Dunakavics

A Dunaújvárosi Egyetem online folyóirata 2024. XII. évfolyam IX. szám

Műszaki-, Informatikai és Társadalomtudományok

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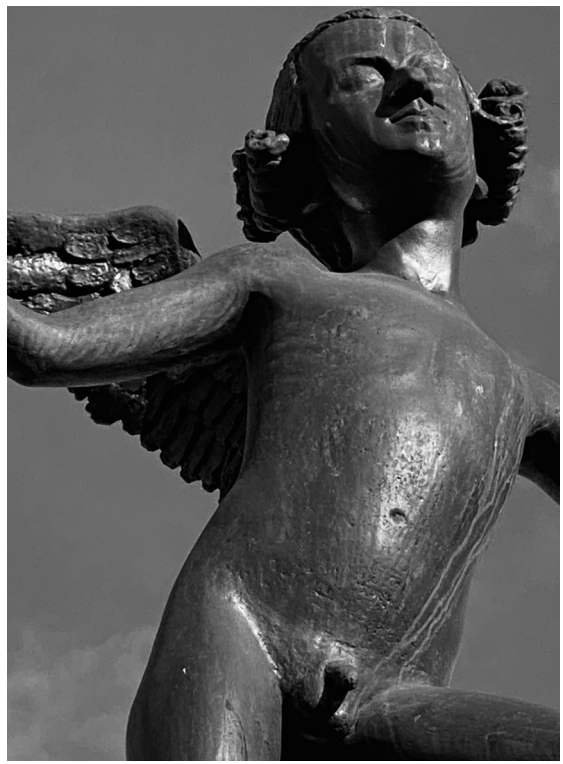

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MIRZAZADE, BARAT ISMAYIL *

Ecomomic relationships in the information economy

Abstract: This paper explores how the knowledge economy influences different market structures, specifically focusing on perfectly competitive, monopoly, and oligopoly markets. It examines the role of information and communication technologies (ICTs) in reducing costs and enhancing access to market information, thereby impacting market dynamics and economic activities. The study highlights that in a monopoly, price discrimination can lead to economic inefficiencies but also serves as a tool to enhance social welfare under certain conditions in the knowledge economy. In oligopoly markets, firms are highly interdependent, and their behavior regarding pricing and production can shift the market towards monopolistic tendencies if innovation is not matched by competitors. Furthermore, the paper discusses how the knowledge economy reshapes macroeconomic variables, such as economic growth, employment, and foreign trade, emphasizing the importance of human capital and ICTs in fostering innovation and international trade. The knowledge economy, therefore, has profound implications for market competition, economic development, and global trade, enabling greater innovation and efficiency.
Keywords: Knowledge Economy; Market Structures; Information and Communication Technologies (ICTs); Price Discrimination; Economic Growth and Development.

Összefoglalás: A jelen tanulmány azt vizsgálja, hogy a tudásgazdaság miként befolyásolja a különböző piaci struktúrákat, különös tekintettel a tökéletesen versenyképes, monopol és oligopol piacokra. Megvizsgálja az információs és kommunikációs technológiák (IKT) szerepét a költségek csökkentésében és a piaci információkhoz való hozzáférés javításában, ezáltal befolyásolva a piaci dinamikát és a gazdasági tevékenységeket. A tanulmány rávilágít arra, hogy monopólium esetén az árdiszkrimináció gazdasági eredménytelenséghez

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vezethet, de a tudásalapú gazdaságban bizonyos feltételek mellett ez a társadalmi jólét növelésének eszköze is. Az oligopol piacokon a cégek nagymértékben függnek egymástól, árképzési és termelési magatartásuk monopolisztikus tendenciák felé tolhatja el a piacot, ha az innovációhoz nem alkalmazkodnak a versenytársak. A cikk továbbá bemutatja azt is, hogy a tudásgazdaság hogyan alakítja át a makrogazdasági változókat, például a gazdasági növekedést, a foglalkoztatást és a külkereskedelmet, hangsúlyozva a humán tőke és az IKT-k jelentőségét az innováció és a nemzetközi kereskedelem előmozdításában. A tudásalapú gazdaságnak ezért mélyreható hatásai vannak a piaci versenyre, a gazdasági fejlődésre és a globális kereskedelemre, lehetővé téve a nagyobb innovációt és hatékonyságot.
Kulcsszavak: Tudásgazdaság; piaci struktúrák; információs és kommunikációs technológiák (IKT); árdiszkrimináció; gazdasági növekedés és fejlődés.

Introduction

With the transition to the information economy, significant changes and transformations took place in the economic production structures of countries, and information-based goods and services began to be produced. In this regard, because the production of goods and services requires a significant amount of technology and information production of technology-oriented knowledge is important. The society has greatly surpassed the industrial society with the knowledge economy. The information economy has been the source of many changes and transformations. Formation of the opportunity cost of the financial capital of the knowledge economy in the research work and the effects of communication and information technologies on societies and including the economy are mentioned. However, the micro and macroeconomics of the knowledge economy effects are highlighted. In terms of microeconomics, it was analyzed in terms of cost, production, consumption, and markets. Macroeconomics in terms of foreign trade, employment, income level, and economic growth were touched upon. All these have been extensively evaluated in the research work.

Microeconomic approaches with a knowledge economy perspective

First, let's analyze the microeconomic factors from the perspective of the knowledge economy.

Production function and increasing productivity from the perspective of the knowledge economy

The transformation of production factors into products and services within a certain period of time, represents production. Factors of production are variable in the short and long run and are evaluated as fixed factors. The law of increasing and diminishing returns requires that at least one of the factors of production in question be subject to constant conditions. In this sense, the law defines a short-term solution. Clark points out that due to the factors of production, the inclusion of information and the dominance of information in the production process continues to increase rapidly. Based on this, information in the context of the information economy when activated as a factor of production, seriously affects the increase in efficiency. However, like other economic constructs, the production in question in the knowledge economy for growth to occur must ensure that the quantities related to production factors are increased during the production period (Kandiller 2007).

In the classical economic approach, Fordism production line technology is in the foreground. Many standard products based on economies of scale in this production approach production is carried out. The knowledge economy is the basis of a rich social structure as an indicator, there is an agile manufacturing approach here. In this sense, it is flexible, taking into account the different choices of individuals on a social scale production is carried out by techniques and methods such as competence, which is of great importance [1].

Communication and by placing information indicators within the production factors of information indicators, the positive reflection of production information can be expressed in three directions [2].

– Introduction to communication and information technologies: Products and services of communication and information technologies are used as inputs in the

[1] Gale–Olmsted (2002): Skills, Flexible Manufacturing Technology, and Work Organization. *Industrial Relations,* pp. 48–79.

[2] Erkan (2013): Definition and Characteristics of Information Economy. Information Economy. *Open Education Publications.* Eskişehir.

production process to ensure continuous improvement of services and products.
– Added value reflection of communication and information technologies: Product and presence of a source of added value in services.
– Innovative reflection of communication and information technologies: Novelty while influencing the formation of technologies, new information, and innovative products and provision of services.

As information is used as a factor of production in the knowledge economy, it has a more fluid structure along with other factors of production. In this sense, it is extremely important that knowledge can be divided, shared, and not exhausted by its production and dissemination. In other words, knowledge represents increasing value as it is moved [3].

Consumption and the perfectly competitive market from the perspective of the knowledge economy

In the consumption theorem, the goal of consumers is to maximize the benefits they provide. It is the behavior of consumers who want to achieve this goal many factors influence the market and guide the behavior of consumers. At this point, consumer behavior experienced in the knowledge economy advancements play an important role. Developments in the knowledge economy, along with products and services available and used in production, information-oriented products and services have also come to the fore and increased in importance. Some changes have also occurred in the existing consumption approaches with the information economy. In this sense, mechanical devices are replaced by digital-based mp3, photo cars and innovative technologies such as laptops. On the other hand, individuals interact directly with companies to obtain the products and services they need and with the knowledge economy, this situation has been replaced by easier communication through e-commerce [4].

There are too many buyers and sellers to direct the market price alone, where both consumers and producers have complete information about the market along with free entry and exit from the market, and a system in which the product offered is homogeneous is described as a perfectly competitive market.

[3] Dinler (2020): *Micro Economy.* Bursa: Ekin Basım Publishing House.

[4] Kevuk (2010): *Knowledge Economy.* Turkey.

Although the market in question is not close to the real-life market, the other market plays an important role in explaining the meaning of styles.

1. *Mobility Status:* Capital owners, consumers, and producers to the market there are no licensing, legal, or patent barriers to entry and exit [5].
2. *Atomicity:* Along with having multiple sellers and buyers of a product describes a situation where sellers and buyers are too small to determine the price of the product on their own.
3. *Having complete information:* In a perfectly competitive market, consumers and producers are assumed to always have complete information.
4. *Product homogeneity:* Produced by a single producer in a perfectly competitive market the product cannot be distinguished from a product produced by other manufacturers.

The possibility of realizing the sale of products and services produced in the knowledge economy on the internet, as well as the information about the products desired by the said consumers gives them access to the websites they shop from, which is very important.

Monopoly and oligopoly market with knowledge economy perspective

A monopoly is a market in which a single firm produces or sells a commodity or product that is difficult to substitute. A monopoly market has two characteristics:
– There is no substitute for the product for which the monopolist controls the supply.
– Other firms can't enter the market where the monopolist operates.

If it is impossible to substitute the product controlled by the monopolist, then a pure monopoly is created. However, in real economic life, pure monopoly is rare. Because there are certainly products that substitute for most goods to a greater or lesser extent. The fact that a monopolistic firm sells the same product at different prices in different markets in order to increase its profit is called price discrimination. Price discrimination is a way for monopolistic firms to increase their profits [6].

The use of price discrimination to increase monopolistic profits leads to distortions in the competitive market and causes economic losses for consumers. So, this situation is subject to change and transformation in the knowledge economy.

[5] Acar (2002): *Economic Growth and Growth Models.* Bursa.

[6] Turkey (2003): *Introduction to Economic Theory Microeconomics.* Ankara.

Therefore, price discrimination from the point of view of information economy as an important function in increasing social welfare and economic activity is seen [7].

An oligopoly is a market in which a small number of producers influence each other and a market where the manufactured product is sold to a large number of consumers is the type. Oligopoly as a result of a limited number of companies in a monopoly market market has emerged. Due to the small number of firms present in an oligopoly market, firms are influenced by each other's behavior in matters such as advertising, pricing, and production.

In an oligopoly there are barriers to market entry. In other words, in this market, the mobility of a perfectly competitive market is disturbed. Therefore, the number of sellers in an oligopoly is small. On the other hand, when examined in terms of goods produced in an oligopoly, firms produce both homogeneous products and they may also produce differentiated products. Produce a different product in this market sellers may charge different prices. However, the price charged by sellers producing a homogeneous product is the same.

When it's researched from the perspective of the knowledge economy, the oligopolistic style is also likely to turn into a monopoly style over a period of time. However, if companies adapt to the web, the monopoly position of the manufacturer offering innovative products to the market can be prevented. On the other hand, if a rival company does not adapt to web technology in front of a company that adopts an innovative style in the market, the leading company in the oligopoly will maintain its position and obtain a monopoly advantage, and it will become a monopolistic structure.

Macroeconomic approaches from the perspective of the knowledge economy

Economic development and employment with a knowledge economy perspective

The ultimate goal of modern societies is to raise the level of well-being by achieving social and economic development. The increase in prosperity provided by economic growth, which is one of the macroeconomic indicators of countries, is also real-

[7] Delong–Lawrence (2001): The New Economy: Background, Historical Perspective, Questions and Speculations. *Federal Reserve Bank of Kansas City Economic Review,* pp. 29–59.

ized due to the growth of products and services produced within the country and technological progress. Based on this, the increase in production realized within a certain period reveals economic growth and growth. The increase in production is related to the increase in production factors [8].

Information and communication technologies, which are one of the indicators of the knowledge economy, not only provide ease of access to information but also reduce the costs of obtaining information. In particular, the activation of communication and information technologies in the production process, caused by the advantage provided by cost reduction, has led to changes in the production of products and services [9].

