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Architecture

ENERGY CONSUMPTION MODELING OF THE PUBLIC BUILDINGS AT THE DESIGN STAGE

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МОДЕЛЮВАННЯ ЕНЕРГОСПОЖИВАННЯ ГРОМАДСЬКИХ БУДІВЕЛЬ НА ЕТАПІ ПРОЕКТУВАННЯ

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Вступ

Енергоефективність є одним з ключових аспектів сучасного будівництва, особливо у випадку громадських будівель, які мають велике значення для соціальної інфраструктури. Ми маємо розглядати необхідність покращення енергоефективності архітектурних рішень з кількох точок зору:

1. Економія ресурсів.
2. Зменшення викидів вуглецю.
3. Забезпечення комфортних умов для користувачів.

Моделювання енергоспоживання є потужним інструментом, що дозволяє досягти оптимальних результатів ще на етапі проектування громадських будівель. Його роль можна окреслити наступним чином:

1. Прийняття оптимальних рішень щодо дизайну.
2. Вибір матеріалів (Kibert, C. J. 2016).
3. Оптимізація систем опалення, вентиляції та кондиціонування (HVAC) (Jayamaha, L. 2006).
4. Оцінка економічної ефективності.

З цього випливає, що моделювання енергоспоживання є невід'ємною частиною сучасного архітектурного проектування, що в свою чергу допомагає досягти вагомих результатів у підвищенні енергоефективності громадських будівель, зменшенні витрат та покращенні екологічної ситуації.

Інструменти та методологія моделювання

Енергоефективні програмні рішення (EnergyPlus, eQuest, DesignBuilder, IES VE (Integrated Environmental Solutions Virtual Environment)) спрямовані на оптимізацію споживання енергії в будівлях та інфраструктурних об'єктах. Вони дозволяють проводити аналіз енергоспоживання, симуляцію енергетичних процесів і розробку заходів для підвищення енергоефективності. (Clarke, J. A. 2007)

Основні характеристики енергоефективних програмних рішень:

1. **Аналіз енергетичної ефективності:** програмні рішення надають можливість проводити детальний аналіз енергетичної ефективності архітектурних проектів, оцінюючи вплив кожного елемента дизайну на загальне енергоспоживання будівлі.

2. **Моделювання енергоспоживання:** інструменти для архітектурного моделювання дозволяють точно відтворити теплові процеси всередині будівлі, враховуючи різні кліматичні умови, особливості конструкцій та використання приміщень.

3. **Оптимізація енергетичних систем:** програмні засоби допомагають архітекторам вибрати найефективніші матеріали, конструкції та технології, що забезпечують мінімізацію енергоспоживання при збереженні комфорту і функціональності будівлі.

4. **Системи моніторингу та управління:** інтеграція систем моніторингу і управління дозволяє в режимі реального часу відстежувати споживання енергії та оптимізувати роботу систем опалення, вентиляції і кондиціонування, забезпечуючи максимальну ефективність використання ресурсів.

Методологія моделювання енергоефективності може включати в собі наступні методи:

1. **Динамічне моделювання** - це моделювання процесів в реальному часі з урахуванням змінних факторів, таких як температура, вологість, інтенсивність освітлення та використання енергії протягом дня.

2. **Статичне моделювання** - проводиться на основі середніх показників і постійних параметрів, без урахування змінних умов.

3. **Використання даних з сенсорів** – полягає в збиранні і аналізі даних з сенсорів в реальному часі, що дозволяє отримувати точну інформацію про поточний стан систем будівлі.

Використання різноманітних методів і інструментів для моделювання енергоспоживання дозволяє досягти високої точності та ефективності в проектуванні громадських будівель. Динамічне моделювання забезпечує детальний аналіз і точне прогнозування, статичне моделювання дозволяє швидко оцінити загальні показники, а дані з сенсорів надають актуальну інформацію для управління системами будівлі в реальному часі.

Основні параметри моделювання

Під час моделювання енергоспоживання надзвичайно важливим є врахування всіх необхідних параметрів які можуть та мають вплив. Серед основних параметрів ми можемо виділити наступні:

- **Кліматичні умови:** Врахування місцевих кліматичних умов та їх вплив на енергоспоживання.

- **Геометрія будівлі:** Включає висоту, ширину, довжину та загальну форму будівлі. Ці параметри впливають на розподіл тепла і світла всередині будівлі. Також важливим елементом є планування та зонування внутрішнього простору для оптимального розподілу тепла та світла всередині будівлі. Важливим є і кути нахилу даху, що впливає на кількість сонячної енергії, що потрапляє на дах, і може бути важливим для систем з використанням сонячної енергії. (Architectural studies Vol. 6, No. 2, 2020).

- **Орієнтація будівлі:** Визначає, які сторони будівлі піддаються найбільшому впливу сонячного світла протягом дня, що впливає на теплові навантаження.

- **Теплові характеристики будівлі:** Теплопровідність матеріалів, ізоляція, типи вікон та дверей (Kruger, A., & Seville, C. 2012).

- **Системи опалення, вентиляції та кондиціонування (HVAC):** Розрахунок потреб у вентиляції та кондиціонуванні повітря. (Jayamaha, L. 2006)

- **Вікна та скління:** Вплив природного та штучного освітлення на енергоспоживання. (Daylight, Energy and Indoor Climate Basic Book, 2014)

- **Використання енергії:** Аналіз різних джерел енергії (електрика, газ, відновлювані джерела) (Hootman, T. 2012).

- **Внутрішні теплові навантаження:** Кількість та типи приладів які використовуються а також кількість людей у приміщеннях та їхня активність, що впливає на теплові навантаження (Reeder, L. (Ed.). 2016).

- **Відновлювані джерела енергії:** Використання сонячних панелей та теплових насосів (геотермальних або повітряних теплових насосів для опалення та охолодження) та їх ефективність. (Eicker U. 2014)

- **Автоматизація та управління:** Використання сенсорів для моніторингу температури, вологості, освітленості. (Castagnino S., Rothballer C., Renz A., Filitz R., Gerbert P. 2016).

- **Економічні параметри:** Вартість матеріалів обладнання, експлуатаційні витрати та окупність інвестицій

Ці параметри дозволяють створити комплексну модель будівлі, що враховує всі важливі фактори, які впливають на енергоспоживання. Така модель допомагає архітекторам і інженерам приймати обґрунтовані рішення для підвищення енергоефективності будівель.

Випадки використання та впровадження результатів моделювання

Останні десятиліття ознаменувалися активним розвитком нових технологій та засобів в архітектурній галузі, серед яких особливе місце займає Building Information Modeling (BIM) (BIM Technology Logo. 2019), що в свою чергу включає моделювання енергоспоживання. На даний час у світі існує багато прикладів використання сучасних архітектурних проєктувальних засобів у відомих проєктах. Ось кілька реальних прикладів проєктів, де моделювання енергоспоживання було успішно використано для підвищення енергоефективності громадських будівель:

- Bullitt Center, Сієтл, США (2013) [https://bullittcenter.org/]

Цей офісний центр був спроектований з метою стати однією з найзеленіших комерційних будівель у світі. Моделювання енергоефективності використовувалось для оптимізації дизайну, що включає використання природного освітлення, вентиляції та систем опалення.

Будівля використовує на 83% менше енергії порівняно зі стандартними офісними будівлями такого ж розміру.

- One Angel Square, Манчестер, Великобританія (2013) [https://www.bam.co.uk/how-we-do-it/case-study/1-angel-square]

Цей адміністративний будинок є однією з найекологічніших будівель у Великобританії. Моделювання енергоефективності використовувалось для визначення оптимальної форми будівлі, розташування вікон, а також системи опалення та охолодження.

Будівля досягла показника енергоефективності BREEAM Outstanding (Campbell, E. 2023) і використовує на 50% менше енергії порівняно зі стандартними будівлями.

- Kendeda Building for Innovative Sustainable Design, Атланта, США (2018) [https://living-future.org/case-studies/1503/]

Проект на території Технологічного інституту Джорджії, яка служить прикладом стійкого дизайну. Моделювання енергоефективності використовувалось для розрахунку енергоспоживання, оптимізації використання природного освітлення та системи пасивного охолодження.

Будівля відповідає стандартам Living Building Challenge і використовує на 70% менше енергії порівняно з типовими будівлями.

- Edge Building, Амстердам, Нідерланди (2015) [https://www.sensoworks.com/the-edge-amsterdam-building-the-future-with-iot-technology%E%BF%BC/]

Даний проєкт є одним з найрозумніших та найзеленіших офісних будинків у світі. Моделювання енергоефективності використовувалось для інтеграції різних інтелектуальних систем управління енергоспоживанням, а також для оптимізації дизайну фасаду і системи освітлення.

Будівля має рейтинг енергоефективності BREEAM Outstanding (Campbell, E. 2023) і використовує приблизно на 70% менше енергії.

- Bosco Verticale, Мілан, Італія (2014) [https://issuu.com/smridhiaryaa/docs/wildlife_conservation/s/25189751]

Два житлових будинки з інтегрованими зеленими фасадами, які включають близько 20000 рослин. Моделювання енергоефективності використовувалось для оцінки впливу зелених фасадів на тепловий комфорт і енергоспоживання будівель.

Завдяки зеленим фасадам будівлі досягають значної економії енергії на охолодження і опалення.

- Masdar City, Абу-Дабі, ОАЕ (2009) [https://www.coursehero.com/file/p44un4uo/The-idea-of-constructing-Masdar-City-was-to-create-a-different-path-for-Abu/]

Місто, спроектоване як приклад стійкого урбанізму з нульовим викидом вуглецю. Моделювання енергоефективності використовувалось для планування міської інфраструктури, визначення оптимальних умов для зниження енергоспоживання та інтеграції відновлюваних джерел енергії.

Енергоспоживання в Masdar City значно нижче середнього, а будівлі використовують передові технології для зниження вуглецевого сліду.

Перелічені приклади та їх результати енергоефективності демонструють, як моделювання енергоспоживання може допомогти досягти значних результатів у підвищенні енергоефективності громадських будівель.

Висновки

Як висновок ми бачимо, що ефективне моделювання енергоспоживання на етапі проектування громадських будівель є ключовим фактором для досягнення високих показників енергоефективності. Завдяки використанню сучасних програмних рішень, таких як EnergyPlus, DesignBuilder, OpenStudio, TRNSYS та BIM в цілому, архітектори та інженери можуть точно оцінити вплив різних параметрів, включаючи геометрію будівлі, орієнтацію, кліматичні умови, теплові характеристики конструкцій, типи вікон, системи HVAC та внутрішні теплові навантаження. Це дозволяє не лише знизити енергоспоживання, але й забезпечити комфортні умови для користувачів будівель. Використання відновлюваних джерел енергії та інтеграція систем моніторингу й автоматичного управління додатково сприяють підвищенню енергоефективності. Врахування економічних параметрів дозволяє оцінити економічну доцільність впроваджених заходів, що є важливим для прийняття обґрунтованих рішень.

Отже, комплексний підхід до моделювання енергоспоживання громадських будівель на етапі проектування є необхідним для забезпечення сталого розвитку та зменшення впливу на навколишнє середовище.

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Economic sciences

EDUCATIONAL INEQUALITY USING THE EXAMPLE OF ALMATY REGION

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Abstract

This article reveals possible ways to solve the problem of inequality in education between the rural and urban population of the Almaty region. The aim of the study is to identify ways to reduce the inequality in education between the rural and urban population of the Almaty region. The hypothesis is put forward that the solution of the problem of inequality in education in rural areas can be solved by applying a cluster mechanism within the framework of controlled urbanization through the creation of educational development centers based on secondary schools. The literature review analyses the Kazakh and international experience of studying the problem of inequality in education in urban and rural areas. The research methodology includes the method of social statistics, methods of analysis of scientific literature, methods of factor analysis, cluster analysis and mathematical and statistical methods.

The section "results and discussions" presents the analysis of the dynamics of educational coverage of graduates of rural and urban schools of the Almaty region, which revealed a catastrophic gap that threatens the prospects for sustainable development of the region. The results of a cluster analysis of nine districts of the Almaty region for opportunities for the development of education according to the criteria of the existing material and technical equipment of schools, their level of digitalization, sufficiency of funding from the local budget and the development of the accompanying socially significant infrastructure are also presented. According to the analysis, the concept of levelling inequality in education was proposed based on the identification of potential locations for the creation of centers for the development of education in rural areas. In the future, this study can be used for further deployment of regional programs to reduce inequality in education in rural areas.

Keywords: education, inequality, reduction of inequality in education, rural education, education development

Disproportion in the indicators of living standards between rural and urban population is a complex, multidimensional problem that affects all socially important factors of rural development. Among them, the problem of educational inequality is the most significant and strategic for the state's competitiveness. The degree of gap in the level and accessibility of education between rural and urban population is traditionally considered to be an indicator of socio-economic development of the country. It is not by chance that the index of education coverage is included in the calculation of many aggregate indicators, including the human development index. In countries with a high level of economic development, about 80% of rural areas have similar conditions of the education system to urban areas. At the same time, the difference in access to education at all levels is practically leveled. In the Republic of Kazakhstan this indicator is 60%. Due to the existing long-term system of universal secondary education, this indicator is somewhat higher than in other countries with developing economies. However, the dynamics of socio-economic and socio-cultural processes indicate significant risks of aggravation of educational inequality between rural and urban population.

Meanwhile, human capital and its qualitative characteristics are generally recognized as the leading factor of a country's competitiveness in the international arena in the 21st century. According to the United Nations Development Program, the level of education of citizens, accessibility of education and its coverage are the prevailing factors of the standard of living, as they determine not only the economic opportunities of the population and its individual groups, but also the vector of development of virtually

all sectors of the economy, form the scope and direction of foreign economic relations, and ensure social stability of society.

The Scandinavian countries, Hong Kong, Singapore and Western European countries lead in the ranking of countries by human development index according to the latest UN calculation (released in 2020). Kazakhstan ranks 51st. However, the report also noted that the dynamics of the indicator is extremely unstable, there is a tendency to slow down the growth rate worldwide (UN, 2020). In our opinion, the reason for this is the accumulation of economic, infrastructural and social obstacles to further growth of the indicator. Among the most significant ones: the increasing gap between the educational level of rural and urban population, the lack of a qualitatively new round of improvement of the education system to meet the needs for further human development.

