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WIDENING OUR HORIZONS

The 19th International Forum for Students and Young Researchers

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і відображають сучасні тенденції та інноваційні розробки молодих учених,
представників різних країн світу в різних галузях економіки.

April 8, 2024

Dear Students and Young Scientists,

This Forum is a unique opportunity for each of you to plunge into the world of science, exchange ideas and participate in the creation of new knowledge.

The modern world requires us to constantly develop and innovate. Science is the foundation on which our future is built. It opens new horizons, helps solve complex problems and improves the quality of life. We live in a time when scientific progress is crucial to the development of society, and your contribution to this process is extremely important.

In this context, it is important to develop all fields of knowledge equally, because each has its place in the great puzzle of science, and none of them can be ignored. From the exact sciences to the humanities, from technology to the arts, they all make important contributions to our understanding of the world and our progress.

Science is a tool that helps to find clarity in complex issues and opens up new possibilities. Your ability to adapt and see perspectives in changing conditions is one of the key success factors.

Furthermore, learning is a lifelong process. Never stop learning, look for new ideas and approaches, be ready to adapt to change. In today's world, where the speed of change is lightning fast, this approach to learning becomes even more necessary.

I wish you inspiration and perseverance in your studies and research. Let this Forum become for you a source of new ideas, knowledge and contacts that will help you develop as scientists and as individuals. Remember that each of you can make a unique contribution to science, and this is a great privilege and responsibility.

I wish you success, self-development and vivid impressions from participating in this Forum.

With best regards,
Artem Pavlychenko
The first Vice-rector, Dnipro University of Technology

TABLE OF CONTENTS

Section 01 Environmental Problems and their Solutions

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Modern approaches to effective waste management from the extraction and processing of minerals in the European Union

Effective waste management arising from the extraction and processing of minerals, as well as metallurgical industry production is critical for sustainable development in the modern world. European countries are leaders in this field, implementing strict standards and innovative approaches to waste management aimed at reducing negative environmental impacts and efficiently utilizing resources. For Ukraine, this issue is extremely relevant, as for decades the resources of our land have been used to achieve maximum productivity without considering the ecological consequences.

Analyzing waste formation according to the classification groups of the state classifier in 2020, four main groups of waste were identified: waste from the extraction industry, waste from the metallurgical industry, household waste, and waste generated by all other industrial sectors.

The waste group	The volume of waste, thousand tons per year.	The volume of waste, expressed as a percentage.
Waste from the mining industry	20 019	4,34
Waste from the metallurgical industry	60 328	13,04
Household waste	586	0,12
Waste from all other industrial sectors	381 442	82,5
Total	462 374	100

Groups of waste generated by:

Metallurgical industry
All other industrial sectors
Mining industry
Household waste
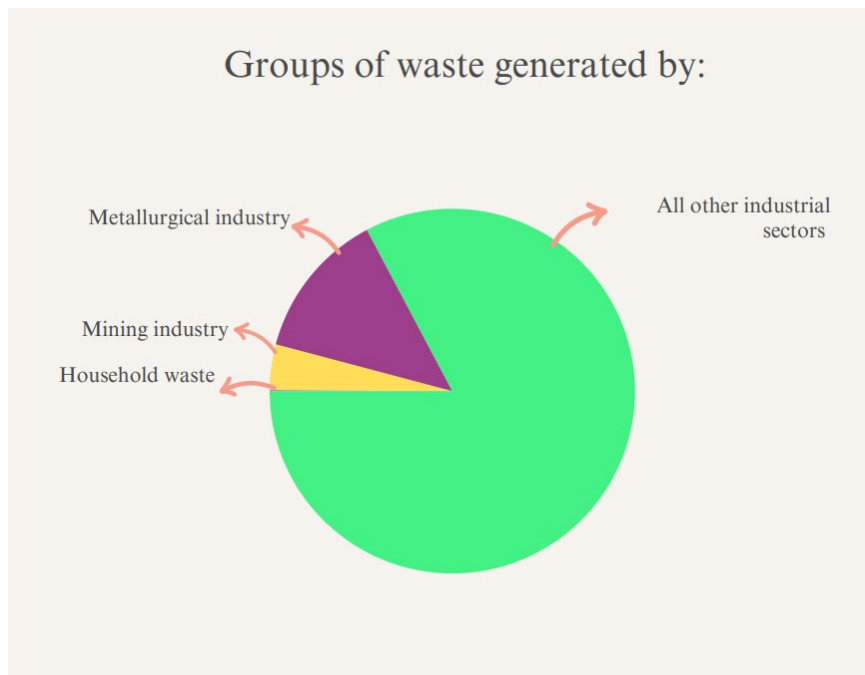
Solid household waste currently lacks proper recycling and reuse infrastructure, but steps are being taken by the government to facilitate the development of infrastructure for collection, processing, and disposal of solid household waste.

Waste from the metallurgical industry mostly consists of raw materials used as a base for metallurgical, construction, and other industrial sectors. Waste from the extraction industry, for the most part, is accumulated in landfills over decades. These landfills occupy vast territories, posing significant environmental hazards. Ukrainian scientists Ivanov and Bilaniuk from Lviv University have calculated that the total area of disturbed land in Ukraine exceeds 265,000 hectares (2,650 km^2) at present. For comparison, the Grand Duchy of Luxembourg occupies a smaller area - only 2,586 km^2.

In European Union countries, there are numerous examples of utilizing waste from open-pit mining for road construction. **European Environment Agency** (EEA) provides reports and data on waste management practices in European countries, including information on recycling rates, waste treatment technologies, and policies. Their website is a valuable resource for understanding waste management trends in Europe. **Waste Management World** covers news, trends, and innovations in waste management globally, including topics related to mining waste recycling and sustainable practices in the industry. **The European Commission's Circular Economy Action Plan** outlines strategies and initiatives aimed at promoting a circular economy in Europe, including measures to improve waste management and resource efficiency.

Here are a few examples of European practices based on the data obtained from above mentioned resources:

Switzerland: Waste from quarrying is used as raw material for road construction. Typically, these materials are processed into gravel or gravel, which is then used for road surfaces.

The Netherlands: Innovative projects use waste from quarries to stabilize soil for road surfaces, reducing the use of primary materials and minimizing waste sent to landfills.

Germany uses ore waste from quarries to produce asphalt mixtures for road surfaces, effectively utilizing these waste materials and reducing waste sent to landfills.

Sweden uses waste from open-pit mining to produce bitumen used in road construction, reducing energy consumption in bitumen production, and preserving natural resources.

There are also numerous examples of transforming abandoned quarries into recreational areas, which become popular leisure spots for locals and tourists. These recreational areas not only restore natural landscapes but also create new opportunities for active recreation and enjoying nature. Here are a few examples:

Torso Quarries, Belgium: Torso Quarries feature lakes and sculptural parks where one can spend time outdoors, relax by the water, and enjoy cycling or walking.

Viyo Quarries, France: Viyo Quarries in Brittany are used for various recreational activities, including water sports, canoeing, and SUP surfing.

Wimmer Quarries, the Netherlands: Wimmer Quarries have been transformed into a natural complex with lakes and forests, where one can spend time on water excursions, bike rides, or relax on the shore.

These examples demonstrate the diverse approaches in Europe to effectively managing waste from extraction and processing of minerals, which reduces negative environmental impacts and preserves resources, creating new ecosystems.

Ukraine also has significant potential for developing efficient waste management from mining and processing of minerals, which can contribute to the country's sustainable development. Currently, Ukraine faces challenges and issues in this area, such as inadequate infrastructure for waste processing and insufficient waste management legislation. However, the Ukrainian government and civil society organizations are actively working to address these problems and develop new strategies and programs that can be listed as following:

Legislative changes and standards: improving legislation and implementing standards for waste management in line with European norms and standards.

Stimulating innovation: supporting and implementing innovative projects and technologies in waste management to promote more efficient resource utilization and reduce negative environmental impact.

Collaboration with international partners: developing cooperation with international partners and organizations to exchange experiences and technologies in waste management.

Considering Ukraine's aspiration to join the EU and the need for waste management improvement, it can be noted that the development of this area in Ukraine has significant potential. Our country has the opportunity to adopt the best practices and technologies from EU countries for efficient waste management from mining and processing of minerals. It is important to consider the specific features of the Ukrainian context, including the needs of regions and industrial sectors

peculiarities. Implementing modern waste management standards will contribute to reduce negative environmental impact, improve the quality of life for the population, and stimulate economic development through creating new markets for secondary raw materials and environmentally friendly technologies. Implementing these measures can be a significant step for Ukraine towards sustainable development and adaptation to European standards.

References:

1. Analysis and data [Electronic resource] // European Enviroment Agency. – 2024. – Resource access mode: https://www.eea.europa.eu/en/.

2. Take on Trash: global waste management TV #1 [Electronic resource] // Waste Management World. – 2024. – Resource access mode: //waste-management-world.com/.

3. Circular economy action plan [Electronic resource] // European Comssion. – 2020. – Resource access mode: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en.

4. Ministry of Environmental Protection and Natural Resources to cooperate with the Secretariat of Minamata Convention on Mercury in issues of accession and implementation of the Convention by Ukraine [Electronic resource] // Ministry of Environmental Protection and Natural Resources. – 2022. – Resource access mode: https://www.kmu.gov.ua/en/news/mindovkillia-spivpratsiuvatymemo-z-sekretariatom-minamatskoi-konventsii-pro-rtut-u-pytanniakh-pryiednannia-ta-implementatsii-ukrainoiu-polozhen-konventsii.

5. Generation of waste according to the classification groups of the state waste classifier in 2020 [Electronic resource] // State Statistics Service of Ukraine. – 2024. – Resource access mode: https://www.ukrstat.gov.ua/.

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Die Rekultivierung von beschädigten Landflächen nach bewaffneten Konflikten: Wiederherstellung der Produktivität und ökologischen Stabilität.

Militärische Konflikte führen zu schweren Schäden und Verschmutzung des Bodens. Tausende Hektar ukrainischer landwirtschaftlicher Flächen sind durch den Einsatz von Waffen, dem Graben von Gräben und Schützengräben sowie dem Einsatz schwerer Militärtechnik betroffen. Militärische Maßnahmen hinterlassen Spuren in der Natur, schädigen die Fruchtbarkeit des Bodens und verursachen Verschmutzung durch den Ausstoß giftiger Substanzen. Dies bedroht die Landwirtschaft, die Gesundheit der Menschen und die ökologische Stabilität. Daher ist es wichtig, beschädigte Flächen für nachhaltige Entwicklung und Umweltschutz wiederherzustellen.

Gemäß Artikel 166 des Bodengesetzbuches der Ukraine umfasst die Rekultivierung gestörter Flächen einen Maßnahmenkomplex zur Wiederherstellung der Bodenbedeckung und Verbesserung ihres Zustands und ihrer Produktivität. Dieser Gesetzesartikel besagt, dass Flächen, die aufgrund von Bergbau-, geologischen, Baumaßnahmen und anderen Arbeiten Veränderungen erfahren haben, rekultiviert werden müssen [1].

Das Graben von Gräben, der Bewegung von Fahrzeugen und Beschuss beeinträchtigen den Bodenbelag und die Bodenqualität negativ. Diese Maßnahmen führen zu einer Verschmutzung mit giftigen Substanzen, Erosion, einer Verringerung der Fruchtbarkeit und der Wasserrückhaltefähigkeit. Landwirte müssen die geschädigten Flächen wiederherstellen, um die Produktivität und die Ernährungssicherheit zu gewährleisten. Vor der Rekultivierung ist es wichtig, den Schaden zu bewerten und die erforderlichen Maßnahmen zur Wiederherstellung festzulegen. Ein solcher Ansatz wird eine effiziente Wiederherstellung der Flächen und eine stabile Funktion des Agrarsektors gewährleisten.

Die Wiederherstellung von Böden, die von Schützengräben, Tranchen und Bunkern betroffen sind, ist ein integraler Bestandteil des Prozesses zur Wiederherstellung der ökologischen Stabilität nach militärischen Konflikten. Für eine erfolgreiche Wiederherstellung müssen eine Reihe von Schritten konsequent durchgeführt werden. Es sollte mit der Minenräumung begonnen werden, um die Sicherheit der Arbeiter und Bewohner zu gewährleisten. Der nächste Schritt wäre die Entfernung von Komponenten, die die Bodenbearbeitung beeinträchtigen, wie Holz, Eisen und Steine. Danach ist es wichtig, zum Verfüllen überzugehen und dabei die richtige Schichtung des Bodens sicherzustellen, ähnlich wie auf unbeschädigten Flächen. Ein solcher Ansatz trägt nicht nur zur schnellen Wiederherstellung landwirtschaftlicher Flächen bei, sondern verringert auch den negativen Einfluss auf die natürliche Umwelt und bewahrt die Fruchtbarkeit des Bodens für zukünftige Generationen.

Die Bewegung von schwerem Gerät auf landwirtschaftlichen Feldern, insbesondere von Panzern mit einem Gewicht von 50 Tonnen und mehr, hat einen negativen Einfluss auf die Bodenstruktur, indem sie Verdichtungen verursacht. Der Prozess der Bodenwiederherstellung von Verdichtungen sollte mit der Minenräumung beginnen. Anschließend ist es notwendig, den Grad und die Tiefe der Verdichtung mit einem Penetrometer zu messen. Die optimale Dichte für die meisten landwirtschaftlichen Kulturen liegt normalerweise im Bereich von 1 bis 1,3 g/cm³. Um der Bodenverdichtung entgegenzuwirken und die Fruchtbarkeit zu erhalten, wird empfohlen, mehrere wirksame Methoden anzuwenden. Erstens ist das Anpflanzen von Deckfrüchten wie Hafer, Luzerne und Raps zu nennen, die zur Zerstörung der Bodenkruste beitragen und seine Struktur verbessern. Deckfrüchte helfen auch bei der Unkrautbekämpfung und erhalten die Bodenfruchtbarkeit [4]. Die zweite Methode ist das tiefe Lockern des Bodens mit spezialisiertem Gerät wie Tiefenlockerer, die es ermöglichen, den Boden in erhebliche Tiefen zu lockern und seine Belüftung und Entwässerung zu gewährleisten [5].

Die Artillerieangriffe haben noch verheerendere Auswirkungen auf die Landwirtschaft durch ihre Zerstörungskraft. Sie verändern die Bodenstruktur chaotisch und verschmutzen sie mit giftigen Substanzen, was sich negativ auf ihre Qualität und das Pflanzenwachstum auswirkt. Im russisch-ukrainischen Konflikt sind die beliebtesten Artilleriegranaten die Kaliber 122 mm und 152 mm. Zum Beispiel zerbricht die 122-mm-Granate OF-465 bei der Explosion in 1100-1200 Fragmente, die eine Trichtertiefe von bis zu 1 Meter und einen Durchmesser von bis zu 3 Metern bilden. Die 152-mm-Granate OF-25 hat ähnliche Eigenschaften, aber die doppelte Sprengkraft und größere Abmessungen, was ihre Zerstörungskraft erhöht.

Das Hauptziel besteht darin, Maßnahmen zur Rekultivierung von durch Beschuss beschädigten Böden durchzuführen. Der erste Schritt wird die Minenräumung der Gebiete sein, da nicht alle Geschosse sicher entschärft werden können, und der Zugang zu solchen Orten ohne vorherige Untersuchung durch Sprengstoffexperten gefährlich ist. Anschließend werden Bodenproben zur Analyse auf Verunreinigungen, insbesondere Schwermetalle, ausgewählt, und es wird eine Entscheidung über die weitere Nutzung der Flächen je nach Verschmutzungsgrad getroffen.

Anschließend ist es erforderlich, die Flächen von Trümmern und Schwermetallen unter Verwendung umweltfreundlicher Methoden, insbesondere der Phytoremediation, zu reinigen. Studien zeigen, dass Löwenzahn eine wichtige Rolle bei der Reduzierung der Bodenverschmutzung durch Schwermetalle spielt [3]. Nach der Phytoremediation sollten Bodenproben erneut gesammelt und unter Berücksichtigung der festgelegten Grenzwerte auf den Gehalt an Schwermetallen überprüft werden.

Um den Boden zu erhalten und ihn vor Erosion und der Migration schädlicher Substanzen zu schützen, sollte die Nutzung landwirtschaftlicher Maschinen oder die Schaffung mehrjähriger Pflanzungen in Betracht gezogen werden, was dazu beitragen würde, den Migrationsprozess zu verlangsamen.

Die Digitalisierung von Flächen mit Bezug zu einem Koordinatensystem ist ein wichtiger Schritt bei der Rekultivierung von beschädigten Landflächen nach bewaffneten Konflikten. Diese Vorgehensweise ermöglicht es, den Umfang der Schäden unter Berücksichtigung physischer und chemischer Aspekte zu bewerten. Selbst geringfügige physische Schäden können mit schwerwiegenden chemischen Verschmutzungen einhergehen, die sich negativ auf die Umwelt und die Landwirtschaft auswirken. Daher ist die Digitalisierung aller Flächen ein wichtiger Schritt zur Wiederherstellung der Produktivität und der ökologischen Stabilität der Böden.

Die Daten zur Digitalisierung der beschädigten Landstücke sollten aus der Gesamtfläche herausgeschnitten und in das staatliche Bodenregister eingetragen werden. Diese Idee kann die Gesamtzahl der Landstücke und die Fläche, die von Kratern durch Artilleriebeschuss eingenommen wird, aufzeigen. Nach den Maßnahmen zur Aufforstung der "komplexen" Bereiche sollte mithilfe von technischer Vermessungsdokumentation die Landnutzung dieser Bereiche von Ackerland auf mehrjährige Bepflanzungen geändert werden, und ihre Nutzung für andere Zwecke sollte verhindert werden.

Es ist wichtig zu betonen, dass die oben beschriebenen Methoden zur Wiederherstellung beschädigter Landflächen wichtige Bestandteile der strategischen Umweltbewertung sind. Gemäß Artikel 3 des ukrainischen Gesetzes über die strategische Umweltbewertung liegt ihre Aufgabe darin, eine nachhaltige Entwicklung zu fördern, indem sie den Schutz der Umwelt, die Sicherheit der Bevölkerung und ihrer Gesundheit gewährleistet und ökologische Anforderungen in den Prozess der Entwicklung und Genehmigung von staatlichen Planungsdokumenten integriert [2]. Die Analyse von Böden und ihrem Einfluss auf die Umwelt sowie die Strategien zur Wiederherstellung sind entscheidend für die Gewährleistung der ökologischen Stabilität und der Gesundheit der Bevölkerung in Gebieten nach militärischen Aktionen.

Quellen

1. Bodengesetzbuch der Ukraine. URL: https://zakon.rada.gov.ua/laws/show/2768-14#Text

2. Gesetz der Ukraine "Über die strategische Umweltprüfung". URL: https://zakon.rada.gov.ua/laws/show/2354-19#Text

3. Die führende internationale, von Experten begutachtete Open-Access-Zeitschrift für Chemie "Molecules", Ausgabe 27, 2022. Das Thema der Studie lautet "Können Pflanzen von städtischen Wiesen zur Phytosanierung von mit Schwermetallen kontaminierten Böden beitragen?" URL: https://fulir.irb.hr/7843/1/StancicZ_CanUrbanGrassland_Molecules27_2022_06558.pdf.

4. Zeitschrift Agronomist, Artikel "Die besten Methoden zur Minimierung der Bodenverdichtung" vom 09.02.2021 URL: http://surl.li/qqxeg

5. Zeitschrift "Healthy Land of Ukraine", Artikel "The benefits of deep loosening for soil fertility" vom 22.02.2023. URL: http://surl.li/qqxhl

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**The Role of Biodiversity in Sustainable Development:
Protecting Ecosystems and Ensuring Natural Resources**

Biodiversity is one of the key components of sustainable development, playing a vital role in the life of our planet. Every day our understanding of its significance deepens, and the need for its preservation and protection increases. In the context of modern problems associated with climate change, loss of natural habitats and unsustainable use of natural resources, the issue of conserving biodiversity becomes especially relevant.

Biodiversity is a key component of life on Earth and represents the variety of living organisms, including different species, genetic purification, climate regulation, and nutrition.

Biodiversity is under serious threat due to various anthropogenic impacts on the natural environment. The main factors affecting biodiversity include:

1. **Habitat Destruction**: Intensive land development, deforestation, swamp drainage and land development lead to the destruction of natural habitats and the loss of unique ecosystems.
2. **Pollution**: Industrial and transport emissions, as well as uncontrolled use of chemical fertilizers and pesticides lead to the pollution of water bodies and soils, which negatively affects biodiversity.
3. **Climate Change**: Global climate change is causing changes in species distribution, seasonality, and leading to extreme temperature fluctuations, which puts pressure on ecosystems and species diversity.
4. **Unsustainable use of natural resources**: Excessive extraction of forests, fisheries, and exploitation of mineral resources without taking into account their renewability leads to the depletion of natural resources and the destruction of ecosystems.

The consequences of biodiversity loss for the environment and human well-being include loss of ecosystem services, deterioration of water and soil quality, increased risk of extreme weather events, and loss of the biological basis for agriculture, medicine, and other human activities.

