development of the free economic zones (Fig 4).

Figure 5. Evolutionary Model of FEZ's Objectives

Types of FEZs	Micro Objectives ⟶	Macro Objectives
Trade-Based FEZ Manufacture-Based FEZ Service-Based FEZ Science-Based FEZ Comprehensive FEZ Cross-Border FEZ	• creating trade opportunities; • generating foreign exchange earnings; • creating export and employment; • attracting foreign capital and advanced technology; • acquiring and upgrading labor and management skills; • creating and expanding service-business possibility; • introducing high-tech industry; • promoting high-tech commercialization and industrialization • training highly skilled scientific personnel; • creating linkages between FEZ and the domestic economy; • developing its relation with international market and expand regional competition edge. • promoting exploiting resource and the cross-border economic development.	• transforming the development strategy from import-oriented to export-oriented industrialization; • realizing the regional development strategy and developing the economic backward region; • recovering the economic vitality of some old economic centers; • holding on to scientific and technological superiority; speeding up high-tech development; • as an instrument for the economic and political reform, and transforming plan- to market-oriented economy in order to integrate the part of host economy into the world economy; • realizing the cross-border cooperation and integration; improving the relations between border regions. • transition to regional integration
Cross-national regional integration: functional integration, regional integration and institutionalization		

Generally, FEZs have more similar micro-economic objectives, but the macro-objectives are mostly different from each other. The objectives evolved from the direct micro-economic objectives to the direct macro-economic objectives, or, in return, the micro- and macro-economic objectives evolved from the trade-based FEZ to the comprehensive and cross-border FEZ, namely, the comprehensive and cross-border FEZ have multi-objectives and more macro objectives. The micro objectives evolved from creating trade, export, employment, foreign exchange, and attracting foreign capital to absorbing advanced technology, investment, and training personnel, but the macro obje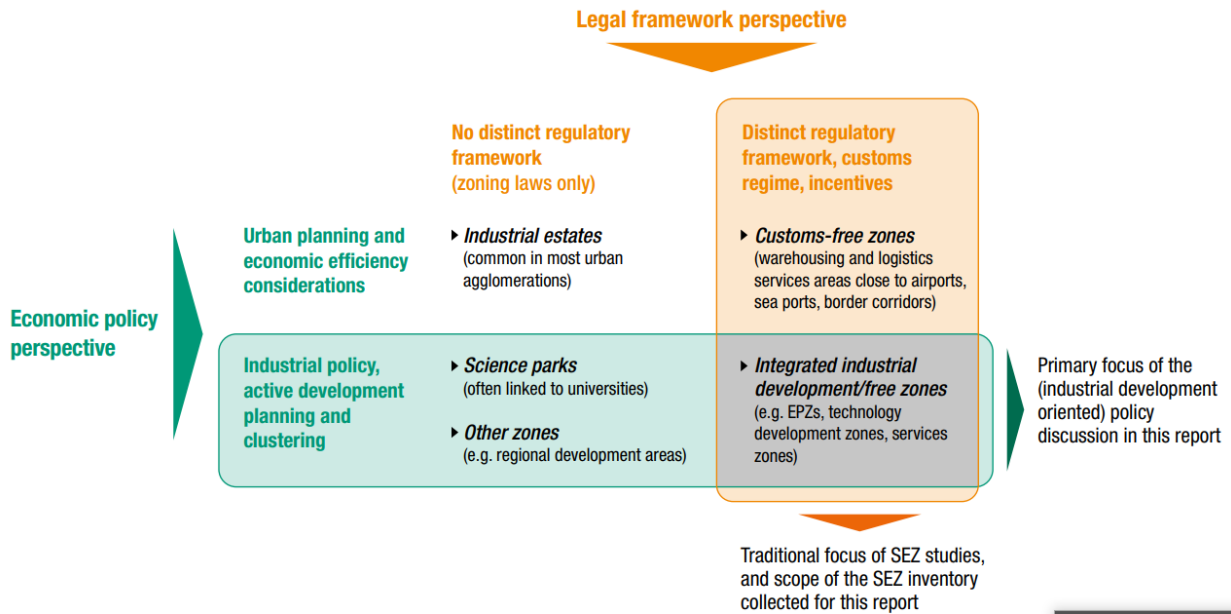ctives evolved from promoting regional development to carrying out structural reform and regional economic cooperation and integration.

From a development perspective, as well as an investment policy perspective, ones that are established as an integral part of industrial policy with active clustering efforts (i.e. the bottom half of the matrix) are the more relevant. Although free trade zones (FTZs), which mostly focus on logistics and warehousing services, are important – especially in developed countries – most existing and planned zones in the developing world are integrated free zones that aim to attract investment in industrial activity (Fig 6).
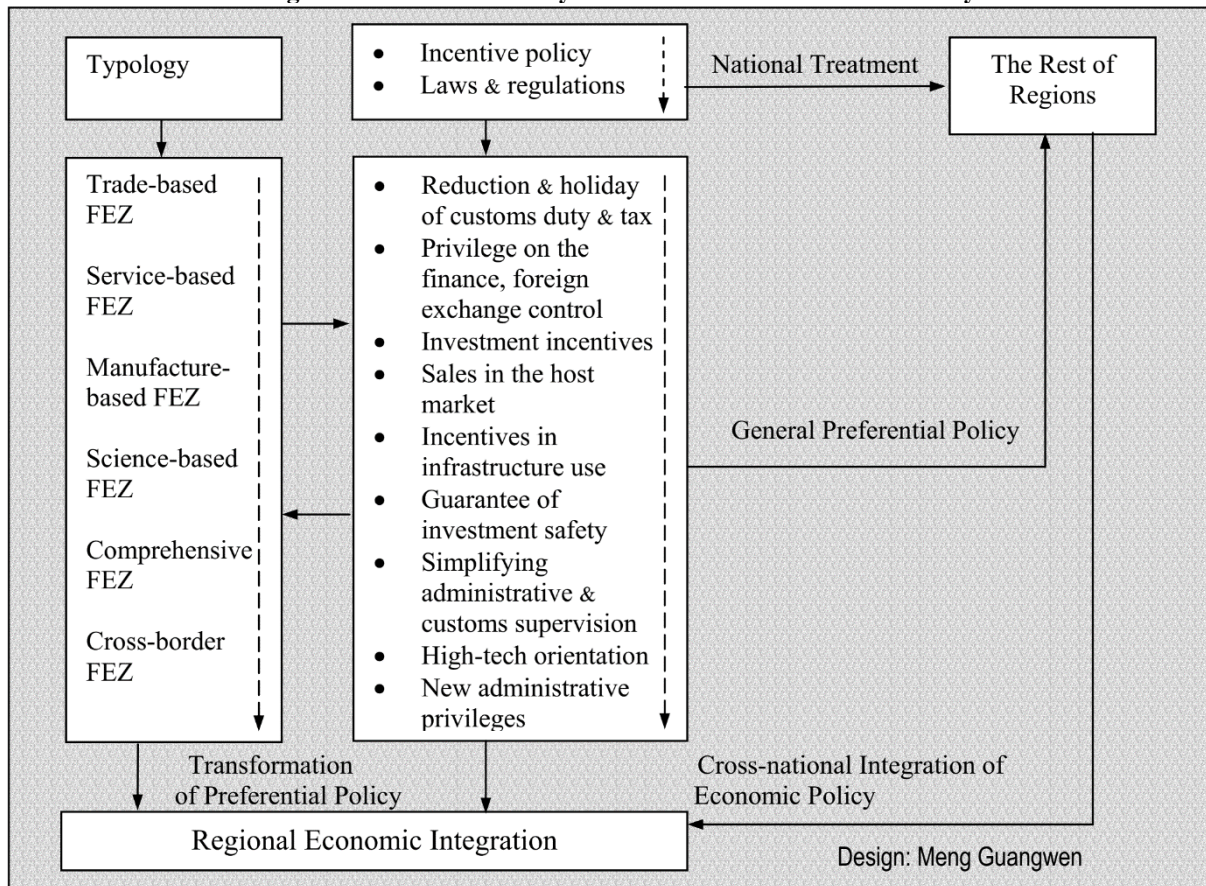
Figure 6. SEZ scope and definitions: a matrix combining two perspectives

Source: UNICTAD

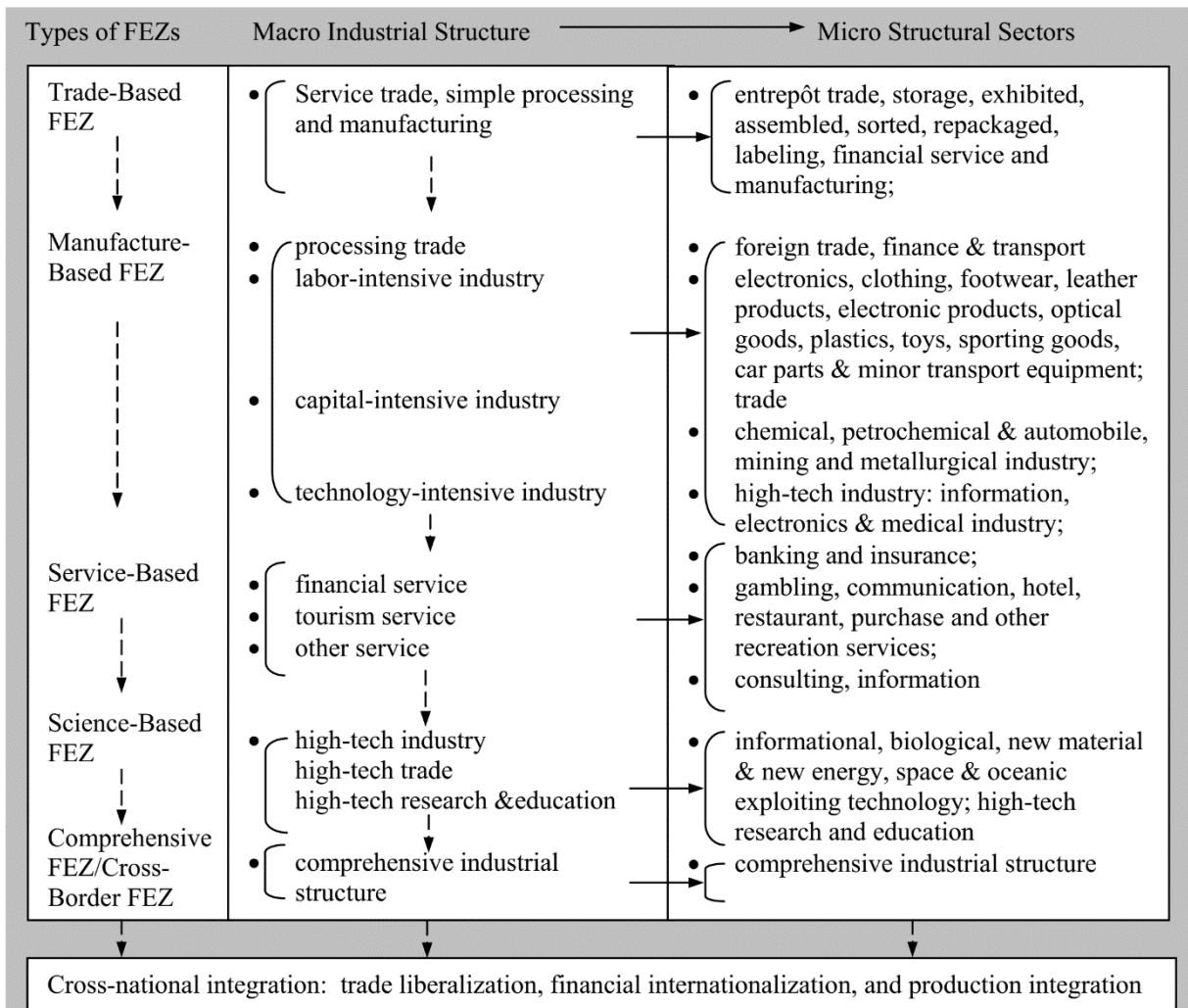### Figure 7. The Evolutionary Model of FEZ's Preferential Policy

Source: The Theory and Practice of Free Economic Zones: A Case Study of Tianjin, People's Republic of China, Ruprecht-Karls University of Heidelberg, Germany, Meng Guangwen Tianjin / People's Republic of China, 2003. The preferential contents and degree are enriched and enlarged following the evolution of FEZs from the trade-based to the comprehensive and cross-border FEZ. It expanded from the trade to the service, production, administrative and social, even political field. In addition, preferential policy will be expanded to the regions outside the FEZs, namely, the national treatment for the foreign investors inside or outside FEZs.