Another indicator of the knowledge economy is human capital. Information and relationships between communication technologies, knowledge-based skilled workers and human capital are mutually reinforcing indicators. Although the demand for skilled labor for the adoption of innovative technologies creates a need for qualified personnel, human capital plays an important role in these personnel. Based on this, the strong relationship between skilled labor, productivity, efficiency, and human capital is identified as a factor in increasing growth success in many countries [10].

Employment is the state of activation of the labor force related to production. With the inclusion of information as a value factor in production, the traditional business structure has undergone certain changes and transformations. The traditional work structure based on physical ability is giving way to an abstract structure focused on human capital and based on intelligence and information. In the knowledge economy, information exchange within an innovative business structure is possible with communication and information technologies compared to the traditional business process. Gaining competition in the knowledge economy through innovative skills by innovative information production and transfer methods is possible through well-equipped individuals [11].

Changes and developments in the fields of employment, and demand for the labor force have also created changes in its characteristics. With the knowledge economy, self-confidence, communication skills, skills such as analytical intelligence, responsibility, productivity, energy level, self-sacrifice, and team spirit began to be required from the workforce. In this sense, with the opening of new employment sectors, there is a need for trained personnel with technology knowledge [12].

[8] Dornbusch–Fischer (1998): *Macroeconomics*. Istanbul.

[9] OECD (2009): *The Impact of the Crisis on ICTs and Their Role in the Recovery.* London.

[10] Turan (2008): Introduction to Economic Growth Theory. *Lean publishing.* Istanbul.

[11] Dereli (2002): Technological Changes, Labor Relations and New Types of Employment. *İşgüç*, Online Magazine. pp. 2–9.

[12] Uchkan (2006): Information Policy and Information Economy: Productivity, Employment, Growth and Development. *World of Information*. pp. 23–48.

In economies dominated by the knowledge economy, the demand for highly qualified managers and technicians is increasing.

Foreign trade from a knowledge economy perspective

In recent years, the significant entry of information into the production process has had a positive effect on personal life and also has a significant effect on foreign trade. Information-based factors, which were not initially emphasized, have become the main parameters of foreign trade theories within the process.

Although the factor of production in classical foreign trade theories is based on labor, it is argued that production costs are related to the seemingly homogeneous amount of labor. Neoclassical economists of another school believe that capital should be considered as a cost factor and a production factor.

Because natural resources are not distributed equally internationally, it may not be possible for another country or countries to own any of their natural resources. Even if the countries have abundant natural resources, they cannot carry out the production process with the existing resources or they have to import the products from abroad because they cannot meet the demand in the domestic market. With this move, sellers thanks to communication technologies, one of the indicators of the knowledge economy they can bring their products to market more quickly and effortlessly. Buyers can get information about the products they are interested in more quickly and easily [13].

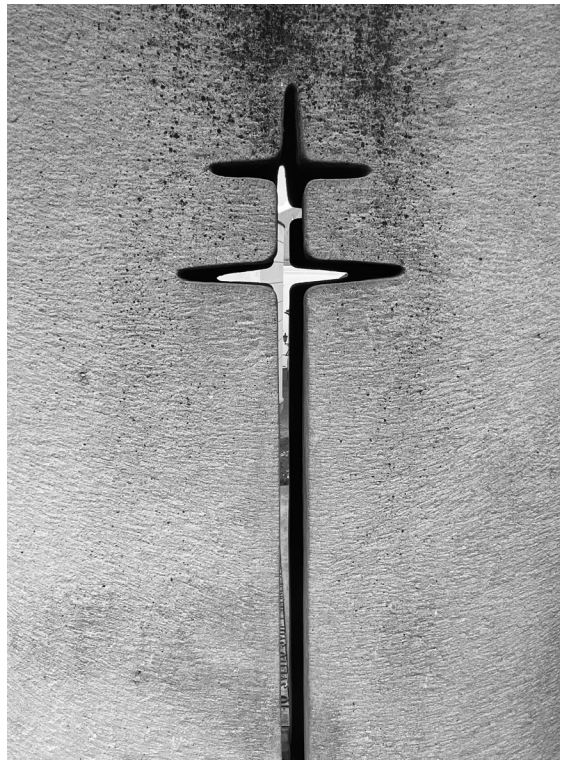
In this sense, with the advantages provided by technology, manufacturers offer their goods to new markets in the international arena, allowing companies to create innovative products. Therefore, the knowledge economy goes beyond geographical locations through globalization, plays an active role in imports and exports, increases direct foreign capital investments, and increases the volume of foreign trade positively. This is an important issue.

[13] Ozlem, Karaoğlu (2022): *Eurasian Academy of Sciences Social Sciences Journal,* pp. 45–63.

Conclusion

The knowledge economy creates several advantages for production and consumers in the modern era. In addition, the knowledge economy has created changes in the quality of employment, and social and cultural life. In addition, it can be concluded from the above that the knowledge economy creates a favorable environment for healthy competition and paves the way for the development of other areas.

The influence of the knowledge economy on micro and macroeconomic relations continues to expand and has already become a requirement of this globalized world. From all these mentioned, we can conclude that the knowledge economy creates innovations in many field structures and allows for obtaining several advantages.



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ORUJOV, ELNUR *

Assessing the fourth industrial revolution: from a human resource management perspective

Abstract: This study investigates the impact of increasing digitization, specifically Industry 4.0, on the labor market from the perspective of human resource specialists in the cosmetics industry in Baku and Sumgait. Using a mixed-methods approach that includes both synchronous (phone, Skype) and asynchronous (email) communication, data were gathered from 20 HR managers. The study focuses on HR professionals' views on digital transformation's effects on recruitment, wage differentiation, and workforce training. Findings suggest a growing need for advanced technological skills, highlighting the gap between current employee capabilities and those required for Industry 4.0. The study also underscores the importance of proactive training and adaptation strategies to navigate the digital transition, emphasizing a coordinated approach involving government, employers, and workers. As organizations increasingly adopt Industry 4.0 technologies, HR specialists anticipate challenges such as a shortage of skilled labor, potential wage disparities, and increased competition for tech-savvy employees. The findings call for an emphasis on quality and adaptability in workforce development to sustain employability in a rapidly evolving digital landscape.
Keywords: Industry 4.0, human resources, digital transformation, labor market, workforce training, technological skills, digitalization, cosmetics industry, Baku, Sumgait.

Összefoglalás: A jelen tanulmány a növekvő digitalizáció, különösen az Ipar 4.0 munkaerőpiacra gyakorolt hatását vizsgálja a bakui és sumgaiti kozmetikai ipar humánerőforrás-specialistái szemszögéből. A szinkron (telefon, Skype) és az aszinkron (e-mail) kommunikációt egyaránt magában foglaló vegyes módszerrel 20 HR vezetőtől gyűjtöttek adatokat. A tanulmány a HR-szakemberek nézeteire összpontosít a digitális átalakulásnak a toborzásra, a bérek differenciálására és a munkaerő-képzésre gyakorolt hatásaival kapcsolatban.

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Az eredmények azt sugallják, hogy egyre nagyobb szükség van a fejlett technológiai készségekre, rávilágítva a szakadékra a jelenlegi munkavállalói képességek és az Ipar 4.0-hoz szükséges képességek között. A tanulmány hangsúlyozza a proaktív képzési és alkalmazkodási stratégiák fontosságát a digitális átállásban történő eligazodásban, hangsúlyozva a kormány, a munkaadók és a munkavállalók bevonásával zajló összehangolt megközelítést. Ahogy a szervezetek egyre inkább alkalmazzák az Ipar 4.0 technológiákat, a HR-szakemberek olyan kihívásokra számítanak, mint a szakképzett munkaerő hiánya, a lehetséges bérkülönbségek és a technológiailag hozzáértő alkalmazottakért folyó verseny. Az eredmények arra hívják fel a figyelmet, hogy a munkaerő-fejlesztésben a minőségre és az alkalmazkodóképességre kell helyezni a hangsúlyt, annak érdekében, hogy fenntartsák a foglalkoztathatóságot a gyorsan fejlődő digitális környezetben.
Kulcsszavak: Ipar 4.0, humán erőforrás, digitális átalakulás, munkaerőpiac, munkaerőképzés, technológiai készségek, digitalizáció, kozmetikai ipar, Baku, Sumgait.

Introduction

The workforce experiences significant turning moments as a result of the influence of globalization and technological advancements on working life. The concept of work has begun to change in the digital working life with artificial intelligence and the substitution of labor by robots leaves the workforce facing new challenges. Flexible working practices, which are increasingly increasing in working life, deregulation approaches to attract technology and global powers to their countries, and legal policies implemented against the workforce, damage the basis of labor in working life. As new technologies become increasingly established in working life, flexible practices take on more political content, increasing criticism of the concept of work. The majority of criticisms center on the idea of work's temporal and spatial dimensions. It is believed that the idea of work has become timeless and spaceless, gradually eclipsing the idea of overtime. It is stressed that numerous indications that characterize employment are obscured by the possibility of being connected to work at any given time. The discussion of this scenario is based on the idea that the concept of work, together with the integration of technology into globalization, necessitates working around the clock and blurs the boundaries between work and personal life. It should be emphasized that this study does not stand on the line against change in this process where Industry 4.0, designed with artificial intelligence, is being implemented. It just wants to express the process under headings that can affect the workforce, based on the thoughts of human resources professionals.

The workforce is struggling to survive in a working life where they must always keep the switch on and compete with machines in the fight against artificial intelligence.

The idea of a new, flexible, technologically integrated way of working is likewise supported by the European study. In the UK, one in three employees checks their e-mails before 08:30, and 90% agree to be reachable outside working hours [1].

Employees must adjust to the new job form's patterns to preserve and enhance their employability in the face of rising unemployment rates and increased labor market competition. The labor force has to change into a qualified structure, particularly to combat artificial intelligence. It emphasizes how important it is for technical advancements and labor qualifications to rise. Workforce qualifications are changing due to factors like higher education levels, the idea of lifelong learning, and the requirement for vocational training that keeps up with technological advancements. In a workplace where smart factories, the internet of things, cloud computing, and cyber systems define artificial intelligence, workforce credentials, production organization, working life regulations, and educational policies must all change along these lines [2].

One of the topics of discussion created by technology in the labor market is gender inequality. It is seen that the digitalization process is rapidly filling the positions of mostly female employees. Female employees are mostly employed in areas such as administrative services and customer services. The digitalization process that started in these areas with software programs and the growth of technology in these positions filled by female employees pose a great threat to the female workforce [3]. A contentious facet of technology is the allocation of wages within the labor market. A further factor supporting the human capital approach is the ability of employees to possess qualifications that are compatible with the technology. However given their growing workload and expertise, the rising R generation's incomes have not increased, raising concerns about the system. The growing disparity and variety in pay point to a rise in unfavorable working conditions.

In the study, first of all, the conceptual framework of digitalized working life will be conveyed and its appearance in the world will be discussed with numerical examples. Afterward, the process and effects of the separation between mental labor and physical labor that started in the workforce with digitalization will be discussed. The findings section will present the viewpoints of human resources professionals following these in-depth parts based on the literature.

The results are interpreted and a framework for consideration of the potential effects on the workforce is established in the conclusion section.

[1] Adolph, S.–Tisch, M.–Metternich, J. (2014): Challenges and approaches to competency development for future production. *Journal of International Scientific Publications – Educational Alternatives,* 12., (8.), pp. 1001–1010.

[2] Bratton, J.–Gold, J. (2017): Human resource management: theory and practice. Human Resource Management: *Theory and Practice.*

[3] World Economic Forum (WEF) (2018): *The Global Competitiveness Report.* http://www3.weforum.org/docs/

Methodology

Population and Sample

What impact the growing digitization of the workplace is expected to have on the labor market is the study's research topic. The purpose of this inquiry is to examine the perspectives of human resources specialists who govern the labor market.

Predicting the change experienced and the Figure it will portray would be more accurate for human resources specialists, who are always keeping a close eye on the staff through training programs, compensation systems, and recruitment procedures. In this regard, data was collected by establishing synchronous communication (cell phone and Skype) with human resources experts and asynchronous communication (e-mail) with some of them. E-mails were used to pose questions before simultaneous communication. They were able to think through the questions and provide more precise analysis by using this strategy. The literature on qualitative data methodologies states that synchronous and asynchronous interview techniques can be used to collect data via phone, Skype, and E-mail (James, 2016: 281).