International agreements and conservation initiatives are an important mechanism for cooperation between countries to conserve biodiversity. They set standards and guidelines for the protection of ecosystems and species, and facilitate global coordination of action. Some of these agreements include the Convention on Biological Diversity (CBD), the Wet Lands Convention (Ramsar), the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and others. Practical approaches to biodiversity conservation include the creation of nature reserves, national parks, nature reserves and other protected areas where

natural ecosystems and species diversity are under special legal protection. Such places play an important role in preserving unique ecosystems and providing refuge for many rare and endangered species.Sustainable use of natural resources is another important aspect of biodiversity conservation. This approach includes principles of resource management that ensure their use without threatening ecosystems and biodiversity. These practices include sustainable agriculture, forestry, fisheries and other activities that take into account the needs of nature and people.

Modern methods for monitoring and analyzing ecosystems, such as geographic information systems (GIS) and remote sensing, play a key role in assessing the health of ecosystems and identifying changes in biodiversity. GIS allows analysis of spatial data on species distributions, changes in land cover and other parameters, which helps to effectively plan conservation efforts. Remote sensing makes it possible to obtain information about the state of ecosystems over large areas without the need for direct survey.Biotechnology and genetic techniques are becoming increasingly important in the conservation of rare and vulnerable species. This includes population restoration programs, cloning of endangered species, preservation of genetic material in gene banks and other methods. Such approaches help preserve genetic diversity and prevent the extinction of unique species.The development of ecotourism and other forms of sustainable use of natural resources stimulates the protection and conservation of biodiversity. Ecotourism helps finance protected areas, creates new jobs and raises conservation awareness among local people and tourists. Other forms of sustainable use of natural resources, such as sustainable agriculture and forestry, also contribute to the conservation of biodiversity.

Biodiversity is not only a key element of nature, but also the basis for sustainable development of humanity. During this presentation, we looked at various aspects of biodiversity, from its concept and significance to innovative approaches to its conservation.We discussed threats that affect biodiversity, such as habitat destruction, pollution, climate change and unsustainable use of natural resources. These factors have serious consequences for the environment and human well-being.However, we also looked at measures taken to protect and conserve biodiversity. This includes international agreements and initiatives, the creation of protected areas, sustainable use of natural resources, and the use of innovative technologies in nature conservation.

All these efforts are aimed at preserving the richness of the living world on our planet for future generations. Understanding the importance of biodiversity and taking concrete measures to protect it is our shared responsibility to nature and future generations.

References:

1. Wilson, E.O. The Diversity of Life. Cambridge, MA: Harvard University Press,1992
2. Sala, O.E. et al. Global Biodiversity Scenarios for the Year 2100, 2000

3. Biodiversity // National geographic URL: https://education.nationalgeographic.org/resource/biodiversity/ (date of the application: 30.03.2024).
4. What is biodiversity and why is it important? // ClientEarth URL: https://www.clientearth.org/latest/news/what-is-biodiversity-and-why-is-it-important/ (date of the application: 30.03.2024).
5. Why is biodiversity important? // The Royal Society URL: https://royalsociety.org/news-resources/projects/biodiversity/why-is-biodiversity-important/#:~:text=Biodiversity%20is%20essential%20for%20the,also%20value%20nature%20of%20itself. (date of the application: 30.03.2024).

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Preservation of a Vital Ecosystem Resource – Water

Water is the main source of life on Earth. Water and its quality affects climate, ecosystems and human health. Despite the fact that water covers 70% of the Earth, the planet's water resources face serious threats due to human activities, especially fresh water, which is a primary strategic resource for many countries. The countries of Central Asia can be taken as an example. The situation in the region is getting worse every year, as the population of the countries is actively growing and with it the consumption and load on the infrastructure is increasing accordingly.

One of the main problems is the pollution and drying up of water bodies. Every year millions of tonnes of rubbish and chemicals are dumped into rivers, lakes and oceans, disrupting ecosystems and threatening animals, plants and human health. The spread of litter and chemicals in aquatic systems causes not only physical pollution, but also leads to the chemical destruction of aquatic ecosystems. This leads to the death of fish and other aquatic organisms, and also reduces water quality, making it unsuitable for drinking and agricultural use.

In addition, the drying up of water bodies has serious consequences for biodiversity and the availability of water to the population. Declining water resources threaten ecosystems, including coastal zones, and reduce the availability of freshwater for drinking, agriculture and industry. This creates water conflicts and tensions between different sectors.

To date, humanity has made attempts to reduce pollution and combat the effects, but the measures that are being taken are not commensurate with the scale of the problem. To address pollution problems, some countries are taking strict measures to treat wastewater and increasing penalties for pollution, creating incentives for the public to reduce the use of plastic and other harmful materials.

Efficient use of water is also an important aspect of water conservation. An example of efficient use is the transition to closed (waste-free) water supply cycles, which is one innovative approach that maximises the use of available water resources. In such systems, treated wastewater is not discharged into the environment, but is instead reused repeatedly in technological processes.

This approach not only reduces freshwater consumption, but also reduces water pollution by reducing the emission of pollutants into the environment. In addition, the use of recycled wastewater in production processes contributes to energy and resource savings, as it does not require large amounts of new fresh water to be treated.

Finally, global co-operation and education play a crucial role in water conservation. Collaborative efforts between governments, scientific organisations,

business and civil society will help to develop effective water management strategies and ensure that water resources are used sustainably.

Thus, the approach to water resources management should be comprehensive and include not only technical and technological solutions, but also educational programmes aimed at raising public awareness of the importance of water and methods of its efficient use. Everyone has the opportunity to contribute to water conservation, starting with simple actions in everyday life, such as saving water at home, using recyclable materials, and participating in coastal and reservoir clean-up activities.

Water conservation is not only a challenge for the present, but also a commitment to future generations. Taking active measures to conserve it is an integral part of responsible civic behaviour. Ultimately, only through joint efforts and global co-operation can we ensure a sustainable future for all of us and our planet.

References:

1. We support communities to build sustainable sand dams in some of the poorest, drought-stricken regions across our world. URL : https://housing.com/news/water-conservation/   (accessed 03.23.2024)
2. Moving toward a better world.   URL : https://www.green.earth/saving-water   (accessed 12.03.2024)
3. Importance of Clean Water in The Environment   URL : https://apureinstrument.com/blogs/importance-of-clean-water-in-the-environment/   (accessed 29.03.2024)

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Les dernières technologies de la surveillance, l'analyse et la réduction de la pollution de l'environnement

Le développement et la mise en œuvre des technologies de la surveillance, l'analyse et la réduction de la pollution environnementale: cet aspect englobe un large éventail de technologies utilisées pour détecter, analyser et lutter contre la pollution de l'environnement. Les méthodes et outils innovants permettent non seulement de déterminer précisément le niveau de pollution, mais également de réagir rapidement aux problèmes environnementaux. Voici quelques exemples de telles technologies :

– systèmes de surveillance de l'air: les capteurs et systèmes de surveillance modernes permettent de mesurer en temps réel la concentration de divers polluants dans l'air, tels que les oxydes d'azote, le dioxyde de soufre, les hydrocarbures, etc. Par exemple, le système AirVisual, utilisant des capteurs PM2.5, fournit aux utilisateurs des informations sur la qualité de l'air en temps réel ;

– systèmes d'information géographique (SIG): les SIG sont utilisés pour l'analyse et la visualisation des données de la pollution de l'environnement. Ils permettent de définir des zones à haut niveau de pollution, de suivre les changements dans le temps et de prévoir les tendances environnementales ;

– systèmes de purification de l'air et de l'eau: des technologies efficaces sont développées et mises en œuvre pour purifier l'air et l'eau des substances nocives. Par exemple, des filtres modernes de purification de l'air sont utilisés dans les installations industrielles et résidentielles pour éliminer les particules et les gaz polluants ;

– méthodes innovantes de restauration des sols: pour lutter contre la pollution des sols, on développe des technologies de bioremédiation, utilisant des micro-organismes et des plantes pour éliminer les substances toxiques du sol.

L'utilisation des biotechnologies dans les processus de purification de l'air, de l'eau et du sol pour assurer un développement durable : ce point couvre l'utilisation des biotechnologies pour résoudre les problèmes de pollution et de préservation de l'environnement. Les biotechnologies utilisent des organismes vivants ou leurs parties pour résoudre les problèmes environnementaux. Voici quelques exemples de telles technologies :

– bioremédiation : il s'agit du processus d'utilisation d'organismes vivants, tels que des bactéries, des champignons ou des plantes, pour éliminer ou réduire les substances polluantes dans l'environnement. Par exemple, les bactéries du genre Pseudomonas peuvent être utilisées pour dépolluer l'eau des hydrocarbures ou d'autres produits pétroliers ;

– phytoremédiation : il s'agit de l'utilisation des plantes pour dépolluer l'environnement. Certaines plantes, telles que le saule ou le bambou, peuvent

accumuler des substances toxiques dans leurs tissus ou leurs racines, ce qui leur permet de les éliminer efficacement de l'environnement ;

– méthodes microbiologiques de purification: il s'agit de l'utilisation de micro-organismes pour purifier l'eau, le sol ou l'air. Par exemple, les lits bactériens activés utilisent des micro-organismes pour purifier les eaux usées des substances organiques ;

– biosenseurs : ce sont des dispositifs qui utilisent des organismes vivants ou leurs composants biologiques pour détecter les substances polluantes dans l'environnement. Par exemple, les biosenseurs basés sur des bactéries peuvent détecter la présence des substances toxiques dans l'eau ou le sol.

Le développement des technologies efficaces de recyclage des déchets pour réduire la charge environnementale et préserver les ressources: cet aspect se concentre sur le développement et la mise en œuvre des méthodes et des technologies visant à recycler les déchets afin de réduire l'impact négatif sur l'environnement et de préserver les ressources. Voici quelques exemples de telles technologies :

– recyclage du plastique : développement des technologies pour recycler le plastique utilisé en matières premières secondaires pouvant être utilisées pour fabriquer de nouveaux produits. Par exemple, les technologies de recyclage mécanique et chimique des plastiques permettent d'obtenir des matériaux polymères pour la fabrication de nouveaux produits ;

– recyclage du papier: développement des technologies pour recycler le papier utilisé en matières premières secondaires pour la fabrication de nouveau papier ou carton. Cela permet de réduire la production des déchets et les coûts énergétiques associés à la production du papier neuf ;

– décomposition biologique des déchets organiques: développement des méthodes de décomposition biologique des déchets organiques par compostage ou valorisation du biogaz. Ces méthodes permettent de réduire la quantité des déchets organiques envoyés en décharge et de réduire les émissions de méthane dans l'atmosphère ;

– recyclage du verre: développement des technologies pour recycler le verre utilisé en matières premières secondaires pour la fabrication de nouveaux produits en verre. Cela permet d'économiser les ressources naturelles et l'énergie utilisée dans la production du verre neuf ;

La mise en œuvre des méthodes innovantes de construction verte et de technologies éco-énergétiques pour réduire les émissions et l'empreinte écologique des projets de construction : cet aspect englobe le développement et la mise en œuvre des technologies et des pratiques de pointe dans le domaine de la construction dans le but de réduire l'impact négatif sur l'environnement et de préserver les ressources énergétiques. Voici quelques exemples d'innovations :

– utilisation des matériaux éco-énergétiques: développement et utilisation des matériaux offrant une isolation thermique améliorée et minimisant la consommation énergétique pour le chauffage et la climatisation des bâtiments. Par exemple, l'utilisation des isolants, des fenêtres éco-énergétiques, des panneaux solaires, etc. ;

– création des toits et des murs verts: mise en œuvre des technologies favorisant l'aménagement des toits et des murs verts, contribuant à améliorer la qualité de l'air, à absorber le dioxyde de carbone et à réduire l'effet d'îlot de chaleur.

 - Utilisation de sources d'énergie renouvelables : intégration de systèmes de sources d'énergie renouvelables tels que les panneaux solaires, les éoliennes, les systèmes géothermiques, etc., pour fournir de l'électricité et du chauffage aux bâtiments.

 -Principes de conception écologique : utilisation de principes de conception écologique tels que la minimisation des déchets, l'utilisation de matériaux renouvelables, la promotion de l'éclairage naturel et de la ventilation, la création de zones de restauration de l'environnement naturel.

5. Étude de l'impact des changements climatiques sur l'environnement et développement de stratégies d'adaptation grâce aux technologies de protection : cet aspect se concentre sur l'étude de l'impact des changements climatiques sur l'environnement et le développement de stratégies d'adaptation visant à atténuer les effets néfastes. Voici quelques aspects de ce point :

 - Surveillance des changements climatiques: Étude des tendances à long terme des changements climatiques, y compris les variations de température, les précipitations, le niveau de la mer, la couverture glaciaire, etc., à l'aide de systèmes de surveillance et d'analyse de données modernes.

 - Modélisation des systèmes écologiques : utilisation de modèles informatiques pour prédire l'impact des changements climatiques sur les écosystèmes, la biodiversité, la distribution des espèces, etc.

-Développement de stratégies d'adaptation: Développement et mise en œuvre de stratégies d'adaptation visant à réduire la vulnérabilité des écosystèmes et de la société aux changements climatiques. Cela peut inclure la protection des écosystèmes, des ressources en eau, ainsi que le développement de plans d'adaptation des villes à l'élévation du niveau de la mer, aux événements météorologiques extrêmes et autres conséquences des changements climatiques.

 -Technologies de protection contre les catastrophes naturelles : développement de technologies de protection contre les catastrophes naturelles qui peuvent devenir plus fréquentes ou plus intenses en raison des changements climatiques. Cela comprend le développement de systèmes d'alerte précoce, d'ouvrages d'ingénierie pour la protection contre les inondations, les tremblements de terre, les ouragans, etc.

Références:

1. Environmental Protection Agency. (2019). Sustainable Materials Management (SMM) | US EPA. [Online] Available at: https://www.epa.gov/smm/sustainable-materials-management-basics

2. United Nations Environment Programme. (2018). Global Waste Management Outlook. [Online] Available at: https://www.unep.org/resources/report/global-waste-management-outlook

3. European Environment Agency. (2020). Circular economy in Europe — Developing the knowledge base. [Online] Available at: https://www.eea.europa.eu/themes/waste/resource-efficiency/circular-economy-in-europe

4. World Green Building Council. (2021). Advancing Net Zero. [Online] Available at: https://www.worldgbc.org/advancing-net-zero

5. International Energy Agency. (2022). Energy Efficiency. [Online] Available at: https://www.iea.org/topics/energyefficiency

6. Intergovernmental Panel on Climate Change. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC. [Online] Available at: https://www.ipcc.ch/report/ar5/syr/

7. National Aeronautics and Space Administration. (2022). Climate Change: Vital Signs of the Planet. [Online] Available at: https://climate.nasa.gov/

8. United Nations Framework Convention on Climate Change. (2021). Adaptation. [Online] Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/adaptation

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Clean Water: Challenges for Ukraine

It is generally accepted that water is a crucial and important component of the human body. It helps ensure the proper level of hydration, supports the normal functioning of organs and systems, contributes to the proper functioning of the brain, and maintains an optimal level of energy. Research in the field of water purification has made significant progress in recent years. In practice, many methods are used for this: mechanical, chemical, biological, and physical.

In the 21st century, quality drinking water is still out of reach for 663 million people on Earth. According to scientists, with the current practice of using available water reserves, the world will face a 40% deficit of projected demand by the beginning of 2030. In terms of reserves of water resources available for use, Ukraine belongs to low-income countries (111th place among 152 countries in the world) [1]. With the beginning of the full-scale military invasion of the russian federation into Ukraine on February the 24th, 2022, the problem of clear water has become more than urgent for our state.

This study focuses on reviewing changes in the water ecosystem of Ukraine after February the 24th, 2022 and the analysis of water purification methods using ultrasound and ultraviolet.

Among other things, russian military aggression bears the signs of ecocide. Targeted attacks are being made on facilities for intake, storage and purification of water, as well as sewage infrastructure. In September 2022, missile strikes were carried out on the hydraulic structure of the Karachuniv Reservoir in the city of Kryvyi Rih. The water level in the Ingulets River rose by 1-2 meters, as a result of which 112 houses were flooded in one evening [2]. In June 2023, the Kakhovskaya HPP dam was destroyed. The amount of direct damage caused by the explosion of the Kakhovskaya HPP is at least $2 billion. Preliminary estimates say that about 20-30 thousand houses fell into the flooding zone, of which at least 150 are high-rise buildings in the city of Kherson [3].

By order of the Ministry of Health of Ukraine dated April the 22nd, 2022 (DSanPiN 683-22 [4]), changes were made to some indicators of the quality of drinking water. Table 1 shows some of the changes in water quality requirements compared to the Hygienic requirements for drinking water order of 2010 [5]:

Table 1

Comparison of some indicators of drinking water toxicity

Indicator	DSanPiN 2.2.4- 171-10	DSanPiN 683-22
Benzopyrene[1], μg/l	0,005	0,01
Boron[2], mg/l	0,5	2,4
Cadmium[2], mg/l	0,001	0,005
Copper, mg/l	1,0	2,0
Chlorites, mg/l	0,2	0,7
Mercury[1], mg/l	0,0005	0,001

As can be seen from the results given in Table 1, substances of the second class of danger, such as cadmium and boron, have got a five times higher permissible concentration level. Mercury and benzopyrene, which belong to substances of the first class of danger, received twice the permissible concentrations.

It is believed that at the moment, the method of water purification by chlorination is already outdated and is gradually becoming a thing of the past, but in Ukraine, as before, it is widely used at large water treatment plants. The developed countries widely use ozonation for water purification. However, this technology is quite expensive and complex, and also has certain disadvantages. Electrochemical purification of water is quite an economical method. Abroad, a similar method is not used for domestic water, but is used exclusively for industrial water purification. Electrochemical water purification helps to destroy all microorganisms, but at the same time it can negatively affect various organic substances. Due to the fact that water can contain completely different microorganisms and substances, and an accurate analysis of wastewater, as a rule, is not done, no one will be able to predict the effect of current on this water. Accordingly, due to the unpredictability of the reaction of substances in water, during its purification, not very safe compounds may emerge [6].

Ultrasonic water purification can be an alternative. The phenomenon of cavitation and the effects accompanying it are of great interest to scientists. The advantages of this technology include simplicity, low capital costs, ease of modernization of a conventional treatment plant, absence of additives to the ultrasonic device and by-products [7]. Interesting results were shown by studies of the influence of ultrasound and chlorination on the growth of bacteria [8]:

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[1] Class 1 Dangerous

[2] Class 2 Dangerous
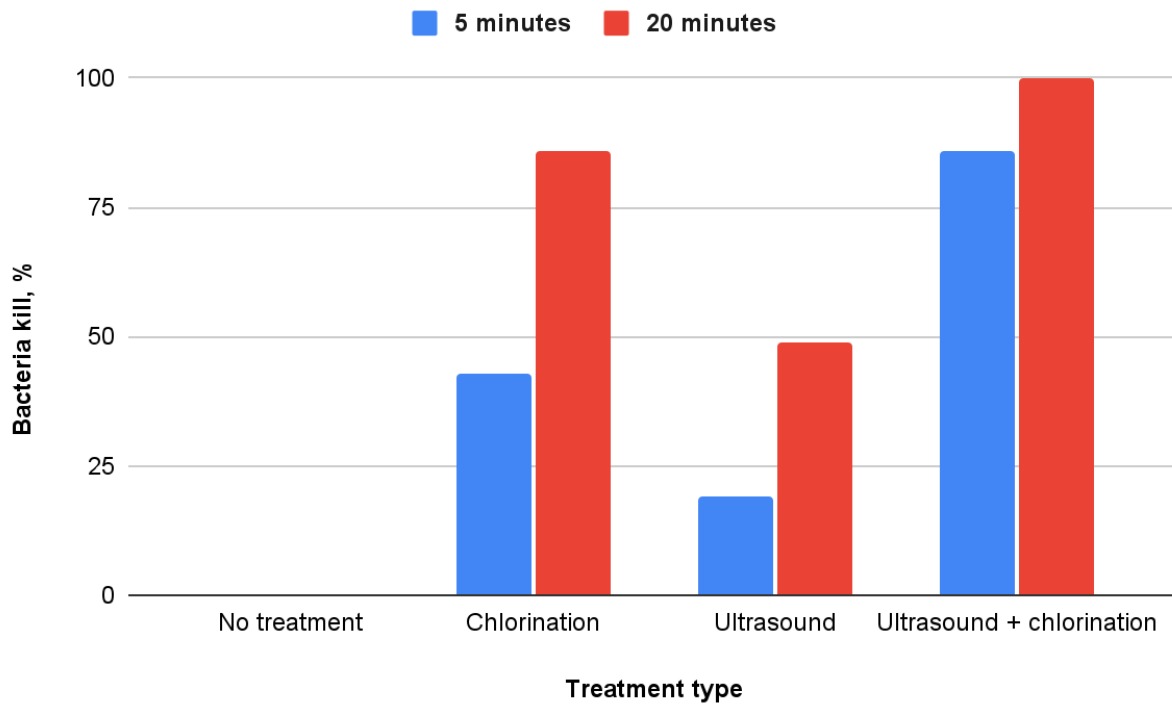
Fig. 1. Impact of ultrasound and chlorination on bacterial growth[3]

As shown in Figure 1, a 5-minute exposure to ultrasound reduces the coliphage count by less than a quarter, while after 20 minutes the bacteria count is reduced by almost half. If you combine ultrasound with chlorination, then almost 100% of the result can be achieved in a 20-minute session.