Figure 8. The Evolutionary Model of FEZ's Industrial Structure

The industrial structure consists of the key factors indicating FEZ economic development. Its evolution occurs both in total FEZs and in each FEZ. Figure 8 presents developed more comprehensive sectors with a stronger orientation toward capital- and technology-intensive manufacturing and services.

Quantitative growth goals are those aiming at attracting investment, promoting trade, increasing exports or creating jobs. Dynamic growth objectives seek innovation, industrial upgrading, skills development, economic diversification and structural change, as well as integration into value chains. Socioeconomic objectives relate to sustainable development, the quality of employment or environmental protection (Fig.9).

Figure 9. SEZs: general definitions and types

General definitions	Geographical location Special regulatory regime Economic activity	**Poland:** a separated, uninhabited part of the territory, on which a business activity may be conducted in accordance with the rules of the Act
		Pakistan: a geographically defined and delimited area that has been notified and approved for economic, industrial and commercial activities
		Indonesia: zones with certain boundaries within the territory that are designated to carry out an economic function and are granted certain facilities and incentives
		The Gambia: any area designated as a free zone where goods and services are deemed, insofar as import duties and taxes are concerned, as being outside the customs territory, where the benefits provided under the law apply
Types	Broad coverage of many zone types	**Botswana:** free trade zone or commercial special economic zone, export processing zone, enterprise zone, free port, single-factory economic zone, specialized zones, and others
	Typology based on specific purposes of each type	**Uzbekistan:** free trade zones (trade focused); free production areas (stimulating entrepreneurship and priority sectors), free scientific and technical zones (development of scientific and production potential)
	Typology based on geographical considerations	**Dominican Republic:** other free zones of border character (at the frontier with Haiti), special free zones (proximity to natural resources processed), industrial free zones or services (any location)

Figure 10. The Development Model of Growth Poles-Axes of China since the1990s
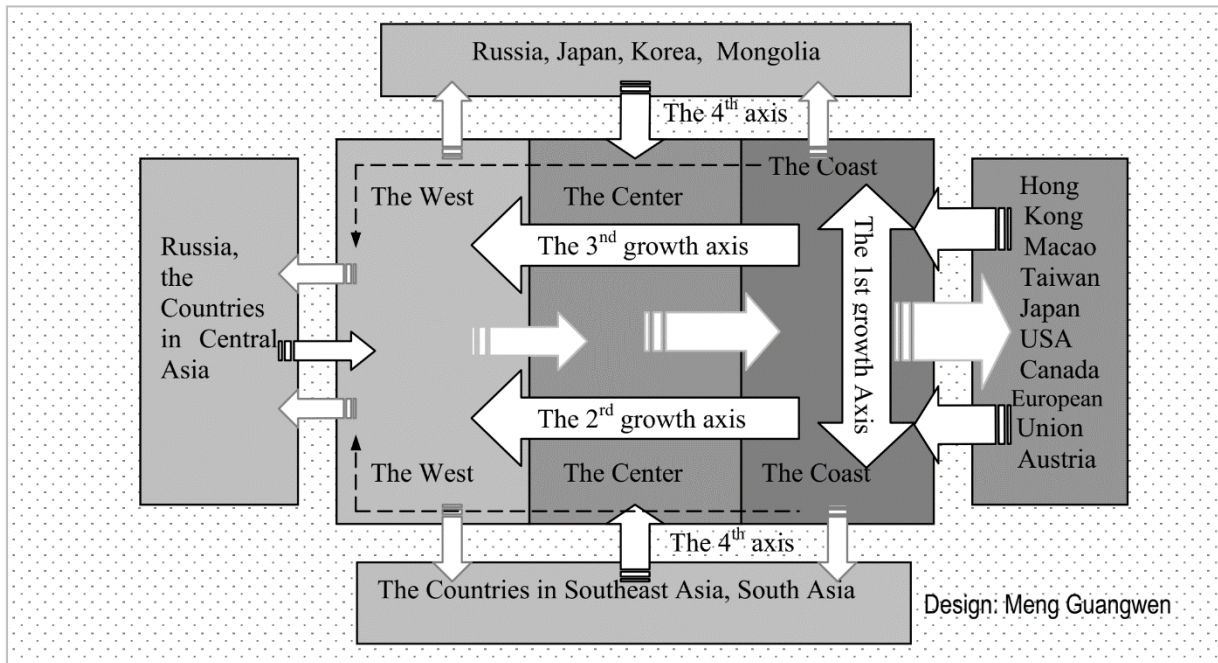

The implementation of the regional-unbalanced development policy promoted and sped up economic development of China, especially that of the coastal regions. This strategy, however, has also resulted in several problems since 1978. For example, along with the rapid economic development, the coastal region is being faced with relocation of some labor-intensive industries due to the increase of the cost of labor forces. Figure 10 clear presents that role of free economic zones in Uzbekistan and its background development model.

Figure 11. The Spatial Evolutionary Model of FEZs by Selected Periods, Geographical Areas and Nations
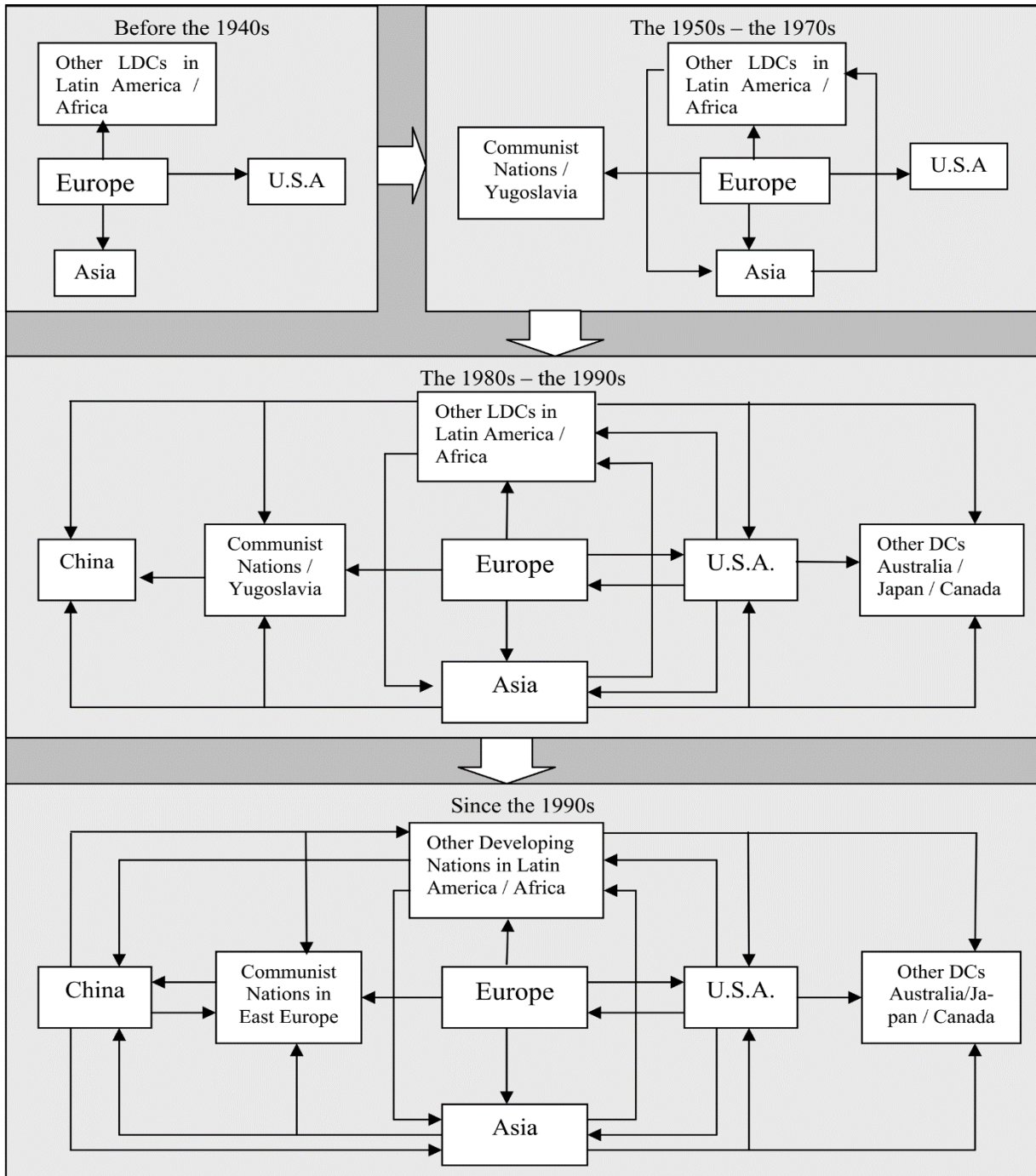
Source: Developed from McCalla, Robert J. (1990), "The Geographical Spread of Free Zones Associated with Ports", In: Geoforum, Vol. 21, No. 1, Pergamon Press Plc. p. 124
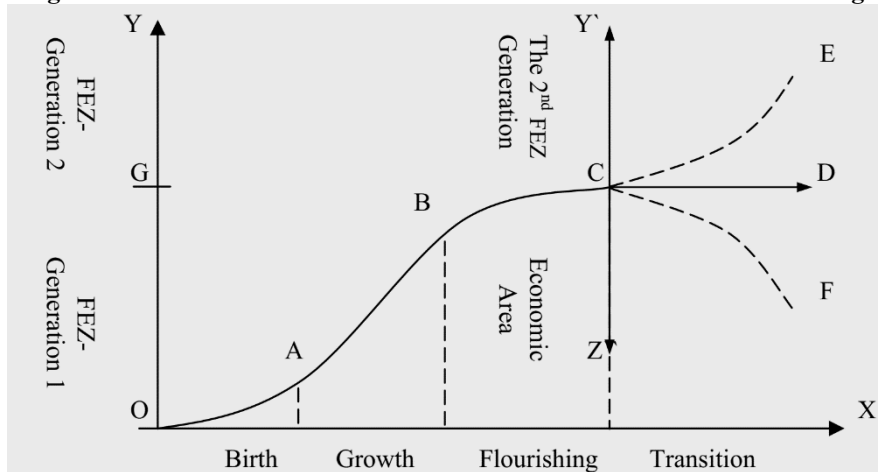
The evolution of FEZs can be classified into five stages. The first stage is symbolized by primitive FEZs such as FC and FP pre-1500s and successively by trade-based FEZs such as FP and FTZ since the 1500s; the second stage has manifested itself in manufacture-based FEZs such as EPZ, and service-based FEZs such as FFZ since the 1960s; the third stage is symbolized by comprehensive FEZs such as SEZ and science-based FEZs such as SIP and technopoles since the 1980s; the fourth stage is incarnated by cross-border FEZs such as CECZ and CGT since the 1990s; the fifth stage is symbolized by cross-national REI since the establishment of the MEU of the Netherlands, Belgium and Luxembourg in the 1930s and was optimized by the establishment of EU.