Obviously, the pandemic that broke out in 2020 and its consequences additionally had a devastating impact on many socially important areas, and first of all, reduced the availability and quality of education, which had a particularly significant impact on rural areas. However, the pandemic is not the only factor determining the risks of worsening educational inequality. For each country, the degree of influence of certain factors will be unique, as the roots of the problem are an overlap of current trends and long-term patterns of socio-economic development, socio-cultural perception, and the scale and focus of government regulation.

In the case of the Republic of Kazakhstan, inequality in educational attainment is one of the key interrelated indicators of inequality between rural and urban populations.

The Concept of Kazakhstan education development for 2023-2029 assumes among the key tasks the gradual elimination of inequality in the availability and quality of education in relation to place of residence (Akorda, 2023).

In this regard, this article investigates the problem of ways to reduce educational inequality between rural and urban population in Almaty. Almaty region has specific conditions of education development and factors affecting it, which should be taken into account when dealing with the problem of educational inequality.

Almaty region is a region with significant potential for economic and social development. Unfortunately, not all of it is fully realized. However, socially important and industrial infrastructure, transportation, logistics and communication networks are widely developed in the region (including in rural areas). The region has a significant (in the scale of Kazakhstan) population - about 1531.1 thousand as of May 2024. At the same time, the migration balance remains positive for the last five years. An important factor determining the permanent gap in the educational level between the rural and urban population is the predominance of the population living in rural areas - about 83.8% (Bureau of National Statistics, 2022).

In addition to the already listed factors determining the aggravation of the gap in the level of education between rural and urban population in Almaty region, it is also necessary to emphasize:

–socio-economic inequality - first of all, inequality in income and access to social benefits between rural and urban population;

–weaker than in urban areas introduction of ICTs in the educational process, permanent shortage of professional teaching staff and lack of educational infrastructure;

–uneven and insufficient financing of educational institutions of all levels and stages;

–population of sparsely populated and geographically isolated areas, which determines a low indicator of accessibility of education for children and youth living in them;

–negative manifestations of uncontrolled intensive urbanization - the outflow of the rural population who receive or have already received education in cities;

–decreasing popularity of education among rural youth.

At the same time, in addition to the population size, sufficient to ensure the development of education with human resources, Almaty region has a number of advantages that can level the problem of educational inequality between rural and urban population:

– the largest urban agglomeration in Kazakhstan and the most developed among the countries of Central Asia in infrastructural, socio-cultural and socio-economic terms is located on the territory;

– the region has a significant natural and economic potential, for the development of which it is necessary to improve the quality of training and increase the number of personnel;

– Almaty region has accumulated significant experience in transfer of scientific, technical, information and educational technologies under international programs of the UN, UNESCO, EBRR, MBRR, international non-governmental funds and initiatives.

In view of the existing objective conditions for both aggravation and leveling of the problem of inequality in education between rural and urban population of Almaty region, the search for ways to solve this problem lies in the field of identification and use of objective opportunities and existing socio-economic mechanisms of the region.

Almaty urbanized zone, which includes Almaty agglomeration, includes the reference centers: Kaskelen, Konaev, Talgar, Yesik, Uzynagash, Alatau and Otegen Batyr villages. These locations have the most developed highly diversified production environment, higher level of development of education structure. But the share of these locations accounts for less than a third of the population of the region. The main share of the population of Almaty region is made up of citizens living in rural areas. As of May 2024, the rural population of Almaty is expected to account for 84% of the total population, urban population - 16%. Along with the overall lower rate of introduction of digital technologies, attention is drawn to the elementary living conditions of educational institutions, poor material and technical equipment, underdeveloped social infrastructure and transportation infrastructure, which limits mobility. All these factors adversely affect both the accessibility and coverage of education at all levels and the socio-cultural significance of education as such.

Based on the data of the conducted research, the article puts forward a hypothesis that the solution of the problem of inequality in education between rural and urban population can be promoted by the introduction of the concept of cluster development within the framework of controlled urbanization with the allocation of secondary school as a center of socio-cultural, socio-economic and infrastructural center of education development in rural areas.

The aim of the study is to identify and justify ways to reduce educational inequality between the population of urban and rural areas in Almaty region through the concept of cluster development within the framework of controlled urbanization processes.

The problem of inequality in education between the population of rural and urban areas is one of the most discussed in the Kazakhstani and world scientific community. However, there is an acute shortage of scientific research on how to solve this problem in the Republic of Kazakhstan. This is due to the fact that in the light of many years of reforms and modernization of the education system concerning the structure and content of educational programs, the problem of territorial inequality in education remained on the periphery of scientific discourse, most widely reflected in professional and citizen journalism.

In addition, studies of recent years reflecting the dynamics of the problem of inequality in education in rural and urban areas in Kazakhstan are conducted by international organizations, such as the UN, UNESCO, UNISEF, until 2023 - Soros-Kazakhstan Foundation.

In the analytical report prepared by S. Alieva and K. Kovyazina of the Soros-Kazakhstan Foundation - "New Frontiers of Educational Inequality in Central Asian Countries: From Problem Measurement to Policy Change", they note that the key aspects of inequality in education are lack of funding, material and technical understaffing and lack of capacity of school institutions. These shortcomings significantly reduce the quality of school education, which has a significant impact on the accessibility of secondary and higher education for graduates of rural schools (Alieva & Kovyazina, 2022).

At the same time, A. Zhusupova, assessing the dynamics of inequality in Kazakhstan, notes that the permanent nature of inequality in education of the population of rural and urban areas is influenced primarily by the low rates of socio-economic development of rural areas and higher indicators of the severity and depth of poverty, increasing the burden on local budgets and increasing the share of socially vulnerable segments of the population (Zhusupova, 2016).

Zh. Nurbayev, analyzing the causes of inequality in education in rural and urban areas, highlights such factors as:

- weak material, personnel and financial provision of the education system of remote rural areas;*
- insufficient funding of state programs to attract young teachers to rural areas;*
- weak financial motivation of young specialists to work in rural areas.*

The expert emphasizes that among the participants of the program "With a Diploma - to the Village" about 71% are pedagogical staff, however, the leading factor in their distribution is the possible accessibility of urban infrastructure, potential income level and material and technical equipment.

Such conditions are absent in most remote rural areas and settlements with small population. As a result, small rural schools are experiencing a constant staff shortage, which reduces the quality of education. In addition, as J. Nurbayev notes, budgetary opportunities cover only 70-75% of the financing needs of the rural education system (Nurbayev, 2021).

Canadian researcher M. Haynes believes that the closure of small schools and the consolidation of educational organizations in rural areas, along with medium-term positive economic effects, has far-reaching negative consequences, exacerbating social and economic factors of inequality in education. The researcher notes that in rural areas, schools play a systemically important social role, are a cultural center, and their importance for society and its development cannot be fully assessed through direct calculation of economic benefits. With the reduction of small schools, the centers of cultural and social development for the rural population are also lost, which in turn complicates the formation of a favorable socio-cultural climate for the desire of young people and children for knowledge (Haynes, 2022).

In the last decade, the issue of reducing inequalities has increasingly referred to the digitalization of rural areas, a problem that is acute even for economically developed countries. The attempt to address it does not always lead to the expected result, which was particularly evident during the pandemic.

For example, German experts C. Rundel and C. Saleminck, based on the results of a study of the impact of digitalization on reducing inequality in education between rural and urban populations in Germany, found that the geographical remoteness and socio-economic structure of rural areas play a key role. During in-depth interviews with 16 heads of educational institutions in the provinces of Baden-Württemberg and Lower Saxony, the researchers concluded that the introduction of digitalization without additional investment in human and logistical resources, without taking into account the socio-economic opportunities of a particular region leads to worsening inequality in education for the rural population (Rundel & Saleminck, 2021).

French researchers A. A. Azema and P. Mathiot in their report "Territorial Mission and Success" also point out that the problem of educational inequality remains extremely relevant for rural France. The main reason for this is the decrease in the population of rural areas, social and economic inequality, low motivation of teachers to work in rural areas, poor technical equipment of rural schools. The researchers put forward the thesis on the need for a differentiated approach to the management of inequality in education based on the identification of regions with special needs in social, human, material and technical support (Azéma & Mathiot, 2019).

Summarizing the above-mentioned research results of foreign colleagues, it was concluded that the ways to solve the problem of inequality in education in rural and urban areas lie in the field of implementation of the following tasks:

1. Detailed analysis of resource needs and opportunities for their development in a rural area;
2. Detailed analysis of the socio-cultural significance of educational institutions in rural areas in each case when optimizing the structure of education;
3. Differentiated assessment of the socio-economic context of rural development when introducing new technologies in the educational process;
4. Comparing the methods of final assessment of students' achievements with the conditions of basic knowledge acquisition in rural schools.

In view of the above, the thesis was put forward that the way to solve the problem of inequality in education lies through the use of the concept of cluster development within the framework of controlled urbanization of rural areas. Moreover, controlled urbanization implies an extensive process with the involvement of rural areas (especially remote ones) in socially important infrastructure and transport and communication environment.

Conclusion

The problem of overcoming inequality in education between rural and urban population is complex and difficult, requiring long-term and systematic work of all stakeholders: local governments, society, educational organizations and representatives of the business environment.

In view of the above, the concept of solving the problem of inequality in education through the use of the mechanism of cluster development within the framework of controlled urbanization of rural areas was proposed. The concept implies the creation of district education development centers in the reference locations of rural territories on the basis of secondary schools with accompanying socially important infrastructure, socio-cultural development program and transport and communication environment.

The proposed concept suggests that taking into account such factors as objective opportunities for the development of budgetary resources, specific features of geographical location, current readiness of infrastructure and staffing, territorial distribution of a particular district should be the leading criteria for selecting the development strategy of the proposed district centers to level the inequality in education of the population of rural areas.

The proposed concept is not a comprehensive solution to all aspects of the problem of inequality in education between rural and urban populations, but it is an initial stage for the development of this

process, the purposeful involvement of all socially important and economic factors. The historical experience of Kazakhstan and advanced foreign experience indicates that the formation of supporting district educational centers, provides consolidation of society on the basis of satisfaction of socio-cultural and educational needs, allows effective aggregation of material, human and technical resources, which ultimately has a favorable effect on the level of education of the rural population.

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MONETARY POLICY AND INFLATION CONTROL: HISTORICAL PERSPECTIVES AND FUTURE CHALLENGES

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Abstract

Monetary policy has long been a critical tool for governments and central banks aiming to control inflation and maintain economic stability. This article delves into the historical evolution of monetary policy, examining key milestones and shifts in strategies used to combat inflation. Beginning with the classical gold standard era, it traces the transformation through the Bretton Woods system, the rise of fiat currencies, and the adoption of inflation targeting frameworks. The study highlights the successes and failures of various approaches, drawing lessons from historical episodes such as the hyperinflation of the Weimar Republic, the stagflation of the 1970s, and the global financial crisis of 2008.

As the article transitions to contemporary times, it explores how central banks today navigate the complex landscape of low interest rates, high debt levels, and unconventional monetary policies like quantitative easing. The discussion extends to future challenges, including the potential impacts of digital currencies, the need for greater coordination between monetary and fiscal policies, and the evolving role of central banks in a rapidly changing global economy. The article emphasizes the importance of adaptive strategies and robust policy frameworks to mitigate inflationary pressures without stifling economic growth. By providing a comprehensive historical overview and forward-looking analysis, this article aims to offer valuable insights for policymakers, economists, and scholars interested in the dynamic interplay between monetary policy and inflation control.

Keywords: Monetary policy, inflation control, central banks, economic stability, historical evolution, gold standard

Introduction

Monetary policy, the cornerstone of economic management, has evolved significantly over the centuries, reflecting shifts in economic thought, technological advancements, and global dynamics. As societies grappled with the complexities of economic stability, the role of central banks and their approach to controlling inflation has undergone profound transformations. From the rigidity of the gold standard to the flexibility of fiat currencies, and from the classical theories of the early 20th century to the contemporary practices shaped by recent financial crises, the strategies to manage inflation have been diverse and dynamic.

This article embarks on a journey through the annals of economic history to explore the evolution of monetary policy. It examines pivotal moments and policy shifts that have defined how inflation is understood and managed. The narrative begins with the early attempts at stabilizing economies through metal-backed currencies, moving through the interwar period and the subsequent establishment of the Bretton Woods system. It delves into the breakdown of this system and the rise of modern fiat currency regimes, highlighting the adoption of inflation targeting as a dominant framework.

As we transition into the present day, the article scrutinizes the contemporary challenges that central banks face. In an era characterized by unprecedented monetary interventions, such as quantitative easing and negative interest rates, the quest to control inflation has become more complex. Moreover, emerging issues like digital currencies and the integration of climate-related risks into monetary policy present new frontiers for economic governance. This exploration aims to provide a comprehensive

understanding of past experiences while shedding light on the future challenges that lie ahead for policymakers striving to maintain economic stability in an ever-evolving global landscape.

Monetary policy has long been the linchpin of economic management, guiding economies through periods of growth and recession, inflation and deflation. The evolution of monetary policy over the centuries reflects a complex interplay of economic theories, technological advancements, and geopolitical shifts. Understanding its historical trajectory is crucial for appreciating the contemporary challenges faced by central banks and for anticipating future developments in economic governance.

Historical Perspectives

The Classical Gold Standard Era

The classical gold standard, which emerged in the 19th century, represented one of the earliest forms of structured monetary policy. Under this system, currencies were pegged to a specific amount of gold, which provided a self-regulating mechanism for controlling inflation. The rigidity of the gold standard imposed strict fiscal discipline on governments, as the money supply was directly tied to gold reserves. This period was marked by relatively stable prices but also by severe economic contractions when gold supplies fluctuated.

The classical gold standard era, spanning from the mid-19th century to the early 20th century, represents a seminal period in the history of monetary policy. This era is characterized by the widespread adoption of gold as the foundation of national currencies, where the value of currency was directly linked to a specific amount of gold. The gold standard provided a self-regulating mechanism that ostensibly ensured monetary stability and controlled inflation, shaping the economic policies and frameworks of the time [1].

Mechanisms of the Gold Standard

Under the gold standard, each country's currency was convertible into a fixed amount of gold, creating a uniform system of exchange rates based on the weight of gold. This standardization facilitated international trade and investment, as it reduced the risks associated with fluctuating exchange rates. Countries maintained gold reserves, and the supply of money was directly tied to the amount of gold held. This linkage imposed a natural constraint on the expansion of the money supply, theoretically preventing runaway inflation.