One of the oldest methods of water purification is the use of solar radiation. This approach should be suitable for developing countries due to the low cost of implementation and virtually zero electricity costs. This approach is based on the ability of microorganisms present in polluted water to absorb sunlight (UV-A), which leads to their inactivation [9]. UV light penetrates the microbe cell wall and damages the genetic information contained in DNA and RNA, thus stopping it from reproducing [10]. Studies have shown that the action of ultraviolet can have a degree of purification up to 99.87% [11].

The researchers also combined the UV type of cleaning with chlorination and got rather unexpected results. It turned out that the order of these types of cleaning is of great importance. If coliphage 14 is first irradiated with ultraviolet light and then chlorinated, then the degree of purification will reach about 99%, and if first chlorinated, then almost 99.99%. Chlorination after UV reduces the synergistic effect for coliphage MS2 to almost zero, and such a coliphage as coliphage 7 will generally have negative values from the synergy of chlorination and ultraviolet. Figure 2 shows the results of this study [12]:

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[3] Conditions: 1:10 dilution of untreated water using a sample immersed in an ultrasonic bath (38 kHz, 20 °C).
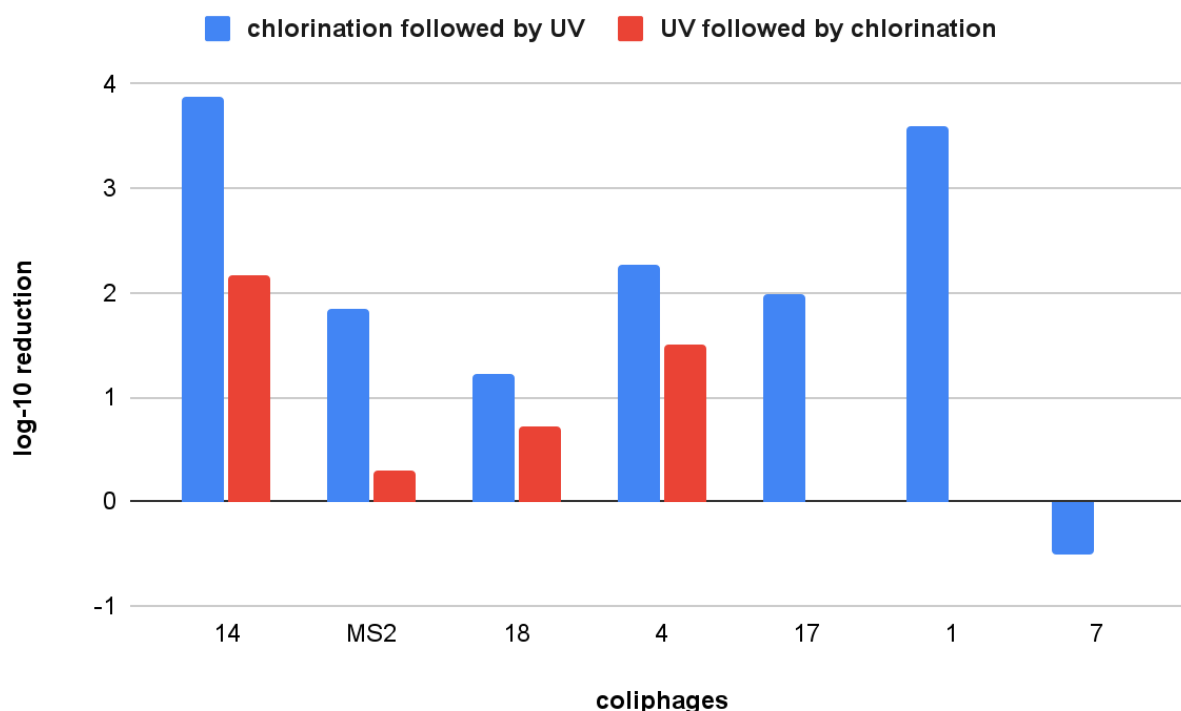
Fig. 2. Synergy values of coliphages when chlorine treatment was done first followed by UV and vice versa with 10 min contact time

The study shows the advantages of the chosen methods and the ways of their further improvement.

References:

1. Зелінський С. Е. 2022. Водопостачання та водна безпека у контексті російської агресії. с. 4-5.

2. Софія Скиба. "Кривава річка". На що вплине пошкодження дамби в Кривому Розі. https://texty.org.ua/articles/107751/kryvava-richka-na-sho-vplyne-poshkodzhennya-damby-v-kryvomu-rozi/

3. Підрив Каховської ГЕС завдав Україні щонайменше $2 млрд прямих збитків — перші обрахунки KSE Institute. https://kse.ua/ua/about-the-school/news/pidriv-kahovskoyi-ges-zavdav-ukrayini-shhonaymenshe-2-mlrd-pryamih-zbitkiv-pershi-obrahunki-kse-institute/

4. Наказ Про затвердження Державних санітарних норм і правил «Показники безпечності та окремі показники якості питної води в умовах воєнного стану та надзвичайних ситуаціях іншого характеру». https://zakon.rada.gov.ua/laws/show/z0564-22#Text

5. Наказ Про затвердження Державних санітарних норм та правил "Гігієнічні вимоги до води питної, призначеної для споживання людиною". https://zakon.rada.gov.ua/laws/show/z0452-10#Text

6. Н. Л. Бернацька. 2015. ВСТАНОВЛЕННЯ ОПТИМАЛЬНИХ УМОВ ПРОВЕДЕННЯ ПРОЦЕСУ ОЧИЩЕННЯ ВОДИ ЗА ДОПОМОГОЮ УЛЬТРАЗВУКУ. с. 1-2.

7. Nashwa A. H. Fetyan, Tamer Mohamed Salem Attia. ARAB JOURNAL OF BASIC AND APPLIED SCIENCES 2020, VOL. 27, NO. 1. p 196-197.

8. T.J. Mason. 2003. Potential uses of ultrasound in the biological decontamination of water. Ultrasonics Sonochemistry. Volume 10, Issue 6, October 2003. p. 319-323.

9. Aniruddha B. Pandit, Jyoti Kishen Kumar. 2015. Clean Water for Developing Countries. p. 6-7.

10. Mohammed Al-Abri, Buthayna Al-Ghafri. 2019. Chlorination disadvantages and alternative routes for biofouling control in reverse osmosis desalination.

11. М.С. Мальований, Н.Ю. Вронська, І.З. Коваль, Г.М. Сакалова. 2013. ПОРІВНЯЛЬНІ ДОСЛІДЖЕННЯ ПЕРСПЕКТИВНИХ МЕТОДІВ ОЧИЩЕННЯ ПРИРОДНИХ ВОД. с. 3-5.

12. Alyaa M. Zyara, Eila Torvinen. 2016. The Effect of UV and Combined Chlorine/UV Treatment on Coliphages in Drinking Water Disinfection.

Section 02 Innovations in Engineering, Energy Efficiency and Alternative Sources of Energy, Earth Sciences

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DIY quadcopter

Today, quadcopters are beginning to play an active role in agricultural transport, etc. But in this paper, I will deal with the basic concepts of building a quadcopter. The main components of the model are: frame, motors, controller, ESC (Electronic Speed Controller), and battery. These are the components that require close attention. Today, it hardly makes sense to make motors yourself, it is cheaper and more practical to buy ready-made ones. I emphasize that it is better to use brushless synchronous motors.

Let us consider the example of the A2212 1400kv motor (enthusiasts achieved a thrust of up to 1 kg with this motor). Its main parameters are: kv (revolutions per minute per volt, by applying the corresponding voltage to the motor, we achieve the necessary rotation frequency), maximum voltage (often measured in cells (2s-3s), one cell has an approximate voltage of 3.7v), maximum current (30A), and efficiency. There are corresponding propellers for the motor, which are supplied together with the motor or their analogues. Propellers can rotate clockwise (Clock Wise) or counterclockwise (Counter-Clock Wise). Both types of propellers are needed for a quadcopter.

The main parameters of the propeller are the number of blades, its length, and pitch. Very often, the manufacturer writes the main characteristics of the propeller in a certain format; for example, in the case of 1045, you can understand that 10 is the diameter of the propeller (in inches), and 4.5 is the pitch of the propeller (in inches). Multi-blade propellers, compared to two-blade propellers with the same lifting force, have a smaller diameter, but their main drawback is balancing. Before assembling the quadcopter, it is necessary to balance the propellers (if this step is omitted, the sensors of the main controller may not work quite accurately). Next, you can choose the ESC (Electronic Speed Controller) (the main characteristic is the maximum current), selected based on the maximum current of the motor with a certain margin. If we choose an ESC of 10A, it will not be suitable for the A2212 motor; if the circuit is assembled correctly, it will still fail after some time.

Now you can think about choosing the battery; they are divided into two types: li-pol, li-ion. In the case of the latter, battery assemblies are used (better assemblies are based on 21700 cells). If you need a quadcopter for racing or tricks, li-pol is more suitable; if you need to rely on longer flight times, li-ion is better. Both types of batteries do not withstand cold, which should be taken into account when flying in winter, as

during this time the battery capacity can significantly decrease, and flight time can be significantly reduced.

As for the frame model, if it is small, it can be 3D printed, but if you print it for racing, it will fall apart at the first high-speed collision, so we use carbon. Here everything is very individual, there are almost no specific recommendations. Frames are divided into: "+" and "x, subtype n" fig.1, the arrow indicates the direction of the controller. Different frames are suitable for different types of tasks.
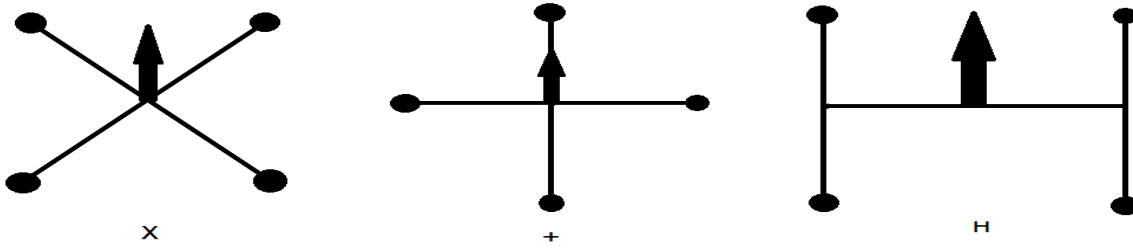
fig.1

If you need to capture footage from the drone camera, perform tricks – choose "x", if you need it to respond sharply and clearly to commands – choose "+", if it is a very small model (one that can fit in the palm of your hand) or for experiments, research – choose "N". For beginners, "x" would be more suitable, as it is more intuitively understandable for control.

As for the controller, there are plenty of options; you can make your own according to the schemes, everything is open and freely accessible, an example of which is the popular MultiWii controller.

Now you can assemble the quadcopter, but it is desirable to assemble the stand fig.4 (1 – power supply, 2 – motor controller, 3 – ESC, 4 – clamps, 5 – motor) where the direction of motor rotation is determined. If the direction of rotation is not satisfactory, you need to connect the two power wires in reverse (fig.2). The motors should rotate exactly as shown in fig.3. The remaining work is carried out according to engineering requirements; some insulate batteries, while others test or connect modules.
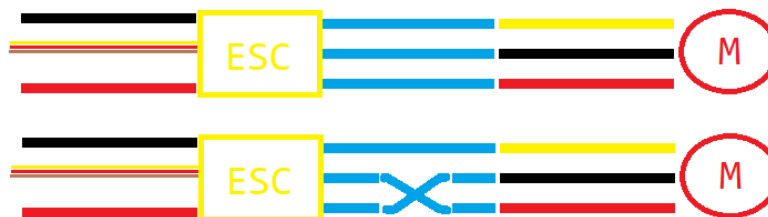
fig.2
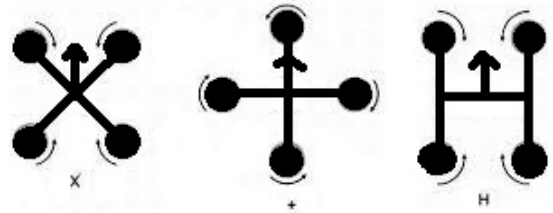
fig.3
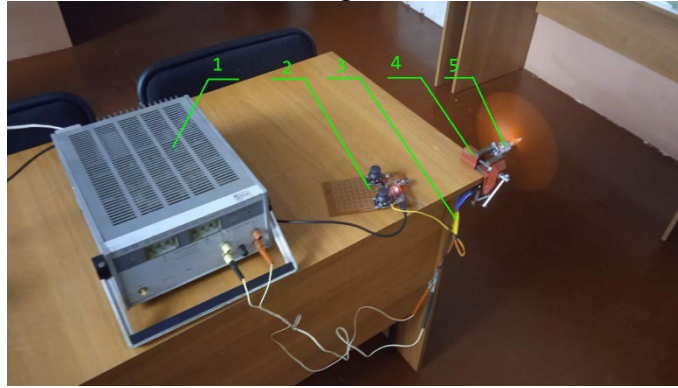
fig.4

Hence, a working model of a DIY quadcopter has been constructed, featuring an individual controller ESP32.

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The role of laser Doppler flowmetry in endothelial dysfunction

In the modern world, where non-communicable diseases pose an increasing threat to public health, the strategic importance of early diagnosis and effective prevention of conditions such as cardiovascular diseases, chronic respiratory pathologies, oncological diseases, and diabetes is paramount. For this reason, the study of microcirculation and endothelial function becomes a key direction in contemporary medical science. In the context of this research, there is a need to improve methods for their assessment and monitoring. One potentially promising non-invasive method is laser Doppler flowmetry (LDF), which can provide valuable information about the structural and functional state of the endothelium. Despite the potential advantages of LDF, its application in clinical practice has not yet gained widespread recognition and remains limited. Therefore, studying the role and capabilities of this method in the diagnosis and monitoring of endothelial dysfunction is of great practical importance for further refining strategies for the prevention and treatment of non-communicable diseases.

The aim of this study is to investigate the application of laser Doppler flowmetry in clinical practice as a method for assessing the state of the microcirculatory bed.

Laser Doppler flowmetry (LDF) is a method based on optical scanning of tissues with a monochromatic signal and analysis of the frequency spectrum of the laser-reflected signal, which reflects from the erythrocytes in tissue capillaries [1]. In the context of studying skin and mucous membrane microcirculation, an important structural and functional component is the endothelium of capillaries and precapillary arterioles. The LDF technique includes the following stages [2]:

1. Determination of microcirculation parameters (MP), reflecting the volumetric content of erythrocytes in capillary blood (%) and the number of simultaneously functioning capillaries in the study area.
2. Wavelet analysis of active (endothelial, myogenic, neurogenic) and passive (respiratory, cardiac) mechanisms of microcirculation regulation. This analysis determines the impact of pharmacological agents on the functioning and interaction of these mechanisms.
3. Occlusive test investigating the reserve capabilities of the microcirculatory bed using the "capillary blood flow reserve" (CBFR, %) parameter.

The results of laser Doppler flowmetry (LDF) assessment reflect the type of blood flow, which determines the presence or absence of endothelial damage and allows for the preliminary establishment of a diagnosis, as well as the evaluation of the effectiveness of the prescribed therapy [3,4]. The first type of blood flow refers to normotonic, indicating the absence of serious disturbances in microcirculation. Meanwhile, spastic blood flow type is characterized by increased tone of microvessels

and decreased blood inflow into the microcirculatory bed due to spasm of precapillary sphincters. This may be associated with conditions such as Raynaud's syndrome, diffuse liver diseases, chronic venous insufficiency, arterial hypertension, and diabetes mellitus.

The hyperemic type of blood flow is characterized by increased blood inflow into the microcirculatory system, caused by dilation of microvessels. This can be observed in Raynaud's syndrome II degree, diffuse liver diseases, as well as in cases of diabetic foot syndrome. Finally, the stasis-stagnant type of blood flow is characterized by the paralysis of inflow vessels and disturbances in outflow at the level of the capillary and post-capillary segments. This may indicate the presence of ischemic heart disease, diabetes mellitus, and other pathologies. Therefore, the analysis of blood flow type based on LDF results is important for the diagnosis and monitoring of various diseases associated with endothelial damage.

These stages define the methodology of LDF and help to understand the functional state of microcirculation, which is crucial for diagnosing and monitoring various diseases, including endothelial dysfunction.

Today, the methodology of using laser Doppler flowmetry (LDF) in medical practice is regulated by European standards and recommendations, based on the results of numerous studies conducted in various medical fields. This significantly expanded our understanding of microcirculation and angiogenesis. These studies have spurred the development of both contact and non-contact LDF systems, which provide data transmission to various devices, including computers and mobile phones, allowing physicians to effectively utilize this method in practice.

Laser Doppler flowmetry is an important method for assessing endothelial function. The results of scientific and clinical studies aim to determine the state of microcirculation in healthy individuals and justify the application of LDF in medical practice. This method allows for the analysis of mechanisms regulating tissue hemoperfusion and evaluating the functional status in patients with various diseases, such as diabetes mellitus, hypothyroidism, and in women with gestational diabetes.

The application of LDF in medical diagnostics and patient monitoring for various diseases is a broad and promising direction. Studying microcirculation and angiogenesis using this method provides important data on the functioning of the body at the cellular level, which is crucial for understanding and effectively treating various pathological conditions associated with microcirculation disorders.

Laser Doppler flowmetry (LDF) allows not only for a detailed analysis of mechanisms regulating tissue hemoperfusion but also for the assessment of its functional status in patients with type 2 diabetes mellitus, hypothyroidism, autoimmune thyroiditis, diabetic foot syndrome (DFS), and gestational diabetes. Complications of diabetes mellitus include both macro- and microangiopathies, which can lead to serious consequences such as myocardial infarction, stroke, and other vascular diseases. This underscores the importance of timely detection and monitoring of complications in patients with diabetes mellitus.

Microcirculatory impairments serve as powerful indicators of cardiovascular and cerebrovascular events in clinical practice and require immediate correction. Laser Doppler flowmetry (LDF) represents a modern non-invasive method of choice for assessing the initial state of microcirculation, detecting endothelial defects, and has proven its effectiveness in influencing pharmacological infusions, predicting disease progression, and managing patients in everyday clinical practice.

References

1. Holowatz LA. Human cutaneous microvascular ageing: potential insights into underlying physiological mechanisms of endothelial function and dysfunction. J Physiol. 2008 Jul 15;586(14):3301. doi: 10.1113/jphysiol.2008.157594.

2. Moises HW, Wollschlger D, Binder H. Functional genomics indicate that schizophrenia may be an adult vascular-ischemic disorder. Transl Psychiatry. 2015 Aug 11;5:e616. doi: 10.1038/ tp.2015.103.

3. Paulus WJ, Tschpe C. A novel paradigm for heart failure with preserved ejection fraction: comorbidities drive myocardial dysfunction and remodeling through coronary microvascular endothelial inflammation. J Am Coll Cardiol. 2013 Jul 23;62(4):263-71. doi: 10.1016/j.jacc.2013.02.092.

4. Scalia R. The microcirculation in adipose tissue inflammation. Rev Endocr Metab Disord. 2013 Mar;14(1):69-76. doi: 10.1007/s11154-013-9236-x.

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Mineral Resources of Ukraine and Sustainability

Substances and compounds found in the earth's crust in the form of rocks are known as mineral resources which are used in various economic activities. Mineral resources play significant role in sustainability of any country as without them and their use the country economy can collapse. Nowadays there are different concepts of classifying mineral resources with the focus on their renewability, sustainability etc. An attempt to describe mineral resources of Ukraine from the perspective of their mining and sustainability is made in this paper.

There are some concepts and modern trends concerning mineral resources and their development. They are as following:

- Mineral resources are non-renewable natural resources.
- Distribution of mineral resources on the planet is uneven that is largely due to the tectonic structure.
- Every year more and more new mineral deposits are discovered and developed.
- Most reserves are found in mountainous areas.
- Recently, there has been an active development of mineral deposits at the bottom of oceans and seas.

There is also a variety of classifications of minerals. The most traditional that minerals can be classified into three main groups: fuel resources, metallic and no-metallic minerals. If to focus on the physical state of minerals, they can be classified in the other 3 groups: gaseous minerals ((flammable gases, methane, helium), liquids (oil, mineral waters), solid (ores, salts, coal, granite, marble etc.).

Ukraine is very rich in mineral resources. There are fuels: coal both black and brown, natural gas, peat oil, metals: ferrous metals (iron ore) and non-ferrous metals (manganese, mercury, titanium and others) and non-metals: rock and potassium salts, sulphur, fire clay, curative waters etc. Bearing in mind sustainability, these minerals will be classified and described according to their geographical location and use.