Figure 12. FEZ's Evolution and the Three Trends at the Transitional Stage

From the above figure we can analyze conceptual approaches of transitional stages of each free economic zone. It explains three trends which means starting point, development and transition whether positive or negative. (Fig. 12).

Discussion

Figure 13. Geographic locations of free economic zones of Uzbekistan

Special concessions have been approved for the development of specific regions of Uzbekistan. The following Free Economic Zones1 have been created:
• Navoi Free Economic Zone;
• Angren Free Economic Zone;
• Dzhizak Free Economic Zone;
• Urgut Free Economic Zone;
• G'ijduvon Free Economic Zone;
• Kokand Free Economic Zone;
• Hazorasp Free Economic Zone

Subject to the value of foreign investment, companies are eligible for concessions of varying duration on:
• Land tax;
• Property tax;
• Corporate profits tax;
• Tax on improvements and the development of social infrastructure

As an additional stimulus, special rules for making payments in foreign currency have been

introduced for companies registered in the above zones.

Legislation of the Republic of Uzbekistan on free economic zones

▪ About measures for strengthening coordination and increasing responsibility of ministries, agencies and local authorities for effective functioning of free economic zones, 2017

▪ Free Economic Zones and Small Industrial Zones, 2018

▪ About measures for further improvement of the system of coordination and management of activities of the free economic zones 2018

▪ Creation of a Free Industrial and Economic Zone in Navoi Oblast, 2008;

▪ Creation of the Angren Special Industrial Zone, 2012;

▪ Creation of the Dzhizak Special Indsutrial Zone, 2013;

▪ Additional measures to stimulate and expand the Activity of Free Economic Zones, 2016;

▪ Creation of Free Economic Zones "Urgut", "G'ijduvon", "Kokand" and "Hazorasp, 2017.

At the same time, the experience gained in the FIEZ shows that there are a number of problems and unresolved issues that hinder their rapid development and effective functioning including as followings:

First, in the medium and long term, there are no clear principles and approaches to the development of the SEZ, which define the specific goals for their establishment and functioning, including economic, social, scientific and technical and other purposes;

Secondly, the efforts of foreign companies and firms to broaden the favorable conditions for doing business in the territory of the FIEZ in Uzbekistan, and to inform potential investors, first of all, of these conditions abroad, are inadequate;

Third, the selection, implementation, analysis and evaluation of promising project proposals for implementation in the FIEZ based on feasibility, validity and profitability, as well as the quality organization, coordination and monitoring of all project implementation cycles, including project design and implementation. No unified system for growth, launch of facilities and achievement of end goals has been established;

Fourth, low-quality investment projects portfolio with high-tech foreign companies, primarily with deep processing of local mineral resources and agricultural raw materials, as well as high-tech export-oriented products under the world-renowned brands. establishment of modern localized enterprises is poorly done; insufficient industrial and cooperative

links between economic entities established on the territory of the FIEZ, lack of proper logistics system;

Fifthly, the process of registration, allocation of land, the approval of investment projects, connection of enterprises to the external engineering infrastructure, assistance to entrepreneurs in the domestic and foreign markets are being improved;

Sixth, as a result of insufficient use of the potential of the FIEZ, the volume of production of competitive, export-oriented and import-substituting products by the FIEZ participants is still low, their share in GDP, supply of the domestic market with consumer goods and components, and expansion of export potential in the country. and its share in increasing foreign currency earnings remains stable.

Suggestions

Critical determinant in configuring a zone development program is the type of zones to be promoted. International experience suggests that the recommended approach is to adopt a SEZ model that incorporates these principles:

▪ Allow SEZ enterprises as well as those licensed under other regimes to co-locate within the same area. The development of separately fenced-off areas solely for SEZ enterprises is a less preferable, but acceptable approach.

▪ Ensure that the SEZ regime is flexible, allowing a range of commercial as well as manufacturing activities. If properly supervised, a separate commercial free zone regime is not required.

▪ Promote private rather than public development of zones.

▪ Develop an appropriate legal, regulatory, and institutional framework to ensure adequate regulation and facilitation, requiring greater administrative facilities within host governments.

Conclusion

This study has shown that world markets that meet international standards on creation free economic zones for attracting foreign investment to produce the related products. In the implementation of these tasks free economic zones are important. The relevance of current research is clearly supported by the obtained findings above. Because it's such a free economy zones are the country and abroad for the social and economic development of the region. Modern market, along with the development of its industrial potential, manufacturing, transportation and social sectors by attracting capital infrastructure in the country.

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ANALYSIS OF THE MAIN INDICATORS OF SOCIO-ECONOMIC DEVELOPMENT OF INDUSTRIAL BUILDING MATERIALS

Abstract: In a market economy, ensuring domestic demand is becoming a critical task not only for each industry, but also for each individual enterprise. Analysis of current research shows that improvement of construction infrastructure is becoming Important in wadi range of factors like human, social, economic and financial. Main purpose of the paper work is identify best way for developing building material manufacturing sphere and optimize import substitute goods from abroad and clarify main socio-economic indicator for measurement of sustainable growth in construction sector of Uzbekistan.

Key words: Construction industry, enterprise, effectiveness, economic growth.

Language: English

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Introduction

Main activities of an industrial development are an important tool for determining further functioning based on the use of production potential and all its constituent elements. Only in practice, using new methods of analysis, it is possible to identify additional opportunities and reserves for the growth of output volumes.

Distributed analysis is different, based on the specific features of this production. For example, the analysis and synthesis method, complex analysis, cost analysis method, SWOT method, etc. At present, European countries have a rather cost-based method of analysis. The advantage of this method is that using the cost analysis method, the costs of production are accurately established, taking into account the influence of both external and internal environment. Namely, the presence and possibility of rational use of the production potential of the enterprise is of the greatest importance for the effective functioning of the enterprise. Therefore, the effectiveness of the production development strategy largely depends on the attraction of production potential, which we see when studying the scientific works of authors dealing with problems of analysis and use of production potential.

The building materials industry has begun to develop along with other industries over the years of independence. And at present, its share in the country's GDP is more than 6 percent. In the construction materials industry of Uzbekistan, there are currently more than 7.0 thousand enterprises providing construction materials for the population of the country. The volume of production of building materials in 2019 exceeded more than 15 billion sums.

The level of utilization of existing capacities for cement reached 92.2%, glass - 100%, gypsum plasterboards - 98%, ceramic plates - 97%, and at the same time, there is a low level of utilization of capacities in the production of cipher 25.2%, wood - particle boards Particleboard - 33%, burnt bricks - 74%.

Method

In this article it is used descriptive analyses with secondary source data from regional enterprises and firms in construction industry of Uzbekistan.

Results

A high level of utilization of production capacities leads to a practical lack of reserves for production growth at existing capacities to fully meet

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the needs of the domestic market through own production, and a low level is associated with higher prices and restrictions. At the same time, to cover existing and newly created capacities, to modernize and diversify, to introduce modern energy-saving technologies, which require large investments and considerable time.

An analysis of the production and consumption of building materials, which for such an important product shows that cement has seen a significant increase in production, so in 2000 - 2017, its consumption in the world as a whole doubled, including China 3.5 times, in Turkey 1.74 times, in Iran 1.84 times. In 2018, per capita cement production worldwide averaged 538 kg, including 1681 kg in China, 1098 kg in South Korea, 948 kg in Turkey, 372 kg in Russia, and 280 kg in Uzbekistan, which creates potential for further development of the cement industry.

A study and comparative analysis of the dynamics of volumes of production of building materials showed a significant lag in the output of products demanded in the market. For example, with a cumulative increase in construction work volumes by 116% in 2017 - 2018, the rate of cement production for this period was only 108.7%, which led to an imbalance in the market, an increase in imports and an increase in prices. At the same time, the positive dynamics of growth in the production of building materials by 2025 is forecasted to be 10% per year.

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A high level of utilization of production capacities leads to a practical lack of reserves for production growth at existing capacities to fully meet the needs of the domestic market through own production, and a low level is associated with higher prices and restrictions. At the same time, to cover existing and newly created capacities, to modernize and diversify, to introduce modern energy-saving technologies, which require large investments and considerable time.

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Production capacity is the basis for the formation of the production potential of the enterprise. It determines the pace and proportions of output. The rational use of production capacity is an important factor in increasing production efficiency.

Table 1. Level of use of production capacity at enterprises that produce building materials in the regions of the Republic of Uzbekistan for 2018.

| № | Regions | | Capacity of manufacturing | | | | | |
| | | | 30 percent | | 31-50 percent | | More than 50 % | |
		Numbers	Numbers	Percent	Number of firms	Percent	Number of firms	Percent
1.	Republic of Karakalpakstan	205	79	36,7	73	34,0	63	29,3
2.	Andijan region	447	164	36,7	179	40,0	104	23,3
3.	Bukhara region	300	68	22,7	135	45,0	97	32,3
4.	Jizzakh region	212	84	39,6	70	33,0	58	27,4
5.	Kashkadarya region	395	98	24,8	190	48,1	107	27,1
6.	Navoi region	336	63	18,8	110	32,7	163	48,5
7.	Namangan region	301	46	15,3	132	43,9	123	40,9

8.	Samarkand region	533	122	22,9	220	41,3	191	35,8
9.	Surkhandarya region	202	48	23,8	73	36,1	81	40,1
10.	Syrdarya region	113	26	23,0	39	34,5	48	42,5
11.	Tashkent region	673	91	13,5	149	22,1	433	64,3
12.	Ferghana region	536	92	17,2	276	51,5	168	31,3
13.	Khorezm region	414	159	38,4	136	32,9	119	28,7
14.	Tashkent city	1325	163	12,3	238	18,0	92,4	69,7
	Total	**6092**	**1303**	**21,7**	**2020**	**33,7**	**2679**	**44,6**

Source: stat.uz

An analysis of the use of production capacity at enterprises producing construction materials by region of the Republic of Uzbekistan is shown in the following table 1. It shows that at enterprises producing building materials in the whole country the maximum use of production capacities does not even reach 50 percent. Hence, the coefficient of efficiency in the whole country is 0.5. This situation affects the decrease in the growth rate of production of building materials. The main reason for the inefficiency of production of building materials is primarily associated with the unsatisfactory organization of production, labor and management, insufficient use of innovative ideas, the development of diversification and clustering, advanced foreign experience, low level of qualification of workers, etc.