The self-regulating aspect of the gold standard was rooted in the concept of price-specie flow mechanism, articulated by economist David Hume. According to this mechanism, trade imbalances between countries would be corrected through the movement of gold. For example, if a country experienced a trade deficit, gold would flow out to settle the imbalance, leading to a contraction of the money supply, deflation, and a subsequent increase in export competitiveness. Conversely, a trade surplus would attract gold, expand the money supply, and create inflationary pressures, making exports less competitive. This cycle would theoretically bring about a balance of payments equilibrium over time.

Advantages of the Gold Standard

Price Stability: One of the main advantages of the gold standard was the relative price stability it provided. Since the money supply was constrained by gold reserves, it limited the ability of governments to engage in excessive monetary expansion, which could lead to inflation [2].

International Trade and Investment: The fixed exchange rates under the gold standard reduced currency risk, facilitating smoother international trade and investment. This stability encouraged economic globalization and cross-border economic activities.

Fiscal Discipline: The gold standard imposed fiscal discipline on governments, as they could not easily finance budget deficits by printing money. This constraint forced governments to maintain balanced budgets and avoid excessive debt accumulation.

The Bretton Woods System

Following the instability of the interwar period, the Bretton Woods system was established in 1944 to create a more flexible yet stable monetary framework. Under this system, currencies were pegged to the US dollar, which was convertible to gold. The Bretton Woods system aimed to combine the stability of the gold standard with the flexibility needed for post-war economic reconstruction. It facilitated unprecedented economic growth and stability for nearly three decades. However, it eventually collapsed in the early 1970s due to imbalances in the US economy and the inability of gold reserves to support the expanding global economy [3].

The Bretton Woods system, established in July 1944, was a landmark in international monetary relations, designed to create a stable economic environment in the aftermath of World War II. Named after the town of Bretton Woods, New Hampshire, where the conference was held, this system sought

to address the economic instability that had plagued the interwar period and lay the foundation for a new global economic order.

Design and Structure

Under the Bretton Woods system, the international monetary system was anchored by the US dollar, which was convertible to gold at a fixed rate of \$35 per ounce. This arrangement effectively made the dollar the world's primary reserve currency, with other major currencies pegged to the dollar. The system created a framework for fixed but adjustable exchange rates, allowing countries to maintain their currency values within a narrow band around their pegged rate but permitting adjustments in response to significant economic shifts.

Key institutions were established to support and oversee the Bretton Woods system:

International Monetary Fund (IMF): The IMF was created to provide financial assistance to member countries facing balance of payments problems. It aimed to stabilize exchange rates and facilitate international trade by offering short-term financial support and policy advice.

World Bank: Officially known as the International Bank for Reconstruction and Development (IBRD), the World Bank was established to provide long-term loans and development assistance to war-torn and developing countries. Its goal was to promote economic reconstruction and development across the globe [4].

The Rise of Fiat Currencies and Inflation Targeting

The collapse of the Bretton Woods system led to the widespread adoption of fiat currencies—monies not backed by physical commodities but rather by government decree. This shift gave central banks greater control over monetary policy, allowing them to use tools such as interest rate adjustments and open market operations to influence economic activity. The 1980s and 1990s saw the emergence of inflation targeting as a dominant policy framework. Central banks, notably the Reserve Bank of New Zealand and the Bank of England, began explicitly setting inflation targets to anchor expectations and guide monetary policy decisions. This approach proved effective in stabilizing inflation rates and fostering economic growth.

The transition from the gold standard to fiat currencies marked a profound shift in monetary policy and economic management. This transition, along with the subsequent adoption of inflation targeting, fundamentally reshaped how central banks approach monetary policy, aiming to balance economic growth with price stability in an increasingly complex global economy.

The Rise of Fiat Currencies

Transition from Gold to Fiat

The collapse of the Bretton Woods system in 1971, due to the inability of the U.S. to maintain gold convertibility, heralded the rise of fiat currencies. Unlike the gold standard, where currency value was directly tied to physical gold, fiat currencies derive their value from government decree and the trust and stability of the issuing institution. This shift allowed for greater flexibility in monetary policy but also introduced new challenges [5].

Characteristics of Fiat Currencies

Increased Flexibility: Fiat currencies enable central banks to adjust the money supply more readily in response to economic conditions. Without the constraints of gold reserves, central banks can implement monetary policies tailored to current economic needs, such as managing inflation or stimulating growth.

Inflation Control: The ability to control the money supply provides central banks with tools to influence inflation. However, this flexibility also necessitates careful management to avoid hyperinflation or deflation, as seen in various historical episodes.

Economic Management: Fiat systems allow for the implementation of discretionary monetary policies, such as changing interest rates and engaging in open market operations. This discretionary power is crucial for responding to economic shocks and managing business cycles.

The Emergence of Inflation Targeting

Concept and Development

Inflation targeting emerged as a prominent monetary policy framework in the late 20th century, primarily in response to the volatility and economic instability of the 1970s and 1980s. The framework was designed to provide clear, measurable goals for central banks, focusing on maintaining price stability as a primary objective. New Zealand was the first to adopt this approach formally in 1990, followed by other countries, including Canada, the UK, and Australia [6].

Principles of Inflation Targeting

Explicit Targets: Central banks set explicit numerical targets for the inflation rate, usually expressed as a percentage. These targets serve as a benchmark for monetary policy decisions and guide expectations for inflation.

Transparency and Accountability: Inflation targeting emphasizes transparency in communication. Central banks publicly announce their inflation targets and policy decisions, enhancing accountability and credibility. This openness helps anchor inflation expectations and reduce uncertainty in financial markets.

Policy Flexibility: While the primary goal is to achieve the inflation target, central banks retain flexibility to address economic conditions. They adjust monetary policy tools, such as interest rates, to respond to deviations from the target while considering other economic factors.

Credibility: For inflation targeting to be effective, the central bank must have a credible commitment to its targets. Credibility is built through consistent policy actions and communication, which helps manage expectations and reduce inflationary pressures [7].

Benefits of Inflation Targeting

Stability and Predictability: Inflation targeting contributes to economic stability by providing a clear and predictable framework for monetary policy. This predictability helps businesses and consumers make informed decisions, reducing uncertainty.

Reduced Inflation Volatility: The focus on maintaining a low and stable inflation rate reduces the likelihood of inflation spikes or deep deflationary periods. This stability fosters a more conducive environment for economic growth.

Improved Policy Framework: Inflation targeting provides a structured approach for evaluating monetary policy performance. By focusing on inflation outcomes, central banks can better assess the effectiveness of their policies and make necessary adjustments.

Contemporary Challenges

The Global Financial Crisis and Unconventional Monetary Policies

The global financial crisis of 2007-2008 posed significant challenges to traditional monetary policy frameworks. Central banks around the world responded with unprecedented measures, including massive interest rate cuts and the implementation of unconventional monetary policies such as quantitative easing (QE). QE involved large-scale purchases of government and private securities to inject liquidity into the economy and lower long-term interest rates. While these measures helped stabilize financial markets and stimulate economic recovery, they also raised concerns about long-term inflationary pressures and asset bubbles.

The global financial crisis of 2007-2008 was a watershed moment in modern economic history, revealing the vulnerabilities in the global financial system and prompting a dramatic shift in monetary policy practices. The crisis, marked by the collapse of major financial institutions and severe economic downturns worldwide, necessitated a range of unconventional monetary policies as traditional tools proved inadequate. These measures aimed to stabilize financial markets, support economic recovery, and prevent deeper recessions [8].

The Onset of the Global Financial Crisis

Causes and Initial Impact

The global financial crisis was precipitated by a combination of factors, including the bursting of the U.S. housing bubble, excessive risk-taking by financial institutions, and the widespread use of complex financial derivatives. As housing prices fell and mortgage defaults surged, financial institutions holding subprime mortgages faced severe losses. The collapse of Lehman Brothers in September 2008 marked a pivotal moment, triggering panic in global financial markets and leading to a severe liquidity crisis.

Economic Contraction

The crisis led to a sharp contraction in global economic activity. Stock markets plummeted, credit markets froze, and consumer and business confidence declined. Major economies entered recessions, with significant declines in GDP, increased unemployment, and reduced industrial output. The interconnectedness of global financial systems meant that the impact of the crisis was felt worldwide, with economies in both developed and emerging markets experiencing severe disruptions.

Unconventional Monetary Policies

Quantitative Easing (QE)

As the conventional tool of lowering interest rates approached its limits—often reaching the zero lower bound—central banks turned to quantitative easing (QE). QE involves the large-scale purchase of government and private sector securities by central banks to inject liquidity into the financial system. The

aim was to lower long-term interest rates, support asset prices, and encourage lending and investment [9].

Implementation and Impact: The Federal Reserve, Bank of England, and European Central Bank were among the major institutions that implemented QE. By purchasing a wide range of assets, including government bonds and mortgage-backed securities, these central banks aimed to ease financial conditions and stimulate economic activity. QE contributed to lower borrowing costs, improved financial market conditions, and supported economic recovery.

Criticisms and Concerns: QE faced criticism for potentially leading to excessive risk-taking and creating asset bubbles. Additionally, concerns arose about its long-term effects, such as potential inflationary pressures and the distortion of financial markets. The effectiveness of QE in achieving its goals was debated, with mixed results observed across different economies.

Forward Guidance

Forward guidance became another crucial tool in the unconventional policy toolkit. This approach involves central banks communicating their future policy intentions to influence expectations and economic behavior. By providing clear indications of future interest rate paths or policy actions, central banks aimed to shape market expectations and influence economic decisions.

Types of Forward Guidance: Central banks used various forms of forward guidance, including calendar-based guidance (specifying when interest rates might change) and state-based guidance (linking policy changes to economic conditions). The goal was to provide greater clarity and reduce uncertainty for businesses and consumers.

Effectiveness and Limitations: Forward guidance helped anchor expectations and provided additional monetary stimulus. However, its effectiveness was dependent on the credibility of central banks and the accuracy of their forecasts. If expectations diverged from actual policy actions, forward guidance could become less effective.

The Zero Lower Bound and Negative Interest Rates

One of the critical issues in recent monetary policy is the zero lower bound (ZLB) on interest rates. When interest rates approach zero, central banks have limited room to maneuver using conventional policy tools. To combat this, some central banks, such as the European Central Bank and the Bank of Japan, have experimented with negative interest rates—charging banks for holding excess reserves to encourage lending and investment. While negative rates have had mixed success in stimulating economic activity, they have also introduced new challenges, such as impacts on bank profitability and potential distortions in financial markets [7].

Digital Currencies and Financial Technology

The advent of digital currencies and financial technology (fintech) presents both opportunities and challenges for monetary policy. Central banks are exploring the issuance of central bank digital currencies (CBDCs) to enhance payment systems, increase financial inclusion, and retain control over monetary policy in an increasingly digital economy. However, the rise of cryptocurrencies and decentralized finance (DeFi) also poses risks to financial stability and the traditional banking system. Policymakers must balance innovation with regulation to harness the benefits of digital finance while mitigating potential risks.

Climate Change and Environmental Considerations

In recent years, there has been growing recognition of the interplay between monetary policy and climate change. Environmental risks, such as climate-related financial shocks and the transition to a low-carbon economy, can impact price stability and economic performance. Central banks are beginning to incorporate climate considerations into their policy frameworks, including stress testing for climate risks and promoting green finance initiatives. This integration of environmental factors represents a significant shift in the scope of monetary policy [9].

Future Challenges and Directions

Balancing Growth and Inflation

One of the perennial challenges for monetary policy is balancing the goals of fostering economic growth and controlling inflation. The dual mandate of many central banks, particularly the Federal Reserve, requires navigating trade-offs between these objectives. In a low-interest-rate environment, achieving this balance becomes even more complex. Policymakers must be vigilant in monitoring inflationary pressures while ensuring that monetary policy supports sustainable economic growth.

Enhancing Policy Coordination

The global nature of modern economies necessitates greater coordination between monetary and fiscal policies. The responses to the COVID-19 pandemic highlighted the importance of synchronizing monetary and fiscal measures to achieve comprehensive economic recovery. Central banks and

governments must work together to ensure that fiscal policies complement monetary initiatives, particularly in addressing long-term challenges such as inequality and infrastructure investment.

Importance of Policy Coordination

Synergy Between Monetary and Fiscal Policies

Policy coordination between monetary and fiscal authorities is essential for achieving comprehensive economic objectives. Monetary policy, typically managed by central banks, focuses on managing inflation, interest rates, and overall monetary conditions. Fiscal policy, overseen by government treasuries or finance ministries, involves government spending and taxation decisions. When these policies are well-coordinated, they can reinforce each other, enhance economic stability, and address cyclical fluctuations more effectively.

Stimulating Economic Growth: Coordinated efforts between central banks and governments can create a more effective stimulus during periods of economic downturn. For example, if a central bank lowers interest rates to stimulate borrowing and investment, fiscal policies such as increased government spending or targeted tax cuts can further support economic recovery.

Managing Inflation: Coordination helps balance the goals of stimulating growth and controlling inflation. While monetary policy focuses on price stability, fiscal policy can influence aggregate demand. Effective coordination ensures that fiscal measures do not lead to excessive inflation or undermine monetary policy efforts [2].

Addressing Global Challenges

In an interconnected global economy, policy coordination extends beyond national borders. Global challenges such as financial stability, climate change, and pandemics require coordinated international responses. Multilateral institutions and forums play a key role in facilitating policy coordination among countries to address these challenges collectively.

Financial Stability: The global financial system's interconnectedness means that financial stability in one country can have far-reaching effects. Coordinated regulatory frameworks and crisis response mechanisms help prevent financial contagion and mitigate systemic risks.

Climate Change: Climate change requires a global approach, with coordinated policies to reduce carbon emissions and promote sustainable practices. International agreements, such as the Paris Agreement, aim to align national policies with global climate goals [10].

Mechanisms for Enhancing Policy Coordination

Institutional Frameworks

International Organizations: Institutions like the International Monetary Fund (IMF), World Bank, and Bank for International Settlements (BIS) facilitate policy coordination by providing forums for dialogue, analysis, and technical assistance. These organizations help align national policies with global economic objectives and offer support during financial crises.

Multilateral Forums: Forums such as the G20 and the Organization for Economic Co-operation and Development (OECD) bring together leaders and policymakers to discuss and coordinate responses to global economic issues. These platforms enable the exchange of information, best practices, and collaborative policy formulation.