Coal is a mineral highly demanded in power generation and metallurgical industry. It can be found in the various parts of Ukraine, in particular in Lviv region (Boykivske deposit) and in Donetsk region (Shodinske. Shakhtarske, and others).

Iron ore necessary for steel and iron production occurs in Kryvyrizhsky Basin in Dnipropetrovsk Oblast. Deposits of marble and limestone widely used in building and construction are found mostly in Prykarpattia (Ivano-Frankivsk and Ternopil Oblasts).

The main gas fields are in Western Ukraine (Lviv, Ivano-Frankivsk Oblasts) and Southern Ukraine (Odesa, Mykolaiv Oblasts).

From the perspective of their use, the minerals extracted in Ukraine can be described in the following way.

Iron ore is used in ferrous metallurgy, wherein Kryvyi Rih metallurgical plant is the largest producer of ferrous metals in Ukraine, and for production of iron, steel and alloys. Metallurgical enterprises manufacture metal structures for construction and infrastructure facilities. In their turn, metallurgical products are used in the production of machines and equipment, i.e. in engineering.

Non-metals are widely use in chemical industry for production of various chemicals and materials.

Marble and limestone are used in construction industry to make building materials such as tiles, cladding materials etc.

Mining and processing technologies are highly developed in Ukraine to extract and process the minerals. Coal mining is carried out by mine and open pit methods. High-tech methods of ore crushing are used to process iron ores. Chain saws and crushers are used for mining marbles and limestones. Modern technologies are used for gas purification and its transportation

To conclude, Ukraine is rich in mineral resources that contribute to sustainability of the Ukrainian economy. However, there are some challenges and opportunities how to sustain the economy of the country.

The main challenges are concerned with environmental problems related to mining and negative impact on biodiversity.

To overcome them there is a need to develop secondary use and recycling technologies and to develop and implement effective mining and processing methods and procedures that can be seen as opportunities to provide sustainability.

References:

1. *Mineral resource classification*. [online]. Available from: https://en.wikipedia.org/wiki/Mineral_resource_classification

2. *Mining* [online]. Available from: https://ukraineinvest.gov.ua/en/industries/ mining/

3. Ministry of Economic Development and Trade of Ukraine (2024) **State Export Support** [online]. Available from: http://www.ukrexport.gov.ua/eng/about_ukraine/geo/ ?country=ukr#:~:text=Ukraine%20satisfies%20its%20oil%20and,are%20located%20in %20Nikopol%20district

4. *Natural Resources* [online]. Available from: https://en.wikipedia.org/ wiki/Natural_resource

5. Swapan Kumar Haldar (2018) *Mineral Exploration: Principles and Applications* [online]. Available from: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/mineral-resource

6. *Types of Minerals* [online]. Available from: https://www.vedantu.com /geography /types-of-minerals

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Biogas: new trends of alternative energy sources in Ukraine

Biogas is a gas obtained from hydrogen or methane fermentation of biomass. In general, the types of biomass processing by bacteria can be categorized into three groups: the first one is hydrolysis, the second one is acidification, and the third one is methane formation process. Biomethane is almost 100% methane produced either by enriching biogas or by gasifying solid biomass [1]. The normal food chain involves the following bacteria eating the products of the previous ones.

Biogas production involves not only methanogen class bacteria, but also all three species. One of the primary forms of biogas is biohydrogen. The list of organic wastes suitable for biogas production is quite large and some frequent examples of raw materials can be outlined: manure, grain and melasse postalcoholic bard, woma, faecal sludge, fish and slaughterhouse waste (blood, fat, intestines), grass, household waste, etc [2]. Biogas production yield is determined by both dry matter content and the type of raw material used [3]. For example, if we take 2,5 tons of cattle manure (pig manure (solid)) per year produce approximately 102 500 m^3 of biogas per year with methane content 60 %.

Minimum tonnage not reached. Increase or add co-substrate.

SUBSTRATE

Pig manure (solid)

2 500   tons per year

CO-SUBSTRATE

Select

ENERGY SELECTION:

○ Bio Natural Gas   ○ Electricity   ○ compare both

⬢ **BIO NATURAL GAS**

102 500 m^3 per year [1]

Supply for **85.42** households [2]

- OR -

⚡ **ELECTRICITY**

389 500 kWh electric per year [1]

44.46 kW Ø CHP power

Supply for **129.83** households [2]
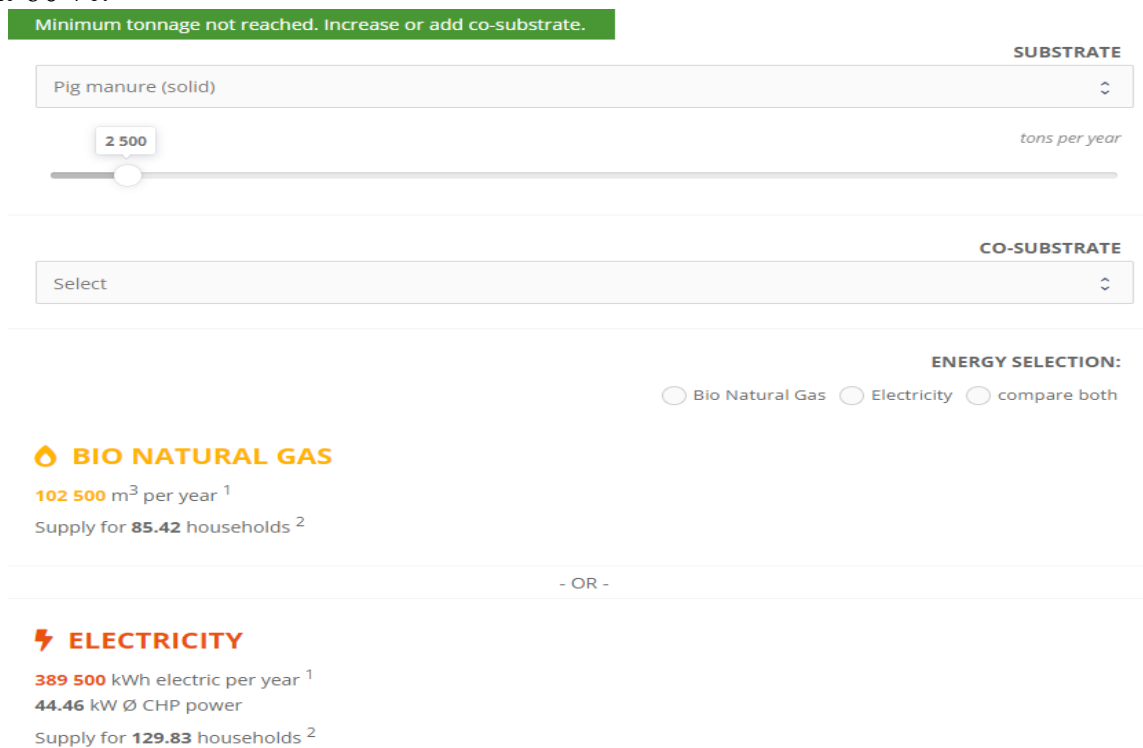
Fig.1 An example of calculation [4].

The definition of biogas was firstly developed in the 17th century by Jan Baptiste Van Helmont who discovered that flammable gases were emitted by decomposing biomass. The research was continued by Alessandro Volta (1776) who made conclusions based on the obtained results that there was a correlation between the amount of degraded biomass and the amount of gas emitted, and the methane occurrence in biogas was identified and described by Sir Humphrey Davy (1808).

It should be noted that the first biogas plant was built in Bombay, India in 1859 and the first use of biogas as street lighting took place in Britain in 1895. The intensive development of microbiology (1930) highly promoted further studies of biogas and the role of some bacteria involved in the biogas production process was emphasized. In the 1960s, India and China began developing small biogas reactors for farmers. The goal of these projects is to reduce energy poverty in rural areas and provide clean fuel for cooking in remote areas. Now in Ukraine, the Gas Institute of Ukraine of the National Academy of Sciences of Ukraine is engaged in this study [5].

Why is it necessary?

The fact that the fuels currently most commonly used are mainly based on coal, fuel oil or natural gas is very disadvantageous in terms of planning for the future, as these reserves will be exhausted in the coming years due to the growing energy demand mediated by the increasing population. Therefore, energy production from biogas is one of the most popular renewable energy sources due to its versatile applications and naturalness.

Biogas is a dynamic form of energy that can be used to produce electricity, biomaterials, heat, and fuel for transportation. The high levels of carbon dioxide (CO_2) presented in the atmosphere and equal around 390 ppm, block the sun's infrared radiation, causing the greenhouse effect and resulting in global warming. This is just one of the many problems that require finding alternative fuels such as bioethanol or biodiesel. Therefore, biogas production is actively gaining momentum as a potential solution to production problems using environmentally friendly technologies that would better utilise raw materials and prevent the accumulation of toxic compounds in the environment.

Biogas in Ukraine

Since Ukraine has a large agricultural potential, progressive changes in energy supply aimed to enhance the use of renewable energies and introduce "green tariffs", encourage the potential agriculture benefits to be reconsidered. Biomass as a constant, renewable energy creates excellent prospects for Ukraine for the further development of this direction, and the possibilities of using this energy are greatly diverse. Biogas is the universal and most efficient energy carrier of all bioenergy to be obtained from reproducible raw materials and organic wastes. Energy from biogas is used in various industries and creates numerous opportunities to be listed as following:

- production of electricity and heat from biomethane using the gas transmission network;
- replacement of natural gas with biomethane;
- use of biomethane as a motor fuel for municipal and agricultural transport;
- export of biomethane to the EU [6].

However, biomethane production in Ukraine is currently not competitive with the market price of natural gas and needs to be changed. It can be explained by the following reasons: the lack of legislation on biomethane and little state support, small opportunities of biomethane-based motor fuel to compete with the price of natural gas, problems with connection to district heating. In addition, the heat obtained from biogas cannot be compared with the heat obtained from natural gas in terms of its efficiency. Lack of experience in using lignocellulose materials (straw) results in insufficient development of a biofuel market, etc [1].

What is required to solve this problem?

The development of the biomass market in Ukraine requires such steps to be carried out: creating a legislative framework, establishing a mechanism guarantees of origin, preparing investment projects to develop industry and energy clusters. Furthermore, such issues as ensuring non-discriminatory access by a third party to heating networks, expanding FIT scheme for electricity generated from biomass, biogas and biomethane, developing organic farming and enhancing digestate use as well as increasing investment attractiveness of the bioenergy sector are also to be considered. When these and other factors are resolved, we will be able to fully adjust the energy system to such energy sources as biogas [1].

If we approach this issue thoughtfully and comprehensively, we can see several advantages for our agriculture in the biogas development. First, farmers will get more value for their products, as the "residues" from raising animals or crops will also be valuable. Second, this also solves such problems as agricultural waste disposal, illegal activities, namely, pouring manure in inappropriate places or burning agricultural residues, as these products will also become a valuable commodity. Thus, such dangerous activity as burning leaves can be decreased as leaves can be also processed into biogas to reduce the damage caused to environment during the constant fall cleaning of gardens. Third, such issues as gas and energy shortages can be also resolved to be produced in sufficient quantities. For example, official information says that this winter Ukraine used its own gas production, but if we add stable biogas production, we will be able not only to cover our own fuel and energy needs, but even establish a market for its sale to the EU [7]. It can get a positive effect as biomethane is almost 100% methane.

References:

1. Bioenergy Association of Ukraine UABIO https://uabio.org/biogas-and-biomethane/ .

2. Qualification paper (explanatory note) by Krasnikova K.S. https://er.nau.edu.ua/bitstream/NAU/45395/1/%D0%94%D0%B8%D0%BF%D0%BB%D0%BE%D0%BC_%D0%9A%D1%80%D0%B0%D1%81%D0%BD%D1%96%D0%BA%D0%BE%D0%B2%D0%B0.pdf .

3. IEA company https://www.iea.org/reports/outlook-for-biogas-and-biomethane-prospects-for-organic-growth/an-introduction-to-biogas-and-biomethane .

4. Biogas calculator https://www.renergon-biogas.com/en/biogas-calculator/ .

5. PEACS-ECO company https://www.peaks-eco.com/news/history-of-biogas-318.html .

6. Jürgen Koop, Janet Hochi, Jennifer Fulton, Henrik Perssonn «Виробництво і використання біогазу в Україні» May 2012 https://uabio.org/wp-content/uploads/2012/11/biogas-arzinger-handbook.pdf .

7. «Суспільне Новини» journalistic company https://suspilne.media/696202-ukraina-projsla-zimu-povnistu-na-vlasnomu-gazi-cernisov/

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AI and Machine Learning in the Electric Power Industry

Innovation made in the electric power industry through the application of artificial intelligence (AI) and machine learning (ML) are reinventing how we manage and maintain energy systems leading to greater efficiency and reliability.

Let's think about this: "How can artificial intelligence change the management of energy systems?" – AI algorithms analyze large amounts of data collected from sensors, smart meters and other sources to optimize energy production, transmission and distribution. Based on energy demand patterns, AI can adjust production in real time to balance supply and demand. Not only does this reduce waste, it also minimizes the risk of outages and improves the overall stability of the grid.

AI-driven predictive maintenance is also reshaping how we maintain energy infrastructure. Traditional maintenance plans are often based on fixed intervals or reactive approaches, resulting in unnecessary downtime and costs. However, with the help of machine learning algorithms, the health of the equipment can be continuously monitored to detect potential failures early. By predicting when components are likely to fail, AI can plan maintenance and prevent costly failures.

AI-driven grid optimization plays a vital role in integrating renewable energy sources into the power grid. Renewable energy generation, such as solar and wind, is inherently variable and make some problems for grid stability. AI algorithms analyze weather forecasts, and grid conditions to anticipate fluctuations in renewable energy generation. By dynamically adjusting grid parameters and energy flows, AI simplifies integration of renewable energy, maximizing its contribution while maintaining grid stability.

Algorithms analyze historical network traffic data, system logs, and attack records to identify suspicious activity and potential vulnerabilities. By continuously monitoring system behaviour, machine learning models can detect anomalies that indicate a cyber-attack or physical intrusion. These models allow utilities to implement strong cybersecurity measures, strengthen system defences, and ensure the integrity and reliability of energy systems.

One of the primary difficulties associated with machine learning in applications is data quality issues, such as missing values, extreme values, or inconsistencies, can negatively affect the performance of machine-learning algorithms. Also, privacy and security issues must be addressed. Future planned investigations should concentrate on developing methods for cleaning data, combining data, and preserving data privacy in order to ensure the reliability and quality of the data for machine learning purposes.

Power systems are operated in real time, and quick decisions must be made to ensure

the grid is protected. stability and consistency. The machine learning algorithms must be able to scale and have the capacity to processing large amounts of data in real time. As the proliferation of smart grids and Internet of Things As the number of devices increases, the volume of data generated will continue to increase. Future planned investigations should concentrate on creating practical, machine-learning algorithms that can deal with real-world time-based data and information that supports effective decision making in power systems. Techniques such as distributed computing, edge computing, and parallel processing can be experimented with to solve the scalability issues.

In conclusion, the utilization of AI and machine learning in the electric power sector represents a novel approach to effectively managing and sustaining energy systems. AI can transform the industry by enhancing efficiency, reliability, and sustainability while also enabling grid operations optimization, equipment forecasting, and renewable energy sources integration. The electric power sector can expect a new future, environmental consciousness, and enhanced resilience by embracing the power of AI.

Nevertheless, it is important to acknowledge and overcome the obstacles that prevent AI from being widely implemented and adopted in this area.

References:

1. Artificial Intelligence in the Energy Sector: Benefits and Use Cases URL: https://intellias.com/ai-in-energy-sector-benefits/ (accessed: 19.01.2024)
2. Machine Learning Applications in Electric Power Systems: Enhancing Efficiency, Reliability, and Sustainability. URL : https://www.researchgate.net/publication/377978225_Machine_Learning_Applications_in_Electric_Power_Systems_Enhancing_Efficiency_Reliability_and_Sustainability (accessed: 08.01.2024)
3. Artificial Intelligence in the Power Sector URL: https://www.ifc.org/content/dam/ifc/doc/mgrt/emcompass-note-81-05-web.pdf (accessed: 01.04.2022)

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The role of artificial intelligence in rehabilitation therapy

Artificial intelligence has emerged as a transformative tool in various fields, including healthcare. In the realm of rehabilitation therapy, AI is revolutionizing the way patients recover from injuries, surgeries, or manage chronic conditions. By harnessing the power of AI, rehabilitation therapy can become more personalized, efficient, and accessible.

Artificial intelligence plays an important role in rehabilitation therapy, transforming approaches to the treatment and support of patients with various types of limitations and impairments [4]. The use of AI makes it possible to personalize therapeutic approaches, maximize the effectiveness of treatment and improve patient outcomes.

As Oleksandr Wolff, a leading specialist of the International Cooperation Department, Department of Palliative and Hospice Medicine of the P.L. Shupyk National Institute of Health of Ukraine, said: "The use of AI in the field of, for example, physical rehabilitation has great prospects. The development of a suitable computer algorithm (program) significantly accelerated the adaptation of people with an amputated leg to a robotic prosthesis". A description of the development was published in the magazine Institute of Electrical and Electronics Engineer (IEEE) Transactions on Cybernetics.

One of the main advantages of using artificial intelligence is the ability to analyze a large amount of data collected during the rehabilitation process. Through advanced algorithms and machine learning techniques, AI systems can process vast amounts of patient information, including medical records, imaging studies, and real-time sensor data from wearable devices [1]. This analysis helps therapists gain valuable insights into each patient's condition, allowing for tailored treatment plans that address specific needs and challenges. This allows for the development of individualized treatment plans, taking into account the unique needs and capabilities of each patient. For example, machine learning algorithms can analyze data on mobility, muscle activity and other physiological parameters to determine optimal therapeutic strategies.

In addition, AI can be used to develop and support a variety of technologies that facilitate the rehabilitation process. For example, the use of virtual reality in combination with AI algorithms allows you to create interactive simulations that contribute to the restoration of movement functions, coordination and cognitive skills [2].

Moreover, AI-powered rehabilitation devices and systems are changing the landscape of physical therapy. Robotic exoskeletons, for example, can assist patients

with mobility impairments in regaining strength and independence. These devices adapt their assistance levels based on the patient's movements, providing a customized rehabilitation experience. Similarly, virtual reality (VR) platforms offer immersive environments where patients can engage in therapeutic exercises and activities, promoting motor function and cognitive skills in a controlled setting.

Despite its tremendous potential, integrating AI into rehabilitation therapy also poses ethical and privacy considerations. Ensuring the security and confidentiality of patient data, as well as addressing biases in AI algorithms, are paramount to maintaining trust and transparency in healthcare delivery [1; 2]. In addition, AI can support patients during rehabilitation with chatbots or mobile apps that provide advice, medication reminders, and motivation to exercise and achieve goals.

Furthermore, AI-driven telemedicine platforms enable remote monitoring and coaching, extending rehabilitation services to individuals who may face barriers to in-person care, such as those living in rural areas or with mobility limitations. These platforms utilize AI algorithms to analyze patient progress and provide feedback in real-time, empowering patients to take an active role in their recovery journey [3].

In conclusion, artificial intelligence opens up many opportunities to improve rehabilitation therapy, providing innovative approaches to the treatment and support of patients with various types of limitations and impairments.

References:

1. **AI in Rehabilitation Medicine: Opportunities and Challenges. URL:** **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10767220/**

2. **Artificial Intelligence (AI) In Health Care and Rehabilitation.** URL: **https://www.physio-pedia.com/Artificial_Intelligence_(AI)_In_Health_Care_and_Rehabilitation**

3. **How AI is Transforming Rehabilitation and Injury Prevention.** URL: **https://www.rupahealth.com/post/the-future-of-physical-therapy-how-ai-is-transforming-rehabilitation-and-injury-prevention**

4. Nevedomska Y., Zumarkov Y., Korop N. (2023). *Mozhlivosti shtuchnogo intelektu, neyronnikh merezh ta chat-botiv u phizichniy terapii* [Possibilities of artificial intelligence, neural networks and chatbots in physical therapy]. Czech Republic : Vedecka perspektiva [In Ukrainian].

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Alternative Energiequellen für das Haus

Die Gestaltung eines komfortablen Lebens und des Lebens im Allgemeinen ist ohne den Einsatz von Energie unmöglich. Das Problem, es zu erhalten, ist eines der relevantesten heutzutage. Alternative Energiequellen werden neben den traditionellen Quellen zunehmend nachgefragt. Alternative Energien sind eine komplexe, aber vielversprechende Branche. Im Gegensatz zur Endlichkeit verschiedener Rohstoffe ist die Nutzung von Sonne, Wind, Wasser und anderen erneuerbaren Quellen praktisch grenzenlos. Alternative Systeme erfordern keinen Kauf von Kraftstoff und keine aufwändige Wartung. Hier sind nur einige Möglichkeiten, die man beim Bau eines energieeffizienten Hauses nutzen kann: Solarenergie zum Heizen, Warmwasser oder zur Stromerzeugung; Windenergie zur Umwandlung in elektrische Energie; Nutzung der Erd-, Wasser- und Luftwärme zum Heizen des Hauses; die Verwendung von Biokraftstoffen und Abfallprodukten lebender Organismen und anderer spezifischer Technologien. Unter ihnen ist es unmöglich, die wirtschaftlichste und rentabelste Option zu bestimmen, da sie alle abhängig von den Ausgangsbedingungen wirksam sind.