Every year in Uzbekistan there is a process of growth in GDP and industry. According to forecasts, in 2020, GDP will increase by 5.5%, and industrial products by 6.5%. Such rates are primarily associated with the development of all industries, including the building materials industry. In the table ... the analysis for 2017-2019. production, the main types of products for JSC "Uz building materials". As can be seen from the table for all these joint stock companies, growth

rates are observed. However, along with this, there are enterprises that do not fulfill forecast indicators.

These joint-stock companies include Kizilkumcement - code, lime, reinforced concrete products, Quartz JSC - bank glass, Akhangaran slate JSC, Marokand Cable invest LLC. It can be noted that in these joint-stock companies there is a low level of utilization of production capacity.

At the same time, diversification will be achieved in expanding the assortment and mastering the production of 43 types and sizes of new products in a gamut of colors, including aerated concrete products of various configurations and type of sizes, including aerated concrete dry mixes, including the innovative brand and Wallpaper, ceramic granite and ceramic tiles by 3D technology, various products from natural stones and composites. In order to achieve these targets in the building materials industry, more than 400 investment projects will be implemented for a total amount of about $ 1.1 billion for the period 2019-2025, financed with the involvement of international financial institutions and foreign banks, as well as the implementation of integrated measures to accelerate the development of the industry.

Table 2. The rate of change in the production of major products for 2017 - 2019 for JSC "Uzstroymaterialy"

№	Materials	Unit	2017	2018				2019	
				Production		Growth rate %		forecast	Growth
				forecast	current	forecast	current		
	Uzmaterial	**Bln.sum**	**3 481,3**	**4 900,0**	**4 903,9**	**104,0**	**103,2**	**5 310,0**	**107,6**
	Kizilkumsement	**Bln.sum**	**1 035,8**	**1 590,0**	**1 597,4**	**105,0**	**103,2**	**1 650,0**	**103,1**
1	cement	Thous. ton	3 570,0	3 475,0	3 571,0	100,0	100,0	3 570,0	100,0
	roof materials	Thous. ton	3,3	28,0	39,2	835,9	1 169,1	40,0	102,1
	mixture	Thous. ton	17,4	18,0	35,4	103,6	203,7	35,5	100,3
	Cement block	Thous. ton	33,5	40,0	43,3	119,3	129,2	43,5	100,5

2	**Oxangaroncement**	**Bln.sum**	**568,8**	**700,0**	**681,0**	**107,2**	**84,2**	**700,0**	**103,1**
	Cement	Thous. ton	1 875,0	1 865,0	1 624,0	99,5	86,6	1 750,0	107,8
	Cement block	Thous. ton	10,0	11,0	11,2	109,9	111,9	12,2	108,7
3	**Kuvasoycement**	**Bln.sum**	**297,2**	**420,0**	**414,5**	**104,0**	**92,8**	**440,0**	**103,5**
	Cement	Thous. ton	1 011,1	1 080,0	946,1	106,8	93,6	1 002,0	105,9
4	**Bekabadcement**	**Bln.sum**	**385,3**	**480,0**	**494,6**	**107,0**	**100,0**	**520,0**	**105,1**
	Cement	Thous. ton	1 100,7	1 070,0	1 115,9	97,2	101,4	1 200,0	107,5
5	**Kvartz**	**Bln.sum**	**288,2**	**295,0**	**301,9**	**108,0**	**108,4**	**334,0**	**108,5**
	Glass	Thous, sq	12 788,0	12 422,0	12 422,0	97,1	97,1	11 600,0	93,4
	Glass glaze	Mln pcs	60,4	62,0	66,8	102,7	110,6	68,0	101,9
	Glass bottle	Mln pcs	104,5	105,0	112,9	100,4	108,0	125,0	110,7
6	**Oxangaranshifer**	**Bln.sum**	**39,0**	**40,0**	**17,3**	**110,0**	**44,3**	**20,0**	**115,6**
	Roof materials	Thous. ton	83,4	85,0	34,8	101,9	41,7	40,0	114,9
7	**Gazganmarmar**	**Bln.sum**	**0,9**	**1,0**	**0,7**	**106,0**	**73,1**	**0,8**	**119,4**
	Marble block	Thous. ton	15,2	15,2	10,1	100,1	66,8	10,2	100,6
8	**PBS Optimum**	**Bln.sum**	**33,3**	**35,0**	**4,9**	**108,0**	**1,6**	**5,0**	**102,0**
	Rail way materials	Thous. ton	138,6	140,0	-	-	-	-	-
9	**Marokand cable**	**Bln.sum**	**2,8**	**12,0**	**20,1**	**-**	**-**	**22,0**	**109,5**
	Other	**Bln.sum**	**830,0**	**1 327,0**	**1 371,5**	**160,0**	**165,4**	**1 618,2**	**118,0**

Source.stat.uz

An analysis of the data in the table shows that the forecast data for 2019-2021 for certain types of building materials are disappointing. For them, domestic demand is not fully provided.

Discussion

Entering new enterprises is a significant business, but at the same time it is necessary to use wider production potential. Opportunities and

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reserves of production, especially it is necessary to increase the account of products from the planned production capacities, which are in poor condition in the industry. It is necessary to switch to multi-shift operation.

In accordance with the Decree of the President of the Republic of Uzbekistan dated December 22, 2016 No - 2692 "On additional measures for accelerated updating of physically worn out and obsolete equipment, as well as reduction of production costs of enterprises of industries", consolidated parameters for reducing production costs in 2018 were approved Uzstroymaterialy JSC for an average of 8.2% per year. The main priority areas and measures to reduce costs at enterprises of the building materials industry are as follows:

1. A fuller use of the capacities for the production of metal tiles, full flooring, bricks, sandwich panels, paints and varnishes, marble and granite slabs, reinforced concrete products, drywall products, etc.

2. Updating, modernization of equipment in small large enterprises for the production of wall, decoration, plumbing, ceramic materials using modern energy-efficient technological furnaces and equipment.

3. Expansion of cement production in Akhangarantsement JSC with the transition of technology to an energy-saving "dry" method.

4. Reducing the energy intensity in the production of building materials due to the implementation of investment projects to introduce energy efficiency and heat-saving technologies in existing plants, including the construction of a new grinding station in Bekabadcement JSC with loans from the World Bank's MPR.

5. Decommissioning and updating morally and physically obsolete equipment, optimization of technological processes to reduce losses, allowing to reduce the cost of electricity and natural gas, increase productivity.

6. Utilization of exhaust gases from process furnaces (clinker and glass melting furnaces) at large enterprises in the cement and glass industries.

7. Organization of electric and heat energy generation at gas-pipe blocks by innovative technologies in large cement enterprises.

Table 3. The dynamics of the composition and structure of fixed assets of the industry of Uzbekistan.

Indicators	Years				
	2016	2017	2018	2019	2020
Production fund	100	100	100	100	
Premises	14,7	13,8	13,3	12,5	
Buildings	22,8	23,2	23,0	23,6	
Machines and equipment's	43,0	42,6	43,5	44,4	
Transportation	6,2	5,9	5,7	5,8	
Other funds	1,3	1,2	1,2	1,2	

Source: Stat.uz

One of the important elements of production potential is labor potential. In the economic literature, especially on labor issues, a concept such as labor potential is often found that characterizes the presence of intellectual and skilled labor in enterprises. Along with the concept of labor potential, there is the concept of labor resources, human factor, employee, personnel, human resources, personality factor, etc. In terms of significance, they are all on the same line, and in terms of the nature of the actions and the performance of any function, they differ. Most importantly, their activity is aimed at fulfilling one goal, i.e. economic growth and improving production efficiency.

Table 3. analyzes the employment, number of employees, staff, their movement within the enterprise and beyond. It also addresses the issue of balancing the number of jobs and the number of employees in terms of their quality attributes of their chosen position.

If we analyze the production of building materials in the category of regions and its specific gravity in industrial production, then there is an uneven distribution of enterprises producing building materials, they are mainly concentrated in two regions - Namangan and Ferghana. In these regions, where there are many raw materials, for example, in Karakalpakstan, Khorezm, Jizzakh, Syr Darya, the share of construction materials in the general industry is insignificant.

Effective use of production potential should affect the increase in the volume of building materials and the dynamics of profit. Indeed, improving the economic and social situation depends on the profitability of the enterprise.

Labor productivity is the main indicator not only of an increase in production, but of profit growth. In economic theory, it has long been proven that one percent increase in labor productivity gives a two percent increase in output. For some reason, with the transition to a market economy, not only in our country, but in all CIS countries, economist scientists have not begun to pay full attention to the indicator of labor productivity.

These and other measures are aimed not only at developing the production of building materials, but also to increase the export potential of the industry, and to produce high value-added products that meet international standards.

In Uzbekistan, trade as an important macroeconomic indicator is increasing at an accelerated pace, but the share of imports remains high. In 2018, the total volume of trade was equal to 33.5 billion US dollars, and the volume of exports amounted to 13.9 billion dollars or 41.5 percent of the total volume of trade, including construction materials 64.7 million dollars. USA. As you can see, from these data, the industry is still importing a dependent sphere. However, the measures defined in the concept show that by 2025 the domestic market will be fully provided with its own building materials.

The main ways to increase export potential in the industry of construction enterprises are:

1. Improving the organizational structure of management of enterprises producing building materials. Transition to the corporate management system.

2. Implementation of modernization and diversification of production, expanding the range of products.

3. Development of production based on innovative technologies with an increase in products meeting the requirements of the international ISO standard and quality management.

4. Expansion of products using local raw materials.

5. Improving the training of higher and secondary specialized educational institutions using international best practices.

At present, the calculation of gross value added is given an important place in economic boundaries. What is gross value added? This is the cost of production, raw materials and basic materials, semi-finished products, the cost of services, which are included in the amount of GDP. It makes it possible to assess the real value of the total volume of production and services in the country. However, taxation cannot be avoided. Before the market economy in the countries of the former union, such an indicator was not calculated, relating it to the capitalist mode of production. Now the economy in the CIS countries occupies a key place.

In Uzbekistan, the practice of using gross value added with the establishment of independence and the transition from the international standard outside the system of national accounts. And the value added tax rate of the government was set at 20 percent, which lasted until 2019. Currently, the rate on the added rate is 12 percent. In developed countries, the size of the rate of value added tax is different.

In Uzbekistan, in order to increase the stimulating role of taxation, as well as for further development of entrepreneurial activity, the taxation procedure is changing in the new value added tax code, i.e. producers will pay value added tax when the volume of output reaches above one billion sums. Such a system of value-added taxation is essential not only for the development of industry, but also for raising the economy of the country as a whole.