Communication and Transparency

Clear Communication: Effective policy coordination requires transparent and consistent communication between policymakers. Central banks and governments should articulate their policy intentions clearly to avoid misunderstandings and ensure that their actions are complementary.

Data Sharing and Analysis: Coordinated policies benefit from shared data and analysis. National and international institutions can collaborate on economic forecasts, risk assessments, and policy evaluations to align their strategies and respond to emerging challenges.

Coordinated Crisis Management

Emergency Measures: During crises, coordinated emergency measures can help stabilize the global economy. For example, coordinated monetary and fiscal responses to the COVID-19 pandemic involved collaborative efforts to provide economic relief, support businesses, and manage public health impacts.

Regulatory Coordination: In the aftermath of financial crises, regulatory reforms often require coordination among countries to address systemic risks and enhance financial stability. Efforts to align regulatory standards and practices help prevent regulatory arbitrage and strengthen the global financial system [4].

Adapting to Technological and Demographic Shifts

Technological advancements and demographic changes will continue to shape the economic landscape and influence monetary policy. The aging population in many developed countries will affect labor

markets, productivity, and demand patterns. Simultaneously, technological innovations, such as artificial intelligence and automation, will transform industries and create new economic dynamics. Central banks must adapt their policy frameworks to account for these shifts and ensure they remain effective in promoting economic stability [11].

Conclusion

In conclusion, the historical trajectory of monetary policy and inflation control underscores the adaptive nature of economic governance in response to changing circumstances. From the gold standard's rigidity to the flexibility of contemporary fiat systems, central banks have continuously evolved their strategies to address the multifaceted challenges of inflation. This evolution reflects a broader understanding of economic dynamics and the recognition that no single approach can universally guarantee stability.

The lessons drawn from past experiences highlight the importance of context-specific policies and the need for central banks to remain vigilant and responsive to emerging trends. Historical episodes, such as the hyperinflation of the Weimar Republic and the stagflation of the 1970s, serve as cautionary tales of the potential pitfalls of mismanaged monetary policy. Conversely, the successful implementation of inflation targeting frameworks in various economies showcases the benefits of clear and consistent policy objectives.

Looking forward, the landscape of monetary policy is poised to face unprecedented challenges. The integration of digital currencies, the implications of sustained low-interest environments, and the necessity for greater fiscal-monetary coordination are just a few of the issues that will shape future policy decisions. Additionally, the incorporation of environmental considerations into economic planning introduces a new dimension to inflation control efforts.

Ultimately, the continuous adaptation and innovation in monetary policy are crucial for maintaining economic stability. As central banks navigate these future challenges, the insights gleaned from historical perspectives will be invaluable. Policymakers must leverage this knowledge to craft robust frameworks capable of addressing the complexities of modern economies, ensuring that the goal of price stability remains achievable in an ever-changing world.

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ACTIVITY OF SPECIALIZED INSTITUTIONS IN PROMOTING THE USE OF ISLAMIC FINANCIAL SOURCES IN AZERBAIJAN

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Abstract

The Islamic financial mechanism provides enterprises and individuals with access to finance as an alternative financial resource. This type of financing is basically a financing mechanism based on risk sharing, creating profit and loss sharing relationships, including Islamic principles. Our research discusses the possibilities of applying Islamic banking and financing in general in Azerbaijan and the stimulating activities of the country's specialized institutions.

Keywords: *Islamic financing, specialized institutions, financial instruments*

Introduction

Recently, in the financing of small and medium-sized enterprises (SMEs), in addition to traditional financial mechanisms, alternative products are also used. We can cite financial instruments such as "Angel investment", "Crowdfunding", factoring, forfeiting, venture financing, etc. as an example. For example, angel investment is a method of financing where investors invest in a business based on the utility of the product. At this time, those investors are called "Angel investors" due to their investment in business development. This type of financing is likened to venture capital [1, p. 46]. Among the alternative financial mechanisms, the most widespread recently is Islamic financing.

Islamic finance includes profit and loss sharing, risk sharing, transactions on real assets, joint ventures, etc. [2, p. 84]. Islamic finance and banking, which began to form in the 1960s, currently exist in 102 countries around the world [3, p. 14]. Kovsarbanc, which once existed in Azerbaijan, as well as Islamic Bank Windows, which operated as part of several banks, stopped their work in 2015 after the devaluation of the country's financial sector. Currently, the issues of forming alternative and innovative financial products and creating conditions for fintechs to apply these products in the country are being discussed at the level of state institutions. The application of Islamic financial resources as an alternative financial product in our country will provide access to a new type of capital for entrepreneurs and will encourage the strengthening of free competition in the financial sector, the reduction of interest rates, and the innovative and digital activities of fintech. In this regard, in the "Strategic Roadmap for the Prospects of the National Economy of the Republic of Azerbaijan", in particular, the issues of attracting Islamic funds from the Gulf countries to our country have been mentioned since 2016. [4, p. 98]. During the survey conducted in 2022 with the financial support of the Small and Medium Business Development Agency (SMBD) and covering 1000 entrepreneurs, it was also studied how much interest in Islamic finance there is [5, p. 9]. In January 2024, the Decision on the "Regulation on the Application of the Special Regulation Regime" approved by the Board of the Central Bank also reflected the issues of creating innovative products and testing them in a special test regime [6]. Taking into account all the mentioned, it is possible to see how relevant is the promotion of the use of Islamic financial instruments by the state as an alternative financial product in Azerbaijan. At the same time, the creation and application of a new legal framework for the development of this type of financing provides scientific innovation in this field.

The main part

Although the interest of the private sector in this area is considered to be the main factor in promoting the use of Islamic financial sources, the activity of state institutions and civil society is also undeniable. If we look at the practice of states specialized in this field, we will see that various state programs have been adopted to meet the needs of entrepreneurs for Islamic financial products, including additions and changes to the legislation. Recently, various works are being done in this regard in Azerbaijan. The Central Bank, the Ministry of Economy, various NGOs, etc., which are located in the ecosystem of Islamic finance, are carrying out promotional activities in the establishment of the mechanism that implements interest-free financing in the country. Schematically, if we look at the ecosystem of Islamic finance, we can classify them as follows:

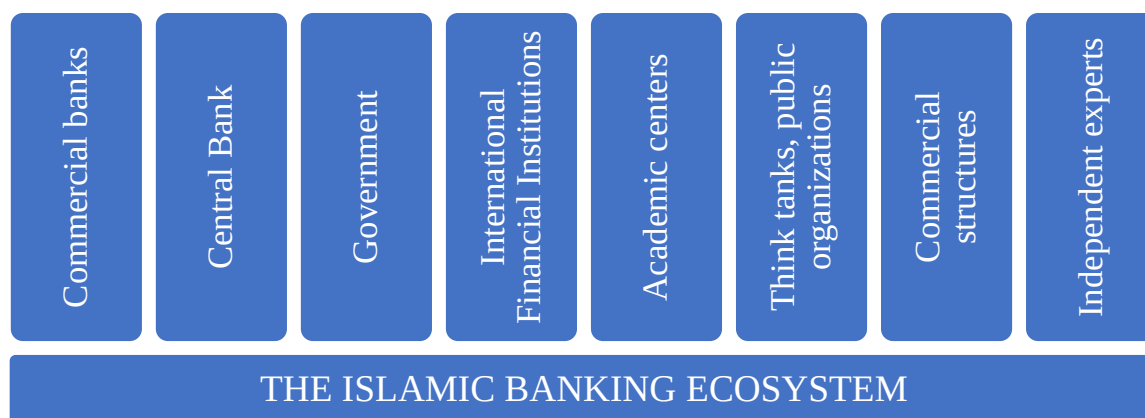


Figure 1. The ecosystem of Islamic finance and banking

Source: Prepared by the author based on a survey of the demand for Islamic finance as an alternative finance [5, p. 61].

Commercial banks:

In Azerbaijan, Islamic banks and bank windows offered Islamic financial products such as interest-free financing, *mudarabah*, and *murabaha*. In modern times, the emergence of Islamic banking in the country began in the late 1990s. Kovsarbank OJSC, which is considered the first bank in this field, was founded in 1989 as "Universal Bank", but since 2001, it has established its activity direction as interest-free banking. The bank, which operated in 2001-2015, offered products such as *sukuk* (Islamic bonds), lease (leasing), *murabaha* (mortgage), *mudarabah* (capital-labor partnership), *musharakah* (labor-labor partnership) [5, p. 57].

Kovsarbank, as an example to other financial institutions, encouraged the creation of Islamic banking windows within traditional banks. Thus, in August 2012, the International Bank of Azerbaijan started implementing the "Islamic Banking Application" project, and in April 2013, the Islamic Bank Window started operating as a department within the framework of this project. Between 2014 and 2015, the bank managed to increase the volume of its Islamic financial assets from 160 million US dollars to 526 million US dollars. This meant 1.4% of bank assets across the country. However, as a result of devaluation in the country, the bank stopped the operation of this window.

In addition, since 2008, Turanbank OJSC in Azerbaijan has been offering several Islamic financial products within the framework of partnership with the Islamic Corporation for Private Sector Development (ICD). From 2011 to 2021, the bank attracted a loan of 12.5 million manats from the mentioned financial institution and directed it to various projects. In June 2021, a new 3-year agreement was signed between Turanbank and ICD, the amount of which is 10 million USD [7].

"Pashabank" OJSC, one of the commercial banks operating in Azerbaijan, joined this trend. Thus, the bank mediates in the purchase of *sukuk* (Islamic securities) from foreign markets by entrepreneurs as private banking (Pasha Private Banking). This mediation has accelerated since mid-2022. In addition, commercial banks such as Rabitabank and Muganbank also offer certain Islamic financial products within the framework of cooperation with ICD. [5, p. 66].

Central Bank:

The Central Bank is the institution that implements monetary policy in the country, and its activities are regulated by the Law "On the Central Bank of the Republic of Azerbaijan" [8]. Although the Central Bank did not take substantial steps in the field of Islamic banking in Azerbaijan until 2024, progress was made in this field on January 31 of the current year. Thus, the "Regulation on the Application of the Special Regulatory Regime" decided by the Board of Directors of the Central Bank played a key role in the implementation of Islamic finance and other innovative financial products in the country. The purpose of the special regulatory regime is that commercial banks that can provide innovative and alternative financial products apply to the Central Bank for special permission and start applying those instruments. With this, if the Islamic financial instruments that can be applied in the test mode at the beginning prove themselves, the creation of a legal framework for those products is also planned. It should be noted that according to Article 33 of the Law of the Republic of Azerbaijan "On Banks", commercial banks are prohibited from operating in the fields of wholesale, retail, transport, agriculture, etc.

Government:

The official administration of the Islamic Development Bank in Azerbaijan is the Ministry of Economy. Thus, in 2021, the Small and Medium Enterprise Development Agency, a sub-structural unit of the ministry, held an international conference on "Sukuk - an alternative financing mechanism in Azerbaijan" [9]. Among other things, KOBIA established "Joint Invest" LLC in 2019 in the direction of the development of micro, small, and medium entrepreneurship, which helped in increasing the accessibility of Islamic financial products to those entrepreneurial subjects. In addition, Azerbaijan Investment Company established "Caspian International Investment Company" within the framework of cooperation with ICD. Currently, the company has 5 shareholders: ICD (28%), Azerbaijan Investment Company (24%), Islamic Development Bank (18%), Saham Holding Company (14%) and Al-Ahmar Group of Trading (16%) [10].

Conclusion and suggestions

The Islamic financing mechanism, which began to form in the 1960s and exists in 102 countries of the world, has been developing in Azerbaijan recently. During our research, it became clear to us that this type of financing existed in Azerbaijan at one time, including that the traditional banking sector also uses Islamic financial instruments. In general, we can take 2 main factors as the main reasons for the existence and development of interest-free banking and financing: 1) the high demand of society, entrepreneurs, and participants of the financial system; 2) acceptance of state programs in this direction, strengthening of cooperation with international Islamic financial institutions. When considering these two conditions as the main factors in the creation of Islamic banking, the following problems must be solved:

1. For high demands of entrepreneurs, participants of the financial system:
 - a) Sending people studying in the field of finance to countries specializing in Islamic finance for experience exchanges in this field;
 - b) Conducting educational events among entrepreneurs, organizing trainings and seminars;
 - c) Conducting a demand assessment survey for Islamic banking among small, medium and large business entities;
 - d) Independent experts in Islamic finance are invited to the country to conduct master classes in the banking sector, obtaining appropriate recommendations;
 - e) To print various publications (books, brochures, magazines, scientific publications, etc.) in this field;
2. On the adoption of state programs in the direction of Islamic financing:
 - a) Creation of a working group and preparation of proposals for making relevant additions and changes to the Law "On the Central Bank of the Republic of Azerbaijan" and the Law "On Banks";
 - b) Using the experience in this field of countries whose national economy is to some extent similar to the national economy of Azerbaijan: for example, the practice of offering Islamic financial products within the framework of a special regulatory regime in Kazakhstan;
 - c) Giving more attention to Islamic banking education to representatives of regulatory bodies and legislative bodies;
 - d) The following relevant changes in the Law "On Banks" can be considered successful:
 - Islamic banking requirements;
 - Sharia Council formation and functioning principles;
 - Activity history and directions of Islamic banks;
 - The range of products and services of these banks;
 - The mechanism by which conventional banks can be converted into Islamic banks, including the principles of establishing Islamic banking windows within conventional banks.

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THE MAIN DIRECTIONS OF ENSURING SUSTAINABLE DEVELOPMENT IN THE LIGHT INDUSTRY SECTOR IN THE CONTEXT OF ECOSYSTEM PROTECTION

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Abstract

The purpose of the research - priority issues in the direction of ensuring sustainable development in the context of protecting the ecosystem in the light industrial sector of Azerbaijan were investigated.

Methodology of the research - the effect of the main factors that play a role in the direction of the sustainable development of the light industry sector was investigated using the observation and analysis type of empirical research method.

The applied importance of the research - The main provisions that will affect the sustainable development of the light industry sector in the research can be taken into account in the process of forming new industrial enterprises in a number of regions, especially the Upper Garbagh economic region.

The results of the research - ensuring sustainable development in the light industry sector in the globalized world is possible by directly reducing the negative effects of industrial enterprises on the ecosystem and human society to a minimum level. In this aspect, modern trends of the 4th industrial revolution should be taken into account.

The scientific innovation of the research was interpreted from a broad aspect, which includes important opportunities in the direction of ensuring the diversification of the economy of Azerbaijan, ensuring the sustainable development of the light industry sector in our republic.