Die Nutzung der Sonnenenergie ermöglicht eine Vielzahl von Solaranlagen, Photovoltaikzellen und Kollektoren verschiedenster Art.
Zu den Vorteilen: Vielseitigkeit. Solarenergie eignet sich zur Wärme- und Stromversorgung. Verfügbarkeit. Die Anwesenheit der Sonne ist ausreichend. Moderne Systeme ermöglichen es den meisten, unabhängig von der Jahreszeit zu sein.
Umweltfreundlichkeit. Dabei entstehen keine schädlichen Emissionen oder andere Verunreinigungen.
Bequemlichkeit. Der Prozess ist völlig autonom und geräuschlos.

Windenergie. Das klassische System geht davon aus, dass die Kraft des Windes das Rad antreibt, dessen Energie auf den Rotor des Generators übertragen wird.
Vorteile: Unerschöpflichkeit. In windigen Regionen ist es eine unschätzbare und fast unerschöpfliche Quelle.
Sicherheit. Windgeneratoren belasten die Umwelt nicht. Einfache Bedienung. Nach der Installation verursacht die Verwendung des Geräts keine Probleme.

Wasserenergie. Im Wohnungsbau sind Wärmepumpen zum Heizen besonders gefragt. Vorteile: Energieeffizienz. Selbst im ungünstigsten Szenario bleibt das System effektiv und rentabel.
Speichern. Zu minimalen Kosten - hervorragende Ergebnisse.

Verfügbarkeit. Die Nutzung von Wasser ist einer der am weitesten entwickelten Bereiche der alternativen Energie, was zur Reichweite und Verfügbarkeit von Geräten beiträgt.

Geothermische Energie. Bei der Geothermie wird die im Erdinneren gespeicherte Wärmeenergie genutzt.

Vorteile: Praktikabilität. Geothermische Quellen werden zur Wärme- und Stromversorgung genutzt. Autonomie. Die Versorgung ist völlig unabhängig von Jahres- und Tageszeit.

Effizienz. Unter günstigen Bedingungen ist es tatsächlich eine unerschöpfliche und stabile Quelle.

Die Auswahl alternativer Quellen für das Haus. Die wesentlichen Nachteile bleiben bei allen Systemen gleich. Dies ist vor allem die Abhängigkeit vom Wetter und den klimatischen Gegebenheiten der Region, die Kosten für die Ausrüstung. Eine kompetente Auswahl und Organisation alternativer Energieversorgung ist eine der Grundlagen für den Bau von Passiv- und Multikomfort-E-Häusern. Die Hauptkriterien sind die territoriale Lage und die klimatischen Bedingungen, die Geländemerkmale, der Zugang zu bestimmten Ressourcen, die Möglichkeit und die Kosten für die Installation von Ausrüstung. Jede der Optionen bewältigt die Aufgaben in ihren spezifischen Fällen am besten. Darüber hinaus wird der Preis für Geräte, die mit alternativen Quellen betrieben werden, in Bezug auf die Kapazität gebildet. Beispielsweise kostet eine 20-W-Wärmepumpe 20.000 Euro und eine 4-W-Wärmepumpe 4.000 Euro. Daher ist der Einsatz alternativer Systeme in E-Haus-Passivhäusern sinnvoll und kostengünstig. So können Sie gleichzeitig Kosten minimieren, sich um die Welt um Sie herum kümmern und die bequemsten Bedingungen für Ihr eigenes Leben schaffen.

Vor- und Nachteile der Solarenergie. Laut Experten haben alle nicht-traditionellen Energiequellen viele unbestrittene Vorteile, obwohl sie nicht ohne Nachteile sind. Der Hauptvorteil ist die Erhaltung der Reinheit der Umwelt und das absolute Fehlen schädlicher Emissionen in die Atmosphäre. Zu ihren Hauptnachteilen gehört die ungleichmäßige und unregelmäßige Leistung, die tagsüber oder in anderen Zeitintervallen erzeugt wird. Darüber hinaus hängt es von der Anzahl der Sonnentage pro Jahr in einem bestimmten Gebiet ab. Beispielsweise wird an bewölkten Tagen oder mit Beginn einer längeren Regenperiode sowie nachts die Stromproduktion eingestellt. Und im Gegenteil, die an schönen und klaren Tagen produzierte Strommenge ist übermäßig und übersteigt den Bedarf der Verbraucher. Dies erfordert den Kauf von Batterien, deren Preis deutlich über den Kosten der produzierten kWh liegt.

Vor- und Nachteile der Windenergie. Seit der Antike nutzt die Menschheit die Windkraft als alternative Energiequelle. Ein Beispiel dafür sind die bekannten Windmühlen. Ihre moderne Version ist ein Windkraftwerk. Das Gerät wandelt die kinetische Energie bewegter Luftströme in elektrische Energie um. Mehrere an ein Netz angeschlossene Windmühlen werden zu einem Windpark zusammengefasst. Eine solche Energiequelle und eine darauf basierende alternative Energieform gehören zu den

billigsten. Zu den unbestrittenen Pluspunkten gehören auch Kompaktheit, absolute Sicherheit für die Umwelt, hohe Wartbarkeit von Windkraftanlagen und die Möglichkeit ihrer Installation in der Nähe von Verbrauchern. Ein schwerwiegender Nachteil ist das Vorhandensein von Lärm, den die Windkraftanlage erzeugt. Auch das Absterben von Zugvögeln, die in die Rotorblätter des Generators fallen, ist als negativer Nebeneffekt zu werten.

Wasserkraft: Stärken und Schwächen. Die Menschheit nutzt die Energie bewegter Wasserströme als unkonventionelle Energiequelle in mehreren Arten von Generatoren. Ihre erste Kategorie arbeitet aufgrund der natürlichen Strömung und wird an den Flüssen installiert. Die zweite wurde entwickelt, um die Kraft der Meeres- oder Ozeangezeiten zu nutzen. Die dritte, die derzeit getestet wird, entfernt den „Schaum vom Wellenkamm", indem sie die Energie der Meereswellen nutzt. Die ersten beiden Generatortypen sind seit langem erfolgreich getestet und funktionieren. Der Haupt- und Hauptvorteil dieser Art von alternativer Energie ist die absolute Sicherheit für die Umwelt. Als nachteilig werden die begrenzt möglichen Einbauorte und die hohen Kosten für Sonderausstattungen angesehen.

Vor dem Hintergrund der jährlich steigenden Energiepreise in der Ukraine ist die Wahl vielversprechender alternativer Energiequellen für die Stromversorgung von Vorstadtgebäuden und privaten Wohngebäuden die beste Option. Unter den Vorteilen: hohe Autonomie der Arbeit; Minimierung des Stromverbrauchs aus dem zentralen Netz; die Fähigkeit, bei allen Wetterbedingungen Wärme zu erzeugen; absolute Sicherheit für Umwelt und Mensch; die Fähigkeit, den Energieverbrauch ohne Einschränkungen zu erhöhen; die Fähigkeit, Gebäude mit Strom zu versorgen, die sich weit entfernt von Versorgungsunternehmen befinden.

Literatur

1. Beste, D., Kälke, M. (Hrsg:): Erneuerbare Energien - warum wir sie dringend brauchen, aber kaum nutzen, VDI-Verlag, Düsseldorf, 1996 S. 33-38.

2.Dr. Wolfhart Dürrschmidt, Elke Hammer (BMU) (2009). Erneuerbare Energien - Innovationen für eine nachhaltige Energiezukunft. Berlin S. 151.

3. Касич А.О. Альтернативна енергетика: світовий та вітчизняний досвід / А.О. Касич, Я.О. Литвиненко, П.С. Мельничук // Наукові записки. Економіка. – Острог : Острозька академія, 2013. – Вип. 23. – С. 43–47.

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The relation between the content of germanium and beryllium in the coal seam c_5^B of the Ternivska mine field of Western Donbas

The general relevance of the study of the content of germanium in coal seams is conditioned by the possibility of its industrial extraction and use as a valuable accompanying component.

The factual basis of the work was the results of analyses of the content of germanium and beryllium in the coal seam c_5^B. The content of germanium and beryllium was determined by quantitative emission spectral analysis. Using the STATISTICA 13.3 and IBM SPSS Statistics 22 programs, the values of the main descriptive statistical indicators were calculated. Correlation and regression analysis was carried out using the methods implemented in the Micromine program and their analysis was carried out in geological terms.

Previous studies were related to the study and analysis of the distribution of germanium in individual coal seams of mines in the Pavlohrad-Petropavlivka area of Donbas [1-2]. At the initial stage of primary geochemical information processing, using STATISTICA 13.3 and IBM SPSS Statistics 22 programs, the values of the main descriptive statistical indicators were calculated, frequency histograms of germanium content and coal thickness were constructed, and the characteristics of the distribution of these parameters were established.

When constructing frequency cumulative histograms, the number of intervals was calculated according to Herbert Sturges' formula:

$$n = 1 + [\log_2 N],$$

where n is the number of intervals, $\log_2$ is the logarithm based on 2, N is the number of analyses, [x] denotes the whole part of the number x.

To achieve the goal set in the work, correlation and regression analysis was carried out in the research process using methods implemented in one of the most popular professional mining and geological information systems for 3D modeling of deposits, statistical processing of mining and geological data and construction of actual mine workings and planning of mining operations - Micromine (license MM5123); and their analysis in geological concepts was performed.

In the field of the Ternivska mine, the concentration of germanium in the coal of seam c_5^B according to the data of 57 analyses varies from 5.6 g/t to 29.53 g/t, with an average value of 13.69 ± 0.57 g/t, a median of 12 .36 g/t, standard deviation 4.27, sample variance 18.26, sample kurtosis 4.48, sample asymmetry 1.86.

The content of beryllium at the sampling sites varies from 1.6 g/t to 10.5 g/t, the average value is 4.26 ± 0.29 g/t, the median is 3.6 g/t, the standard deviation is 2.19, variance 4.79, kurtosis 1.06, asymmetry 1.28.

Visual analysis of the given histograms (Fig. 1-2) indicates: non-compliance of all samples with the normal or lognormal law of distribution; in all cases, the polymodality of the distribution of indicators is fixed; on all frequency histograms, the kernel of the distribution density is shifted to the left.
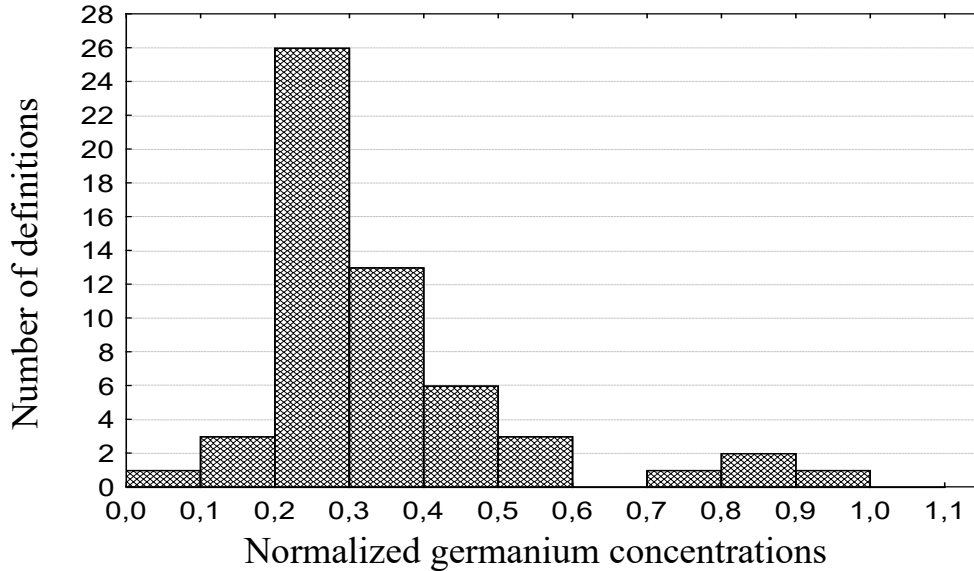
Fig. 1. Frequency histogram of normalized values of germanium concentrations
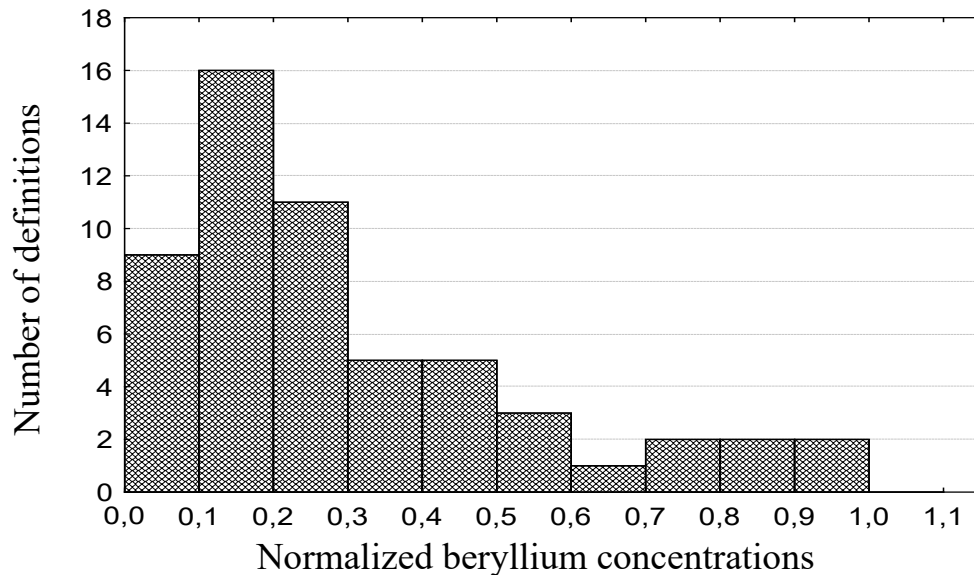
Fig. 2. Frequency histogram of normalized values of beryllium concentrations

The relation between the content of germanium and the concentration of beryllium in the coal seam, according to the results of analyses on the Chedok scale, taking into account the data of correlation (Pearson's linear correlation coefficient 0.27) and regression analyses is direct and very weak. Figure 3 shows the graph of the result of the regression analysis of the modeling of the linear relationship between the concentration of germanium and beryllium. The regression equation for this model is: Ge = 0.279 + 0.199 x Be.
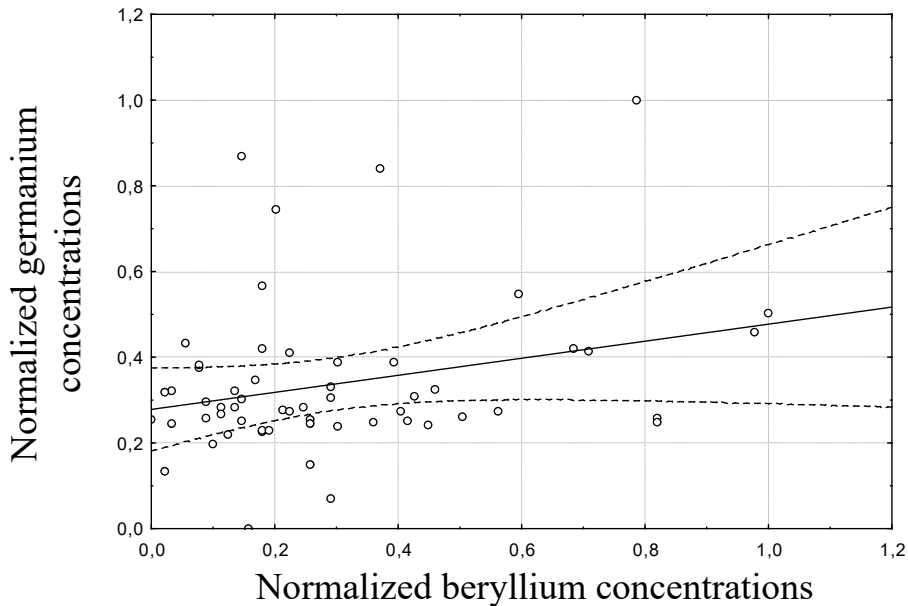
Fig. 3. The result of linear relationship modeling regression analysis
between normalized concentrations of germanium and beryllium

It has been proved that the distribution of germanium and beryllium concentration values in coal seam c_5^B of the Ternivska mine field differs from the Gaussian-Laplace and lognormal distribution, in all cases the polymodality of the distribution is fixed and the density kernel of the distribution is shifted to the left. The simultaneous increase in the content of germanium and beryllium in the area of their low and abnormally low concentrations is caused by the joint accumulation of these elements at the syngenetic stage of coal seam formation, and their increase in the area of maximum contents is caused by the manifestation of the empirical regularity of the "Zilbermints law". Despite the insufficient study, it can be assumed that the forms of occurrence of the studied elements and their ratio in coal with their concentrations around Clark and in coal with increased contents of these elements differ significantly.

References

1. Ishkov V.V., Kozii Ye.S., Chernobuk O.I. (2023). Geochemical peculiarities of germanium, arsenic, mercury, beryllium, fluorine and total sulfur in the $c_8^{\text{н}}$ coal seam of the Dniprovska mine field. Collection of scientific works "Geotechnical Mechanics". No. 164, pp. 21-36. https://doi.org/10.15407/geotm2023.164.021

2. Chernobuk O., Ishkov V., Kozii Ye., Kozar M., Pashchenko P., Dreshpak O. (2023). Germanium relationship with ash and "toxic" elements in coal on the example of seam c_5 of the Blahodatna mine field of Western Donbas. Sci. Papers of DONNTU Series: "The Mining and Geology. No. 2(30). pp. 68-79. https://doi.org/10.31474/2073-9575-2023-2-30-68-79

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How to Get the Most out of a Small Drone

In December 2023 president Zelenskyi stated that 1 000 000 drones would be crafted here in Ukraine by 2024. Those include all kinds of UAV's you could ever hear of: from basic FPV drones to the strategic or combat ones, which can be up in the sky for up to 10 hours.

The full-scale war made us all learn a lot about types of weapon, so most Ukrainians must have already heard of "Leleka", "Furiia", "PD-2", "Raybird-3" or any others. The former ones are most common, which can be explained by their comparatively low cost and easy assemble process.

The internet is full of guides about how to make one and its part can be ordered from sites like AliExpress in one click. This makes quite a few people get into FPV drones production in order to satisfy the urgent needs of the military.

Though those small killing birds might seem to be a single-use flying bomb, whose only purpose is to get to the destination and destroy the enemy, there is a whole horizon of technological improvements that can be made to not only make FPV drones easier to use, but also boost their effectiveness.

To begin with, I find it important to state that none of the information below contains details that have to be kept a secret as all of it is already well known by our Eastern neighbour and can be easily found in the Internet.

The first change that needs to be made is not directly connected with engineering innovations but I consider it worth mentioning. Currently we are dependent on component parts and the main supplier of them is quite obviously China. The Red Dragon is a partner of our enemy and hinging on its produce can play a cruel joke. Chinese suppliers can limit export or set an inflated prices on products that are in high demand. Moreover, our Western neighbour's actions led to troubles with import, which became yet another impetus for action.

In the beginning of 2024, the news about the start of FC (Flight Controller) manufacturing by "Wild Hornets" spread all over social networks. Those were short videos showing the manufacture process without adding any extra details. Not much had been told about their characteristics, but this could be considered as making first steps in the production localisation process. Unfortunately, unless the production is scaled, the self-cost of those circuit boards will be higher than their imported version from China.

Next important thing is improving FPV's efficiency. One way to do it is by solving the problem of drones not exploding when needed. Adding a backup method of detonating is the most apparent way of fixing this. The two main approaches include

dropping a bomb right above the aim and using the drone as a kamikaze. To secure them several additional systems can be added.

Firstly, to make sure that the contact between a FPV and an enemy triggers an explosion two special wires can be installed in the front part of the vehicle. Those are connected to an initialisation board and form a half circle. Once they touch each other due to a contact with a target, the circuit is completed and this leads to an outburst.

One more conceivable idea includes pre-programming. For instance, a drone can be programmed to explode within several seconds after losing connection with its operator.

Another betterment worth attention is implementing AI technology. Using it could also be one of the possible solutions of the previous problem: once the connection between an operator and a drone is lost, the latter will be self-guided to the aim. Other than that, AI can simplify the steering by stabilizing the drone. Moreover, it can scan the surroundings and alter the route in order to avoid large obstacles. At the currents stage of AI introduction, it cannot fully operate without human's help, but their tandem is definitely promising.

AI technologies are a rather new field of engineering, so Ukrainian specialists are in a need of foreign experts' help. Luckily, countries like Sweden, the United Kingdom and Netherlands have agreed to share advanced technology knowledge.

When we speak about drone's usage on the battlefield, the mentioning of REW is inevitable as it is one of the main ways to protect oneself from the blast. Therefore, it is worth adding at least some peculiar ideas of how to avoid the electronic warfare work.