The adopted industry development concept for 2019 - 2025. is the most important strategic mission of the building materials industry for the medium term. The implementation of the measures envisaged in this concept will increase the production of high-quality, innovative import-substituting building materials and products, more fully meet the growing needs of the construction complex and increase export of products. This concept is envisaged in 2019 - 2025. more rational use of the raw material base of the industry through the expansion of geological exploration, production and in-depth processing of local raw materials, ensuring the achievement of target parameters for the production of building materials. The concept also envisages an increase in wallpaper production volumes of more than 47 times, parquet panels and plates - 19 times, chipboards - 15 times, aerated concrete blocks - 7 times, paints and glass for energy and heat saving float technology - 4 times, environmental composite reinforcement from igneous rocks - 3 times and others.

Conclusion

If we conclude industrial enterprises distinguish the concept directly related to the production of products. These include fixed assets, fixed assets, fixed production assets. Fixed assets include buildings, structures, warehouses, auxiliary facilities. This is the real estate of the enterprise or inactive part of the production process. They do not participate in the creation of products. The cost of production is the main component of all production costs. It also characterizes the rational and efficient use of the production potential of the enterprise. Since the main elements of cost constitute the basis of production potential, especially the resource part. Using the production potential in industrial production, attention should be paid to the change in the cost of production.

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THE GROUP OF PARALLEL CONNECTED THERMISTORS

Abstract: *A working mathematical model of a technical system was obtained. The technical system involves parallel connection of PTC thermistors. The created mathematical model is sufficiently full, accurate, adequate, productive, and economical. Such a model, when applied, requires less time and costs spent on research and enables efficient use of mathematical modeling tools.*

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

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ПАРАЛЛЕЛЬНОЕ СОЕДИНЕНИЕ ТЕРМОРЕЗИСТОРОВ

Аннотация: *Получена рабочая математическая модель технической системы. Техническая система включает параллельное соединение терморезисторов с положительным температурным коэффициентом сопротивления. Построенная математическая модель в достаточной мере обладает свойствами полноты, точности, адекватности, продуктивности и экономичности. Применение такой модели сокращает затраты времени и средств на проведение исследования, позволяет рационально использовать возможности математического моделирования.*

Ключевые слова: *рабочая математическая модель, свойства математических моделей, принципы математического моделирования.*

1. Введение

Рассмотрению технических характеристик терморезисторов с положительным температурным коэффициентом сопротивления, основных принципов их работы, способов расчета схем с этими терморезисторами, а также многочисленным примерам практического использования таких приборов посвящена обширная учебная и научная литература.

Целью настоящей работы является разработка в рамках единого подхода рабочей математической модели технической системы. Техническая система включает параллельное соединение терморезисторов с положительным температурным коэффициентом сопротивления.

Зависимость сопротивления R такого терморезистора от его температуры T не является линейной в широком диапазоне температур (см., например, [1]). Однако в сравнительно узком диапазоне температур можно считать, что

$$R(T) = r\left[1 + \beta\left(T - T_0\right)\right],$$

где r — сопротивление терморезистора при $T = T_0$; β — положительная постоянная величина.

Единый подход к построению рабочей математической модели, которая в достаточной мере обладает нужными свойствами применительно к конкретному исследованию,

изложен в работах [2; 3]. Некоторые свойства математических моделей сформулированы, например, в [4; 5]. В работе [6] приведен пример построения математической модели, в достаточной мере обладающей нужными свойствами применительно к исследованию, некоторые результаты которого опубликованы в работах [7–9]. Особенности внедрения единого подхода к построению математических моделей рассмотрены, например, в [10; 11].

2. Постановка задачи

Рассмотрим параллельное соединение n терморезисторов. Пусть i-й терморезистор является высокотеплопроводным телом, температура T_i которого в начальный момент времени t_0 равна T_0, причем $T_i \leq T_1$, $i = 1, 2, \ldots, n$. 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_1 считаем, что

$$R_i(T_i) = r_i \left[1 + \beta_i (T_i - T_0) \right],$$

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

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. Через i-й терморезистор протекает электрический ток, сила которого равна

$$I_i = \frac{U}{r_i \left[1 + \beta_i (T_i - T_0) \right]}, \qquad (1)$$

где U — постоянная разность электрических потенциалов на полюсах i-го элемента.

Пусть в рамках проводимого исследования представляет интерес величина

$$I = \sum_{i=1}^{n} I_i. \qquad (2)$$

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

3. Решение задачи

Для решения поставленной задачи используем полученные в работе [12] результаты. Эти результаты позволяют легко построить иерархию математических моделей данного объекта исследования и определить условия, при выполнении которых можно с относительной

погрешностью не более заданного значения δ_0 найти искомую величину I.

Если разности $T_i - T_0$, $i = 1, 2, \ldots, n$, достаточно малы, то согласно (1) найдем искомую величину по формуле

$$I_0 = U \sum_{i=1}^{n} r_i^{-1}. \qquad (3)$$

Определим условия, при которых применима полученная формула. Для этого рассмотрим установившийся процесс теплообмена. В этом случае согласно выкладкам, приведенным в работе [12], установившееся значение величины I_i найдем по формуле

$$I_i^* = \frac{2U}{r_i \left[1 + \sqrt{1 + 4\beta_i U^2 \alpha_i^{-1} S_i^{-1} r_i^{-1}} \right]},$$

причем для данного диапазона температур

$$\frac{U^2}{\alpha_i S_i r_i (T_1 - T_0)} \leq 1 + \beta_i (T_1 - T_0). \qquad (4)$$

Тогда установившееся значение искомой величины равно

$$I_* = \sum_{i=1}^{n} I_i^*. \qquad (5)$$

Для относительной погрешности величины I_0 запишем

$$\delta(I_0) = \left| \frac{I - I_0}{I} \right| = \frac{I_0}{I} - 1 \leq \frac{I_0}{I_*} - 1.$$

При выполнении неравенства

$$\frac{I_0}{I_*} - 1 \leq \delta_0 \qquad (6)$$

можно с относительной погрешностью не более δ_0 использовать формулу (3) для нахождения искомой величины. Следовательно, при выполнении неравенства (6) математическая модель (3) в достаточной мере обладает свойствами полноты, точности, адекватности, продуктивности и экономичности.

Затем определим условия, при которых применима математическая модель (5). Для этого рассмотрим неустановившийся процесс теплообмена. Тогда, учитывая результаты, полученные в работе [12], приходим к задаче Коши

$$\frac{dI_i}{dt} = \frac{\beta_i r_i I_i^2}{c_i U} \frac{\alpha_i S_i U - \alpha_i S_i r_i I_i - \beta_i r_i U I_i^2}{\gamma_i U - \gamma_i r_i I_i + \beta_i r_i I_i},$$

$$I_i(t_0) = U r_i^{-1}, \qquad (7)$$

где $i = 1, 2, \ldots, n,$ и найдем момент времени

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

$$\left. + \left(\frac{U}{2U - r_i I_i^*} + \frac{\gamma_i}{\beta_i} \frac{U - r_i I_i^*}{2U - r_i I_i^*} \frac{U}{r_i I_i^*} - 1 \right) \times \right.$$

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

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

для которого

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

Очевидно, что при $t \geq t_i$

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

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

$$\delta(I_*) = \left|\frac{I - I_*}{I}\right| = \frac{\sum\limits_{i=1}^{n}(I_i - I_i^*)}{\sum\limits_{i=1}^{n} I_i} \leq \delta_0.$$

Следовательно, можно с относительной погрешностью не более δ_0 использовать формулу (5) для нахождения искомой величины.

Если не выполнено условие (6), то математическая модель (5) при $t \geq t_*$ в достаточной мере обладает свойствами полноты, точности, 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 полученные результаты, можно уточнить условие применимости формулы (3). Для этого найдем момент времени

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

$$\left. + \frac{U}{2U - r_i I_i^*} - 1\right) \ln\left(1 + \frac{r_i I_i^*}{U}\delta_0\right) -$$

$$- \left(\frac{U}{2U - r_i I_i^*} + \frac{\gamma_i}{\beta_i} \frac{U - r_i I_i^*}{2U - r_i I_i^*} \frac{U}{r_i I_i^*}\right) \times$$

$$\left. \times \ln\left(1 - \frac{r_i I_i^*}{U - r_i I_i^*}\delta_0\right) - \frac{\gamma_i}{\beta_i}\delta_0\right],$$

для которого

$$I_i(t_i) = \frac{U}{r_i(1 + \delta_0)}.$$

Очевидно, что при $t \leq t_i$

$$\delta(Ur_i^{-1}) = \left|\frac{I_i - Ur_i^{-1}}{I_i}\right| = \frac{U}{r_i I_i} - 1 \leq \delta_0,$$

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

$$\delta(I_0) = \left|\frac{I - I_0}{I}\right| = \frac{\sum\limits_{i=1}^{n}(Ur_i^{-1} - I_i)}{\sum\limits_{i=1}^{n} I_i} \leq \delta_0.$$

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

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

4. Результаты

Построение иерархии математических моделей объекта исследования позволяет выявить рабочую математическую модель, которая в достаточной мере обладает нужными свойствами применительно к конкретному исследованию.

Действительно, если выполняется неравенство (6) или в рамках проводимого исследования $t \leq t^*$, то математическую модель (3) считаем рабочей. Если не выполнено условие (6), а временной интервал от t_0 до t_* можно в рамках проводимого исследования не рассматривать, то выбираем математическую модель (5) как рабочую, иначе — математическую модель (2), (7). Приведенные утверждения справедливы при выполнении неравенства (4).

5. Заключение

Таким образом, в рамках единого подхода сформулированы применительно к данному исследованию утверждения. Они позволяют установить рабочую математическую модель технической системы, которая включает параллельное соединение терморезисторов с положительным температурным коэффициентом сопротивления. Построенная математическая модель в достаточной мере обладает свойствами полноты, точности, 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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INHERITANCE OF MORPHOBIOLOGICAL SIGNS IN PLANTS F1-F2 OBTAINED BASED ON THE INTRASPECED HYBRIDIZATION OF THE PERUANIAN COTTON HOUSEHOLD

Abstract: This article provides a genetic analysis of the morphobiological traits of F_1-F_2 plants obtained by hybridization of the intraspecific diversity of G. barbadense L. In particular, it was determined that the heredity of the photoperiodic phenotype reaction in a 15:1 ratio is regulated by the non-cumulative effect of polymer genes. Demanding for photoperiodism of the subspecies subsp. vitifolium is regulated by 3 recessive genes ph1, ph_2, ph_3, and a neutral reaction to a long daylight is controlled by two dominant genes Rh_1, Rh_2 and one recessive ph_3 gene. In addition, the separation of F_1-F_2 plants by anthocyanin color was observed in a phenotypic ratio of 15:1 (15 plants with anthocyanin color, 1 green). When analyzing the combination of F_2 f. brasiliense x subsp. vitifolium, among 212 plants examined 196 were plants with anthocyanin coloration, and stem 16 and plants were green, with $\chi^2=0.60$, P was in the range 0.50-0.20. It was determined that the anthocyanin color of plants is driven by two genes when the plant genotype was $Rp\, R_p R_p\, R_{st}^V\, R_{st}^V$.