Keywords: light industry, sustainable development, competition, innovation, diversification

Introduction

In the last thirty years, the acceleration of the integration of scientific and technical innovations into production, along with the expansion of the globalization process, has created the basis for the intensive development of the industrial sector. However, in the background of these processes, the rapid increase of the world's population has affected the ecosystem on a very large scale. The created situation creates great consequences not only for the environment, but also for people's health and the protection of public values. In this aspect, the rapid consumption culture formed by the liberal economy in the society for decades should be comprehensively evaluated from the perspective of the ecosystem. In particular, the use of large amounts of water and chemicals in industrial production, and the disposal of generated waste into nature, the great risks to the future of the ecosystem should be analyzed and urgent measures should be taken in this direction.

Sustainable development involves preserving ecosystem diversity and non-renewable resources for future generations. One of the priority steps in this direction involves the prevention of negative effects on the ecosystem by partially limiting the use of non-renewable resources by current generations (Altun, Sh. 2012). Achieving sustainable development in each area affects people's income level and well-being, creates environmental, economic and socio-political effects at both global and local levels. Ensuring sustainable development includes 3 directions: ecological, social and economic:

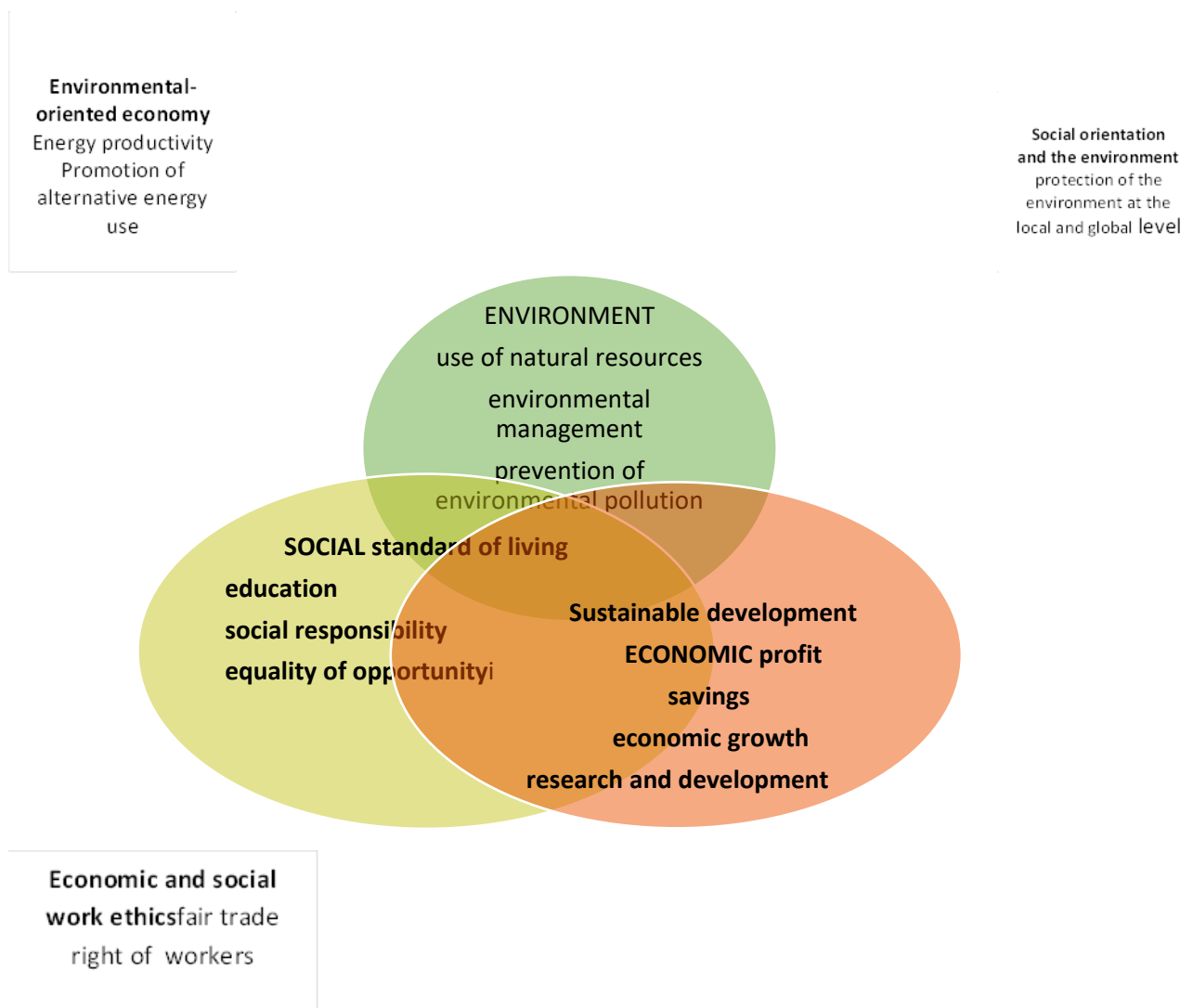


Figure 1. The main directions of sustainable development

The main directions of sustainable development and their characteristics can be explained as follows:

- Ecological sustainability aims to ensure the preservation of nature and the environment for future generations;
- Economic sustainability: requires efficient use of resources such as raw materials, energy and labor force;
- Social sustainability is achieved by meeting the basic needs of the individual, taking into account human rights and workers' rights.

Sustainable development, which is important for all sectors, is also very important for the light industry sector. Preference for natural origin of raw materials and semi-finished products in the production of clothing, accessories and textile products, which are necessary for human society, and reduction of pesticides (especially chemical pesticides) used in the production of raw materials are considered important nuances in this aspect (Eser, B., Çelik, P., Chay, A., and Akgümüş, D. 2016). The production of natural products and the construction of the corresponding production infrastructure are also considered important issues for the light industry sector. The complex situation has caused the potential of the field to drop considerably.

Materials and methods

At the end of the 20th century, along with the state independence of our republic, it became necessary to apply the main principles of liberal economy in order to accelerate the integration of our country into the international economic environment (Mammadov S.M. 2012). However, the difficult situation created by the transition to a market economy has caused significant setbacks in all areas of the economy, including the industrial sector. One of these areas in our republic was the industrial sector, which had quite wide opportunities during the former union. However, in the last twenty years, in order to

ensure economic diversification, the redirection of the revenues from the oil industry to economic areas with highly valued potential has given rise to a certain revitalization of the light industrial sector as well.

Table 1

Dynamics of production of textile industry products

Product name	Years						% increase in 2022 compared to 2015, decrease+
	2015	2018	2019	2020	2021	2022	
cotton yarn, thousand tons	9,1	24,7	34,8	11,7	22,5	14,1	+54,9
Knitted hosiery, million pairs	3,7	3,2	2,9	3,0	3,7	2,3	-37,8
Carpet, carpet products, thousand sq. m	0,4	2,4	3,0	1,3	13,0	5,6	+14 times
Cotton mill, thousand tons	6,6	61,0	85,0	71,6	92,5	91,0	+13,7 times
Ready-made cotton fabrics, thousand sq.m	9595,6	19314,4	21098,0	29965,5	33918,9	22531,5	+2,3 times
Ready-made silk fabrics, thousand sq.m	272,4	40,7	103,2	-	69,8	181,8	-33,2
Underwear, thousand pieces	352,5	597,4	556,3	529,8	560,8	796,8	+2,2 times
Outerwear, thousand pieces	723,1	469,9	521,5	765,4	863,6	946,9	+30,9
Shoes, a thousand pairs	87,9	186,6	190,3	544,2	1214,0	1405,0	+15,9 times

Source: official website of the State Statistical Committee of Azerbaijan: www.stat.gov.az

From our research, it is known that in the period covering the years 2015-2022, there was a noticeable increase in the production of light industrial products in our republic. Thus, in the corresponding period, cotton yarn production was 54.9%; 14 times in the production of carpets and carpet products, 13.7 times in the production of cotton wool; 2.3 times increase in the production of ready-made cotton fabrics, 2.2 times in the production of underwear, 30.9% in the production of outerwear, and 15.9 times in the production of shoes were recorded. As a result of our research, it is known that during the period under investigation, there was a 37.8% decrease in the production of knitted hosiery products and a 33.2% decrease in the production of ready-made silk fabrics. It should be noted that today, the growth of China's special weight in the development dynamics of the light industry sector in the world has a direct impact on countries such as Azerbaijan, where the light industry sector has been reshaped in accordance with the requirements of the market economy. The processes taking place against the background of the rapid growth of the Chinese economy in the last twenty years show that, despite the fact that open competition with this country is very difficult, it is possible to partially reduce its influence on national economies. One of the most important indicators in this direction is to form the industrial infrastructure in accordance with the requirements of the 4 industrial revolutions and to achieve optimal indicators in the direction of reducing production costs in the production of raw materials. The application of sustainable development in the light industrial sector also creates a favorable basis for the production of environmentally friendly products, which can be considered as one of the noticeable advantages compared to China. Researches show that artificial fibers obtained by chemical methods as raw materials in Chinese light industry, along with natural products, are more widely used as raw materials in the production of light industry. The advantages to be gained in this direction can be important in terms of increasing the competitive opportunities.

Conclusions and discussions

The rapid growth of the world's population and the prevention of major damages to the ecosystem in the background of the political and economic processes taking place at the global level are considered to be one of the most urgent issues of the current period. One of the most important nuances in this

aspect is that each state complies with all the important requirements of preventive measures implemented at the international level. This is an important condition for minimizing the economic and social effects of industrial production on the environment and human society as a whole. It will play an important role in terms of shaping production areas in accordance with the principles of environmental responsibility and ensuring sustainable development in extending the consumption period of products. In order to reduce the burden on nature, it is necessary to recycle textile waste generated during the production process and after consumption. In this framework, conducting educational activities among consumers, changes in purchasing habits can lead to innovations in the structure of demand for ecological products. It is true that, at first sight, the formation of such an optimal demand is not considered to be purposeful from an economic point of view, but it is inevitable that such an approach is implemented for the future of human society and the protection of the ecosystem. The light industrial sector is considered to be one of the areas of strategic importance within the measures implemented in recent years in order to ensure economic diversification in the Republic of Azerbaijan (Aliyev R. 2010).

Within the framework of the reconstruction works carried out in our lands freed from occupation after 30 years, especially within the limits of the Upper Karabakh economic region, which has a great historical tradition, the reshaping of the light industry sector and its most important sectors, the textile industry, in accordance with the principles of ecosystem protection, will ensure sustainable development in other economic areas in our country. It can be said that it will constitute an important example in terms of its application.

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Pedagogical sciences

CRITERIA FOR THE SELECTION OF MATERIAL IN THE PROCESS OF LINGUOCULTURAL COMPETENCE BUILDING

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KRITERIEN FÜR DIE AUSWAHL VON DEM MATERIAL IM PROZESS DER SPRACHKULTURELLEN KOMPETENZBILDUNG

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Abstract

The article examines the criteria for the selection of materials for the formation and assessment of linguocultural competence, which is considered one of the structural components of foreign language communication competence.

Annotation

Der Artikel untersucht die Kriterien für die Auswahl von Materialien zur Bildung und Bewertung sprachkultureller Kompetenz, die als eine der strukturellen Komponenten fremdsprachlicher Kommunikationskompetenz gilt.

Keywords: linguistic-culturological competence, linguistic-culturological material, criteria for the selection and evaluation of didactic resources.

Schlüsselwörter: sprachkulturologische Kompetenz, sprachkulturologisches Material, Kriterien für die Auswahl und Bewertung didaktischer Mittel.

Derzeit wird in der Republik Usbekistan dem Erlernen von Fremdsprachen in allen Phasen des Bildungsprozesses große Bedeutung beigemessen. Dies ist vor allem notwendig, um das Land mit hochqualifizierten Fachkräften zu versorgen.

In diesem Zusammenhang werden Inhalte und Methoden des Fremdsprachenunterrichts zu problematischen Themen.

In der Methodik des Fremdsprachenunterrichts ist die Bedeutung von Lehrmitteln unbestreitbar, darunter das Lehrbuch der englischen Sprache. Neben Sprach- und Sprachmaterial sollten Lehrbücher auch kulturelles Material präsentieren. Daher ist es notwendig, die Kriterien für deren Bewertung für die wirksame Ausbildung sprachkultureller Kompetenz der Studierenden des akademischen Lyzeums festzulegen.

Viele Arbeiten zum Problem der Auswahl und Bewertung von Lehrmaterial [3,4,5,6,7] weisen darauf hin, dass die kulturelle Komponente der Ausbildung meist mit Texten ethnokulturellen Inhalts und Aufgaben zur Beherrschung kultureller Codes verbunden ist. In diesem Fall werden diese Codes direkt durch die sozialen und kulturellen Kontexte des Lernens bestimmt.

Unter sozialem und kulturellem Kontext versteht M. Bayram [2] Folgendes:

soziale Identität und soziale Gruppen;

soziale Interaktion;

Werte und Verhalten;

soziale und politische Institutionen;

der Prozess der persönlichen Sozialisation und des Lebensstils;

nationale Geschichte;

nationale Geographie;

Stereotypen und nationale Identifikation.

Da kulturelle Spezifität durch Sprache und Verhalten repräsentiert wird, empfiehlt es sich, Begriffe wie „linguokulturelle Einheiten“ und „linguokulturelle Informationen“ zu verwenden [4]. Aus unserer Sicht wird sprachkulturelles Material am deutlichsten in ethnografischen Texten und in verschiedenen Kommunikationssituationen präsentiert, in denen soziale Interaktion und Verhalten in expliziter und

impliziter Form gezeigt werden. Diese Liste kann erheblich erweitert werden, da Texte mit ethnokulturellem Inhalt auch andere sprachkulturelle Fakten enthalten können, beispielsweise Traditionen, Bräuche, Mythen, Legenden, Sprichwörter, Aphorismen [6].

Für die erfolgreiche Umsetzung der Programmziele ist es notwendig, die Anforderungen an die Auswahl sprachlicher und kultureller Materialien korrekt zu erfüllen. Die folgenden Kriterien für die Auswahl von Informationen wurden entwickelt, spezifische Kriterien für die Auswahl dieser Materialien, wie Informationswert, beispielhafte Sprache, unter Berücksichtigung des Niveaus der Sprache/Sprachkomplexität, das dem Grad der Beherrschung einer Fremdsprache entspricht [7, S. 88-90].