The most obvious way is creating a drone the operates on the frequency that cannot be detected by enemy's REW. This means going much lower on the spectrum. Currently most REW operate on the frequency of around 780-915 MHz. Thus, in order to avoid it, drones' frequency should be around 750 and lower.

Recently Russian drones were noticed even at 600 MHz, which is really low and we cannot withstand them using electronic warfare. In the "war of frequencies" we certainly should not lag behind and knowledge concerning Russian innovations should make us think far ahead.

A rather ingenious concept was spotted by our soldiers in the beginning of spring 2024. Russians used a "wired drone" for attacking our positions and it somehow managed to remain intact. After this unusual looking thing was passed to the specialists, they explained that the spool installed on the drone was coiled with thin optical fiber cable measuring 10 kilometres in length [Militarnyi, 2024]. The cable was unwound in the air while the drone on its way to our positions. Thus, Ukrainian REW would have no effect on this FPV's flight and our soldiers would have to think of a different countering strategy on spot.

What makes this case even more curious is that a similar idea was presented on a hackathon here in Ukraine some time ago but judges decided that it was unpromising. Thus, we did not even give it a try.

To conclude, FPV drones are like a constructor that has loads of instructions about how to assemble one on-line and this makes them comparatively cheap. This encourages more and more people to start their own production, which is great for our defence capability. In order to maximize the effectiveness of those enthusiast a number of alternations should be implemented. However, most of them require certain skills that require one's education and experience.

Therefore, engineers from variable fields should unite as well as be brave in the process of idea generation and introduction. Such teams should always think a step further in order to "forecast" and avoid sudden troubles as they might cost someone's life. They also ought to keep an eye on what our foe is creating and using against us on the battleground so that we have an advantage, which is crucial for wining this war.

References:

1. Войцехівська Ю. Україна розробляє дрони зі штучним інтелектом. ГЛАВКОМ. URL: https://glavcom.ua/techno/devices/ukrajina-rozrobljaje-droni-zi-shtuchnim-intelektom-985037.html (дата звернення: 25.03.2024).
2. В Україні розробили політний контролер для дронів. Militarnyi. URL: https://mil.in.ua/uk/news/v-ukrayini-rozrobyly-pilotni-kontrolery-dlya-droniv/#google_vignette (дата звернення: 25.03.2024).
3. Донець О. В Україні тестують FPV-дрони зі штучним інтелектом, які можуть уразити ціль після втрати зв'язку. hromadske - Останні новини дня, всі надзвичайні новини в Україні читайте на Громадському | hromadske. URL: https://hromadske.ua/posts/v-ukrayini-testuyut-fpv-droni-zi-shtuchnim-intelektom-yaki-mozhut-uraziti-cil-pislya-vtrati-zvyazku (дата звернення: 25.03.2024).
4. Дрони зроблені в Україні: розвідники, бомбери та далекобійні камікадзе. Militarnyi. URL: https://mil.in.ua/uk/articles/drony-zrobleni-v-ukrayini-rozvidnyky-bombery-ta-dalekobijni-kamikadze/ (дата звернення: 25.03.2024).
5. Росіяни застосували «провідний» FPV-дрон. Militarnyi. URL: https://mil.in.ua/uk/news/rosiyany-zastosuvaly-providnyj-fpv-dron/ (дата звернення: 26.03.2024).
6. Свиридюк Ю., Галка Н. ЗСУ тестують дрони зі штучним інтелектом – Сухаревський. Суспільне | Новини. URL: https://suspilne.media/665996-zsu-testuut-droni-zi-stucnim-intelektom-suharevskij/ (дата звернення: 25.03.2024).

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ServoDirekt-Technologie

Die Stanz- und Umformtechnik ist ein wichtiger Teil der industriellen Fertigung und wird bei der Herstellung unterschiedlichster Teile und Produkte eingesetzt. Typische Einsatzbeispiele sind z. B. die Fertigung von Münzen, Fahrzeugteilen, elektrischen Maschinen, Möbeln u. s. w. Man ist daher bestrebt, neue Pressen-konzepte mit besserem Wirkungsgrad und für flexible Betriebsabläufe zu entwickeln.

Dabei unterscheidet man z. Zt. die drei nachfolgend angegebenen Klassen von Umformmaschinen, die sich durch ihre jeweiligen charakteristischen Vorgaben für das Arbeitsvermögen, den Weg- und/oder für den Kraftverlauf unterscheiden: arbeits- bzw. energiegebundene Umformmaschinen (Hämmer und Spindelpressen), weggebundene Umformmaschinen (mechanische Kurbel- und Exzenterpressen) und kraftgebundene Umformmaschinen (Hydraulikpressen) [1].

Neu sind in diesem Zusammenhang die sog. Servopressen, die bei der Fa. Schuler GmbH unter der Bezeichnung ServoDirekt-Technologie entwickelt und vertrieben werden und heute einen neuen Standard für Pressenlinien darstellen.

Die Basis dieser Technologie beruht auf der Konstruktion von Exzenterpressen. „ServoDirekt-Technologie heißt, dass der bisherige frequenzgeregelte Drehstrom-motor mit konstanter Drehzahl durch flexible Torque-Servomotoren ersetzt wird. Die Anlagen kommen ohne Schwungrad aus, außerdem entfallen Kupplung und Bremse. Der wesentliche Vorteil der Servoantriebstechnik liegt darin, dass die Stößelkinematik frei programmierbar ist. Dabei sind höhere Produktionsleistungen im Vergleich zu konventionellen Pressen." [2]

Dank der dabei möglichen frei programmierbaren Stößelkinematik kann man in der ServoDirekt-Technologie außer dem Normalbetrieb als Exzenterpresse (weg-gebundener Betrieb) nun auch einen Betrieb als Hydraulikpresse (kraftgebundener Betrieb) und den sog. Hammerbetrieb (energiegebundener Betrieb) realisieren. Dies macht die neuen Servopressen praktisch multifunktional und somit universell einsetzbar.

Als besonders interessant gelten dabei der Hammerbetrieb und die kraftgebundene Umformung.
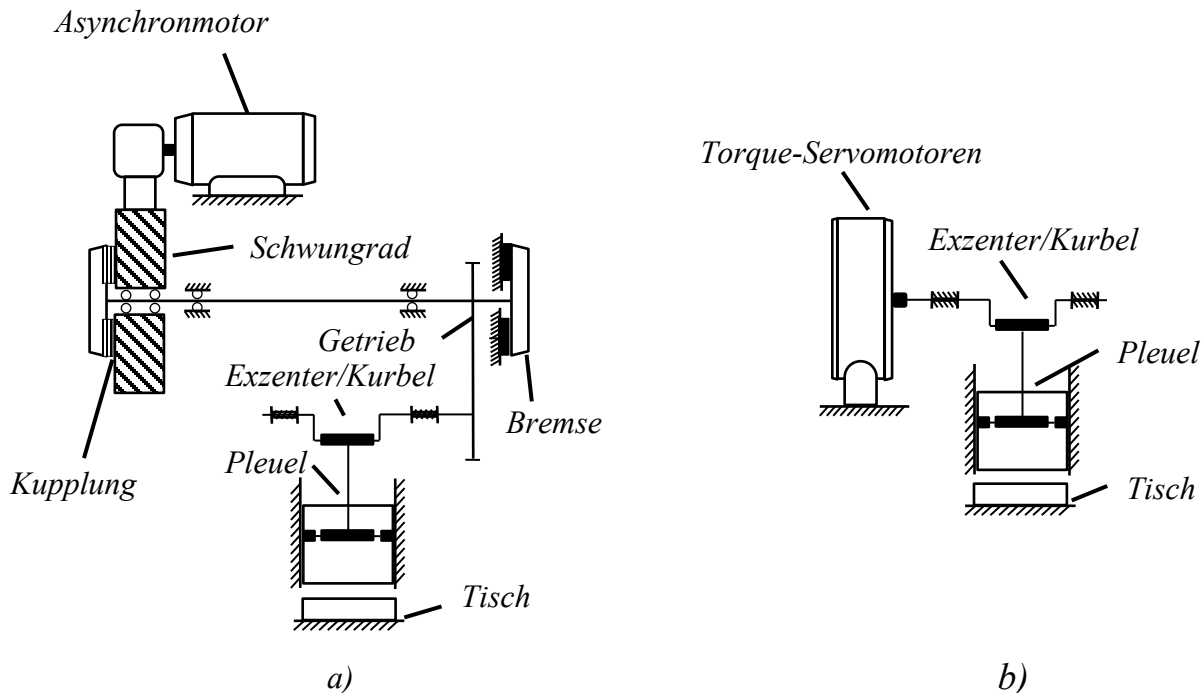
Bild 1 Elektrischer Pressenantrieb
a) konventionelle Kurbel-/Exzenterpressen   b) Servopressen

Dazu zeigt Tabelle 1 einen Vergleich der Produktionsleistungen mit konventionellen Pressen und mit Pressen in der neuen ServoDirekt-Technologie. Tabelle 1 Vergleich der Produktionsleistungen zwischen konventionellen Pressen und mit Pressen in der ServoDirekt-Technologie [2].

Formteil	Presskraft, kN	Ziehtiefe, mm	max. Hubzahl konventionell	max. Hubzahl Servo	Steigerung
Flansch	1.200	30	30	56	+87%
Halter	2.000	40	30	60	+100%
Käfig	2.400	50	30	50	+67%
Mittelkonsole	6.000	190	12	17	+42%
Querblech	4.000	90	23	33	+43%

Diese Beispiele zeigen, dass die Produktionsleistungen durch die neuen Servopressen um ca. 40…100 % im Vergleich zu den konventionell angetriebenen mechanischen Pressen gesteigert werden können [2, 3, 4].

Die besonderen Vorteile der ServoDirekt-Technologie sind [5]:

1. hohe Wirtschaftlichkeit durch hohe Verfügbarkeit bei optimalen Ausbringungsleistungen;

2. beste Bauteilqualität selbst bei komplexen Teilen;

57

3. große Flexibilität durch anpassbare Stößelbewegungen;

4. bessere Energieeffizienz im Vergleich zu konventionellen Pressen;

5. maximale Prozesssicherheit.

Daraus ergeben sich dann folgende besonderen Anforderungen an die elektrischen Antriebe und das Steuerungssystem für eine neue C-Pressen-Generation in der ServoDirekt-Technologie entwickelt und optimiert:

1. hohe Drehmomente sowohl beim Betrieb als auch im Stillstand

2. bester Wirkungsgrad

3. hochdynamisch und für Servobetrieb geeignet

(bis 500 Hübe pro Minute im Hammerbetrieb)

4. hohe Positioniergenauigkeit im kraftgebundenen Betrieb

5. Drehzahl- und Drehmomentregelung für beliebige Vorgaben

6. Drehmomentwelligkeit < 2 % des Nenndrehmomentes.

Quellen:

1. E. Doege: Handbuch Umformtechnik, 2007 Druckerei: Springer-Verlag Berlin Heidelberg, ISBN-10 3-540-23441-1.

2. Fa. Schuler Pressen Gmbh, Massivumformung mit ServoDirekt Technologie, 2013, https://pdf.directindustry.de/pdf/schuler-mueller-weingarten/massivumformung-servodirekt-technologie/13229-592414.html

3. Fa. Schuler Pressen Gmbh, Stanz- und Umformsysteme mit ServoDirekt Technologie, 2014, https://www.hieke.com/de/downloads/stamping_cutting_broschuere_stanzsysteme_umformsysteme_servodirekt_d.pdf

4. Fa. Schuler Pressen Gmbh ,Servopressen in Monoblockbauweise Kompakt, flexibel und wirtschaftlich, 2011, https://hieke.com/de/downloads/blechumformung_stanzautomaten_umformautomaten_broschuere_servopresse_monoblock_d.pdf

5. Fa. Schuler Pressen Gmbh ,C-frame presses and stamping presses, 2015, https://pdf.directindustry.com/pdf/schuler-mueller-weingarten/c-frame-presses-stamping-presses/13229-670888.html

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What is happening with radio technology now and what awaits it in the future?

At the moment, the world is developing very quickly in the field of computer technologies, which is not the case with radio engineering. For example, even in the last century, such products as the electronic computer, telephones, wireless communication, the Internet and many other things, which cannot be said about our century, were invented. Even a quantum computer began to be developed in the early 1980s, when physicist Paul Benioff proposed a quantum mechanical model of a Turing machine [1]. After that, we can ask: "What can be invented today if everything has already been invented, if all the important products we use or hear about were developed forty years ago?" We try to answer this question.

The first innovation in radio engineering that we will talk about today will be 5G communication. This is a relatively new mobile communication standard that can offer us increased bandwidth and Internet speed. Scientists were able to achieve this by using the two main frequency bands FR1 and FR2, which theoretically provides a speed of up to 20 gigabits per second [2]. In theory, if you use private 5G networks, you can significantly reduce the cost and speed up various processes in various locations, in particular industrial, construction and transport, due to unlimited use of the Internet [3]. It is also impossible not to mention that 5G will advance the creation of flying cars, smart cities, virtual reality and network robots. All this, of course, is due to higher speed, because it will allow data to be transferred not to your smartphone, for example, but immediately to the server. Since it is created on the basis of millimeter waves, they fade out quite quickly. In order to solve this problem, small base stations will be used, MIMO arrays will be used to increase the number of data transmission and reception ports, and BeamForming technology will be used to reduce wave interference [4]. This concludes the story of 5G, and we move on to quantum communication.

Quantum communication technology is essentially a very secure transmission of information using the properties of quantum particles, in particular photons. The main feature of this method is the use of quantum entanglement, which allows two particles to instantly sense changes in each other's state regardless of the distance between them. Obviously, this contributes to the protection of information and affects the fact that it is impossible to intercept it. In general, the first successful experiments in this field began as far back as 1984. Now this technology is used in banking, or where a high level of data security is required. A great achievement can be considered the fact that in 2016 China launched a quantum communication satellite that allowed such experiments to be

carried out at very long distances. Quantum communication can also be used in high-precision measuring devices. For example Rydberg atomic sensors are very sensitive to electromagnetic fields, which makes it very useful in complex electromagnetic conditions[5] Now we will talk about quantum entanglement to better understand its nature. All fundamental particles have one common property - spin. This name was born in analogy with the name of rotation, although the particles do not rotate. on the other hand, particles have momentum and orientation in space. We can measure the numerical value of spin if we first choose in which direction to measure it. If the direction of measurement coincides with the direction of spin, then this spin is called spin up and vice versa, if it does not coincide, then it is spin down. It also happens that the spin, for example, is vertical and we measure it horizontally, in this case there will be a fifty-fifty chance that the spin will be directed up or down. After measuring the spin, interestingly, it keeps the direction. Now remember one of Einstein's experiments. Spontaneously received two particles of energy, we know that the moment of momentum is always conserved. This means that if one particle has an upward spin, another measured in the same direction will have a downward spin. It can be assumed that all particles are born with a predetermined spin, but this is where strange things begin, because this is not the case. All this because the spins are entangled with each other and simultaneously have opposite spins, which follows from the laws of quantum mechanics and is the principle of quantum communication [6].

The next innovation is satellite communication. It uses space satellites to transmit and receive signals between different points on Earth. In fact, it can be used in various cases, from telecommunications to navigation and communication. Obviously, satellites have different frequencies and they, in turn, are used for different tasks. For example, there is the C band for data transmission by large organizations and the Ku band for satellite television, which, by the way, is sensitive to weather conditions. Starlink, which was developed by SpaceX, can now be considered a major innovation in this field. It was created to provide access to broadband Internet in any part of the globe. The system started with test launches in 2018 and has currently deployed about 10,000 satellites. This, by the way, caused a lot of concern on the part of people and some organizations. Now it's time to talk about the technical characteristics of these satellites. At the moment, 4 different versions of starlink have been released, although it cannot be said that they are very different from each other. Their mass is 260 kilograms, they have a coating to reduce the ability to reflect sunlight, their Internet speed for download is 11-60 megabits, for sending data 5-18 megabits per second. The delay, in turn, is 20-94 milliseconds. You need a special antenna to use their Internet [7].

We consider it is obvious that all three directions will develop. As for quantum communication, we think that eventually it will start to supplant conventional communication in military and peaceful areas where great privacy is required. Also, in the near future, quantum computers will be very advanced and ready for complex calculations that would take years for ordinary computers in the shortest possible time.

Unfortunately, at the moment, they are rather experimental samples, since their power is not enough to solve the above tasks. We are also sure that the expansion of the Internet of Things will take place. This technology requires efficient and energy-efficient data transfer between billions of devices, so it will develop very quickly. It is also impossible not to mention the prospects for the development of satellite communication. The SpaceX company plans to launch another 30,000 satellites to completely cover the globe with the Internet. All this will develop in the coming years and the field of radio engineering will be as important as it has been for the last 100 years.

References:

[1] - Дипломна робота на здобуття ступеня бакалавра за освітньо-професійною програмою «Системи і методи штучного інтелекту» спеціальності 122 «Комп'ютерні науки» на тему: «Квантова реалізація класифікатора методом опорних векторів (SVM)». URL: https://ela.kpi.ua/server/api/core/bitstreams/a4a76294-66a4-47d0-9488-be304adfc077/content

[2] – Нова ера зв'язку. Що таке 5G та як ця технологія змінює Європу. EU4Digital. URL: https://eufordigital.eu/uk/a-new-era-in-communication-what-is-5g-and-how-is-this-technology-changing-europe/

[3] – Потенціал технологій 5G для відбудови та розвитку України. Національний інститут стратегічних досліджень. URL: https://niss.gov.ua/doslidzhennya/natsionalna-bezpeka/potentsial-tekhnolohiy-5g-dlya-vidbudovy-ta-rozvytku-ukrayiny

[4] – 5G. Вікіпедія. URL: https://uk.wikipedia.org/wiki/5G

[5] – Квантова мережа. Вікіпедія. URL: https://uk.wikipedia.org/wiki/%D0%9A%D0%B2%D0%B0%D0%BD%D1%82%D0%BE%D0%B2%D0%B0_%D0%BC%D0%B5%D1%80%D0%B5%D0%B6%D0%B0

[6] – Quantum Entanglement & Spooky Action at a Distance. Veritasium. URL: https://www.youtube.com/watch?v=ZuvK-od647c

[7] – Starlink. Вікіпедія. URL: https://uk.wikipedia.org/wiki/Starlink

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Features of Thermowood Machining on CNC Machines

Thermowood is an innovative, high-quality product of the 21st century that is more stable and durable than natural wood, as it is processed at high temperatures in chambers with limited oxygen access, with a multi-stage heating mode, and without the use of any chemicals. The manufacturing technology is quite simple, as the wood does not contain any cellulose or resins after high temperature treatment. It changes the structure of the wood fibre, which leads to high exploitation characteristics and a dark glossy colour.

Production technology

The production technology for thermowood includes three phases: heating (up to 200-240°C, depending on the type of wood and the properties we want to achieve), drying, and holding at high temperatures.

- In the first phase, the material is heated to a temperature of more than 200C° and treated with steam. Steam not only protects wood from fire but also changes its natural chemical properties.

- The second phase is intensive steam drying.

- In the third phase, the temperature causes colour changes and achieves new qualities, and removes resins from the wood[1].

Types of thermowood

- Class 1: Processed at temperatures above 210°C. As a result of the treatment, it increases stability to decay by 3-4 times, but at the same time it decreases flexibility and elasticity. Such wood is used to make high-quality lumber, garden and park structures, finishing panels and floors, home and garden furniture, doors, etc.

- Class 2: Processed at temperatures above 230°C. Thermowood with this class of treatment is recommended in cases where maximum stability against decay and wetness is required. For example, for windows, exterior wall decoration, outside products (balconies), yacht decoration, etc.

As a result, as the resistance to deformation increases, flexibility, plasticity and mechanical strength decrease, so it is not recommended to use thermowood in load-bearing and supporting structures.

Properties that thermowood takes on

- After heat treatment, the surface of the material repels water and does not take in water from the air. The advantages of this material also include lower weight (10-15%) compared to natural wood.
- The moisture of thermowood is only 2...3%, which is significantly less than after industrial drying. As a result, its heat capacity is reduced. Moisture absorption is reduced by five times. Drying of the accumulated moisture is ten times faster. Even with prolonged contact with moisture, the maximum moisture of the material does not rise above 8-10%.
- Dimensional stability. Products made of thermowood do not warp, do not dry out and keep their geometric dimensions in all weather conditions;
- Thermal insulation. The thermal isolation properties of the material increase by 30%, which makes thermowood an ideal material for saunas, baths, and building facades.
- Eco-friendly, as no chemical additives are used during heat treatment, only steam and temperature. As a result, the product is 100% environmentally friendly and neutral to the human body. The smell of wood is also kept.
- The compressive strength and hardness increase by more than 50%;
- Thermowood is a less fire-hazardous material than natural wood. Its fire point is 60-80°C higher than that of natural wood. [2].