Human resource managers employed in Baku and Sumgait's cosmetics industry make up the research population. Convenience sampling was employed since it is challenging to contact every member of the general population for the study owing to scheduling conflicts and budgetary limitations. It is a non-random selection technique based on population initiative and accessibility. It appears adequate to make an opinion regarding the research question's answer, despite its poor representation of the general population. Human resources managers who volunteered to work voluntarily and were contacted through reference contacts were sent a questionnaire.

To facilitate a more honest discussion of the subject and protect the reputations of the participating companies, all personal information about the participants was concealed. It is not claimed that the study universe is representative of the entire cosmos.

Data collection tool

Among the qualitative research approaches available, the semi-structured interview method was selected for the study. A structured questionnaire was utilized because it was assumed that the participants knew something about the research issue because of their occupation. Literature and expert opinions were used to create question designs.

In creating the first question design, the understandability of the questions and their ability to answer the research question were evaluated by academic experts [4]. Academicians whose expert opinion was requested were asked to read the prepared questions and to point out expressions that were difficult to understand or were not appropriate to the research question.

Academicians were asked ”What do you think this question means?”, ”Do you think the question expressions are appropriate?” Among the qualitative research approaches available, the semi-structured interview method was selected for the study. A structured questionnaire was utilized because it was assumed that the participants knew something about the research issue because of their occupation. The questions were reviewed based on the feedback received, and the survey was re-evaluated and given its final form.

The questionnaire consists of 5 demographic questions and 11 open-ended questions evaluated in 3 different dimensions. These dimensions; Opinions about Industry 4.0 are classified as opinions about the reflection of digitalization on the participants' professions and their opinions about the labor market. Some questions asked in the research are as follows: ”How do you evaluate the effectiveness of artificial intelligence applications in recruitment processes?

How do you think the labor market will be affected by the digitalization process?” What are your thoughts on wage differentiation in labor markets with digitalization? How should human resources departments prepare the workforce for the change process?, Industry 4.0 in your company. Is there any budget allocated for this?

[4] Dhanpat, N.–Buthelezi, Z. P.–Joe M. R.–Maphela, T. V.–Shongwe, N. (2020): Industry 4.0: The role of human resource professionals. *SA Journal of Human Resource Management/ SA Tydskrif vir Menslikehulpbronbestuur,* 18., (0.).

Data Analysis Method

The data obtained after interviews with 20 participants were analyzed with Nvivo, a qualitative data analysis program. This program systematically evaluates and classifies data.

Findings

Demographic Findings

Of the 20 participants in the study, 12 were women and 8 were men. The average age of the sample was 38 years. (youngest age is 25, oldest age is 45) The education level of the majority of the participants is a master's degree. There are 13 master's degrees and 7 bachelor's degrees. Their industry experience is an average of 17 years. The minimum period of employment in the institution is 2 years and the maximum is 5 years.

Table 1. Demographic Characteristics of Participants

№	Gender	Age	Educational Status	Working Time in the Sector	Working Time in the Institution
1	Woman	38	Master Degree	17	2
2	Woman	36	Master Degree	14	3
3	Male	38	Master Degree	18	4
4	Woman	40	License	20	5
5	Male	37	Master Degree	18	3
6	Male	36	Master Degree	16	2
7	Male	42	Master Degree	21	3
8	Woman	37	Master Degree	16	3
9	Woman	35	Master Degree	12	3
10	Woman	36	License	13	4
11	Woman	36	Master Degree	14	2
12	Woman	40	License	17	3
13	Male	36	Master Degree	14	4
14	Woman	37	License	16	4
15	Woman	42	License	21	5
16	Male	45	Master Degree	23	3
17	Male	39	Master Degree	21	2

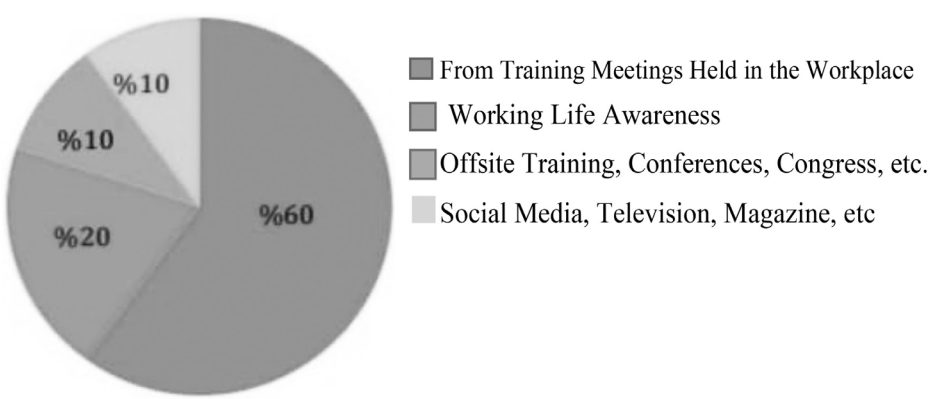
№	Gender	Age	Educational Status	Working Time in the Sector	Working Time in the Institution
18	Woman	35	License	15	4
19	Male	38	License	17	5
20	Woman	38	Master Degree	19	2

Source: Compiled by the author.

Participants' Opinions on Industry 4.0

The main goal of the study was to find out what human resources experts thought about Industry 4.0. Every human resources specialist claimed to be informed on Industry 4.0. They claimed to have attended training sessions on Industry 4.0 that provided them with in-depth knowledge *(Figure 1)*. They "watched with astonishment the point that technology has reached, that they will work with robotic colleagues in the future, and that they sense the possibility that the utopian films they watched about the future may come true very shortly," stressed the individuals who received information through workplace training.

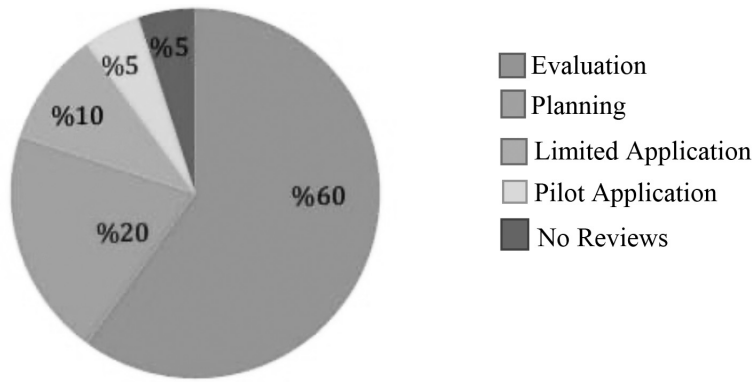
Figure 1. How to Learn About Industry 4.0



Source: Compiled by the author.

When asked what phase of Industry 4.0 their firms were in, human resources experts responded *(Figure 2)*. The responses provided are encouraging for our nation. It is seen that most of the human resources professionals' companies have allocated a budget for Industry 4.0 and have started the evaluation phase.

Figure 2. Implementation Stage of Industry 4.0 in Companies

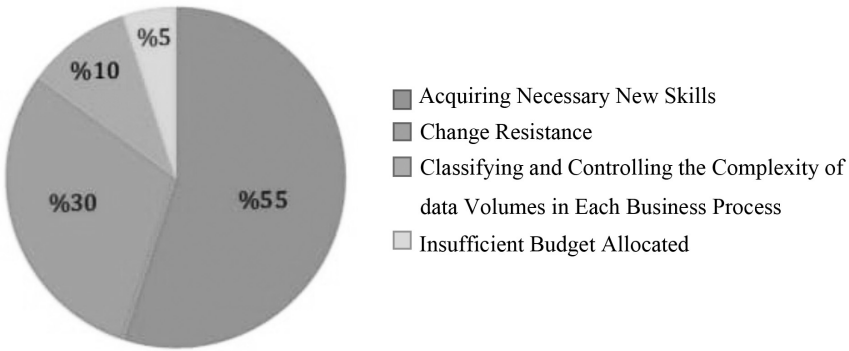


Source: Compiled by the author.

When questioned about the largest obstacles they might encounter in putting Industry 4.0 into practice, the majority of HR experts emphasize the scarcity of skilled labor *(Figure 3)*. Here are a few responses to this question that participants have provided. ”Technology skills are severely lacking, particularly for individuals employed in the industrial process. Our current technological skill needs map profile is not comprehensive enough. The most crucial and essential component of this job is training.

We began by creating distinct training curricula for every department. ”We have analyzed it well, the biggest challenge is the skill changes we are looking for in our employees as the way of doing business becomes digital”.

Figure 3.



Conclusion

When questioned about the largest obstacles they might encounter in putting Industry 4.0 into practice, the majority of HR experts emphasize the scarcity of skilled labor *(Figure 3)*. Here are a few responses to this question that participants have provided. "Technology skills are severely lacking, particularly for individuals employed in the industrial process. Our current technological skill needs map profile is not comprehensive enough. The most crucial and essential component of this job is training. We began by creating distinct training curricula for every department. ”We have analyzed it well, the biggest challenge is the skill changes we are looking for in our employees as the way of doing business becomes digital” [5].

The study's most remarkable finding is that employees are held accountable for their ability to adjust to change during the digital transformation process. The human resources department is planning its training more along the lines of dealing with resistance to change than with professional knowledge's adaptation to technology. Some people believe that employees should pursue technology-based and vocational training.

[5] Fray, C.–Osborne, M. (2017): The Future of Employment: How Susceptible Are Jobs To Computerisation? *Technological Forecasting and Social Change,* 1., (14.), pp. 254–280.

[6] Huws, U. (2013): The Making of A Cybertariat: Virtual Work In A Real World. *The Monthly ReviewPress,* New York.

It has been predicted that the labor market's transformation will lead to a rise in competition, a need for more qualified workers, difficulty finding employment, the creation of new professions and job descriptions, and the creation of a more productive workplace with fewer employees. It is anticipated that as competition grows, a new class of workers focused on skilled labor will emerge. It is believed that when the human capital strategy is prioritized, the diverse pay structure would diversify and lead to a (natural) disparity in income. It is anticipated that there will be a rise in the organizational issue within the industrial relations system, where individual bargaining becomes more prominent and the traditional structure is altered. It is advised that workers enhance their digital abilities and receive education in digitally oriented fields. It is underlined that the workforce and unadaptable working conditions have entered a massive vortex due to artificial intelligence [6].

The study's conclusions show that enhancing workforce competencies is deemed necessary before pursuing a significant incentive in the context of digital transformation. The workforce's rising caliber is crucial to the digital transition. Prioritizing quality is deemed necessary for enhancing employability and accelerating the digital transformation process in the workplace, where artificial intelligence plays a prominent role. From this perspective, the crossroads for the part of the workforce that does not have these qualifications is on the verge of a huge cliff. However, reflecting on the digitalization process through discussions of qualification or deskilling may run counter to the inevitable reality that change reveals.

It is thought-provoking that the process should be normalized by leaving what the employer should do to the workforce. The new skills that the workforce has to develop in terms of adapting to new technologies under the title of lifelong learning may cause anxiety and stressful situations. This burden left on the shoulders of the workforce and also expected to be covered by the worker's wages for his labor will create another vortex. This burden left on the shoulders of the workforce and also expected to be covered by the worker's wages for his labor will create another vortex. The feeling of uselessness on the part of the workforce can create a working environment lacking job satisfaction for both parties, with inefficient work output on the part of the employer. Therefore, the process should not be viewed from the employer's perspective, where skilled labor can be easily substituted for each other. A mission should be undertaken to reveal the workforce qualifications needed within the scope of Industry 4.0 education and active employment policies. This mission should be addressed together at the pillars of government, employer, and workforce.