Key words: photoperiodism, genetic analysis, anthocyanin coloration, heredity, intraspecific diversity, hybridization.

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НАСЛЕДОВАНИЕ МОРФОБИОЛОГИЧЕСКИХ ПРИЗНАКОВ У РАСТЕНИЙ F1–F2, ПОЛУЧЕННЫХ НА ОСНОВЕ ВНУТРИВИДОВОЙ ГИБРИДИЗАЦИИ ПЕРУАНСКОГО ВИДА ХЛОПЧАТНИКА

Аннотация: В данной статье проведен генетический анализ морфобиологических признаков F_1-F_2 растений, полученных путем гибридизации внутривидового разнообразия G.barbadense L. В частности,

было определено, что наследственность фотопериодической реакции фенотипа в соотношении 15:1 регулируется некумулятивным эффектом полимерных генов. Требовательность к фотопериодизму подвида subsp. vitifolium регулируется 3 рецессивными генами ph_1, ph_2, ph_3, а нейтральная реакция к длинному световому дню контролируется двумя доминантными генами Rh_1, Rh_2 и одним рецессивным ph_3 генами. Кроме того, наблюдено разделение растений F_1-F_2 по антоциановой окраске в фенотипическом соотношении 15:1 (15 растений с антоциановой окраской, 1 зеленого цвета). При анализе комбинации $F_2 f.$ brasiliense x subsp. vitifolium, среди 212 просмотренных растений 196 были растения с антоциановой окраской, а стебель 16 и растений имели зеленый цвет, при этом $\chi^2=0,60$, P было в промежутке 0,50-0,20. Определено, что антоциановая окраска растений управляется двумя генами, когда генотип растений было $R_p R_p R_{st}^V R_{st}^V$.

Ключевые слова*: фотопериодизм, генетический анализ, антоцианая окраска, наследственность, внутривидовое разнообразие, гибридизация.*

Введение

УДК 633: 511: 575: 22.2

Общеизвестно, что эволюция фотопериодизма наряду с скороспелостью тесно связана с перемещением хлопка из тропических зон в северные регионы, где присутствуют естественные длинные световые дни. Из-за полиморфизма потребности хлопчатника к начальному фотопериодизму созданы сорта с низкой чувствительностью к фотопериодизму или скороспелые, нейтральные к длинному световому дню путём мутаций, естественных и искусственных отборов [5, 8, 9].

R.J. Kohel [11] в результате своих экспериментов, выяснил, что ген R1 контролирующий антоциановую (красную) окраску растений хлопчатника относится к III группе сцепления, а антоциановые пятна лепестков разделил к I первой группе сцепления.

Привлечение диких видов, подвидов и форм в селекционный процесс для изучения и описания морфобиологических признаков свойственных только этим образцам, таких как, тип ветвление, антоциановая окраска листьев, наследственность антоциановых пятен лепестков, цвет волокна, цвет волосков, гладкость семян, безволокнистость, отсутствие хлорофилла, мужская стерильность вовлек собой внимание многих ученых [2, 10].

Чувствительность хлопчатника к фотопериодизму в условиях длинных дней определяется с учетом расположения первых плодовых ветвей. Несмотря на то, что эти признаки контролируюся разными системами генов они тесно взаимосвязаны. При изучении рудеральных и культурных тропических форм описание приводиться по требовательности к фотопериодизму, а культурные сорта наоборот описываются по нейтральности к длинному световому дню [5].

Среди многих видов и даже в образцах культурных сортов рода *Gossypium* L. встречаются растения с антоциановой окраской. При изучении наследования окраски растений коллекционных линий было определено моногенный характер данного признака и ген контролирующий развития антоциановой окраски вегетативных органов обозначен символом – Rp [3].

Показано, что антоциановая окраска листовой пластинки тетраплоидных видов хлопчатника *G.hirsutum* L. и *G.barbadense* L. управляется одним основным геном -RL. Ряд авторов считают, что интенсивность окраски связано с дополнительными генами, имеющих полимерную природу [6, 7].

М.Ф. Абзаловым, Г.Н. Фатхуллаевой [1] анализировано наследование окраски растения и цветков линий из генетической коллекции. В качестве селекционного материала получено линии Л-662, Л-663, Л-665 (растения и цветки темно-красной окраской). Линия Л-660 разделение антоцианового пигмента аналогичен с линией Л-477, но окраска цветков желтая, линия Л-12-1 с окраской растений и цветков антоцианового цвета, линия Л-12 растения зеленого цвета, а цветы желтой окраски. F1 гибриды комбинаций Л-662 х Л-12, Л-12 х Л-663, Л-12 х Л-665 охарактеризованы как растения с антоциановой окраской стебля, листьев и цветков. Определено наследственное расхождение данного признака 15 к 1 в растениях F2 поколения.

Цель исследования

Анализ наследования растений F1-F2 поколения полученных в результате гибридизации внутривидовых разновидностей вида хлопчатника *G.barbadense* L. по морфологическим признакам.

Объект исследования

Эксперимент заложили в опытной участке лаборатории "Систематика и интродукция хлопчатника" Института генетики и экспериментальной биологии растений Академии наук Республики Узбекистан. В качестве объекта исследования отобраны внутривидовые разнобразные формы вида *G.barbadense* L. - *f.brasiliense* (Бразилия), культивируемые образцы Аш-8 и Карши-8 (Узбекистан).

Материалы и методы

Для решения поставленной цели было применены методы простой гибридизации и генетический анализ.

Результаты исследования и их обсуждение

Требовательность к длинному световому дню. Анализировано фотопериодическая реакция растений F_1-F_2 поколений полученных на основе гибридизации сортообразцов культурных форм Аш-8 и Карши-8, культурного тропического подвида *G.barbadense* L. форма *subsp. vitifolium, f. brasiliense*. Отобранная форма для опытов *f. brasiliense* является требовательной к фотопериодизму, так в длинном световом дне первая плодовая ветвь образуется в 15-24 узлах, в растениях искусственно коротком дне данный показатель находиться в 7-9- узлах, в условиях длинной световой дне (13-14 часов) первая плодовая ветвь образуется в 23-30 узлах, данный же показатель в искусственно коротком дне (10 часов) формируется в 9-10 узлах растения хлопчатника (Таблица 1).

При рассмотрении растений гибридных комбинаций F_1, F_2 *subsp. vitifolium* х Карши-8, растения F_1 поколения свободно бутонизировали, цвели и плодообразовали. А F_2-растениях наблюдалось широкая изменчивость в условиях длинного светового дня. Изменчивость первой плодовой ветви в 4-5 образовалась 20-ой и даже в высших узлах. Среди 206 и анализированных гибридных растений 194 (hs=4-15) были нейтральны к световому дню, 12 из них (hs=15-20 и выше) отнесены к растениям требовательные к фотопериодизму.

Результат генетическиого анализа показывает, что практические показатели были очень близки к теоретическим данным. Показано, что признак наследуется в соотношении 15:1 контролирующиеся некумулятивным эффектом полимерных генов, подвид *subsp. vitifolium* требователен к фотопериодизму контролирующаяся тремя рецессивными генами ph1, ph2, ph3, а нейтральность к световому дню управляется двумя доминантными Ph1, Ph2 и одним рецессивным геном ph3. При этом χ2=0,05, а Р было в промежутке 0,99-0,95. Кроме этого, при анализе реципрокных гибридных комбинаций F_2 Аш-8 × *f. brasiliense* среди 207 растений 196 (hs=4-15) были нейтральны к световому дню, 11 растений (hs=15-20 и выше) оказалась требовательны к фотопериодизму. Наблюдалось наследование фотопериодизма некумулятивным эффектом полимерных генов в соотношении 15:1.

Таблица 1. Наследование признака требовательность к длинному световому дню селекционных материалов и их F_1-F_2 растений

Селекционный материал и F_1-F_2 комбинации	Коли-чество рас-тений, шт	Фотопериодизм				Соот-ноше-ние	X^2	Р
		Количество требователь-ных растений		Количество не требователь-ных растений				
		шт	%	шт	%			
Селекционные материалы								
subsp.*vitifolium*	5	5	100,0	-	-			
subsp.*vitifolium* f.*brasiliense*	5	5	100,0					
Карши-8 сорт	5	-	-	5	100,0			
subsp.*eubarbadense* Аш-8	5	-	-	5	100,0			
Растения F_1								
subsp.*vitifolium* × Қарши-8	10	-	-	10	100,0			
Қарши-8 × subsp.*vitifolium*	10	-	-	10	100,0			
Аш-8 × f.*brasiliense*	10	-	-	10	100,0			
f.brasiliense × Аш-8	10	-	-	10	100,0			
Растения F_2								
subsp.*vitifolium* × Қарши-8	206	12	5,9	194	94,1	15:1	0,05	0,99-0,95
Қарши-8 × subsp.*vitifolium*	213	16	7,5	197	92,5	15:1	0,57	0,50-0,20
Аш-8 × *f.brasiliense*	207	11	5,4	196	94,6	15:1	0,30	0,80-0,50
f.*brasiliense* × Аш-8	184	8	4,3	176	95,7	15:1	1,07	0,50-0,20

Наследование антоциановой окраски растений. Было изучено *subsp. vitifolium* тропический культурный подвид хлопчатника *G.barbadense* L. и форма *f. brasiliense*, сортообразцы Карши-8. Также, анализировано наследование актоциановой окраски растений F_1-

F₂ поколения. Отобранные для экспериментов форма *f. brasiliense* является растениями с антоциановой окраской, а тропический культурный подвид *subsp. vitifolium* и культурный

сортообразцы Карши-8 относятся к зеленостебельным растениям (Таблица 2).

Таблица 2. Наследование антоциановой окраски растений селекционного материала и растений F₁-F₂ поколений

Селекционные материалы F₁-F₂ гибридные комбинации	Коли-чество растений, шт	Окраска растений				Соот ноше ние	X^2	P
		С антоциа-новой окраской		С зеленым стеблем				
		шт	%	шт	%			
Селекционные материалы								
subsp.*vitifolium*	5	-	-	5	100,0			
subsp.*vitifolium* f.*brasiliense*	5	5	100,0	-	-			
subsp.*eubarbadense* Аш-8	5	-	-	5	100,0			
Растений F₁								
f.*brasiliense* x subsp.*vitifolium*	10	10	100,0					
subsp.*vitifolium* x f.*brasiliense*	10	10	100,0					
Аш-8 x f.*brasiliense*	10	10	100,0					
f.brasiliense x Аш-8	10	10	100,0					
Растения F₂								
f.*brasiliense* x subsp.*vitifolium*	212	196	92,4	16	7,6	15:1	0,60	0,50-0,20
subsp.*vitifolium* x f.*brasiliense*	208	194	93,2	14	6,8	15:1	0,08	0,99-0,95
Аш-8 x f.*brasiliense*	207	195	94,2	12	5,8	15:1	0,07	0,99-0,95
f.*brasiliense* x Аш-8	184	171	92,9	13	7,1	15:1	0,20	0,80-0,50

При анализе внутрифидовых комбинаций F₁, F₂ f. *brasiliense* x subsp. *vitifolium,* все растения F₁ имели тёмную антоциановую окраску. А среди изученных растений F₂ по антоциановой окраске наблюдалась широкая изменчивость. Анализ гибридных комбинаций F₂ f. *brasiliense* x subsp. *vitifolium* среди 212 растений 196 имели антоницановую окраску, а 16 из них отнесены к зеленостебельным растениям и при этом χ^2=0,60, P был в промежутке 0,50-0,20. Как было отмечено в литературных источниках данный признак контролируется двумя генами, а также определено генотик по антоциановой окраске $R_p R_p R_{st}^V R_{st}^V$.