Die Grundsätze der Ausbildung sind „eine der Grundkategorien der Methodik, von der aus die Anforderungen an das Ausbildungssystem als Ganzes und an seine einzelnen Komponenten bestimmt werden“ [10, S. 171].

Die Ergebnisse unserer Forschung zum Problem der Auswahl sprachlicher und kultureller Materialien für den Fremdsprachenunterricht ermöglichten es uns, die folgenden Gruppen von Prinzipien zu identifizieren:

- Grundsätze der Auswahl sprachkultureller Materialien zur Entwicklung fremdsprachlicher Kommunikationsfähigkeiten in jeder Art von Bildungseinrichtung, unabhängig vom Ausbildungsstadium;*
- Grundsätze der Auswahl sprachkultureller Materialien zur Entwicklung fremdsprachlicher Kommunikationsfähigkeiten, unabhängig vom Ausbildungsstadium;*
- Grundsätze der Auswahl sprachkulturologischer Materialien zur Entwicklung fremdsprachlicher Kommunikationsfähigkeiten im Grundstudium;*
- Grundsätze der Auswahl audiovisueller Materialien für die Entwicklung fremdsprachlicher Kommunikationsfähigkeiten auf Masterniveau.*

Die von M. Bayram aufgeführten Punkte werden als Kriterien zur Bewertung der kulturellen Komponente im Vergleich zu den in Lehrmitteln dargestellten Fakten der einheimischen Kultur definiert [3]. Der nationale Kontext des Deutschunterrichts unterscheidet sich je nach Umfeld und Lernbedingungen, insbesondere wenn es um die sprachliche und kulturelle Komponente geht. Unter den Bedingungen eines nichtsprachlichen und nichtkulturellen Umfelds und im Klassenzimmer findet die Interaktion hauptsächlich zwischen Lehrer und Schüler statt. Letztere haben in seltenen Fällen die Möglichkeit, sowohl mit Muttersprachlern als auch mit Nicht-Muttersprachlern (Vertretern einer anderen Kultur) zu kommunizieren. Sprachliches und kulturelles Material kann in solche unterteilt werden, die deklaratives und prozedurales Wissen und Fähigkeiten von Studierenden des akademischen Lyzeums bilden. Unserer Meinung nach werden Informationen über die Wertorientierungen und Verhaltensstereotypen der englischsprachigen Bevölkerung den Studierenden als deklaratives Wissen vermittelt. Um prozedurales Wissen und Fähigkeiten zu entwickeln, ist es notwendig, reale Kommunikationssituationen zu schaffen, in denen deklaratives Wissen berücksichtigt werden kann, je nachdem, mit wem die Studierenden kommunizieren. Daher sollte die Bildung sprachkultureller Kompetenz auf der Grundlage des Prinzips der kulturellen Annäherung erfolgen, das in den Werken von G. T. Makhkamova [8; 9].

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EXPLORING EFFECTIVE STRATEGIES FOR TEACHING ENGLISH VOCABULARY TO EFL LEARNERS

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Abstract

This research explores effective strategies for teaching English vocabulary to English as a Foreign Language (EFL) learners, specifically focusing on third-year undergraduate students at Astana International University. Vocabulary acquisition is a fundamental element of language learning, significantly impacting both comprehension and communication skills. Despite its critical role, EFL learners often encounter difficulties in effectively acquiring and retaining vocabulary. The primary objective of this study is to identify the most effective vocabulary teaching strategies and to investigate the challenges that learners face in this domain. The study utilizes qualitative research methods, including an online survey administered to 20 third-year undergraduate students. The survey was crafted to gather detailed data on students' attitudes, preferences, and obstacles related to vocabulary learning. It included a mix of closed-ended and open-ended questions, enabling an in-depth analysis of the frequency of use, perceived effectiveness, and common issues associated with various vocabulary learning approaches. Findings indicate a strong preference among participants for multimedia and technology-driven strategies. The most favored methods include engaging with English-language films and television programs, utilizing mobile applications designed for vocabulary enhancement, and reading a variety of English texts. These strategies were valued for their contextual richness and interactive nature, which contribute to enhanced vocabulary comprehension and retention. Additionally, the study identifies significant challenges faced by learners, such as a lack of motivation and difficulties with long-term vocabulary retention. These challenges impede the effective use and recall of new vocabulary. Participants expressed a need for more engaging and interactive resources to overcome these obstacles and improve their vocabulary learning experiences. Based on these findings, the study advocates for the integration of diverse multimedia resources, including educational games, interactive applications, and immersive language experiences, into vocabulary instruction. Such strategies are proposed to enhance student engagement and motivation, thereby addressing the identified challenges and supporting more effective vocabulary acquisition. In conclusion, this study provides valuable insights into EFL learners' preferences and difficulties regarding vocabulary learning strategies. By aligning instructional methods with students' preferences and addressing their challenges, educators can develop a more dynamic and supportive learning environment. The recommendations aim to refine vocabulary instruction practices and facilitate improved English proficiency among students.

Keywords: *Vocabulary acquisition, EFL instruction, learning strategies, multimedia tools, educational technology, motivation in learning, interactive methods, retention techniques, language proficiency*

Introduction

In the contemporary global landscape, the importance of the English language cannot be overstated. English is increasingly crucial in fields such as technology, engineering, medicine, and education. At Astana International University, English is integrated into the curriculum, necessitating that students achieve proficiency to meet academic standards. Mastery of vocabulary is a fundamental component of language learning, as comprehension of both spoken and written material relies heavily on a strong vocabulary base (Krashen, 1982). Without adequate vocabulary, learners find it challenging to understand the information they receive (Alqahtani, 2015). Zimmerman (1997), as referenced by Lin et al. (2013), asserts that "vocabulary is central to language and of critical importance to EFL learners." Unlike grammar, which is comprised of a limited number of rules, vocabulary is an expansive set of countless terms, making it a crucial element of language acquisition. Learners' beliefs about language learning, shaped by their interactions with the external world, significantly influence the learning process (Barcelos, 2003). These beliefs impact how learners use vocabulary learning strategies, with stronger beliefs often leading

to more effective strategy application (Alarcón Hernandez, Ortiz Navarrete, & Díaz Larenas, 2015, cited in Jahangir Mardali & Masood Siyyari, 2019).

Research problem:

Students at Astana International University encounter difficulties in expanding their English vocabulary, impacting their comprehension of academic material. Unlike grammar, which follows specific rules, vocabulary presents a vast and challenging array of terms. Additionally, learners' beliefs about language learning influence their vocabulary acquisition strategies. However, the specific barriers and effective strategies for vocabulary acquisition in the context of English as a Foreign Language (EFL) instruction at Astana International University require further investigation. This research aims to identify these barriers and explore strategies to improve English language proficiency among students by focusing on vocabulary acquisition.

Research questions:

- (1) What challenges do intermediate-level EFL learners aged 20-21 face when learning vocabulary?
- (2) What vocabulary learning strategies do these learners find most effective?

Purpose statement:

This study aims to examine effective strategies for teaching English vocabulary to intermediate-level EFL learners at Astana International University.

Literature Review

Exploring Effective Strategies for Teaching English Vocabulary to EFL Learners:

1. Integration of Authentic Materials:

Integrating authentic materials, such as newspapers, articles, and literature excerpts, into vocabulary instruction has proven to be an effective strategy for EFL learners. By exposing students to real-world language usage, educators provide opportunities for learners to encounter vocabulary in authentic contexts, facilitating better comprehension and retention of new words.

2. Multimedia Resources:

The use of multimedia resources, including videos, podcasts, and interactive applications, has become increasingly prevalent in vocabulary teaching. These resources offer dynamic and engaging learning experiences, providing learners with diverse language input and opportunities for active engagement. Multimedia integration enhances learners' exposure to vocabulary and reinforces their understanding through visual and auditory stimuli.

3. Vocabulary Games and Activities:

Incorporating games and interactive exercises into vocabulary instruction has emerged as a popular strategy to enhance learner engagement and motivation. Educators design vocabulary games such as crossword puzzles, word searches, and vocabulary bingo to make learning enjoyable and interactive. These activities not only reinforce vocabulary retention but also encourage active participation and collaboration among learners.

4. Personalized Learning Paths:

Adopting personalized learning approaches allows educators to tailor vocabulary instruction to individual learner needs and preferences. By conducting diagnostic assessments and learner profiling, educators identify learners' strengths, weaknesses, and learning styles. Personalized learning paths are then created, offering customized vocabulary lists, exercises, and activities to optimize learning outcomes and foster learner autonomy.

5. Collaborative Learning Strategies:

Promoting collaborative learning environments encourages peer interaction and cooperation among EFL learners. Educators facilitate collaborative vocabulary activities such as group discussions, peer teaching, and vocabulary games. Collaborative learning provides opportunities for learners to engage in meaningful language use, share knowledge, and support each other's vocabulary development.

These strategies represent effective approaches for teaching English vocabulary to EFL learners, emphasizing the importance of authentic materials, multimedia resources, vocabulary games, personalized learning paths, and collaborative learning environments in enhancing vocabulary acquisition and retention.

Recent studies underscore various effective strategies for vocabulary instruction in EFL contexts. Contextualized learning, which embeds vocabulary in meaningful contexts, aids comprehension and retention (Richards & Schmidt, 2020). Repetition and practice are essential for reinforcing vocabulary (Ellis, 2020). Integrating vocabulary learning with other language skills enhances overall language proficiency (Paribakht & Wesche, 2021). Personalized learning approaches increase motivation and engagement (Ushioda, 2020), and timely feedback supports individualized learning (Brown, 2020). Cultural and

contextual factors also play a significant role in vocabulary acquisition (Laufer, 2020), while technological tools provide innovative methods for vocabulary instruction (Chun & Plass, 2021).

Methodology

3.1 Participants

The participants in this study comprised 20 third-year undergraduate students enrolled at Astana International University, Astana, Kazakhstan. All participants were pursuing bachelor's degrees across various academic disciplines. Their ages ranged from 20 to 21 years old. Convenient sampling was used to select participants, and recruitment was conducted through an online survey platform.

3.2 Instrument

Data collection was carried out through an online survey created using Google Forms. The survey was specifically designed to gather quantitative data on participants' attitudes and preferences regarding English vocabulary learning strategies. The questionnaire consisted of closed-ended questions, allowing participants to select their responses from predetermined options.

3.3 Procedure

Participants were invited to complete the online survey via email. They were provided with a link to access the survey, along with instructions on how to respond to the questions. The survey comprised questions related to participants' frequency of usage and perceived effectiveness of various English vocabulary learning methods.

Upon accessing the survey, participants were presented with a series of statements describing different vocabulary learning strategies. They were asked to indicate their agreement with each statement using a Likert-scale format, where 1 represented "strongly disagree" and 5 represented "strongly agree."

Participants were instructed to respond honestly and to select the option that best reflected their views and experiences. They were assured of the confidentiality of their responses and informed that their participation was voluntary.

3.4 Data Analysis

Quantitative data analysis was conducted to analyze the responses collected from the online survey. The Likert-scale responses provided numerical data that could be quantitatively analyzed to identify trends and patterns in participants' attitudes towards vocabulary learning strategies.

Descriptive statistics, such as means, frequencies, and percentages, were calculated to summarize the participants' responses. The data were then interpreted to gain insights into the most preferred and effective vocabulary learning methods among the participants.

Overall, the quantitative approach enabled a systematic analysis of participants' attitudes towards English vocabulary learning strategies, providing valuable insights into their preferences and perceptions in a structured and measurable manner.

Results

The survey results indicated the following preferences for vocabulary learning methods among intermediate-level EFL learners:

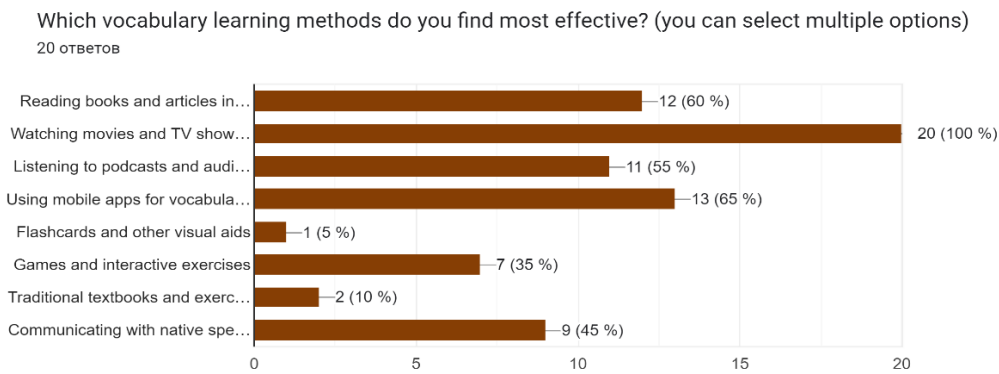


Table 1. Preferred Vocabulary Learning Methods

How often do you use the following vocabulary learning methods? (rate on a scale from 1 to 5, where 1 - never, 5 - very often)
20 ответов

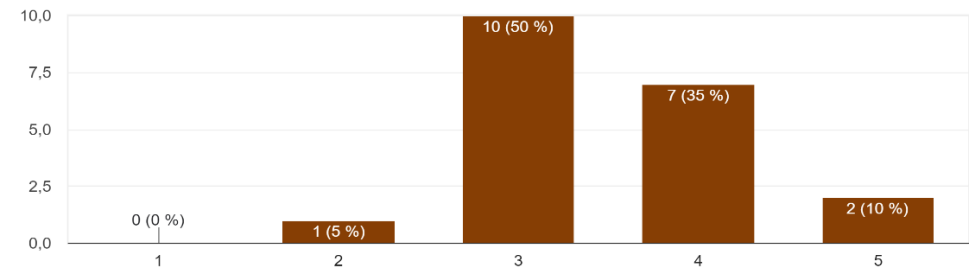


Table 2. Frequency of Vocabulary Learning Method Usage

What challenges do you most frequently face when learning English vocabulary? (you can select multiple options)
20 ответов

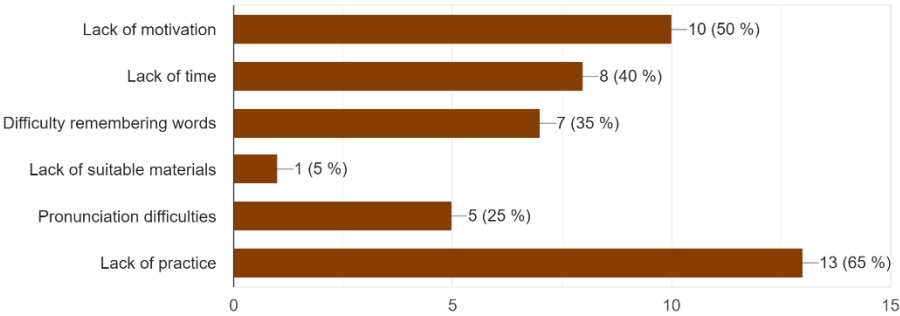


Table 3. Vocabulary Learning Challenges

Discussion

The findings of the quantitative analysis revealed valuable insights into the attitudes and preferences of third-year undergraduate students at Astana International University regarding English vocabulary learning strategies. The discussion below highlights key observations and implications derived from the survey data:

- 1. Preferred Vocabulary Learning Methods:** Among the surveyed participants, the most preferred vocabulary learning methods included watching movies and TV shows in English (100%), followed closely by using mobile apps for vocabulary learning (65%) and reading books and articles in English (60%). This indicates a strong inclination towards multimedia-based and technology-driven approaches to vocabulary acquisition.
- 2. Effectiveness of Vocabulary Learning Strategies:** The perceived effectiveness of vocabulary learning strategies varied among participants. While some methods, such as watching movies and TV shows in English and using mobile apps, were rated highly for their efficacy, others, such as traditional textbooks and exercises, received lower ratings. These findings suggest a need for educators to adapt their instructional methods to align with students' preferences and perceived effectiveness.
- 3. Challenges Faced in Vocabulary Learning:** The survey data also shed light on the challenges encountered by students in learning English vocabulary. Lack of motivation (50%) and difficulty remembering words (40%) emerged as the most frequently cited challenges. This underscores the importance of addressing motivational factors and implementing memory-enhancing techniques in vocabulary instruction to support student engagement and retention.
- 4. Recommendations for Improvement:** Participants offered valuable recommendations for enhancing the vocabulary learning process, including the use of additional resources such as memes and immersive language experiences. Incorporating these suggestions into instructional practices could

potentially enhance student motivation and engagement, thereby promoting more effective vocabulary acquisition.