Change and uncertainty will therefore always be a part of life. Being adaptable is the only way to properly navigate these procedures. Therefore, all segments, from the state to the unions, from the employer to the workforce, need to be able to undertake their responsibilities with social awareness by analyzing the social, social, and economic added values of the current process. It will be necessary to evaluate the process with great sensitivity, from a solidarity perspective, by placing the acquired rights of the workforce on strong legal grounds. Otherwise, serious costs may be paid to the workforce. To prevent this result from occurring, it is hoped that the study will shed light on future research on topics that include a disciplined approach to working life, discuss the future of the workforce, and address the change in labor markets.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Teaching commitment issues of unity of protected life and sustainable development

Abstract: The study aims to develop practical skills among learners in sustainable development and environmental protection, focusing on the North-Western region of Azerbaijan. Through interdisciplinary integration and modern teaching methods, students investigate the potential of renewable energy sources such as solar, wind, biomass, and hydro resources. This hands-on approach highlights the importance of green chemistry and the green economy in addressing the environmental challenges posed by non-renewable energy sources. The research emphasizes the economic efficiency of renewable energy, advocating for its increased use to reduce ecological damage and ensure long-term sustainability. By fostering these skills, the study contributes to developing a workforce capable of addressing global environmental issues effectively.

Keywords: Sustainable development, environmental protection, renewable energy, green chemistry, green economy, interdisciplinary integration, Azerbaijan, economic efficiency, teaching methods.

Összefoglalás: A tanulmány célja, hogy a tanulók gyakorlati készségeit fejlessze a fenntartható fejlődés és a környezetvédelem terén, az Azerbajdzsán északnyugati régiójára összpontosítva. Az interdiszciplináris integráció és a modern oktatási módszerek révén a hallgatók megvizsgálják a megújuló energiaforrásokban rejlő lehetőségeket, például a nap-, szél-, biomassza- és vízenergia-forrásokat. Ez a gyakorlati megközelítés rávilágít a zöld kémia és a zöld gazdaság fontosságára a nem megújuló energiaforrások jelentette környezeti kihívások kezelésében. A kutatás a megújuló energia gazdaságosságát hangsúlyozza, szorgalmazza annak fokozottabb felhasználását az ökológiai károk csökkentése és a hosszú távú fenntarthatóság biztosítása érdekében. E készségek előmozdításával a tanulmány hozzájárul a globális környezeti problémák hatékony kezelésére képes munkaerő fejlesztéséhez.

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[1] Guliyeva Gulzar –Seyidova Antiqa (2020): Teaching chemistry with modern teaching methods. SSU.Scientific news. *Social and humanitarian sciences department.* 3., pp. 94–97.

Kulcsszavak: Fenntartható fejlődés, környezetvédelem, megújuló energia, zöld kémia, zöld gazdaság, interdiszciplináris integráció, Azerbajdzsán, gazdasági hatékonyság, oktatási módszerek.

Introductıon

Educating the young generation capable of 21st century skills starts at school. The formation of competencies, such as soft and hard skills, which they will have in their future activities, starts from the period of education of the learners. Learners of various sciences should not only master the fundamental laws in the learning process, but also develop them from an experimental point of view.

Application of the presented materials from a practical point of view helps to develop various competencies in the students. For example, during the study of any science, no work was done from the point of view of financial literacy related to 21st century competencies, or it was at the minimum level. Unfortunately, later this problem was noticeable in their work. Along with the changes in the education system, the emergence of new learning technologies, as well as learning methods and their application, have already radically changed this approach. Giving the students project-oriented tasks has led to the creation of many skills in them, as well as financial literacy, which has been neglected until now, achieving this skill creates a better employability in the future labor market, as well as an advantage in terms of competition [1]. As we mentioned, this ground is created in the same process, that is, the acquisition of economic knowledge and skills occurs in parallel with the acquisition of scientific knowledge and skills during the teaching of the subject. In other words, students with financial literacy will develop these skills in the future and will not have difficulty working on projects in any enterprise, because they already have practical skills about it, they will be able to determine how important it is to design a project, calculate the costs to be incurred and implement these projects.

Objectıve of the research

The main goal of the work is to interpret the sequence of actions implemented by us so that learners acquire practical skills on protected environment and sustainable development. It is clear that these goals are currently facing all progressive humanity. As we know, since the beginning of the human society, it has used nature blindly, without measure and form, and as a result, today's reality has emerged. The exhaustible sources of energy from natural resources have decreased day by day, and at the same time, a lot of damage has been done to the environment. We are in this business

In order to protect the environment and ensure sustainable development in line with the growing population, we have tried to bring to the agenda the work that learners will do with the facilitation of teachers and the projects that will be prepared as a result. Prospects of using water, air, solar and bioenergy resources related to inexhaustible energy sources existing in the north-western region of Azerbaijan are investigated by the students. As a result of this, the main goal will be achieved: protection of the environment, ecology and reduction of the cost of goods produced due to the obtained ecologically clean cheap electricity. This will also ensure sustainable development.

One of the main goals in this work is to organize the activity from the point of view that the learners have practical skills in green chemistry and green economy, as mentioned above. For this, we consider it important to master the knowledge in the field of photosynthesis through interdisciplinary integration [2].

Research methods

Modern methods of training were used in our research, which plays an important role in achieving results [3]. At the same time, during the training, the principles of training were kept in focus, which plays a specifotoal role in acquiring practical habits [4]. For the full implementation of what we said, this process should be approached in the unity of modern and classical context. Because, by studying the traditional process comparatively, we can adapt the modern education system to the standards of the world education system.

[2] Raziyev, Safar–Guliyeva, Gülzar–Mammadova, Sanubar (2023): From the experience of teaching photosynthesis process with interdisciplinary integration. *PLUS. Scientific Works.* 90., (2.), pp. 62–66.

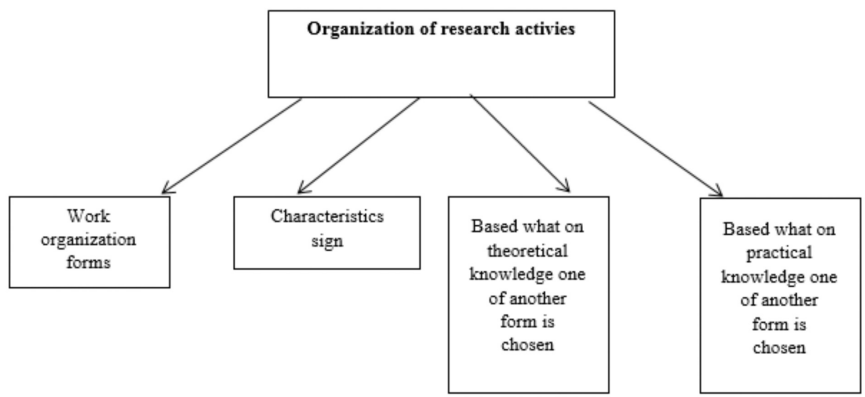
[3] Veysova, Zulfiyya (2008): What should a teacher be able to do to conduct an active lesson effectively? Part I/ facilitation skills/ *Curriculum-scientific-methodical magazine,* 4., pp. 83–101.

[4] Pashayev, Amrulla (2010): Pedagogy. *Science and education publishing house.*

[5] Mukarramoglu, Mehdi (2015): Alternative and renewable energy sources play an important role in solving environmental problems. *People's newspaper.* 10., (11.).

It is also important to follow the principles of didactics in this field (Komensky 1961: 11). The teaching method is based on the independent experiences, researches and hypotheses of the learners. At the same time, it is the determination of the ways of its implementation, the selection of the necessary resources and materials by the learners themselves. These activities can be organized as follows:

Figure 1. Organization of research activies



At the beginning of work with students, we also inform them about environmental factors that ensure the safety of human health. Here, at the same time, achieving economic efficiency as the conclusion of the process is brought to the fore [5]. After that, from the point of view of using alternative energy sources in environmental protection, the production of affordable products will be ensured in the North-West region of the republic.

In this field, a comparison was made between solar, hydro-aero- and bioenergy from renewable energy sources. In the meantime, we note to the students that man, who has a dominant position on earth, has the opportunity to protect himself from anthropogenic influences better than other living beings, because, as the only conscious being, he regulates his activities according to his interests. However, a person's desire to improve his living conditions and livelihood leads to an increase in factors that threaten his health. In our opinion, this process should be approached fundamentally so that our results have a practical effect.

First of all, the roots of the problem, the specificity of our region for today should be taken into account.

First of all, what are the traditional energy sources, as well as their prospects and final promise analysis should be determined here. It would be better to approach the issue from this point of view, taking into account the ability of energy to do work. On the other hand, we must be able to create and accumulate it. But here comes the second main issue: what potential energy sources do we have and how have we used them so far? It is no secret that non-renewable energy sources should be saved. Because these energy sources are blindly used from the beginning and are gradually depleted. So, the way out of the current situation is through the use of more renewable energy sources. On the other hand, as a result of using non-renewable energy sources, the environment is damaged and ecological problems arise. We have air, water, land, etc. here. we can attribute pollution. This ultimately endangers human health. For example, the engine of 1 car burns 4350 kg of oxygen per year, which is more than the amount of oxygen needed to breathe for 10 people per year. At the same time, this engine emits 32 kg of carbon dioxide, 530 kg of carbon monoxide, 93 kg of toxic hydrocarbons and 27 kg of nitrogen oxides into the air during the year. Therefore, to ensure the health of the future generation, we must give priority to the use of renewable energy sources. The other side of the matter is that non-renewable energy sources such as gas, oil, peat, coal and uranium are not economically viable. Accordingly, since the cost of the products produced from the electricity purchased at the expense of these energy sources is high, their prices will be high. We see the way out of this situation in the use of renewable energy sources, which are more efficient in product production. It should be noted that only 0.02% of solar energy, which is one of the sources, is used by plants for photosynthesis. The solar energy used for heating the earth's dry layer, water bodies, and atmosphere returns to outer space after being used in certain natural processes. This circular process that we mentioned has been going on for millions of years. The positive aspect of using solar energy is that it is renewable on the one hand, and it is also used for one purpose on the other. In addition, solar cells are used in spaceships, household appliances, cars, street lighting, etc. is used. However, since the price of these devices is high, their use is not so economically profitable. Sun. One positive aspect of using solar energy is that, as mentioned above, this energy will last for many years, that is, as long as the sun exists. Taking into account the large number of sunny days in our region, the use of this source can be considered economically profitable.

Another renewable energy source for our region is wind, which is always available due to our location. However, the disadvantage of this source is that it requires a large area for the electricity generation facilities.

Biomass is one of the energy sources with the greatest potential in our region. It has too many resources. There are many remains of plants and animals, etc. includes. Since ancient times, the people of this region have used artisanal types of energy sources and are still using them today. Because the application of this energy is very simple. However, the low level of technology in its transportation, storage, and processing increases their cost. As a result, the useful efficiency of biomass heat generators is 0.04%. One of the renewable energy sources that promise great prospects for our region is water.

Therefore, since water resources are abundant, the cost of electricity purchased at its expense is low. For the future, it is possible to build dams in the bed of mountain rivers to install mini-hydro stations and generate low-cost electricity. However, taking into account that fish go to the sources of rivers to spawn, their passage should be taken into account during production.

Addressing what we said to the students, we can conclude that the use of renewable energy sources such as solar, wind, biomass and water in our region promises great prospects for future energy security. Thus, the cost of the products produced due to this energy will be lower, which will lead to an increase in economic efficiency.

Solving environmental problems promises its own effects in various areas of the economy. It should be noted that complex learning with skills in terms of applying ways to solve problems from an early age is of great importance in the development of young people who have been formed in the future as a staff. Because when a specialist suddenly starts working in a team without acquiring these skills, he will not be incompetent, but will act as a competent staff who has learned to cope with this work from an early age. Therefore, it is important to acquire such skills and habits in the training process.

In our opinion, the economic efficiency in the field of energy shows itself more prominently. So, as mentioned above, depletion of raw materials of non-renewable energy sources eventually poses great threats to energy security. Of course, by taking preventive measures, the use of renewable energy sources both prevents environmental pollution and fills the gaps in the energy sector. Regular work in this field is carried out at the state level in our republic. The operation of power plants using wind energy on the Absheron Peninsula in cooperation with companies from Japan, South Korea, and Arab countries can lead to special progress in this field. It is also possible to add hydropower plants to be built on the Araz River and electricity to be obtained based on solar batteries. At the same time, the heat that will be generated at various processing facilities due to biomass is also of great importance in ensuring energy security. The economic effects that will be achieved with the help of the above-mentioned issues will play an important role both in solving environmental problems and in highlighting the problem of energy security in the globalized world [6]. In this area, in our opinion, the main tasks are the protection of the living and non-living world of the environment that surrounds us globally, increasing the stability of the work of all areas of the economy, etc. includes.