Выводы

Анализ полученных результатов показал, что в поколении F₂ родительских форм с

антоциановой и зеленой окраской расщепление признака в фенотипическом соотношении 15:1 (15 частей с антоциановой окраской, 1 часть с зеленой окраской). Контролирование антоциановой окраски двумя генами и генотип растений с такой же окраской охарактеризован в виде $R_p R_p R_{st}^V R_{st}^V$.

У внутривидовых гибридов F₁ фотопериодизм наследовался в основном по типу доминирования, а у растений F₂ под некумулятивным влиянием полимерных генов. Наследование данного признака в соотношении 15:1 показывает, что фотопериодизм у подвида subsp. *vitifolium* детерминируется рецессивными генами, а у культурного сорта Карши-8 – доминантными генами.

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QR – Issue   QR – Article

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THE CONCEPT OF INTEGRATION AND ITS APPLICATION IN EDUCATION

Abstract: This article gives an overview of the concept of integration and outlines the types of integration. It also talks about the principles and importance of using integration in research and education based on integration.
Key words: integration, methodology, integrated education, education system, skills, system, communication, innovative technologies.
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Introduction

The organization of the lesson-based learning process is an emerging notion that the modern world methodology is an important factor in the formation of the younger generation's worldview. The organization of the lesson process based on the principle of integration, rejects the traditional course. The concept of integration is not a particular focus of today's or yesterday's methodology. The root of this is the life of the great geniuses of our own land: the great medical genius Avicenna, the great mathematician al-Khorezmi, and the world leader who has used pragmatics of words - Alisher Navoi. We can see that they are not limited to a single science. This is because interdisciplinary interdependence is a combination of elements based on irreconcilable laws. Our view is in agreement with Fariduddin Attor's statement: "There is no small thing on this earth, everything is interdependent and complementary." [1] The great didactic Jan Amos Komensky mentioned: "Everything related to each other must be studied in the same way." [2]

II.Literature Review

Many scientists have worked on the concept of integration: Y.A. Kamensky, A.S. Makarenko, N. K. Krupskaya, V. A. Sukhomlinsky, D.B. Elkonin, V. Davidov, D. Dewey, G. Freezing, E. Hoffman, and others.

In their research Kulnevicha S.V., Lakocenina T.T. mentioned an idea of integration in Contemporary Lesson Analysis: "Integration is the integration of deep learning into one learning material as much as possible."

Integrating education as a didactic principle in the pedagogical process.The use of an integrated approach in the system of secondary and higher vocational education by Daniluk is studied by A. Artemyev, M. N. Berulava, I. G. Eremenko, E. V. Bondarevskaya, and A. Slastenin and others.

Establishment of interdisciplinary and these type of approaches in the pedagogical process, the development of integrated courses, blocks and modules have been the subject of scientific research by A. Ignatova, V. Maksimova, N. Belyankova, I. Bogatova and others.

III.Analysis

Regarding the term integration, the term "Interpretation Dictionary of the Uzbek Language" explains the following: "INTEGRATION [lot. Integration-recovery, restarting, replenishment] 1. Concept that describes the interconnectedness of individual components and their combination. The process of convergence and interconnection of sciences. "[3] Integrity, formed by the combination of several elements in order to formulate a concept in the term integration, provides a deeper understanding of

Clarivate
Analytics indexed

the subject matter. Interdisciplinary links bring sciences closer together and complement each other. Integration in education is as an interaction of pedagogical, socio-cultural, socio-political and economic factors in the development of the education system and the co-existence of traditions and innovations in the field – learning by the R.N. Averbux, N.P. Litvinova has been an important factor in the development of the education system.

The integration of educational content (MN Berulova), the integration of the education system (VV Bolgov), has done investigate as a tool integrating for organize primary education. As well as in articles such as , Sh. Yusupova, D. Rajabova "The Methodology of Integrated Lesson Organization Techniques" (Interdisciplinary Education in native language and botany), B.S. Articles such as Abdullayeva's "About Types of Interdisciplinary Relevance", U.Musayev's "Levels of Integration", and D. Yuldosheva's "Opportunities of Defining Educational Content to Compatible for The purpose of Education" provided information about the concept of integration and the importance of integration .

On the basis of research, can be separated several types of integration in education:

1) Integration of education topics.

2) Integration of scientific approaches, methods, practices and technologies into education

3) Integration of theoretical education and practical activities.

4) Integration of different types of educational activities into the system of continuous education in the open educational space (preschool, general, higher, postgraduate, basic, additional, etc.).

5) Integration of different participants of the educational process into a single education system (including teachers, students and parents' communities, integration of special social and cultural groups (disabled, immigrants, etc.).

8) Integration of all participants in the field of culture and education.

7) Integration of internal education into a single global process.

Some researchers also classify integration into:

Interdisciplinary integration - is the integration of concepts within a single subject into individual themes.

Interrelated integration - is the synthesis of facts, concepts, principles, and so on. Two or more subjects that a teacher should use in preparing an integrated lesson;

Trans-interpersonal integration - trans-theme - Synthesis of basic and additional components of education Trans description: Trans ... [lot. behind; through; between; during] International is the first part of a joint statement, which means: 1) any space, moving through space, crossing it (for example, transatlantic);

2) to go from one thing to the other, to be located (for example, transurans); 3) indication of something in the medium; designation, delivery (e.g. transliteration).

The use of integration types in the classroom depends on the objectives of the lesson.The educator chooses one of the types of integration in the subject matter knowledge.

Within the framework of pedagogical integration there are common scientific and private methods of scientific integration. It is connected with the use of common scientific forms and means of learning in the learning process. It includes the following types of integration:

• conceptual (the concept of integration is a common theme in several themes)

figurative concepts (forming holistic ideas about objects, events, people, the world)

problematic (combining different concepts into common problems);

• methodology type (common types of integration process, takes place using methods of activity);

• methodological (uniting different facts, phenomena, theories, concepts and perceptions of the world)

Important aspects of integrating educational content are addressed at the level of pedagogy theory and practice. Integrated programs on elementary education, fine arts, and natural science are created in the Republic of Uzbekistan. Ways to promote interdisciplinary communication include:

- the sequence and sequence of learning of various disciplines should be chosen over time so that one can facilitate learning of the other;

- providing the same approach to building common understanding, skills and abilities;

- providing the unity of knowledge and skills required for acquiring skills

- wide use of knowledge, skills and abilities of other disciplines in the acquisition of knowledge, skills and competencies in one subject.

The reasons for the establishment of the Intellectual Education Process are as follows:

- avoid uniformity in the educational process;

- prevention of decrease in interest in the educational process;

- to develop logical and creative thinking;

- to draw the correct conclusions from the reality;

- be able to think independently;

- be aware of innovative technologies;

- Have your own vision and so on.

Achieving the goal of an integrated lesson is an indication of how well the teacher organized the lesson. It should be noted that the learner must be able to prove the importance of the integrated lesson, first of all, the ability of the teacher to be creative, to demonstrate interdisciplinary or interdisciplinary

links. Improper use of integration during the lesson can lead readers to deviate from the topic and fail to master the topic. They can also be distracted and tired. An integrated lesson should be persuasive, well-grounded, and capable of fully explaining the essence of the topic, otherwise the lesson will not achieve its intended purpose. It is important to keep in mind the timing of the integration process as well. Other information that needs to be understood as complementary to the subject matter of the integration process should be as brief, justified and relevant as possible.

IV.Discussion

There are the following types of organization of an integrated learning process:

• Coordinated (knowledge of one subject is based on knowledge of another subject) - such lessons are focused on solving a common problem of different disciplines. They do not form a holistic worldview.

• Combined - similar lessons are built on the same organizational theme, combining multiple objects together to explore the same problem from different perspectives.

• Amalgamated - problem-solving, lessons learned from different perspectives using knowledge from different areas. They should be based on the study of life experience or general social problems.

An integrated lesson will encourage the student to think logically. Integrated lessons can enhance the interest of the student in the lesson, help to shape their world outlook, increase their imagination, and move away from homogeneity. It is wrong to consider the subjects in the educational process as primary or secondary. After all, each discipline is effective when it is based on the integration principle.

Whether we want it or not, today's student is living in a time of intense growth. Formation of their comprehensive worldview and development as a competitive person in line with international standards will ensure the training of qualified specialists in the future. Therefore, the teacher should be aware of all the concepts available to the learner in the learning process and be able to organize lessons based on the integration of the learning process. This, in turn, should give the teacher a clear understanding of the science that connects their subject. The student gets the quality of the teacher as a "teacher" and feels responsible for the assignments given by him. We know that the respect for the teacher's personality depends on how the teacher organizes the lesson. The question may be asked. What can an Integrator-based teacher give?

- the teacher can easily convey the essence of the topic to the students; -to combine certain elements and fulfill the requirements of DTS;
- works on its own;
- improving the quality of knowledge of students;
- learning creativity

V.Conclusion

In summary, the organization of an integrated learning process is of particular importance to today's education content and education system. In Turonzamin, where many great geniuses, such as Beruni, Al-Khorezmi, Avicenna, Alisher Navoi, Zahiriddin Muhammad Babur, and other great geniuses, the world is no longer able to see such great people. One of the reasons we think it is because we are confined to one subject. After all, the learner can see the whole, only if he can combine all the elements. An element ensures that an understanding of the whole within a single concept makes sense. However, it should be noted that the wrong element does not complement each other, and it prevents proper judgment. Therefore, a well-integrated approach to the learning process, with a clear understanding of the essence of integration, will ensure the quality of education.

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PROBLEMS OF LEARNING LANGUAGES IN THE HERITAGE OF THE SCIENTIST - ENCYCLOPEDIST Y. A. KOMENSKY

Abstract: *Y. A. Komensky tirelessly promoted the need for active development, distribution and study of languages as one of the most important conditions for human progress. He warned that languages should be studied in order to gain knowledge and communicate it to others, for mutual communication. "If you even knew your native language perfectly, and besides that, foreign languages and others, and even all the languages of the world, after all, if you lack understanding of the things that underlie words, you would be no more like a parrot, not a sage at all."*
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Introduction

The outstanding Czech encyclopedic scientist Y. A. Komensky is known as the founder of pedagogy, the science he considers in the widest age framework, as a theory of human education. His research activities included issues of philosophy, sociology, technology, psychology, economics, etc. Y. A. Komensky throughout his life was engaged in pedagogical activity. He was a teacher and school leader and compiled school textbooks. He was the author of scientific works on education and upbringing and was the organizer of educational institutions. The most famous is his famous "Great Didactics". But many of the works of Y. A. Komensky, such as the "Maternal School", "The Newest Method of Languages", "The General Council on the Correction of Human Affairs" were little known. In his "natural" or "mechanical" method Y. A. Komensky saw a threefold goal, three components of learning: "knowledge, activity, speech, i.e. to know everything correctly, to know how to do everything good and what is necessary, to be able to communicate to another." Hence, one should constantly "form" the mind, hands, language. The last component of this triad is the "education" of the language, the problem of studying the native and "other foreign" languages occupy a large place in the legacy of Y. A. Komensky.