Conclusion

In conclusion, the findings of this study provide valuable insights into the attitudes and preferences of third-year undergraduate students at Astana International University regarding English vocabulary learning strategies. The survey data indicate a strong preference for multimedia-based and technology-driven approaches to vocabulary acquisition, highlighting the importance of integrating innovative instructional methods into vocabulary instruction.

Despite the perceived effectiveness of certain vocabulary learning strategies, such as watching movies and using mobile apps, students face challenges such as lack of motivation and difficulty remembering words. Addressing these challenges requires a multifaceted approach that considers motivational factors, memory-enhancing techniques, and the incorporation of additional resources suggested by participants.

Moving forward, educators should strive to align their instructional practices with students' preferences and perceived effectiveness of vocabulary learning methods. By incorporating innovative and engaging instructional strategies, educators can create a more dynamic and effective learning environment that fosters students' motivation, engagement, and success in English vocabulary acquisition.

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Political sciences

CHINA'S POSITION IN THE RUSSIA-UKRAINE WAR

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Abstract

The Russia-Ukraine war has been going on for more than two years, and in this process, international politics has gained a complex dynamic, especially between the USA, China, and European states. While Russia claims that it intervened in Ukraine on the grounds of NATO expansion and security threats, China continues to establish close relations with Russia in line with its strategic interests. Although China claims to maintain a neutral stance in the Ukraine war, it has increased trade and energy cooperation with Russia. In this context, China's "peaceful rise" strategy and efforts to maintain its legitimacy in the international system stand out. China, which carefully conducts its economic relations with the European Union, tries to balance the global influence of the United States and emphasizes international peace and stability in this process. China's concerns about Taiwan also affect its stance on the Ukraine war. China's strategic and balanced foreign policy is shaped as a counterweight to the global hegemony of the United States.

Keywords: The Russia-Ukraine War, China, International Relations

Introduction

Two years have already passed since the start of the war between Russia and Ukraine. Russia has claimed that under the leadership of the United States, especially Eastern European states have become a threat to it, it has been encircled by NATO and this has created a security dilemma, and it has established a military front in Ukraine. This threat has already crossed its borders and turned the grounds of a reliable line into a real invasion. After the start of the war, the states took a political position against the belligerent states in international politics, and China also took a political position according to its interests. Chinese diplomat Wang Yi reaffirmed the close bilateral relations between China and Russia a few days before the one-year anniversary of the start of the Ukrainian war. Wang Yi, who met with Vladimir Putin in Moscow, stated that he is ready to deepen the strategic cooperation between China and Russia. Putin also said that mutual cooperation between the two states continues[11].

China has been subjected to a lot of mobbing in international politics by the US during the Trump era. For reasons such as indirect nuclear tensions with North Korea, commercial embargoes, and military tensions in the South China Sea, China considers any actor and crisis that can balance the United States in international politics as an opportunity[8]. In fact, despite countries taking sides against Russia and imposing embargoes in the war between Russia and Ukraine, China continues to take steps to improve cooperation with Russia.

In this regard, Putin calls the international situation "very complicated" and states that China-Russia cooperation is "important for stabilizing the international situation". In order to reduce international pressure against it, Moscow is implementing a balancing policy against the US's global dominance through China, its potential biggest challenger. "A crisis is always an opportunity," Wang said. He said that China-Russia relations "have never been dictated by third parties". Both leaders emphasized the importance of a "multipolar" approach in international relations and rejected the "unipolar" approach led by the United States[11].

Thanks to the existing international dynamics and cooperation, Russia and China have developed a multipolar world discourse. Because in the current system, international public opinion was created under the leadership of the United States, and in this way, all global actions of the United States were tried to be based on legal grounds. However, other superpower states in the international system, such as Russia and China, perceive the international system in which states follow the United States as a threat to their legitimacy. At this point, even though China has made many statements in support of Russia since the beginning of the Ukrainian war, it claims to be neutral [6]. This is precisely the policy that

China has implemented in order to maintain its legitimacy in the international system or not to harm its peaceful rise.

Contents of the study

China pursues a policy it calls "peaceful rise" in the international system. This great strategy implemented by China is a policy implemented to show the world that China, which is becoming stronger in international relations with reference to the United States, does not pose any threat to the whole world, and is not a threat to internal affairs or states. territorial integrity of any country. To emphasize its peaceful rise, Beijing's administration is exemplifying its cooperation with African countries and its relations based on a win-win approach. In contrast to the relations established by the colonial states based on unilateral profit in the past centuries, China shows its developing relations with African countries through cooperation based on mutual benefit as an example in explaining the ideas of peaceful rise [4]. For this reason, China not only continues cooperation with Russia but also avoids actions that would undermine its policy of peaceful ascent.

Wang's visit to Moscow was a chance to spread the idea that China wants a "peaceful solution" to the conflict rather than escalation. Emphasizing the importance of stability in international relations to achieve its economic goals, China tries to project a peaceful image without taking any responsibility for conflicts, but without completely removing from its agenda the possibilities that could lead to the loss of US power. Thomas Haldenwang, head of Germany's domestic intelligence service, said: "When it comes to international security, Russia is a storm, China is climate change" [8].

Ken McCallum, director of MI5, made similar comments. Through these arguments, it was intended to express the opinion that "if Russia is not in its current form, China will have to bear the burden of Western criticism and actions" [10]. In other words, the conflict between Russia and Ukraine has created a basis for China to challenge the international system, albeit indirectly. In this era of China's rise, it is trying to turn the current conditions into an opportunity to undermine its global influence without damaging the image of the United States in international relations.

Despite the European countries embargoing Russia after the start of the war, China continued its trade relations with Russia without any territorial restrictions and exported more than \$128 million in computer chips and chip components to Russia between April and October 2022. The US has claimed that China's relations with Russia are not only commercial, but have become full cooperation in all fields, and have provided Russia with high-quality satellite images from Spacety China to support China's military operations[3]. In the above-mentioned situation, it can be explained as one of China's attempts to use opportunities to discredit the United States and its allies, albeit covertly.

Fu Kong, China's ambassador to the European Union (EU), who does not want to portray himself as an actor fighting directly with European states, said in an interview with the "South China Morning Post" newspaper that the Ukraine crisis "has put Beijing in a difficult situation and damaged China's relations with the EU." China pursues a policy that balances current tensions without bringing its relations with the EU to the breaking point. Because China and the EU are interdependent actors. China is the largest importer of EU countries [7]. According to the data of 2022, China's trade volume with EU countries was 626 billion euros[3].

Therefore, China, which keeps its relations at a level where it does not risk its trade, knows that the EU is partly dependent on it. On the other hand, the EU, which does not want to depend on a single supplier for imports, creates security of supply in imports. In this regard, according to the data of 2022, the second largest importing country of the EU was the USA with 358 billion euros. Thus, the EU countries use the US-China conflict as an element of trade balance[7]. In other words, the EU, which creates mutual dependence by importing a very high amount from both countries, thereby tries to prevent both countries from taking part in a formation that will threaten their security. In short, China, which is in a position not to oppose the EU, but not to provoke the EU, with its attitude in the Russia-Ukraine war, seems determined to maintain the balance of power it has created.

China, which is an energy-dependent country that imports a large amount of energy from Russia and Middle Eastern countries, has spread energy trade in the region to a large area and reached high volumes, despite the active role of the United States. in the Middle East. The Beijing administration has avoided its own weakness in this field by not depending on a single actor in the energy issue. Russia's energy exports to China have significant advantages for both sides. Because the share of Russia is very important so that the influence of the United States on world energy markets does not create a disadvantage for China. On December 21, 2022, with the completion of the construction of the China-Russia Eastern route natural gas pipeline, Russia's Kovikhta gas field and the Kovikhta-Chayanda part of the "Power of Siberia" natural gas pipeline were put into use[2, p. 19]. The two countries also accelerated the

China-Russia Far East pipeline project and started negotiations on China-Mongolia-Russia pipeline cooperation. Russia and China also cooperate extensively in nuclear energy, fast reactors, nuclear fuel, nuclear science and technology exchange.

This situation again made it necessary for China to create a balance of power in the conflict between Russia and Ukraine. Despite developing relations with Russia through energy imports, China is acting with the understanding of protecting mutual benefits, rather than harboring a hostile attitude towards the US, which supports Ukraine. Because energy dependence is a significant disadvantage of China, and it takes careful policy to prevent this issue from becoming a big problem.

China abstained from voting on the resolution of the UN Security Council on ending the crisis in Ukraine. China's representative said he abstained because the Council should act with the aim of "putting out the fire rather than fanning it". Although the decision was adopted with 11 votes in favor and 3 abstentions, it could not be implemented due to Russia's veto. On the one hand, China agrees with the United States to end the war, but on the other hand, it plays a calming role in the fronts formed in favor of Russia [7].

China's other concern about the Russo-Ukraine war is that it is worries about experiencing a similar problem in Taiwan. Due to US political and military support for Taiwan, long-standing problems with Taiwan are becoming more likely to turn into conflict. For this reason, China pays attention to avoiding any action that may create problems for China in the future in terms of both international law and international public opinion in the Ukraine issue [6].

As the Russia-Ukraine war drags on, its implications for China's regional and global politics become more pronounced. China is taking strategic steps to maximize its interests in this process. China, which is determined to continue and deepen cooperation with Russia, pays attention to showing a neutral and peaceful image in the international world.

China's attempt to improve relations with Russia is part of a strategy to balance US and Western pressure on China. In this context, China has increased its energy cooperation with Russia and has taken important steps, especially in natural gas pipelines and nuclear energy projects[2, p.21]. For example, the China-Russia East Pipeline and Power of Siberia projects are concrete examples of energy cooperation between the two countries.

However, China refrains from becoming a direct party to the Russia-Ukraine war and urges the international community to propose peaceful solutions. This reflects China's concern over a similar conflict over Taiwan[1]. To protect its claims on Taiwan and balance US influence in the region, China maintains that the conflict in Ukraine should be resolved peacefully.

China also carefully manages its trade relations with the European Union (EU). The EU is one of China's largest trading partners, and these economic ties are of strategic importance to both sides. By continuing to trade with the EU, China aims to counterbalance US global economic policy[10]. The EU also seeks to balance its trade dependence on China with its relationship with the US, thus pursuing a policy of strategic balance.

Result

As a result, China is managing its international policy cautiously and strategically in the context of the Russia-Ukraine war. China's main goals in this process are to maintain its legitimacy in the international arena, to maximize its strategic and economic interests, and to position itself as a balancing force against the global hegemony claims of the United States. In this context, China pursues a multifaceted and balanced foreign policy by deepening cooperation with Russia and offering peaceful solutions to the international community.

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Technical sciences

SHAPING OF THE DIAMOND SURFACE BY LASER THERMOCHEMICAL METHOD

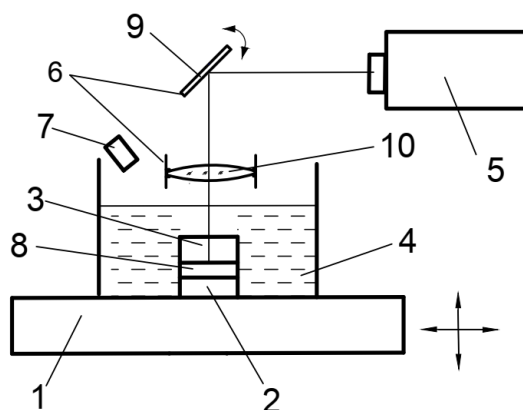
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At present, diamond and diamond-like materials are widely used in various fields of microelectronics and laser technology. In particular, as heat sinks in semiconductor laser lines and high-power multi-chip modules. Among the various methods of diamond processing, the thermochemical method of processing is still the most promising. The thermochemical method of diamond processing is based on the process of catalytic interaction of carbon that is part of diamond with hydrogen or mixtures of hydrogen with water vapor and carbon dioxide [1–7].

In order to optimize the process of thermochemical treatment of diamond and identify factors affecting the thermochemical reaction, it is necessary to conduct a comprehensive study of the physical and chemical mechanisms of this process.

To ensure the localization of the thermochemical treatment process, laser radiation is used as a surface heat source, which is absorbed by the metal. The schematic diagram of the process of thermochemical treatment of diamond is shown in Fig. 1.