Comparison of thermowood and natural wood

The Modulus of Elasticity (MOE) and Modulus of Rupture (MOR) are two important mechanical properties of wood. Figure 1 shows the MOR was gradually decreased with an increase of temperature and duration. For example, the MOR was gradually decreased from 203.85 MPa of the control sample to 169.28 MPa of TM-200-9. The decrease of MOR was mainly due to the acceleration of the thermal degradation of hemicellulose at higher temperatures and longer durations. Ayrilmis et al. reported that after TM at 180 °C, the MOR and MOE of eucalyptus wood fibers decreased by 5–19% and 7–22%, respectively. The decrease of MOR was highly related to the thermal
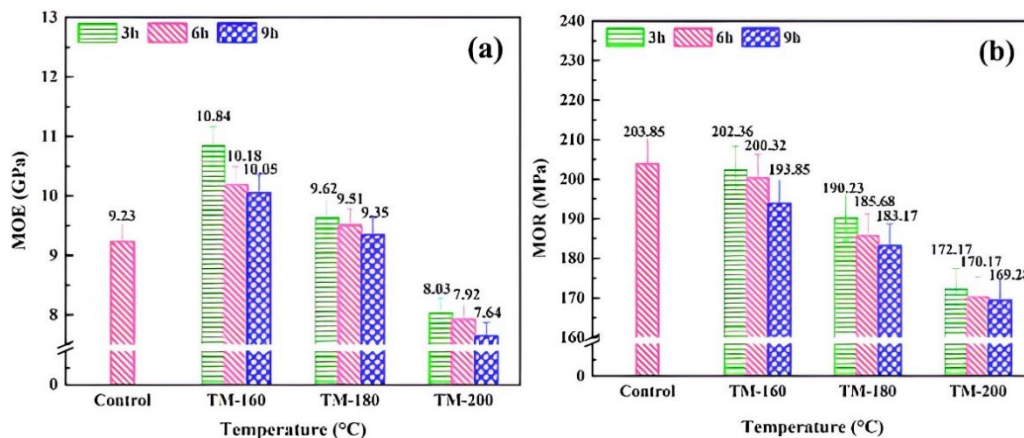
Figure 1 - Effect of thermal modification on MOE (a) and MOR (b).

degradation of cellulose and hemicellulose[3].

Features of mechanical processing of thermowood

Machining thermowood is easier because it is free of resin and the effect of dimensional changes is significantly reduced. Good results can be achieved with hard metal tools, which are usually used for harder woods. During machining of thermowood on a CNC machine, it is necessary to follow the basic recommendations for high-quality processing of thermowood: milling similar to working with brittle and hard wood; use a cutting tool made of hard metals, as well as increasing the front and back cutting corners, increasing the cutting speed.

The only problem is the dust in the air. As the material is very dry, the dust is extremely dispersed and easily spreads everywhere. This has to be taken into account when designing suitable ventilation systems. As with any other type of wood, there is a risk of dust explosion under certain conditions[4].

Areas of use

Facades, interiors, individual elements of landscape design (terraces, verandas, etc.), wet rooms (saunas, bathrooms, pool areas), yacht building: for facades, furniture and exclusive interior decoration. [5].

References:

1. Thermowood – Introduction, Pros, Cons, And Uses. URL: https://wooddad.com/thermowood/#What_is_Thermowood (date of access: 26.03.2024).
2. 1. Hill C., Altgen M., Rautkari L. Thermal modification of wood–a review: chemical changes and hygroscopicity. Journal of Materials Science. 2021. Vol. 1. P. 6581–6614.
3. New Perspective on Wood Thermal Modification: Relevance between the Evolution of Chemical Structure and Physical-Mechanical Properties, and Online Analysis of Release of VOCs / J. Xu et al. *MDPI* - Polymers. 2019. Volume 11, Issue 7. URL: https://www.mdpi.com/2073-4360/11/7/1145 (date of access: 26.03.2024).
4. Kučerka M., Očkajová A. THERMOWOOD AND GRANULARITY OF ABRASIVE WOOD DUST.
   URL: https://df.tuzvo.sk/sites/default/files/04-02-18.pdf (date of access: 26.03.2024).

5. Thermally modified wood. Wikipedia.
   URL: https://en.wikipedia.org/wiki/Thermally_modified_wood (date of access: 26.03.2024).

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Solar windows as a solution for power outages in Ukraine

Solar energy has the potential to alleviate the humanitarian crisis in Ukrainian communities by creating decentralised renewable energy sources. This would ensure a reliable power supply to critical infrastructure, such as hospitals and water utilities, thus allowing residents to maintain access to electricity and water services, even during challenging situations [1].

One of the ways to decentralise power generation is solar windows technology. Solar windows are essentially transparent solar panels that can be integrated into the windows of buildings, allowing them to generate electricity from sunlight while still allowing natural light to pass [2]. When sunlight is unavailable or during blackouts energy storage systems, such as batteries can be used to store excess energy generated during daylight hours. This enhances the reliability and usability of solar power even under low-light conditions or at night.

Solar windows can serve as a reliable source of electricity during blackouts, provided sunlight is available. This continuous power source can be crucial for ensuring that essential devices and systems in buildings remain operational during emergencies. By harnessing sunlight, solar windows offer a sustainable and resilient solution to maintain critical services during power outages. This capability can enhance the resilience of buildings and communities, particularly in areas prone to frequent blackouts or facing challenges with their energy infrastructure. Urban areas where land is scarce can benefit immensely from the installation of solar windows. By converting window surfaces into solar panels, buildings can use untapped spaces to produce renewable energy without additional land or rooftop space [3].

Decentralisation of energy generation with solar windows can be achieved by generating electricity on-site and reducing reliance on the central grid during blackouts. This decentralized approach enhances energy resilience by distributing power generation across multiple buildings and locations. By alleviating the strain on the grid during peak demand periods or times of stress, such as during extreme weather events or system failures, solar windows can help prevent widespread power outages and ensure a more reliable energy supply for essential services. Additionally, by reducing the dependency on the central grid, solar windows can enhance overall energy security and stability, making the energy system more robust and resilient to disruptions.

Solar windows are a promising example of a clean, renewable energy technology. During blackouts, they provide a reliable source of electricity without relying on fossil

fuels, thereby reducing greenhouse gas emissions and mitigating climate change. What is more, electricity is generated in an environmentally friendly manner, without producing harmful pollutants or greenhouse gases [4].

This dual benefit of addressing energy shortages and promoting environmental sustainability is crucial. Solar windows both help ensure a continuous power supply during blackouts and contribute to the broader goal of transitioning to a cleaner, more sustainable energy system. As people strive to reduce their dependence on fossil fuels and combat climate change, technologies, such as solar windows, will play an essential role in shaping a greener and more resilient future.

However, it is essential to recognize that although solar windows provide significant benefits, they also present challenges, such as the upfront cost of installation, limitations in efficiency compared to conventional solar panels, and the requirement for ample sunlight exposure. Furthermore, incorporating solar windows into existing structures may necessitate retrofitting or modifications, which could entail additional expenses and logistical considerations. Nevertheless, despite these challenges, solar windows represent a promising technology for enhancing energy resilience and sustainability, especially in regions prone to power outages or energy scarcity. This technology could contribute to mitigating energy shortages during blackouts in Ukraine by providing an alternative source of power generation.

References

1. Solar energy as a component of solving humanitarian problems in Ukrainian communities. [Electronic journal]. – Available at: https://ecoclubrivne.org/en/spp_vodokanals/.
2. Solar windows: The next architectural revolution? [Electronic journal]. – Available at: https://www.tomorrow.city/what-are-solar-windows-how-will-work/
3. Solar windows? New tech could change how you power your home. [Electronic journal]. – Available at: http://surl.li/sszwj
4. Electricity-generating liquid coatings and processes. [Electronic journal]. – Available at: https://www.solarwindow.com/technology/

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Addressing the Current Challenges in the Mining Industry

The mining industry around the world is facing complex challenges from various directions. War, climate and environmental change, trade conflicts and geopolitical tensions, fluctuations and uncertainties in demand, technological innovation and global skills shortages are just a few of the many challenges that need immediate solutions to ensure the long-term sustainability of the mining sector.

Mining companies and shareholders need to face these issues head on or risk falling behind their competitors in a tight and tightly controlled mining sector. Here are the current key challenges that need to be addressed and mitigated in the mining industry.

1.Ecology

Mining is known to have a serious impact on the environment. Although this type of activity has contributed to the economic and social development of local communities, it is important to take into account the environmental aspects, because the environment is a place for life. Mining companies need to make efforts to mitigate environmental issues and leave a positive legacy that will last long after mining is finished in that area.

2. Occupational health and safety

Mining is a dangerous business from these points of view. Toxic gases, high temperatures and instability of geological formations can lead to landslides. Using complex and heavy equipment also increases the risk of accidents. Therefore, mining companies should consider the implementation of secure technologies as a priority investment.

3. Unpredictable demand

Energy trends are constantly changing and so is the demand for various products. For example, the world is currently seeing an increasing trend in the use of renewable energy sources, which leads to an increase in the demand for metals and minerals necessary for the production of batteries and electric vehicles. Therefore, mining companies should create flexible business models that can adapt to changes, including price fluctuations, unpredictable demand and the threat of product substitution.

4.Constant innovations and changes in technology

Innovations and technological changes constantly bring about various challenges and changes. Artificial intelligence, data science and automation are advancing rapidly in the mining industry. Mining companies need to keep up with this pace and continue to invest in innovations and technologies that increase efficiency and productivity. They

must integrate these technologies into all aspects of their operations to drive innovation and create the mines of the future.

The challenges that the mining industry is facing are complex. An engaged workforce solution is a powerful tool in addressing these challenges and empowering mining operations to achieve sustainability, efficiency and long-term success. By equipping your workforce with the necessary tools and technologies, you will be able to:

- reduce environmental impact and promote a sustainable future;
- manage market uncertainty with confidence and make data-driven decisions;
- drive digital transformation and unlock the full potential of your workforce;
- bridge the skills gap and ensure continuity of knowledge and experience;
- optimize operational efficiency and maximize profitability.

References:
1. 5 Challenges Confronting Mining Operations (and How Connected Worker Solutions Can Help). URL: https://www.innovapptive.com/blog/5-challenges-confronting-mining-operations (accessed 29.01.2024)
2. Major Challenges Faced by the Mining Industry. URL: https://agincourtresources.com/2023/06/09/major-challenges-faced-by-the-mining-industry/ (accessed 29.09.2023)
3. Borley J. 6 Challenges that Mining Industry is Facing Now. URL: https://www.dynaway.com/blog/6-challenges-that-mining-industry-is-facing-now (accessed 30.03.2024)

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Energy Saving and Efficient Alternative Energy Usage

Energy is the ability to do work or cause change. In a broad sense, energy is a concept that defines the ability of a system or object to interact with other systems or objects. It does not arise from anything and does not disappear; it can only move from one state to another (the law of conservation of energy). The concept of energy combines all natural phenomena into a single whole, is a general characteristic of the state of physical bodies and physical fields.

Energy conservation is a set of measures aimed at rational use of energy to reduce consumption. This may include the introduction of energy-efficient technologies, process optimization, and changes in consumer habits to reduce energy consumption. Energy conservation is important both to save resources and to reduce the negative impact on the environment. Energy conservation helps to reduce emissions of harmful substances into the atmosphere, conserves natural resources and reduces our environmental footprint. One of the key benefits is reducing dependence on non-renewable energy sources such as coal and oil. This contributes to the country's economic sustainability and reduces its vulnerability in the energy sector. The use of energy efficient technologies in construction, transportation, and industry can lead to significant economic benefits. Reducing energy consumption also reduces utility bills for households and businesses, allowing them to use the savings for other purposes. In addition, energy saving affects our daily lives by enabling us to use and distribute electricity more efficiently. Adopting energy-efficient habits in the home and business helps not only save money, but also makes our environment more environmentally friendly. [1]

In Ukraine, as in other European countries, it is important to reduce consumption in all sectors of the economy, but energy saving in the housing and utilities sector remains the most critical. The total energy saving potential in Ukraine is about 40% of the volume of consumed fuel and energy resources. Every day, the costs in Ukraine reach UAH 100 million. All this has a negative impact on the national economy. Smart and efficient energy use is a key factor in creating new jobs and economic growth. In 1994, Ukraine adopted the Law on Energy Saving, which defines this term as "activities aimed at the rational use and economical consumption of primary and converted energy and natural energy resources".

In turn, the "rational use" of energy resources is defined in this Law as "achieving maximum efficiency of energy resources at the current level of development of

technology and engineering". Against the backdrop of the energy crisis, the issue of transition from traditional energy sources to new ones, i.e. alternative ones, is of great importance. Alternative and renewable energy sources have been successfully used around the world for a long time. [2]

For example, energy-saving lamps have become popular due to their high efficiency and ability to significantly reduce energy consumption compared to standard lamps. One of the main advantages of energy-saving lamps is their efficiency in energy use. They produce more light per watt of energy used compared to incandescent lamps. In addition, they have a significantly longer lifespan, which means fewer replacements and less waste.

Energy-saving batteries are innovative energy solutions aimed at providing high efficiency and a long-life cycle for a variety of devices that use battery power. One of the key characteristics of energy-saving batteries is their high capacity and ability to provide a stable energy output. This is especially important for devices that require large amounts of power, such as electronic gadgets, tools, or vehicles. They can provide stable operation for a long time before needing to be replaced or recharged. In general, energy storage batteries contribute to the creation of more sustainable and efficient energy use in various industries, such as electric transportation, portable electronics, and solar power.

Energy-saving wind turbines are technological solutions aimed at harnessing the wind to generate electricity. This has become a key component of sustainable development and greenhouse gas emission reduction. The basic idea is that wind turbines convert the kinetic energy of the wind into mechanical energy, which can then be used to generate electricity. One of the key advantages of wind power is the absence of emissions into the atmosphere during electricity generation. Energy-saving wind turbines can be installed onshore or offshore. [3]

Offshore wind farms have their advantages, such as more sustainable and constant wind energy, but they also require technical and engineering solutions to operate in the harsh marine environment. The development of wind energy technologies is helping to increase the efficiency and reduce the cost of wind power generation. Energy storage is also an important area to compensate for the variability of wind power and ensure a stable supply of electricity. Due to its clean and renewable nature, wind power is an important tool in the fight against climate change and ensuring a sustainable energy future.

Energy conservation is recognized as a key element of sustainable development and rational use of resources aimed at ensuring efficiency and sustainability in the energy sector. Its importance encompasses economic, environmental and social dimensions, affecting all spheres of modern life. From an economic point of view, energy saving helps reduce energy costs for businesses and consumers.

The use of energy-efficient technologies in production and business reduces utility costs, improves the competitiveness of enterprises and contributes to economic

growth. Energy saving also plays an important role in creating new jobs and stimulating innovation in the energy sector. From an environmental perspective, energy conservation has a powerful impact on reducing greenhouse gas emissions and other pollutants. The use of renewable energy sources and energy-efficient technologies helps to limit the negative impact on the environment and contributes to the conservation of natural resources. Energy conservation is a key tool in global efforts to combat climate change and maintain a sustainable ecosystem. The social aspect of energy saving is manifested in improving the quality of life and ensuring sustainable development of society. Reducing energy dependence helps ensure energy security in the face of energy crises and price fluctuations. In addition, energy saving leads to the formation of a conscious and responsible consumer approach, which contributes to the development of a sustainable consumption culture.[4]

In summary, energy saving is an important tool for creating an efficient, sustainable and environmentally conscious energy system. Its impact covers all spheres of modern life, contributing to sustainable development and preserving the environment for future generations.

References

1. P.H. References Andersen, J.A. Mathews, M. Rask "Integrating private transport into renewable energy policy: The strategy of creating intelligent recharging grids for electric vehicles.", 2009.

2. M. Asif, T. Muneer "Energy supply, its demand and security issues for developed and emerging economies.", 2007.

3. Abolhosseini, Shahrouz and Heshmati, Almas and Altmann, Jorn, "A Review of Renewable Energy Supply and Energy Efficiency Technologies.", 2014.

4. M. I. Blanco "The economics of wind energy.", 2009.

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The influence of the chemical composition on the quality of 10G2FB steel welds

Metal during welding can heat up quite a lot, and with thermal methods, it melts in a small local area. In such conditions, the chemical composition of the metal changes. The degree of changes depends on the chemical activity of the metal itself, the composition of the environment, the temperature, the quality of the preparation of the metal surface for welding, and diffusion processes in the welding bath.

The influence of welding heating on the structure and mechanical properties of the base metal. The main goal pursued during welding is to obtain a joint with equal strength to the base metal, but it is quite difficult to achieve it. The most noticeable changes in structure and properties are observed in metals that have polymorphic transformations. The latter can flow with or without a change in volume. Steels of the pearlite and martensitic classes, for example, belong to alloys that have pronounced properties of polymorphism with a change in the volume of the structure within 3-5%. Titanium alloys have polymorphic transformations accompanied by a slight change in volume (0.15%); refractory metals and some alloys of non-ferrous metals do not have similar transformations [1; 2; 3].

We check the susceptibility of the weld metal to the occurrence of hot cracks under the most unfavorable conditions (content of alloying impurities):

$$HCS = \frac{C \cdot (S + P + 0.01 \cdot Si + 0.04 \cdot Ni)}{3 \cdot Mn + Cr + Mo + V} = \frac{0.12 \cdot (0.04 + 0.035 + 0.01 \cdot 0.37 + 0.04 \cdot 0.3)}{3 \cdot 1.3 + 0.3} = 0.00241$$

Since HCS=0.00241<0.004, below the permissible limits, the metal is not prone to the formation of hot cracks.

We check the possibility of the formation of cold cracks under the most unfavorable conditions (with the maximum amount of alloying impurities):

$$C_{ýêâ} = Ñ + \frac{Mn}{6} + \frac{Si}{24} + \frac{Ni}{40} + \frac{Cr}{5} + \frac{Mo}{4} + \frac{V}{14} + \frac{Cu}{13} + \frac{P}{2} = = 0.12 + \frac{1.7}{6} + \frac{0,37}{24} + \frac{0.3}{40} + \frac{0.3}{5} + \frac{0.3}{13} + \frac{0.035}{2} = 0.515$$

CEKB=0.515>0.4...0.45, – the metal has a tendency to form cold cracks when the content of alloying elements reaches maximum values. However, in real conditions, such a ratio of alloying impurities is unlikely. But in factory conditions, it is necessary to control the composition of steel according to the relevant certificates [1].

The temperature deformations of each fiber correspond to the heating temperature, which makes it possible to construct a curve of temperature deformations $\&_a =$ АГ (Figure 1, a – shortening deformations are placed downward, elongation – upward). But since the cross sections of the plates remain flat, the ends of the fibers will not be

located according to the curve Γ_a, but will occupy the same position e $_н$. The position of the line mm' is chosen from the conditions of equality of the sum of the inherent compressive and tensile stresses within the intersection I-I. The vertical segments between the curve Γ_a and the line mm' will represent complete deformation [1; 2].
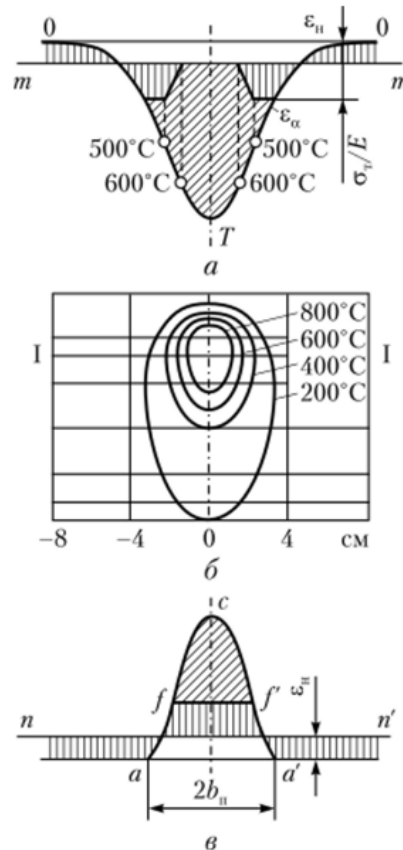
Figure 1: The effect of elastic stresses and deformations during uneven heating.

Structural transformations take place over a long period of time, so welded products from such alloys can change shape and size duringseveral hours, days, and even months after welding. They cannot be subjected to final mechanical processing directly after welding without heat treatment.