[6] Raziyev, Safar (2016): Environmental issues in the context of the globalized world. *Educational problems*. 7., (3.).

Identifying opportunities for a green world and sustainable development

The urgency of environmental problems in the globalized world has already become a reality of the day, and taking into account the importance of this topic, we have conducted research in this field, and this process is being continued in accordance with the requirements of the day [6]. The positive results of these works have a positive impact on environmental protection as well as achieving economic efficiency. In our opinion, in order for the learners to have the above-mentioned characteristics, it is necessary to prioritize integrativeness in the educational process, as evidenced by the studies conducted on having economic progress as a result of interdisciplinary integration [7]. Because with the help of integration, even the weakest of learners acquires knowledge in at least several fields of science. In the article, we have tried to build our activity from the context of what learners can do, not what they know.

Environmental and economic effectiveness of green chemistry and green energy measures

In order to ensure the ecological and economic effectiveness of green chemistry and green energy measures, on the one hand, learners should be taught the importance of nature protection in a globalized world, and on the other hand, they should understand how important their energy security is. In the article, we try to highlight the parallel research of the directions mentioned above. The studies conducted in the fields we have indicated indicate that the economic efficiency will increase due to the environmental protection on the one hand, and the low-cost electricity to be obtained on the other hand [5]. We present this information to students in electronic and visual form. In this process, they are divided into four groups. This division is carried out in fully democratic conditions under the facilitation of the teacher. Brainstorming and carousel are chosen as training methods. In this double choice, the goal is first to get the groups to be united in order to find a solution to the problem together and to make it possible for them to compare the obtained results with each other.

[5] Mukarramoglu, Mehdi (2015): Alternative and renewable energy sources play an important role in solving environmental problems. *People's newspaper.* 10., (11.).

[6] Raziyev, Safar (2016): Environmental issues in the context of the globalized world. *Educational problems.* 7., (3.).

[7] Askerov, Shahlar (2017): Econophysical analysis of the relationship between monopoly and competition. *The Journal of economics sevens theory and practic,* 74., (1.), pp. 4–9.

Because the names of the groups before the topic were appropriately accepted as the names of water, air, light and bioenergy at the research stage.
According to the stages of the active lesson, the groups start working [3].
Consider an example of a task presented to learners during the pre-research phase:

[3] Veysova, Zulfiyya (2008): What should a teacher be able to do to conduct an active lesson effectively? Part I/ facilitation skills/ *Curriculum-scientific-methodical magazine,* 4., pp. 83–101.

Task 1.

Write ”yes” if the statement is true, ”no” if it is false.
1. The process of forming organic substances from inorganic substances in chloroplasts using light energy is called photosynthesis.
2. Photosynthesis occurs only in cells with chloroplasts.
3. Chloroplasts contain the yellow pigment chlorophyll, which gives the plant its color.
4. Plants have devices for capturing light: long and short leaf blades.
5. The plant gets water and minerals from the soil.
6. Photosynthesis comes from the Greek words ”photos” – light, ”synthesis” – connection.
7. Light energy is not needed for the photosynthesis process.
8. Photosynthesis ability is the most important feature of green plants.

A practical work example is as follows:

Carry out the experiment, observe and record the results.

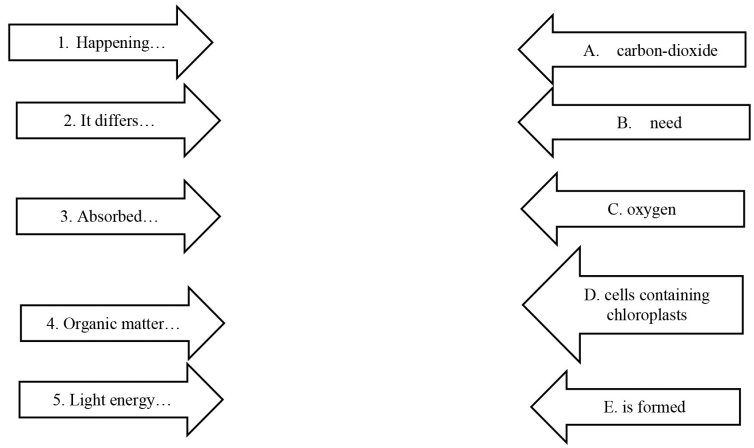
In the last lesson, we take a sheet of black thick paper and cut out the word ”light” on it (Mukhametdinova, 2021: 1). We make an envelope from this paper and put a sheet inside. Place the plant in the sunlight.

The sequence of activities to record the result is as follows:

First, a task is given. A sample assignment is as follows.

Task:

1. Make correct sentences about photosynthesis. Write the corresponding number and letter in your notebook.



Task 2.

”What will happen to the planet Earth if green plants disappear?” write an essay.

Task 3.

Draw a conclusion about the process of photosynthesis using key words and write it in the notebook. Evaluation criteria are mainly activity, cooperation, design, presentation, etc. can be taken.

Research results

In order to achieve the result, the subject material is given to the learners in electronic and mechanical form as information in the form of task sheets. Web tools are also used in the evaluation, which ensures efficiency and transparency. Because being able to use ICT resources forms and develops hard skills in learners. As it is known, the work performed in the conditions of joint activity and cooperation becomes complete, and the qualities created in the learners in this process make it possible for them to have both soft skills and hard skills in the future, and at the same time, they fix their superior abilities as personnel accordingly.

[8] Mukhametdinova, Aygul (2021): *Laboratory work using the technology of critical thinking "Photosynthesis" 6th class,* 28., (11.).

The performance of the groups is evaluated, and the groups have the opportunity to evaluate both themselves and the performance of other groups.

When organizing the form of work with pairs, we can choose the one related to the characteristics of the activity: strong student-weak student or both are equal in terms of success. Based on theoretical knowledge:

1. During the updating of acquired knowledge when the work ahead requires serious thinking initially. Pairs of students discuss the upcoming task.
2. In the course of laboratory and practical works, mutual control and mutual assistance can be organized. In the end, it is possible to evaluate the work done as a result of joint activity.

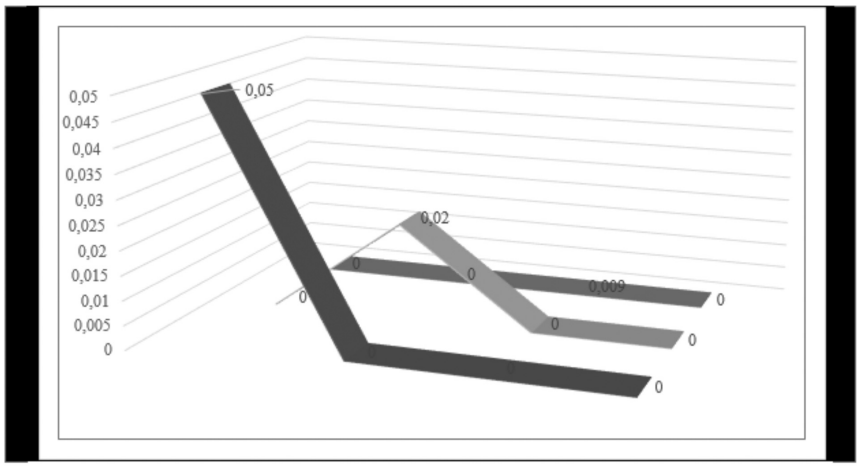
Examples of practical knowledge include:

1. Looking at the introduction guide, learners discuss the task among themselves when they need serious thinking about the practical work.
2. In the course of practical work, mutual control and mutual assistance can be organized.
3. Regarding the final instruction, it is possible to organize the evaluation of the work.

Organic substances produced during photosynthesis include carbohydrates (mainly sugar and starch), amino acids from which proteins are made, and fatty acids. For the synthesis of all these compounds, water (H_2O) and carbon dioxide (CO_2) from inorganic substances , nitrogen and sulfur are additionally needed for amino acids [8]. In addition, phosphorus and metal ions – iron and magnesium – can be included in the composition of organic compounds during photosynthesis.After the generalization process is carried out, the results of the groups are announced. It turns out that after calculating the results by groups in the evaluation phase, group III took the first place, group II took the second place, and group I took the corresponding third place.

According to the results of the experiment, the distribution of the values obtained by the groups according to the relative error is shown in the figure:

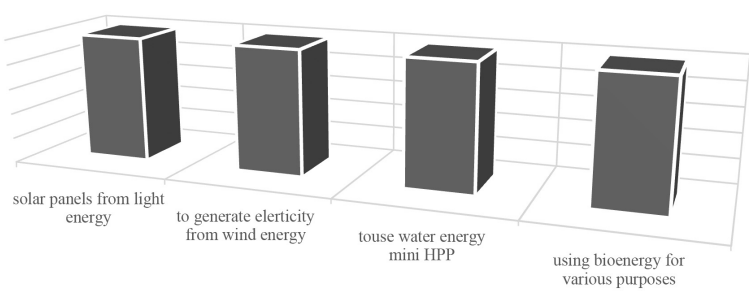
Figure 2. Diaqram of the according to the results of the experiment



Conclusıon

As a result of research, our research on green economy and green development in the North-West region of the Republic helps to reach the following conclusions. We offer recommendations for solving these issues that we mentioned in the North-West region of the republic:

Figure 3. Diaqram of the research on green economy and green development in the North-West region of the Republic



In the future, it is considered appropriate to use the methods mentioned above to help learners acquire practical skills in other areas. Implementation of learning with the help of various modern teaching methods facilitates acquisition and ensures consistent acquisition of knowledge as well as acquisition of skills and habits. In particular, the teaching of ecological and economic knowledge with the extracurricular integration of natural sciences, both theoretically and experimentally, ensures the acquisition of various competencies as well as the comprehensive assimilation of the material.

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Exploring the Ecological and Medical Benefits of Dill (Anethum graveolens) as an Alternative to Spirulina (Arthrospira platensis)

Abstract: This study explores the potential of dill (Anethum graveolens) as a sustainable alternative to spirulina (Arthrospira platensis) in nutrition and health applications, specifically within Azerbaijani culture and broader ecological contexts. Dill, widely used in Azerbaijani cuisine and traditional medicine, offers significant ecological and medicinal benefits. Its culinary uses include flavoring various dishes, while its medicinal applications range from aiding digestion to enhancing immune function. Dill also plays an economic role in rural Azerbaijani communities, providing income through agriculture and appearing in cosmetics and personal care products. The study employs a comparative approach to examine the ecological sustainability, medicinal properties, and resource use of dill and spirulina. Laboratory analyses focus on antioxidant, antimicrobial, and anti-inflammatory properties, as well as the effects on human cells. The findings suggest that dill's ecological footprint and health benefits could make it a viable substitute for spirulina, especially in regions with suitable growing conditions. Furthermore, its cultural significance and economic value in Azerbaijan highlight dill's multifunctionality as a food, medicinal, and cultural product.
Keywords: Dill (Anethum graveolens); Spirulina (Arthrospira platensis); Sustainable Nutrition; Traditional Medicine; Ecological Sustainability.

Összefoglalás: Ez a tanulmány feltárja a kapor (Anethum graveolens) potenciálját a spirulina (Arthrospira platensis) fenntartható alternatívájaként a táplálkozási és egészségügyi alkalmazásokban, különösen az azerbajdzsáni kultúrában és tágabb ökológiai összefüggésekben. Az azerbajdzsáni konyhában és a hagyományos orvoslásban széles körben használt kapor jelentős ökológiai és gyógyászati előnyökkel jár. Kulináris felhasználása magában foglalja a különféle ételek ízesítését, míg gyógyászati alkalmazásai az emésztés elősegítésétől az immunrendszer működésének fokozásáig terjednek.