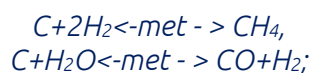


1 – processing table; 2 – holder; 3 – diamond; 4 – process gas environment; 5 – laser source; 6 – focusing agent; 7 – thermal imager; 8 – metal coating; 9 – rotating mirror; 10 – F_θ -lens.

Fig. 1 – Schematic diagram of laser thermochemical processing of diamond

The process of thermochemical treatment includes the following stages:

- 1) absorption of carbon atoms from the diamond into the metal coating;
- 2) diffusion transport of carbon atoms through the metal to the surface;



- 3) hydrogen dissociation by catalytically active catalyst metal atoms;
- 4) hydrogenation of dissolved carbon on the outer surface of the metal with atomic hydrogen.

One of the factors affecting the probability of destruction of synthetic diamonds by laser irradiation is the concentration of dispersed nitrogen (C-defect), which in turn affects the thermophysical parameters of the crystal. The temperature gradient that occurs under the local influence of laser radiation is determined to a large extent by the thermal conductivity coefficient. At the same time, thermal conductivity depends on the type of crystal, origin (natural or artificial) and temperature, which in turn determines the distribution of temperature fields in the crystal during its laser processing. As a result, with an increase in thermal conductivity, the value of the temperature gradient will also decrease, so crystals with a large number of impurities due to their low thermal conductivity will have a high probability of destruction. Thus, taking into account the dependence of thermal conductivity on temperature in these processes is one of the determining factors that allow them to be optimized.

In the study of the effect of laser radiation on diamond crystals, the method of interpolation of experimental data by a polynomial of the dependence of thermal conductivity on temperature for various types of diamond, both natural and artificial, was used.

Taking into account the dependence of thermal conductivity on temperature leads to a significant difference in the design temperature T in the treatment area. For example, at a power density of 50 W/mm², the temperatures in a type IIa diamond crystal, calculated by various methods, differ by 15–25%.

It has been established that taking into account the dependence of thermal conductivity on temperature significantly affects the dynamics of thermochemical processes. If the mechanical microstresses are greater than the tensile strength of the crystal, this leads to its cracking.

The presence of an etching trace on a diamond specimen with a molybdenum coating was experimentally studied at a relative speed of the sample movement in the range of 10–60 mm/min. It was established that at speeds below 10 mm/min, the coating is destroyed, a distinct etching trace is observed in the range of 15–60 mm/min, and at velocities above 60 mm/min, there is no etching trace.

Experimental studies have made it possible to create a thermal diffusion channel that allows controlling the topology of the surface. The coating for thermal diffusion processes in the presence of a metal catalyst and a gas medium in laser assistance includes diamond-molybdenum. Localization of the laser effect zone on the surface of the diamond is achieved by focusing laser radiation. The thickness of the metal coating is selected from the condition of total absorption of radiation in a given range of laser wavelengths.

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EDUCATION QUALITY ESTIMATION ON THE BASE OF POTENTIAL AND ITS REALIZATION

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Abstract

Recently, many publications have appeared on improving the quality of education and the need to introduce objective assessments of this quality. At the same time, education quality assessments are often considered in a very simplified manner. The conversation is mainly about assessing the individual achievements of students and the procedures for licensing, certification and accreditation of educational institutions. Meanwhile, the problem of assessing the quality of education is much deeper and more serious.

Keywords: quality improvement, quality estimation, education quality, higher education, problems in education, modelling, competences.

Main part

Currently, higher education institutions offer various educational services, the purpose of which is to train highly qualified specialists who meet the requirements of employers and the demands of the labor market. An effective comprehensive assessment of the quality of education is a necessary condition for the educational process of a university, since it reflects the expectations of employers and helps to improve the image of the university as a whole.

Active development in the higher education system of Kazakhstan and Russia has received external quality assessment, which is focused on current standards and performance indicators.

The procedures for standardization, licensing, certification, accreditation, comprehensive assessment of organizations providing educational services are elementally included in the assessment system and are included in the internal audit.

Professional activity of future specialists currently involves not only professional mobility, self-realization, but also possession of qualified knowledge, the ability to apply modern technologies, and take responsibility for solving complex professional problems (Fig. 1).

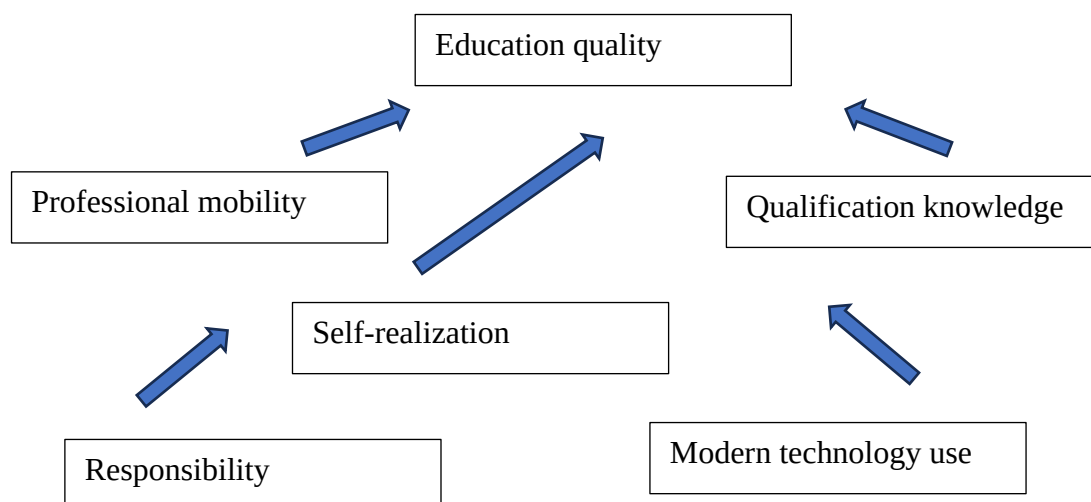


Fig. 1 – Education quality

Currently, innovative processes in higher education significantly increase the requirements for the quality system of training students, which includes both the processes and the results of education.

According to [1], quality can be considered as a "degree of excellence" or as a "degree of compliance". Therefore, each concept should be given its own specific clarifications. Until recently, the Ministry of Science and Higher Education of the Republic of Kazakhstan and the Ministry of Education and Science of the Russian Federation considered the quality of education at a university to be higher the more enrolled students successfully completed the educational program. Currently, employers evaluate the quality of education in relation to their production based on specific knowledge, practical skills and abilities acquired by graduates during their studies at a university. A modern employer needs employees who are

able not only to promptly identify problems that have arisen, but also to quickly and, most importantly, efficiently solve them. Innovative processes in higher education increase the requirements for the quality assurance system for training students, which includes all aspects related to the quality of education. Therefore, this problem is relevant, since higher education institutions need to prepare graduates who are capable of solving highly professional problems, ready for productive work, for the process of continuous professional self-education [2]. This indicates new requirements for the existing professional training of students, the transition from the existing process of acquiring knowledge, skills and abilities to a deeper and more complex process - the formation of professional competencies in students required by the employer, ensuring the necessary high-quality performance of the tasks associated with the future profession [3, 4].

"The quality of education is such training of employees of an educational organization who are capable of effective professional activity, quick adaptation in modern conditions, possessing technologies in their field, the ability to use the knowledge they have acquired in solving professional problems" [3].

The introduction of a competency-based approach in the educational activities of CIS universities in the absence of a scientifically based approach to this issue has led to a paradoxical situation when graduating departments of universities are forced to pass off a traditional knowledge-based approach as a competency-based one [5, 6].

As an example, the specialty "Applied Informatics" is considered. The analysis shows that competencies are based on such concepts as "ability", "readiness", "possession", "skill", as well as their various combinations. From the substantive side, competence is a complexly organized structure of its constituent knowledge, skills, abilities and professionally important qualities of the individual [7, 8].

A matrix of competencies (general cultural, general professional and professional) and a fund of assessment tools (mainly tests) for each of the academic disciplines of the mastered curriculum were compiled. The procedure for working with the table of correspondence of competencies and studied disciplines was determined.

The formal conclusions made by the expert indicate that the results of the assessment of the formation of competencies correspond to the results of the midterm certification of students, are formed at a sufficient level, the proportion of students who demonstrated the formation of the verified competencies is 100 percent.

The problem of the relationship and connection of the knowledge and competence approaches arises. The proposed assessment method seems to be a way out of this situation, which assumes a conditional representation of competence in the form of two components - potential and the quality of its implementation in the context of professional, educational and professional or quasi-professional activity.

It is advisable to give a formalized representation of competence in the known concepts of mathematics, namely: we assume that each competence is a vector that has knowledge, skills, abilities and personal qualities that determine behavior as components. It is possible to consider "integrated personal qualities" (professionally important qualities with the greatest weight in the model of professional success) [9-13].

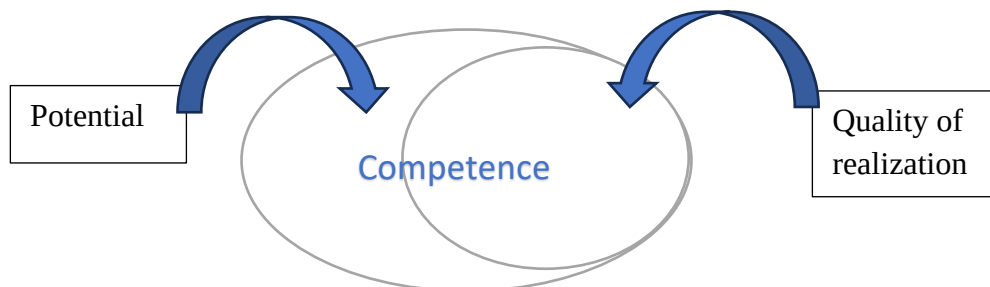


Fig. 2 – Competence

Each indicator can be assessed on its own scale. In practice, it is advisable to have a single scale both at the component level and the entire competence, for example, all indicators of the "knowledge" component are assessed using testing.

Effective solution of problems of managing complex systems has become possible due to the development of information technologies, methods of system analysis, artificial intelligence, mathematical modeling and the theory of optimization and management of complex systems.

Let us designate K as a competence matrix:

$$K = \begin{pmatrix} k_1 \\ k_2 \\ \vdots \\ k_i \end{pmatrix} \quad (1)$$

Each element of the competency matrix represents a set of potentials p_{ij} :

$$k_i = \{p_{ij}\}$$

It is necessary to assess each element of the matrix - the indicator p_{ij} , where i is the number of rows, j is the number of columns of the matrix to find a quantitative assessment corresponding to the matrix K of competence (1).

The matrix (potential) is assessed component by component.

We will assess knowledge, skills and abilities through potentials. The knowledge vector will be presented as a set of characteristics:

$$\bar{k}_1 = \{\text{characteristics}\}$$

This vector will be assigned a vector of the number of points awarded for knowledge:

$$\bar{b}_1 = \{b_{1j}\}$$

If the significance level of each indicator is known or artificially set in the form of a vector, the sum of whose elements is equal to one:

$$\bar{a}_1 = \{a_{1j}\}, \sum a_{1j} = 1 \quad (2)$$

Then the Dot product of vectors $\bar{a}_1$ and $\bar{b}_1$ determines a numerical value, for example K_1 , expressing the empirical assessment of the first component of competence - "knowledge".

$$(\bar{a}_1 \times \bar{b}_1) = \sum (a_{1j} \times b_{1j}) \quad (3)$$

Let's look at an example.

The student's knowledge score for the first indicator is 8.2 points, for the second - 7.8 points, for the third - 8.3 points.

Then

$$\bar{b}_1 = \{8,2; 7,8; 8,3\}$$

Let's assume that the significance level of each indicator is set:

$$\bar{a}_1 = \{0,4; 0,35; 0,25\}, \sum a_{1j} = 0,4 + 0,35 + 0,25 = 1$$

Let's calculate

$$\begin{aligned} \bar{k}_1 &= 0,4 \times 8,2 + 0,35 \times 7,8 + 0,25 \times 8,3 = \\ &= 3,28 + 2,73 + 2,075 = 8,085 \end{aligned}$$

In the same way, you can find an assessment of the components "skills", "abilities", "personal qualities".

Depending on the conditions of the implementation of the competence, its various components may also be different. In connection with this fact, it is necessary to consider the vector of weight coefficients, the sum of which will be equal to one

$$\overline{coef} = \{coef_j\}, \sum coef_j = 1 \quad (4)$$

Then the Dot product of $\overline{coef}$ and $\bar{K}$ corresponds to the assessment P of the entire competence (assessment of its potential):

$$P = (\overline{coef}, \bar{K}) = \sum coef_j \times K_j \quad (5)$$

It is quite obvious that the integration of competencies can be carried out by a graduate independently in the real conditions of his professional activity.

Conclusion

Unlike the situation of accreditation expertise, the quality of the implementation of competence should be assessed in real production conditions, which is not easy to model at a university, especially considering that competencies are natural characteristics of social actions, characteristics of the relationship between the subject and the activity.

Accreditation expertise of basic educational programs in terms of the formation of competencies is aimed at identifying intra-subject competencies, and not integral interdisciplinary ones. Thus, the expertise is an indicator of the knowledge approach and testifies to the residual knowledge of students in individual subjects. At the same time, in the expert opinion it is always possible to state that the academic discipline does not form competencies, which is impossible to either prove or disprove, i.e. the expert opinion cannot be considered objective.

Currently, assessments are not formalized. The process is developing due to the development of social partnership of governing bodies and educational institutions with public organizations, the development of supervisory, trustee and other councils. It should be especially emphasized that an important factor in the successful development of regional and municipal educational systems is the broad participation of employers, public organizations, the educational community, and the population in these processes.

One of the main conditions for such participation is the "transparency" of the activities of the territorial education management body, the completeness and accessibility of information for all social partners of the education system. This is why the information on the state and development trends of regional and municipal education systems obtained within the framework of monitoring studies should be presented to the main customers and consumers, social partners of education. The format of presentation of monitoring information is determined by the specifics of readiness of various target groups to perceive such texts: a public analytical report - for interested "non-professionals", a series of popular articles in the media - for "ordinary people" (in the good sense of the word), a brochure with a more detailed presentation of the revealed facts and patterns - for the teaching community, etc. The introduction of a competency-based approach requires the formation of interdisciplinary competencies, which is associated with the use of innovative forms and methods of teaching. Including such as methods of practical training, including business games, analysis of specific production situations, educational complex design, integrative problem-oriented classes dedicated to solving practice-oriented tasks.

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