Literature review

Thoughts on the meaning of language in people's lives, on its development and functioning, on the correlation and interconnection of words and things, on the teaching of oral and written speech are found in almost all the works of the scientist. A number of works are specifically devoted to the problem of language. This is, first of all, "Panglottia" (universal language culture), which is the fifth part of the "General Council on the correction of human affairs"; "The latest method of languages"; "On the skillful use of books - the first tool for the development of natural talents."

Y. A. Komensky tirelessly promoted the need for active development, distribution and study of languages as one of the most important conditions for human progress. He warned that languages should be studied in order to gain knowledge and communicate it to others, for mutual communication. "If you even knew your native language perfectly, and besides that, foreign languages and others, and even all the languages of the world, after all, if you lack

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understanding of the things that underlie words, you would be no more like a parrot, not a sage at all."

It is useless to study many languages, Y. A. Komensky considered, since time is taken to study the world around us, and it is impossible to learn all languages. In determining the nomenclature of the languages studied, as well as the degree of completeness and perfection of mastering them, one should proceed from the requirements of necessity. The necessary languages are: for personal life - the native language, for languages, education, international communication and cooperation in the field of activities with developed countries, foreign languages are needed.

For the study of scientific works, the necessary language is English, German, French and other languages, for doctors - Latin. The author of the "General Council ..." in search of ways to correct imperfections in humanity thought a lot about overcoming language barriers between peoples and proposed a plan for introducing monoglotia, a single world language: simple, understandable, perfect. He developed the principles of its creation based on existing languages. (As you know, attempts to develop a new international language have been made repeatedly, and the widespread use of an artificial language, such as Esperanto, is in great doubt.) However, his approaches are of interest not only for gaining a single language, but also for a deeper understanding of the laws of development and functioning of languages. In the history of pedagogical thought from ancient times to the present day, ambiguous views on the order of learning languages. For example, one of the predecessors of Y. A. Komensky, M. F. Quintilian, advised to start teaching a child from a foreign language, since his language will be acquired in the process of everyday communication; then he suggested moving to the mother tongue and learning both languages in parallel. K. D. Ushinsky insisted on learning first of all his native language. But what was the position of Y. A. Komensky?

Discussion

He had no doubt about this. He strongly stood for the primary study of his native language. "Each language needs to be studied separately. First, of course, the native language, then the one that needs to be used in the locality of the native language, that is, the language of the neighboring people, and then English, German, French, etc. - always one after another, and not together, otherwise one language will interfere with another." The study of foreign languages should be based on the indispensable reliance on the native language. Moreover, the native language is the basis of all education. Therefore, it should be studied, perhaps more fully and thoroughly: in childhood - "learn to speak haphazardly", in the adolescent - correctly, in the youth - gracefully, in the

mature - expressively. Y. A. Komensky linked not only didactic goals, but also the democratization of public education, the ability for all "born people" to enter real science with a focus on primary and thorough study of their native language. The idea of the priority of the mother tongue in teaching was consistently upheld and developed by K. D. Ushinsky, I. S. Gogebashvili, I. Y. Yakovlev and other progressive educators. Let us highlight some of the most important ideas for studying foreign languages that were proposed by Y. A. Komensky:

1. "The study of languages should go hand in hand with the study of things, especially in youth ...", that is, the study of words should take place along with an understanding of the essence of things themselves and of the reality that are reflected in the words. This requirement follows from the scientist's ideas about the process of human cognition, about the interconnection of language, thinking and the environment. He claims that "the beginning of knowledge, necessarily, always follows from sensations (after all, there is nothing in the mind that previously would not have been in sensations). Therefore, one should begin training not with a verbal interpretation of things, but with real observation of them. And only after getting acquainted with the thing itself, let it be discussed, clarifying the matter more comprehensively. "

Criticizing scholasticism, senseless cramming, and verbalism in the schools of that time, Y. A. Komensky reasoned as follows about the relationship of "thing" and the word: "A thing is an essence, and a word is something random, a thing is a body, and a word is clothes, a thing is grain, and a word is bark and husk. Therefore, both must be provided to the human mind at the same time, but first, a thing as an object of not only knowledge, but also speech. " "Things in themselves are what they are, even if no reason and no word touched them, but reason and word revolve only around things and depend on them, and used without things, assuming such a stupid and ridiculous attempt, they either turn into nothing, or become a meaningless sound. " Therefore, in training, "the following three elements must always be combined: things, so that sensory perception of things precedes then their understanding follows, and finally, the name joins." Although in these arguments there is a certain exaggeration of the role of sensory perception in cognition, on the whole this approach can be recognized as correct, especially in connection with overcoming scholasticism and formalism. This epistemological and didactic approach by Y. A. Komensky transfers to the teaching of "foreign" languages, ancient and modern. This is perfectly realized in his world-famous textbook "The World of Sensual Things in Pictures," written in 1650-1654 and published in 1658. "The world in pictures," as the author notes in the introduction, "contains a brief overview of the whole world and the whole language."

On the one hand, it is a kind of encyclopedia that provides basic and necessary information about a person and the world around him. On the other hand, the textbook serves to study the native and foreign languages. The titles of some of its 150 articles give an idea of the diversity of the "material" content of the book: "God", "Water", "Earth", "Metals", "Vegetables", "Cattle", "Man", "Agriculture", "Carpenter" "," Machines "," Painting "," Swimming "," Typography "," Book "," Court "," Globe "," Humanity "," Philosophy "," Medicine "," Warrior "," State and country "," Christianity ".

Each article is given a picture (image), on which its individual parts and details are marked with numbers. In texts in the native and foreign languages in brackets after the words the corresponding part numbers and details are indicated. In the methodological introduction it is recommended not only to consider only the drawings, but also to show the reader real objects. The textbook was destined for a great life. Up to now, it has been reprinted many times in many languages of the world. There are a large number of additions, corrections, imitations, among which there are parallel texts of articles in three, four and five languages.

2. "It is better to learn each language not by the rules, but in practice, that is, as often as possible listening, reading, re-reading, rewriting, trying to imitate written and verbal. However, the rules must support and reinforce the practice. " The secrets of quick and reliable success are inherent in our own activities, as we become skilled through practice, the scientist claimed.

The main flaw of schooling in foreign languages Y. A. Komensky saw in the gap between the study of grammar and language practice. As a result, students of a foreign language can only say "something", and in most cases it is not without the help of their "crutches" - grammars and dictionaries. Meanwhile, cooks in the kitchen, artisans, ministers during the wagon train in the process of communication quickly learn a foreign language, or even two or three. What conclusion follows from this? Strengthen the language practice (conversation, reading, writing, listening, translations, etc.), "so that each student learns everything by himself, with his own feelings, tries to pronounce and do everything, and begins to apply everything. With my students I always develop independence in observation, in speech, in practice and in application ..." He emphasis on strengthening practice, with the goal of overcoming formalism, scholasticism, and poor learning outcomes in no way means underestimating the theory. The point is that the unity of the three substances must be observed - "mind, tongue and hand", "combination, always and in everything, of example, instruction and exercise, for without examples there is no ease of learning, without instructions - solidity, without practice - strength ". "They can encourage examples, explain the

rules, and reinforce the practical application." Rules, laws, theoretical conclusions should be concise, understandable, truthful, not burdened by exceptions (although in grammars due to deviations in languages one cannot do without them). "Rules should be grammatical, not philosophical, " i.e. without fractional identification of causes and relationships, the origin of words, phrases, combinations, etc.

3. Learns to write - practicing in writing, to speak - practicing in speech. "Since only exercise makes people skilled, we demand that students in all groups practice in practice: in reading and writing, in repetition and debate, in translations of direct and reverse, in disputes and recitation, etc." The Great Didactics gives a variant of collective exercises when translating from one language to another: when everyone completes the translation, one student is invited to challenge someone to the competition; after reading the translation out loud, the adversary must indicate errors; then other students criticize; the named opponent submits his translation for evaluation; if necessary, the teacher makes instructions, and all students make adjustments to their translations. In the same way, work is being done with the following pairs of students. Exercises should be constantly complicated, continue until the task is completed. "The first exercises in a new language should revolve around previously known subjects."

4. "A new language is being studied gradually, namely: first, the student learns to understand it (this is the easiest), then write (this gives time for preliminary reflection) and, finally, say what is the most difficult." This requirement is consistent with his principles of consistency and feasibility of learning: to go from easy to difficult, from simple to complex, from close to distant; the previous paves the way for the next, and the next is based on the previous; cognitive forces and capabilities of the learner are gradually increasing; material and methods of action are proposed that are appropriate to the student's strength at a given time.

5. "No language should be learned from grammar, and each language should be studied from the works of suitable authors", since exemplary works and skillfully prepared dictionaries provide reliable language material, words, grammar adds only form, word-formation laws, the order of their arrangement and combination.

6. To differentiate and individualize training in accordance with the age, abilities and level of development of students. Y. A. Komensky shows that the main thing in the peculiarities of teaching children's languages is orientation primarily on feelings, young people on using examples, adults on identifying causes. It reveals the features of educational work with students zealous, quick-witted, successfully advancing, slow, negligent, incongruous, careless, underachieving, etc.

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7. "The norm for drawing up the rules of a new language should be a language previously studied, so that only the difference between one and the other is shown." Y. A. Komensky considers it a serious drawback when the rules of the language being studied are given in the same language. In the same way, a big mistake is made when students of all nationalities are taught according to the same grammar rules, and at the same time, the features of each mother tongue are not taken into account.

8. "The teacher and student speak the same language." It is bad when students and teachers are foreigners and lack a common means of mutual understanding. They are forced to communicate using signs and conjectures.

9. When teaching languages to widely use the method of comparison. It is especially important to compare the words and grammatical forms of the new language with their native or other well-known language. It is important to find a common and difference in grammatical forms and words within the language being studied.

10. In teaching languages to use dramatization. In the theory and practice of Y. A. Komensky, theatrical action occupied a special place as a means of developing speech, increasing interest in language learning, stimulating liveliness and activity. As a teacher and principal of the school, he widely used stage plays, theatrical performances both in separate lessons and in generalizing and repetitive stages at the end of the semester and at the end of the school year, conducted in the presence of parents and the general public. For this purpose, Y. A. Komensky himself wrote a number of plays on educational material were successfully put on by students. Unfortunately, in our time, dramatization for educational purposes is not used enough.

Conclusion

Many of the productive ideas of Y. A. Komensky organically entered into pedagogy and into modern methods of teaching foreign languages. However, when rereading the lines of the works of the great teacher, you always find something new or famous, suggesting useful thoughts.

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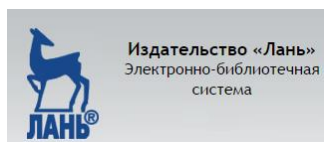
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