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A kapor a vidéki azerbajdzsáni közösségekben is gazdasági szerepet játszik, a mezőgazdaságon keresztül jövedelmet biztosít, és megjelenik a kozmetikumokban és testápolási termékekben. A tanulmány összehasonlító megközelítést alkalmaz a kapor és a spirulina ökológiai fenntarthatóságának, gyógyászati tulajdonságainak és erőforrás-felhasználásának vizsgálatára. A laboratóriumi elemzések az antioxidáns, antimikrobiális és gyulladásgátló tulajdonságokra, valamint az emberi sejtekre gyakorolt hatásokra összpontosítanak. Az eredmények arra utalnak, hogy a kapor ökológiai lábnyoma és egészségügyi előnyei a spirulina életképes helyettesítőjévé tehetik, különösen a megfelelő termesztési feltételekkel rendelkező régiókban. Továbbá kulturális jelentősége és gazdasági értéke Azerbajdzsánban rávilágít a kapor élelmiszer-, gyógyszer- és kulturális termékként való multifunkcionalitására.
Kulcsszavak: Kapor (Anethum graveolens); spirulina (Arthrospira platensis); fenntartható táplálkozás; hagyományos orvoslás; ökológiai fenntarthatóság.

Introduction

Dill *(Anethum graveolens)* and Spirulina *(Arthrospira platensis)* [1] are two important plant species obtained from different sources in nature. While Spirulina is known for its high protein, vitamin, and mineral content, dill stands out as a plant that has been used in traditional medicine for a long time. In recent years, the search for more sustainable and environmentally friendly alternatives to spirulina has highlighted the potential of dill. This comparative study aims to investigate the ecological and medicinal benefits of dill as a substitute for spirulina. From an ecological perspective, the effects of dill in natural habitats and the environmental effects of spirulina production will be examined and compared. Growing dill more widely and using sustainable agricultural methods suggests that it has less potential to harm the ecological balance. From a medical perspective, the health effects of the bioactive compounds contained in dill and how these effects differ from spirulina will be investigated. To understand the potential medicinal benefits of dill [2], its antioxidant, antimicrobial, and anti-inflammatory properties will be taken into account. Additionally, dill's potential effects such as supporting the digestive system, strengthening the immune system, and supporting cardiovascular health will also be examined. In this way, it will be better understood what advantages dill

[1] Aghili, Khorasani–Shirazi M. H. (2008): Makhzan al-Advyeh. Tehran: *Tehran University of Medical Sciences.* pp. 490–491.

[2] Aghili, Khorasan–Shirazi M. H.–Qrabadin-e, Kabir (1999): Tehran: *Mahmoudi Bookstore Publication.* [Google Scholar]

has medically compared to spirulina. Finally, it is also important to compare the culinary use of dill with spirulina. While dill can be used in a variety of dishes and recipes [3], spirulina's distinct taste and smell may be a drawback for some consumers. Therefore, comparing dill with spirulina will take into account not only its medicinal and ecological benefits but also its ease of use. This comparative study aims to reveal the ecological and medical benefits of using dill instead of spirulina.

Understanding the potential of dill can make a valuable contribution to sustainable nutrition and health. Dill has various application areas in Azerbaijan. First, dill is an important spice frequently used in Azerbaijani cuisine and is one of the main ingredients in many traditional dishes. It is especially widely used in pilaf [4], stuffed vegetables, and salads. Additionally, dill is frequently used in making pickles and pickles. Dill is also used for health and medicinal purposes in Azerbaijan. It is widely used in traditional medicine to relieve digestive problems and strengthen the immune system. Dill oil is used externally to relieve pain and support skin health. Additionally, dill farming is an important economic activity in Azerbaijan. In particular, dill cultivation is an important source of income for farmers who want to generate income in rural areas. Dill farming [5] increases employment by contributing to the country's economy. In Azerbaijan, dill is also used in cosmetics and personal care products. In particular, dill extracts and oils are frequently included in the formulation of natural products used for hair and skin care. Dill also plays an important role in traditional Azerbaijani culture and festivals. For example,
during important events such as the Novruz Feast, dill is an indispensable part of some traditional rituals and dishes. Finally, dill also takes part in local folk culture and folklore in Azerbaijan. Dill and motifs associated with it appear frequently in folk songs, folk dances, and other traditional art forms.

[3] Hosseinzadeh, H.–Ramezani, M.–Salmani, G. (2000): Antinociceptive, anti-inflammatory and acute toxicity effects of Zataria multiflora Boiss. extracts in mice and rats. J. *Ethnopharmacol.* 73., pp. 379–85. [PubMed] [Google Scholar]

[4] Ansari Shirazi, A. I. H.–Ekhtiarat e Badiee (1992): Tehran: Pakhshe Razi Companies.[Google Scholar]

[5] Avicenna, H. (2005): *Canon in Medicine,* 2., Alaalami Library. [Google Scholar]

[6] Ibn Bitar, Z. (2001): *The Whole Vocabulary of Medicine and Food.* 1. Beirut: Scientific Book House. [Google Scholar]

Figure 1. The General View of Dill (Anethum graveolens)

Dill has different vegetation stages throughout its plant life. First, there is a germination phase that begins with planting seeds. Seeds receive moisture and germinate under suitable conditions. This is followed by a growth phase in which the seedlings grow and develop. During this phase, seedlings develop their root systems by taking nutrients from the soil and growing their leaves [6]. Next comes the flowering phase. During this stage, the dill plant forms flower buds and blooms. Flowers provide fertilization of the plant and lead to seed production. After seed production is completed, the plant moves into the maturation and ripening phase of the seeds. Finally, come the harvesting and replanting phases. After the dill plant matures, it is harvested and its seeds are collected. These seeds can be saved or replanted for use in future growing seasons. Thus, the life cycle of the dill plant is completed and a new cycle begins. The purpose of this comparative study is to investigate the ecological and medicinal benefits of dill (Anethum graveolens) as a substitute for spirulina *(Arthrospira platensis)*. In this context, we aim to examine the health and environmental effects of dill with a comparative approach by the following methods:

– examining the ecological effects of dill, we aim to evaluate its potential effects on soil health;
– comparing the medicinal properties of dill with spirulina, we aim to determine its antioxidant and antimicrobial activities;
– evaluating in terms of ecological sustainability by comparing the use of resources required for the cultivation and production of both plants;
– investigating the potential medical applications of dill and spirulina extracts by testing their effects on human cells;

– taking a comparative approach, we aim to determine whether dill has similar or different health benefits to spirulina;
– an evaluation of the consumers' habits, and acceptability by examining traditional and modern uses of dill.

The Research Object and Materials

The research object is the dill plant which is widely used in daily life, modern medicine, and the kitchen, too. The investigation was realized to prove the profitability of the plant in traditional medicine, the environment, and the kitchen. The biochemical properties of the plant are the main factor in the investigation. While studying it was revealed that dill planted in different soil types and climate conditions gives us various results. Among abiotic factors, solar radiation takes the first place. The generation of ascorbic acid in the dill and biochemical reactions happening demand more direct solar radiation as in other vegetables. The research aims to examine the ecological and medicinal benefits of dill *(Anethum graveolens)* by comparing it with spirulina *(Arthrospira platensis)*. In line with this purpose, the materials and methods of the research were determined. To evaluate the ecological impacts of dill and spirulina, data on the cultivation and production of both plants will be collected and analyzed. Seeds, cultivation materials, and soil samples of dill and spirulina plants will be used as research materials. Various materials needed to grow dill and spirulina will also be taken into account, such as the use of water and fertilizer. The procurement and use of these materials were determined as one of the methods of the research. To study the medicinal benefits, extracts, and extracts from dill and spirulina samples will be obtained and subjected to laboratory testing. These tests will be performed to determine the antioxidant, antimicrobial, and anti-inflammatory properties of the herbs. Additionally, the effects of dill and spirulina extracts on human cells will be examined. The materials to be used throughout the research were carefully selected to obtain reliable and accurate results. Standard methods will be used for growing and processing dill and spirulina plants. Analysis of the data obtained will provide the information necessary to achieve the purpose of the research.

Botanical description of Dill (Anethum graveolens):
It is an annual plant species from the Apiaceae family. Its thin and hairy body is generally 40 to 60 cm long and has a branched structure. Its leaves are long and thin, bright green, and have a hairy texture. The plant has small, white, or yellow flowers in umbrella-shaped inflorescences. These flowers mature into seed fruits and are filled with long, cylindrical seeds that have a characteristic odor. Dill seeds are the most valuable part of the plant and are generally used in the kitchen, but also for medicinal and aromatic purposes.

[7]Moemen, Tonekaboni M. M.–Tohfatol-Moemenin (2007): Tehran: Shahid Beheshti University of Medical Sciences. [Google Scholar]

The scent of dill is fresh and aromatic, often with a refreshing effect like mint and anise. Its scent contains slightly spicy and lemony notes, making it familiar and attractive. When it is broken or crushed, it becomes more noticeable and a pleasant smell spreads to the environment. Whether cooked or consumed directly, the aroma of dill is used to add a unique taste and smell to dishes and beverages. Its scent is known as an indispensable part of various cuisines and recipes, and it has a sweetening and aromatic property.

Figure 2. Dill (Anethum graveolens)

Botanical description of Spirulina (Arthrospira platensis):

It is a single-celled type of blue-green algae and a photosynthetic organism. Its long and thin cells form a spiral-shaped array. It is commonly found in freshwater lakes and saltwater habitats. When examined under a microscope, spirulina cells appear greenish-blue in color. The plant contains pigments such as chlorophyll and phycocyanin, which give it its characteristic color. It produces energy and releases oxygen using sunlight and carbon dioxide through photosynthesis. Spirulina [7], which has high nutritional value, is consumed by many people as a dietary supplement and is often sold in powder or tablet form. Spirulina generally has a slight marine odor, but it does not have a distinct odor. Fresh spirulina can be identified by a slight seaweed smell, which some people liken to the scent of the sea. However, in dried and processed spirulina products, this odor is less pronounced and often has almost no odor. Since Spirulina is generally consumed in powder or tablet form, its scent can

be described as a sweet sea breeze. When added to drinks and meals, especially in smoothies, the scent of spirulina is often balanced by combining with the taste and smell of other ingredients.

Figure 3. Spirulina (Arthrospira platensis)

Dill (Anethum graveolens) in Turkish Cuisine:

Dill has a wide range of uses in Turkish cuisine as a delicious and characteristic spice. It is especially preferred in salads and appetizers and adds a fresh aroma to dishes. Dill adds richness to dishes both visually and in taste with its green leaves. Dill, an indispensable ingredient of fish dishes, is in perfect harmony with fish. It complements the fresh and natural taste of fish, which enhances the flavor of dishes made with seafood. Dill is also frequently used in fish marinades and sauces. Dill, which is a spice frequently used in pastries and pastries, is added to the dough or sprinkled on it. In this way, a unique aroma and flavor is added to the pastries. Dill added to cheese pastries [8] enriches the flavor of the filling. Dill, which is frequently seen on breakfast tables, increases the taste of egg dishes by using it in omelets and menemen. Additionally, dill spread on bread or added to cheese toast becomes one of the indispensable flavors of breakfast. Dill has a wide range of uses in Turkish cuisine as a delicious and characteristic spice. It is especially preferred in salads and appetizers and adds a fresh aroma to dishes. Dill adds richness to dishes both visually and in taste with its green leaves.

Dill, an indispensable ingredient of fish dishes, is in perfect harmony with fish. It complements the fresh and natural taste of fish, which enhances the flavor of dishes made with seafood. Dill is also frequently used in fish marinades and sauces. Dill,

[8] Zargari A. (1996): *Medicinal Plants,* 6., (2.). Tehran: Tehran University Press. pp. 531–528. [Google Scholar]

[8] Zargari A. (1996): *Medicinal Plants,* 6., (2.). Tehran: Tehran University Press. pp. 531–528. [Google Scholar]

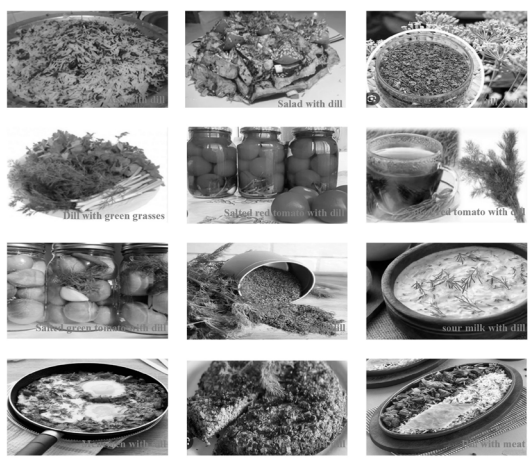
[9] Razi, M. Alhavy (2005): Vol. 21. Teheran: Iranian Academy of Medical Sciences. [Google Scholar]

[10] Murray, M.D.–Brater, D. C. (1993): Renal toxicity of nonsteroidal anti-inflammatory drugs. *Ann. Rev. Pharmacol. Toxicol.* 32., pp. 435–65. [PubMed] [Google Scholar]

which is a spice frequently used in pastries and pastries, is added to the dough or sprinkled on it. In this way, a unique aroma and flavor is added to the pastries. Dill added to cheese pastries enriches the flavor of the filling. Dill, which is frequently seen on breakfast tables, increases the taste of egg dishes by using it in omelets and menemen.

Additionally, dill spread on bread or added to cheese toast becomes one of the indispensable flavors of breakfast. Dill [8], which is frequently preferred in appetizers, is especially used in yogurt and olive oil appetizers. In this way, it ensures that the appetizer has a fresh and light taste. Additionally, it helps drinks have a refreshing taste by adding them to drinks such as lemonade. The plant has a specific place in Turkish cuisine. In drinking, meals, and salads, salted vegetables the dill is widely applied.

Figure 4. Dill in the Kitchen with Various Applications



Dill has low calories and possesses a high fiber content that supports the digestive health of human beings. Also, dill is rich in minerals [9] including iron, calcium, potassium, and magnesium, which strengthen bone health, heart muscular, brain, and lungs. The special vitamins in the plant are vitamins A and C. Vitamin C strengthens the Human's immune system, while vitamin A helps keep the skin healthy, brain, eyes, hairs, and intestines. Besides, dill contains essential fatty acids [10], such as; omega-3 and omega-6 fatty acids, which support heart health and fight inflammation,

sight, and intestine diseases. Dill provides many health benefits in traditional and modern medicine, the plant supplies the necessary nutrients for human ecology.

[9] Razi, M. Alhavy (2005): Vol. 21. Teheran: Iranian Academy of Medical Sciences. [Google Scholar]

Results and Discussion

The results obtained in the study titled "Study of dill (Anethum graveolens) as an alternative to Spirulina (Arthrospira platensis)" revealed important findings. From an ecological point of view, the more widespread cultivation of dill [9] and the use of sustainable agricultural practices can reduce its negative effects on natural habitats. Also, the health effects of dill have been compared with Spirulina, focusing especially on its antimicrobial and digestive system-supporting properties.

Ecological advantages of the dill plant are the following: grown in various climates and resistibility to the dried climate; less consumption of natural water resources and resistibly to waterless medium; maintaining soil quality, and the recultivation feature; reducing the use of chemical fertilizer and pesticides in soil and human-beings and the protection of local ecosystem and human ecology.

As a result of the investigation, the most advantages of the dill plant have been revealed and collected. Some of the most important advantages of dill compared to Spirulina are followings: an easier cultivation and wider growing areas: dill can be grown more easily in different climate and soil conditions and can spread over a wider geographical area, making it more accessible around the world; it is more economically and commercially viable: dill is a more economically and commercially accessible herb compared to Spirulina, encouraging its more widespread use in various cultural cuisines; wider areas of use and cultural value: dill is a plant widely used in various cuisines and traditional medicine practices, which is an important part of our cultural heritage; less intense taste and odor: the taste and smell of dill can be milder and more pleasant compared to the distinct taste and smell of Spirulina, offering a wider variety of uses; more diverse nutritional value: while dill comes with a profile rich in vitamins, minerals, and antioxidants, Spirulina focuses on more specific nutrients, resulting in a more balanced diet. Due to the investigations, I can say that different impacts of the dill which are more progressive than spirulina have to be investigated by ecologists, doctors, culinarians, and biologist.

Conclusion

This comparative study revealed several important findings. From an ecological perspective, dill's wider cultivation and suitability for sustainable agricultural practices indicate that it can reduce its negative effects on natural habitats. It has also been concluded that dill has various health benefits and has unique properties compared to Spirulina. The results of this study emphasize that the ecological and medicinal advantages of dill are important. Dill's broader potential for use encourages its more widespread use in various cultural cuisines and medicinal practices. As a result, it is concluded that dill should be further investigated as an alternative option to other herbal sources such as Spirulina. This could be an important step in terms of both environmental sustainability and human health.

Acknowledgment
The study aimed to provide essential information about the dill plant (Anethum graveolens) to a wide scientific audience, highlighting its profitability in supplying essential nutrients to the human body and enhancing soil and nature. Additionally, it explores the plant's culinary applications, such as preparing delicious meals, salads, and pickled vegetables in our cuisine.

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New age of money transfer: CBDCs

Abstract: This paper provides a comprehensive analysis of Central Bank Digital Currencies (CBDCs), examining their potential to transform the global financial landscape. It explores the three primary models of CBDC issuance: direct, indirect, and hybrid, detailing their operational complexities, privacy concerns, financial inclusion potential and regulatory challenges. The study also delves into cross-border CBDC initiatives, assessing various models for enhancing payment system interoperability and cooperation among central banks. Additionally, the paper addresses critical issues such as cybersecurity risks and privacy implications associated with CBDCs, emphasizing the need for robust regulatory frameworks and technological safeguards. Overall, the findings highlight the promising yet complex role of CBDCs in improving transactional efficiency, expanding financial access, and reinforcing monetary security in an increasingly digital economy.
Keywords: Central Bank Digital Currency (CBDC); Cross-Border Payments; Financial Inclusion; Privacy Concerns; Cybersecurity Risks.

Összefoglalás: A jelen tanulmány átfogó elemzést nyújt a központi banki digitális valutákról (CBDC), megvizsgálva a globális pénzügyi környezet átalakítására képes potenciáljukat. Feltárja a CBDC kibocsátásának három elsődleges modelljét: a közvetlen, a közvetett és a hibrid változatot, részletezve működési bonyolultságukat, adatvédelmi aggályaikat, a pénzügyi integráció lehetőségét és a szabályozási kihívásokat. A tanulmány a határokon átnyúló CBDC-kezdeményezésekkel is foglalkozik, felmérve a fizetési rendszerek interoperabilitásának és a központi bankok közötti együttműködés javításának különböző modelljeit. Ezenkívül a dokumentum olyan kritikus kérdésekkel foglalkozik, mint a kiberbiztonsági kockázatok és a CBDC-kkel kapcsolatos adatvédelmi vonatkozások, hangsúlyozva a szilárd szabályozási keretek és technológiai biztosítékok szükségességét.

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Összességében az eredmények rávilágítanak a CBDC-k ígéretes, mégis összetett szerepére a tranzakciós hatékonyság javításában, a pénzügyi hozzáférés bővítésében és a monetáris biztonság megerősítésében az egyre inkább digitálissá váló gazdaságban.
Kulcsszavak: Központi banki digitális valuta (CBDC); határon átnyúló fizetések; pénzügyi befogadás; adatvédelmi aggályok; kiberbiztonsági kockázatok.

Introduction

In the ongoing evolution of the global finance system, the emergence of the Central Bank's Digital Currencies can be viewed as a significant point, which will define the new dynamics of monetary exchange and finance interaction [1]. With such common practices in the banking system taking a new form in the digital innovation context, the role of the CBDCs in the global finance architecture may become one of the central themes, causing far-reaching consequences for cross-border transactions and contradict the traditional practice of corresponding banking [2].

The discussion on central bank digital currencies is essentially based on the potential role that they can play in the current global financial ecosystem [3]. It should be noted, that CBDCs differ from cryptocurrencies in that they are regulated and issued by the central bank [4]. This implies a new role of the central bank as a direct issuer of digital cash and requires a detailed discussion on the impact and potential for CBDCs to become a substitute for correspondent banking, the system already in place in which a bank performs transactions on behalf of another bank.

A closer look at CBDCs will show that their introduction poses a range of opportunities and challenges. On the one hand, there is the strong possibility of greater inclusivity and creating abilities and scales that allow transferring money to any country in a matter of seconds. Improved efficiency can be seen as another potential advantage which, however, depends on whether the transactions are made in real-time, or their execution is deferred. With the conveniences of usage, however, comes the disadvantage of risks and potential challenges.

[1] Yamaoka, H. (2022): *Digital Currencies and the Future.*

[2] Foster, K. (2021): Digital Currencies and CBDC Impacts on Least Developed Countries (LDCs). *The Dialogue on Global Digital Finance Governance Paper Series.*

[3] Engen, O. (2019): *Central Bank Digital Currency.*

[4] He, D. (2021): Digitalization of cross-border payments. *China Economic Journal,* 14., (1.), pp. 26–38.

Literature Review and Theoretical Framework of Central Bank Digital Currencies (CBDCs)

An understanding of the theoretical framework of CBDCs is crucial for making any assumptions about its potential impact on the financial system and society. As such, the most important points of consideration as stipulated in the theoretical framework are outlined below:

Monetary Policy Implications: One of the most significant purposes of CBDCs is the utility provided to the central banks. By creating and controlling CBDCs, the central banks could control interest rates, affect inflation, and stabilize the economy through transmission effects [5]. The theoretical framework of CBDCs underlines its ability to improve the effectiveness of the monetary policy transmission mechanism and enhance macroeconomic outcomes.

Transaction Efficiency and Cost Reduction: CBDCs have the theoretical capability to improve payment systems and decrease transaction costs. The speed with which digital technology works makes the CBDC transactions faster compared to the traditional methods [6]. The theoretical framework of CBDCs demonstrates that their use is advantageous in the capacity to increase the speed, trustworthiness, and cost-effectiveness of financial transactions.

Technological Infrastructure and Security: The integrity and security of CBDCs are ensured by advanced technological instruments. For instance, blockchain technology and cryptographic processes are used to protect the development of CBDCs in the digital form. The theoretical perspective emphasizes that proper encryption techniques and cybersecurity mechanisms are integral in preventing an individual's or organization's CDBCC from being hacked, defrauded, or accessed without permission [7].

International Implications and Interoperability: The theoretical implications of CBDCs can also be observed in the context of international monetary systems and cross-border transactions. The consideration conducted in the theoretical framework demonstrates the fact that CBDCs are expected to be adopted in different countries and supported by many central banks, and it will contribute to the need for these institutions' coordination in the process of establishing the prevalent approach to the resolution of such issues as currency exchange, monetary sovereignty, and regulatory arrangements.

[5] Ms. Mitali Das (2023): *Implications of Central Bank Digital Currencies for Monetary Policy Transmission.*

[6] Michael Kumhof a, C. N. (2021): Central bank digital currencies — Design principles for financial stability. *Economic Analysis and Policy,* Volume 71.

[7] Varonin, A. (2021): *Central bank digital currencies: the historical view, technologies, and perspectives.*

Comparative Analysis of CBDC Models

Central Bank Digital Currencies can be implemented in several ways, with each way having its own set of characteristics and implications. A comparative analysis of different CBDC models can help understand the differences between them and the consequences these models have.

Direct Issuance Model

In the direct issuance model, central banks issue their CBDCs directly to end-users. Instead of relying on financial intermediaries such as commercial banks, members of the general public and firms get access to the medium of exchange directly. Namely, digital currency tokens are placed on accounts on the books of central banks, which they can then use for payments and other transactions. Such an implementation allows a monetary authority to control the money supply more directly and execute monetary policy more efficiently [8]. By avoiding commercial banks as intermediaries, the direct issuance model eliminates the counterpart risk. Moreover, in this model, financial authorities have direct access to the details of transactions between individual and corporate accounts on CBDCs, which raises privacy concerns.

Indirect Issuance Model

On the other hand, there is also an indirect issuance model, where central banks distribute CBDCs through commercial banks or other financial representatives. Both individuals and companies access CBDCs through their accounts opened with intermediaries, who hold CBDCs reserves with the central bank. Indirect issuance maintains an existing intermediately function of commercial banks preserving banking-related services and extending loans [9]. This model helps avoid operational and other costs associated with direct issuance. The high reliance on commercial banks can, however, adversely affect financial stability if the banks become weak links in the chain, which can happen due to the ever-present possibility of bank failures.

[8] Redaelli, S. (2022): *CBDC and Bank Run in an open economy context.*

[9] George, A. (2019): *Essays on innovation, central bank digital currency, and asset pricing.*

Hybrid Approach

The hybrid approach combines direct and indirect issuance and represents a flexible and agile model for CBDC implementation. Under this model, central banks may decide to issue CBDCs directly to some entities or citizens while providing indirect issuance of CBDCs through commercial banks to others. Together with diversification benefits, the hybrid approach allows the central banks to adjust the mechanisms of CBDC issuance to a particular use case and beneficiaries. Hybrid issuance also leads the concentration risk when only a single channel for CBDC distribution is used [10]. Nonetheless, the hybrid approach might bring management challenges in the form of the coordination of multiple channels for CBDC issuance. In particular, regulatory coherence of direct and indirect issuance might present a challenge. Moreover, identifying target audiences for direct and indirect channels of CBDC issuance might be difficult and require access to large-scale data and corresponding analytical capabilities.

[10] Kondova, S. M. G. (2023): The Potential Impact of Central Bank Digital Currencies (CBDCs) on Economic and Financial Sector Development. *International Congress on Information and Communication Technology.*

Table 1. Comparison of the key aspects of each CBDC model

Aspect	**Direct Issuance Model**	**Indirect Issuance Model**	**Hybrid Approach**
Issuance Mechanism	Central banks issue CBDCs directly to end-users	Central banks distribute CBDCs through banks	Combination of direct and indirect issuance
Control Over Money Supply	Central banks have direct control over issuance	Central banks delegate issuance to intermediaries	Mixed control through direct and indirect means
Financial Intermediation	Bypasses commercial banks	Utilizes existing banking infrastructure	Combination of direct and intermediary access
Counterparty Risk	Reduced due to direct issuance	Exists due to reliance on commercial banks	A mix of direct and indirect risks
Operational Complexity	This may be high due to managing individual accounts	Relatively lower due to leveraging banks	Moderate complexity due to dual issuance

[11] Marinos Themistocleous (2023): Towards cross-border CBDC interoperability: insights from a multifocal literature review. *Journal of Enterprise Information Management,* 36., (5.).

Aspect	**Direct Issuance Model**	**Indirect Issuance Model**	**Hybrid Approach**
Privacy Concerns	Central banks may have access to detailed transactions	Intermediaries may access transaction data	Privacy concerns depend on the implementation
Financial Inclusion	Potentially high due to direct access to CBDCs	Depends on the reach and accessibility of banks	Enhanced by targeting underserved populations
Regulatory Alignment	Direct oversight by central banks	Compliance with commercial bank regulations	Requires coordination between different systems
Flexibility	Limited by centralized issuance	Relatively higher due to intermediary channels	Offers flexibility in reaching diverse

Source: The table was created for the above-mentioned facts.

Exploring Cross-Border CBDC Initiatives

Central banks all over the world collaborate and research to develop Central Bank Digital Currencies to enhance cross-border payments. As a result, many initiatives try to turn the work into an experimentation program to investigate CBDC arrangements. Three distinct models delineate the varying degrees of payment system interoperability and collaboration:

Enhanced Compatibility among Domestic CBDC Systems: Several central banks work in this direction, which is seen among the members of the Committee on Payments and Market Infrastructures [11]. The point is that enhanced compatibility among domestic CBDC systems implies coordinating regulatory frameworks, data standards, and market practices to support cross-border payments. Thus, recent efforts of several financial institutions to focus on common data standards, which could be used as a basis for compatibility, indicate that their CBDC systems are aligned with international norms.

Interlinking CBDC Systems: Some projects have shown how domestic wholesale CBDC networks can be connected across countries.

This approach removes settlement risk as payment actions are synchronized and do not rely on any trusted intermediary or common platform. Other initiatives describe the advantages and complexities of using wholesale CBDCs to settle cross-border transactions and explain how central banks and private enterprises can effectively cooperate. Establishing a single multilateral CBDC system: Aber, and BIS Innovation Hub projects [12] and initiatives aim to build one platform through which numerous digital currencies can transact. Corridor networks are implemented to connect distinct domestic wholesale CBDC networks. This approach enables cross-border payments to take place without the need for complex legislation, correspondent banking networks, or currency arrangements.

[12] Athanassiou, P. L. (2020): *Wholesale central bank digital currencies: an overview of recent central bank initiatives and lessons learned.*

Advancing Cross-Border Payments through Central Bank Digital Currencies

Individual Jurisdiction CBDCs: For cross-border payments, several configurations of CBDCs can be discussed. One potential scenario is that CBDCs originating from their respective single jurisdictions are capable of being accessed globally (Gabriel Soderberg, 2022). As such, access to these digital currencies may be limited, and certain characteristics and features of these CBDCs, including their anonymity and regulation, may mirror the position selected by their issuing bodies.

Cooperative CBDC Arrangements: Alternatively, to improve CBDCs' cross-border operability, central banks consider the development of cooperative frameworks. Such configurations include the interaction of multiple central banks aimed at forming a uniform market and technological infrastructure (Banerjee, 2020). Thus, the overall goal of numerous initiatives is to enable transactions across multiple CBDCs regardless of geopolitical boundaries and regulations.

Perspectives of Central Banks: A thorough review of the central bank survey illustrates the persistent uncertainty surrounding this issue. Notably, there is a tendency among these institutions to consider the potential of CBDC in the context of non-residents in their respective countries. However, there are doubts related to the international application of domestic coins. This tendency can be associated with emerging concerns about the effectiveness of control on the international use of CBDC and appropriateness for compliance with monetary policy requirements.

Illustrative Case Studies

Examining ongoing CBDC initiatives provides valuable insights into potential cross-border implementations:

China's e-CNY Project: China's Digital Currency known as e-CNY, exemplifies a nuanced approach towards international usage [13]. Initially tailored for domestic retail transactions, e-CNY could extend its reach to foreign tourists and business travelers through collaborative agreements with foreign jurisdictions.

The Bahamas' Sand Dollar: The Bahamas' CBDC is focused mainly on domestic financial inclusion [14]. Nevertheless, non-residents may also access Sand Dollars, yet within the stipulated limits and through traditional banking channels.

The ECCB's D-Cash: The Eastern Caribbean Central Bank D-Cash project is intended for frictionless border transactions within the Eastern Caribbean Currency Union. The focus on financial inclusion and trade within the region highlights the true potential of CBDCs for cross-border economic integration [15].

Advantages of CBDCs in Global Financial Transfers

Real-Time Transactions: CBDCs enable real-time transactions, facilitating instant settlement of payments across international borders [16]. Such transactions are made possible by the absence of intermediary banks and clearance processes, which reduce both the time and cost taken to complete a transaction. Instant settlement offers improved liquidity management and reduced counterparty risk, thereby boosting the efficiency of global financial transfers.

Broadened Financial Access: CBDCs can broaden financial access as they provide digital ways to transact for citizens and organizations using both banking and less-known banking infrastructure [17]. Providing peer-to-peer transactions and online payments, CBDCs enable the unbanked and underbanked to take part in economics. Broadened financial access facilitates economic inclusion by growing the economy and narrowing income inequality by providing equal access to financial services for everyone.

Enhanced Security Measures: CBDCs use advanced cryptographic methods and blockchain technology to enhance security measures in global financial transactions.

[13] Oriol Caudevilla, H. M. K. (2022): *The Digital Yuan and Cross-Border Payments: China's Rollout of Its Central Bank Digital Currency.* Hong Kong: University of Hong Kong, Faculty of Law.

[14] Sisodia, H. (2024): *Case Study on the Sand Dollar CBDC of the Bahamas: Lessons, Challenges, and Insights.* Exploring Central Bank Digital Currencies: Concepts, Frameworks, Models, and Challenges.

[15] Chen, X. (2023): Privacy Protection in the Context of CBDC: *Development Trends and China's Practice.* 16., (2.).

[16] Mehl, M. F. a. A. (2021): *Central bank digital currency and global currencies.*

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These enhanced security measures prevent various cyber threats, including hacking attacks, data breaches, and identity theft, which protect the integrity of the financial system and create trust in digital transactions.

Challenges and Considerations for CBDC Implementation

Privacy Concerns: More specifically, the use of CBDCs raises serious privacy concerns due to the constant gathering and application of transactional data [18]. Because of the nature of CBDCs as a medium of exchange, continual surveillance of the population's financial activity by central banks or other official institutions can be considered a serious privacy violation. At the same time, transparency in tracking and preventing various illegal activities is a top regulatory priority. Therefore, the efficient implementation of central bank digital currencies implies a necessary balance between these concerns.

Cybersecurity Risks: There is a variety of cybersecurity risks concerning CBDCs, which include possibilities of hacking, data loss, and malicious assault of digital infrastructure. Implementation of these attacks could undermine the credibility of CBDC transactions while provoking financial losses, identity thefts, and even the collapse of the financial system [19]. Therefore, central banks and regulatory authorities need to enforce strong cybersecurity measures, including encryption, authentication protocols, and non-stop monitoring of digital networks. However, these actions could be insufficiently effective owing to the adaptive nature of cyber threats.

Summary

This comprehensive analysis of Central Bank Digital Currencies (CBDCs) juxtaposed against the correspondent banking system elucidates the transformative potential of digital currencies in reshaping the global financial landscape. Through the lens of the direct, indirect, and hybrid models of CBDC issuance, this paper has delineated the operational intricacies and implications of integrating CBDCs into the financial ecosystem, highlighting their capacity to enhance transactional efficiency, broaden financial inclusion, and fortify the security of monetary exchanges.

[18] Mohamed, H. (2020): *Implementing a Central Bank-Issued Digital Currency with Economic Implications Considerations.* 3., (1.).

[19] Delak, T. H. a. K. (2022): Security Considerations for a Central Bank Digital Currency. *Economic Research.*

The exploration of CBDCs reveals a paradigm shift towards digitalization in the financial sector, promising significant advancements in the speed and accessibility of transactions. CBDCs, as regulated and central bank-issued digital currencies, stand in stark contrast to decentralized cryptocurrencies, embodying a state-backed endeavor to meld the benefits of digital currency with the regulatory and stability assurances of traditional monetary policy. The theoretical and practical analyses underscore the potential of CBDCs to catalyze inclusive financial participation, providing unbanked and underbanked populations with unprecedented access to financial services.

In conclusion, CBDCs represent both an opportunity and a challenge for the global financial architecture. Their integration into the financial system promises to enhance transactional efficiency, expand financial access, and improve security. However, realizing these benefits while mitigating associated risks requires careful consideration of the operational, regulatory, and technological dimensions of CBDC implementation. As central banks and financial institutions navigate the complexities of digital currency integration, the evolution of CBDCs and their interplay with existing financial mechanisms will undoubtedly continue to be a focal point of scholarly and policy-oriented discourse.

Galéria

Németh István Péter fotói


HEART


MARIUS VON MAYENBURG
RÉŽIE AMINATA KEITA
20. ŘÍJNA 2023 V DIVADLE REDUTA
HAMLET
ŽENITBA
CARLO GOLDONI
RÉŽIE MARTIN GLASER
19. LEDNA 2024 V MAHENOVĚ DIVADLE
NIKOLAJ VASILJEV GOGOL
RÉŽIE ŠTĚPÁN PÁCL
22. BŘEZNA 2024 V MAHENOVĚ DIVADLE
YAEL RONEN DMITRIJ SCHMAD
RÉŽIE LUKÁŠ BRUTOVSKÝ
3. ÚNORA 2024 V DIVADLE REDUTA
RÉŽIE ANNA DAVIDOVÁ
12. DUBNA 2024 V DIVADLE REDUTA
YASMINA REZA
RÉŽIE ŠTĚPÁN PÁCL
26. DUBNA 2024 V DIVADLE REDUTA
JAROSLAV ILJEŠ
RÉŽIE Thomas Zielinski
7. ČERVNA 2024 V DIVADLE REDUTA


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