The possible negative impact of these factors is shown in the form of a diagram 1 [2].
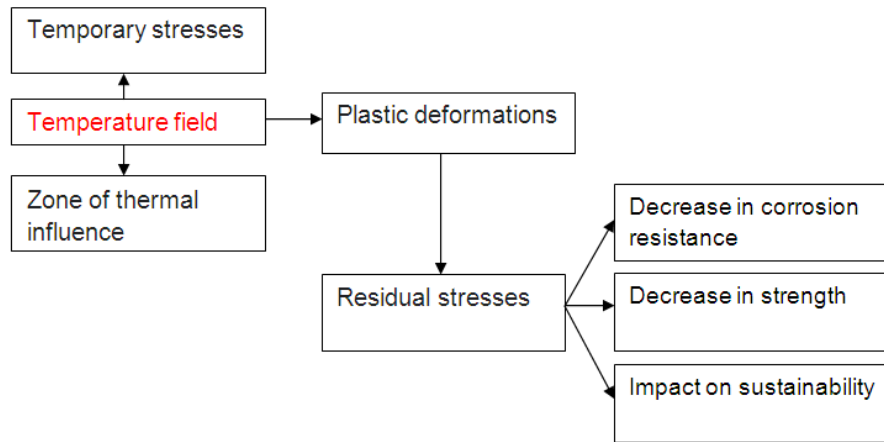
Diagram 1: Negative effects of thermal impact on 10G2FB steel

Problems arising during welding 10G2FB steel.
Pores can cause:
  •CO – due to the burning of carbon. To prevent carbon burning reaction, the wires must be protected with a special coating.
  • N2– can enter the welding bath from the air, with unreliable protection.
  • H2–moisture (n2o) may be on electrodes, flux, in a cylinder with CO2 or rust and lubricant which can be present in the welding zone.
Ways to prevent the formation of pores:
  •technological (thorough cleaning of edges from rust, grease, paint).
  • reliable protection of the welding zone from nitrogen.
  • burning of electrodes, fluxes.
  • reducing the welding speed so that the gases have time to release.

Doping with manganese or silicon increases the strength of the weld metal. Increasing the cooling rate of the weld metal also increases its strength, but at the same time plastic properties and impact strength decrease.

When welding metals with different alloying elements (molybdenum, silicon, chromium, etc.), various problems may arise that directly affect the quality of the resulting welded joint (cracks, pores, lack of welds, etc.). In order to avoid difficulties and problems, it is necessary to know very well how a particular alloying element affects the weldability of the product.

Conclusion. Cold transverse cracks are observed when welding low-alloy carbon steels. These cracks originate in the areas having maximum grain size structure in the zone of thermal influence. Most often, they are formed when welding long multi-layer seams. In the thermally affected zone, the metal adopts a coarse-grained structure, which leads to an increase in compressive strength, but its plasticity before bending decreases. To improve the quality of steel, it is necessary to gradually cool the weld zone.

References:

1. Фетисов Р.І. Зміна хімічного складу і розподіл елементів в зварному з'єднанні. URL: https://stud.com.ua/173409/tehnika/zmina_himichnogo_skladu_rozpodil_elementiv_zvarnomu_zyednanni (accessed: 30.03.2024)

2. Камель Г.І., Гасило Ю.А., Івченко П.С., Романюк Р.Я. Утворення тріщин і механіка структурного руйнування кранових зварних металоконструкцій. URL: https://kzpto.com.ua/uk/kranovi-zvarni-metalokonstrukcij/ (accessed: 20.01.2024)

3. Ingram E., Golan O., Haj-Ali R., Eliaz N. The Effect of Localized Vibration during Welding on the Microstructure and Mechanical Behavior of Steel Welds. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6719122/ (accessed: 22.03.2024)

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Main trends in power generation

The power generation sector is undergoing a significant transformation driven by various trends, including the rapid expansion of renewable energy sources, advancements in technology, and the emergence of decentralized energy systems. While these trends offer opportunities for a more sustainable and resilient energy future, they also present challenges that must be addressed.

Renewable energy expansion:

While the rapid expansion of renewable energy sources such as solar and wind power contributes to reducing greenhouse gas emissions and mitigating climate change, it presents challenges related to grid integration and intermittency.

Addressing grid integration challenges requires the development of flexible and smart grid infrastructure capable of accommodating variable renewable energy generation. This includes investing in energy storage technologies, such as batteries and pumped hydro storage, to store excess renewable energy for use during periods of low generation.

Advancements in Solar Power:

Despite significant advancements in solar photovoltaic (PV) technology, the deployment of solar power faces challenges related to land use, resource availability, and intermittency.

One solution is the adoption of innovative solar technologies, such as building-integrated photovoltaics and solar tracking systems, to maximize energy generation efficiency and optimize land use. Additionally, coupling solar PV installations with energy storage solutions can enhance grid stability and reliability.

Expansion of Wind Power:

While wind power has become increasingly competitive with conventional energy sources, challenges related to land use, environmental impact, and public acceptance persist.

Addressing land use conflicts and environmental concerns requires careful site selection and stakeholder engagement. Technological advancements, such as larger and more efficient wind turbines, can increase energy capture and reduce environmental

impacts. Additionally, offshore wind development presents opportunities for expanding wind power generation while minimizing land use conflicts.

Grid Modernization and Energy Storage:

Aging grid infrastructure and the integration of variable renewable energy sources pose challenges to grid reliability and stability.

Grid modernization efforts, including upgrading infrastructure and implementing smart grid technologies, are essential for enhancing grid resilience and flexibility. Energy storage solutions, such as batteries and pumped hydro storage, play a crucial role in balancing supply and demand and integrating renewable energy into the grid.

Decentralized Energy Systems:

While decentralized energy systems offer benefits such as increased resilience and energy independence, challenges related to regulatory frameworks, financing, and conformity exist.

Establishing supportive regulatory frameworks and encourage investments in decentralized energy systems can facilitate their deployment. Interoperability standards and grid integration technologies are essential for ensuring seamless integration with existing infrastructure and maximizing the benefits of decentralized energy systems.

In conclusion, the main trends in power generation present both opportunities and challenges for achieving a sustainable and resilient energy future. Addressing the identified problematics through innovative solutions and collaborative efforts among stakeholders is essential for realizing the full potential of renewable energy and advancing the transition to a clean energy economy.

References:

1) Energy - Sustainability - JBS: https://jbs.com.br/en/sustainability/energy/
2) Major trends reshaping the power sector - ENTSO-E Vision 2030: https://vision2030.entsoe.eu/major-trends-reshaping-the-power-sector/
3) 2023 in data: the trends that shaped the power sector: https://www.power-technology.com/news/2023-in-data-the-trends-that-shaped-the-power-sector/
4) Renewable energy trends and developments powering a cleaner: https://www.ibm.com/blog/renewable-energy-trends/

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The DLP-based bioprinting of Dual ECM Scaffolds Encapsulating Limbal Stem Cells

Limbal stem cell deficiency (LSCD) is a corneal abnormality in which limbal epithelial stem cells (LESCs) are damaged or become dysfunctional. Under homeostatic conditions, LSCs maintain a slow cell cycle and can increase their proliferative capacity in the event of damage. However, dysfunction or loss of the LSC niche can lead to the development of limbal stem cell deficiency (LSCD). This disease is characterised by the overgrowth of conjunctival epithelium on the cornea, which leads to impaired regeneration and the development of various complications, such as corneal opacity, pain, vision loss and even blindness.

New therapies that combine stem cell transplantation with engineered hydrogel scaffolds for biological and mechanical support are becoming a growing trend in the field. Hydrogel scaffolds based on collagen, gelatin, hyaluronic acid (HA) and synthetic polymers have been investigated as LSC carriers for transplantation.

The fabrication of hydrogel scaffolds based on digital light processing (DLP) stands out as a highly efficient platform. This method allows for the creation of hydrogel scaffolds capable of containing many types of stem cells, including retinal progenitor cells, conjunctival stem cells, mesenchymal stem cells, neural progenitor cells and cancer stem cells. This technique also allows the stiffness of the hydrogel scaffolds to be adjusted in selected areas through spatial and temporal control of the light. In turn, this makes it possible to manipulate the phenotypes of encapsulated cells and use different extracellular matrix (ECM) components and cell types in the hydrogel creation process, which helps to better reproduce the complex natural microenvironment of the stem. cells [1].

Materials and methods. The research utilized New Zealand white rabbit eye tissue, isolating rbLSCs by enzymatic cleavage and cell dissociation. These rbLSCs were cultured in DMEM/F-12 supplemented medium. GelMA and HAGM were synthesised separately and combined into a photo-crosslinkable bioink together with LAP. GelMA showed approximately 95% methacrylation after preparation. The HAGM synthesised from sodium hyaluronate had approximately 35% methacrylation. A bioink containing GelMA, HAGM, LAP and rbLSC at a concentration of $1\text{-}2 \times 10^7$ cells/ml was used for DLP-based bioprinting. The DLP bioprinter setup included a 365 nm light source, a projection optics unit, a motion-controlled table, and a DMD for generating light patterns. Digital templates designed with Adobe Photoshop controlled the DMD chip. PDMS spacers helped to create gaps for loading the bioink. Photopolymerisation took place and the printed constructs were transferred to a 24-well plate, washed and incubated in culture

medium. Experiments performed included immunofluorescence staining, mechanical properties (Young's modulus), viability assessment, RNA extraction, reverse transcription, quantitative real-time PCR, and flow cytometry. The constructs were cultured at 37°C with 5% CO2 after printing [2,3].

Conclusions. Limbal stem cell deficiency (LSCD) results from damage or dysfunction of limbal epithelial stem cells (LESCs), causing corneal abnormalities like chronic epithelial defects and impaired vision. Molecular markers such as cytokeratin 19, vimentin, CD44, P63, and ABCG2 are used to identify LESCs. The DLP-based bioprinting system manipulates light to create precise patterns for photopolymerization of hydrogel constructs containing GelMA and HAGM. Microscale scaffolds maintain viability of primary rbLSCs and hLSCs, exhibiting ECM-dependent behavior: active proliferation in GelMA scaffolds and quiescence in HAGM scaffolds. These findings suggest an innovative approach for disease modeling, drug screening, and advancing LSC-based regenerative therapies for treating ocular conditions like LSCD. [2,4].

References:

1. Sanie-Jahromi, F., Eghtedari, M., Mirzaei, E., Jalalpour, M. H., Asvar, Z., Nejabat, M., & Javidi-Azad, F. (2020). Propagation of limbal stem cells on polycaprolactone and polycaprolactone/gelatin fibrous scaffolds and transplantation in animal model. *BioImpacts : BI*, *10*(1), 45–54. https://doi.org/10.15171/bi.2020.06

2. Zhong, Z., Balayan, A., Tian, J., Xiang, Y., Hwang, H. H., Wu, X., Deng, X., Schimelman, J., Sun, Y., Ma, C., Dos Santos, A., You, S., Tang, M., Yao, E., Shi, X., Steinmetz, N. F., Deng, S. X., & Chen, S. (2021). Bioprinting of dual ECM scaffolds encapsulating limbal stem/progenitor cells in active and quiescent statuses. *Biofabrication*, *13*(4), 10.1088/1758-5090/ac1992. https://doi.org/10.1088/1758-5090/ac1992

3. Ouyang H, Xue Y, Lin Y, Zhang X, Xi L, Patel S, Cai H, Luo J, Zhang M, Zhang M, Yang Y, Li G, Li H, Jiang W, Yeh E, Lin J, Pei M, Zhu J, Cao G, Zhang L, Yu B, Chen S, Fu XD, Liu Y, Zhang K, WNT7A and PAX6 define corneal epithelium homeostasis and pathogenesis, *Nature*. 511 (2014) 358–361. 10.1038/nature13465.

4. Nguyen KN, Bobba S, Richardson A, Park M, Watson SL, Wakefield D, Di Girolamo N. Native and synthetic scaffolds for limbal epithelial stem cell transplantation. Acta Biomater. 2018 Jan;65:21-35. doi: 10.1016/j.actbio.2017.10.037. Epub 2017 Nov 6. PMID: 29107055.

5. Bonnet, C., González, S., Roberts, J. S., Robertson, S. Y. T., Ruiz, M., Zheng, J., & Deng, S. X. (2021). Human limbal epithelial stem cell regulation, bioengineering and function. *Progress in retinal and eye research*, *85*, 100956. https://doi.org/10.1016/j.preteyeres.2021.100956

6. Chen, D., Qu, Y., Hua, X., Zhang, L., Liu, Z., Pflugfelder, S. C., & Li, D. Q. (2017). A hyaluronan hydrogel scaffold-based xeno-free culture system for ex vivo expansion of human corneal epithelial stem cells. *Eye (London, England)*, *31*(6), 962–971. https://doi.org/10.1038/eye.2017.8

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Improving air quality through alternative energy sources

Renewable energy is sure to become an increasingly affordable, widespread, and viable energy source and the necessity to develop and implement alternative sources of energy gets much attention because of increased number of negative impacts on air quality, climate change and environmental health caused by extended use of such non-renewables as fossil fuels. Enhancing reliance on renewable energy sources such as wind and solar energy can reduce air pollution, lower greenhouse gas emissions, reduce healthcare costs, create a more resilient electricity grid and create additional jobs.

Fig. 1 demonstrates the data of the percentage of electricity generated from renewable energy sources such as wind, solar and nuclear compared to coal use and the increase in the use of renewable energy sources since 1971 can be clearly identified.

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Wind   Solar PV   Other renewables   Nuclear   Low-carbon   Coal
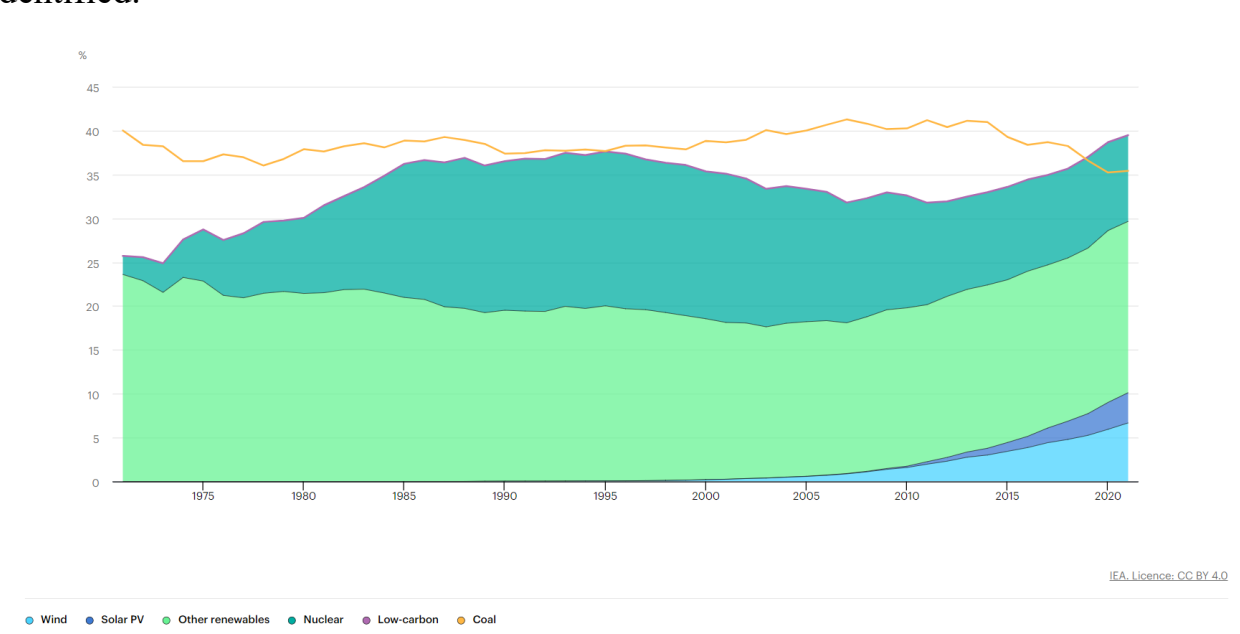
Figure 1. Share of low-carbon sources and coal in world electricity generation, 1971-2021

Air pollution is a serious global crisis, and the World Health Organization (WHO) estimates that 99% of the world's people breathe air that exceeds air quality standards and threatens their health. Black carbon alone, for example, is responsible for 640,000-4.9 million premature deaths each year.

What are the solutions?

1. **Solar panels:** Solar panels are installed on the roof for walls of buildings equipped with air purifiers and ventilation systems. These devices can filter particulate matter, dust, allergens and other pollutants from indoor air, improving air quality and occupant comfort.

2. **Wind-assisted dispersion:** Another way in which renewable energy can be used for air pollution control is through the use of wind turbines and fans to facilitate the natural dispersion of pollutants. These devices create artificial wind currents that can disperse pollutants farther from their sources and receptors, reducing pollutant concentrations and exposure.

3. **Hydrogen fuel cells:** A third way to use renewable energy for air pollution control is to use hydrogen fuel cells to generate electricity and power vehicles. Hydrogen fuel cells are devices that combine hydrogen and oxygen to produce electricity and water without any combustion or emissions. Hydrogen can be produced from renewable sources such as electrolysis of water using solar or wind energy or reforming biomass through gasification. Hydrogen fuel cells can be used to power stationary or mobile applications such as homes, offices, factories, cars, buses, trains and airplanes. Hydrogen fuel cells can reduce dependence on fossil fuels and lower emissions of greenhouse gases and other pollutants.

4. **Integration into smart grids:** The fourth way renewable energy can be used for air pollution control is by integrating renewable energy into smart grids that optimize electricity supply and demand. A smart grid is a network of sensors, meters, controllers and communication devices that can monitor and manage the flow of electricity from different sources and loads. Smart grids allow the integration of more fluctuating and intermittent renewable energy sources such as solar and wind power, using energy storage systems, demand response and load shifting to balance the grid. Smart grids also enable the deployment of more efficient and cleaner technologies that can reduce electricity consumption and pollutant emissions, such as electric vehicles, heat pumps and LED lighting.

A bright future for renewable energy

It should be concluded that investing in renewable energy and educating people about its benefits to reduce air pollution and mitigate climate change is crucial to harnessing its potential for improving environmental health.

References:

1. https://www.clarity.io/blog/steps-toward-cleaner-air-a-closer-look-at-the-air-quality-and-climate-benefits-of-renewable-energy
2. https://www.linkedin.com/advice/3/how-can-renewable-energy-integrated-air-bgyxc
3. https://www.iea.org/data-and-statistics/charts/share-of-low-carbon-sources-and-coal-in-world-electricity-generation-1971-2021

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Nuclear fuel production in Ukraine

Ukraine ranks the fifth place in Europe in terms of nuclear reactor number. There are four nuclear power plants located in Rivne, Khmelnytskyi, Zaporizhzhia, and Hard. These power plants have a total of 15 reactors and their installed nuclear power capacity reaches over 13 GW. It covers more than 40 % of Ukrainian energy needs and helps lowering energy costs for the residents of the country. However, to ensure continuous and proper operation nuclear power plants need 2,200 to 2,400 tons of uranium per year.

According to the data from the Nuclear Energy Agency (NEA), Ukraine possesses up to 185,400 tonnes of recoverable uranium at $260 per kg and 71,800 tonnes of recoverable uranium under $80 per kg. Ukraine has around 17 deposits total with the majority of them being in the Kirovohradska oblast. They are producing most of Ukrainian uranium, with the numbers being around 700-800 tonnes of uranium per year. This, unfortunately, covers only 40 % of Ukraine's nuclear fuel needs.

So why has Ukraine been facing challenges in meeting its fuel demands despite its potential? The primary challenge lies in refining and processing uranium ore. The Figure 1 shows the complete nuclear fuel cycle from mining to final utilization.
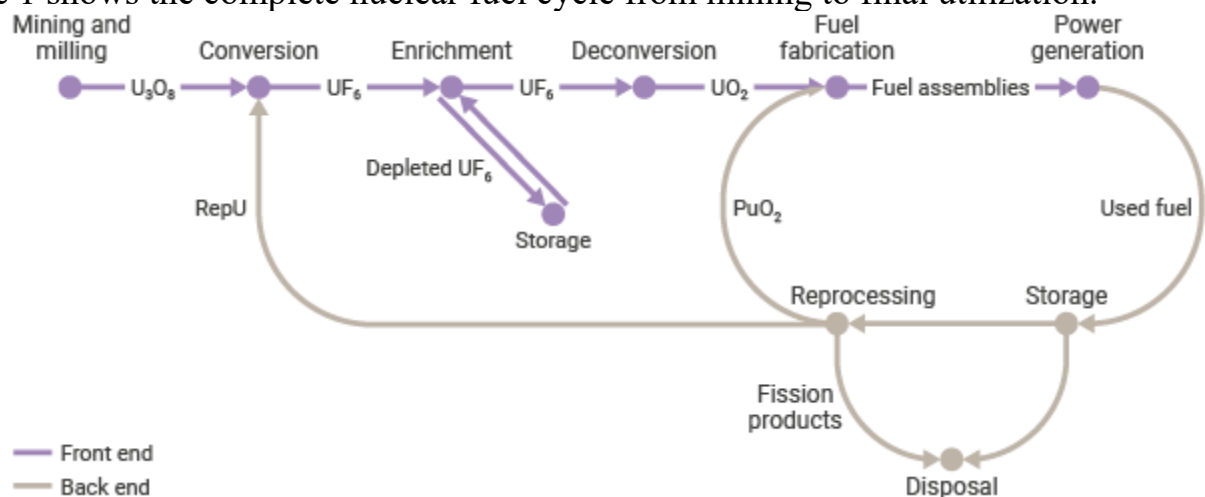
Figure 1. Nuclear fuel cycle (by World Nuclear Association)

The first step in the nuclear fuel cycle involves mining and milling uranium ore, which is excavated and refined into uranium oxide. Due to the fact that most of the Ukrainian deposits being deeper than 120m, underground mining techniques are utilized, leading to increased costs for the extracted products which in turn lead to the unprofitability of prosses. Following the milling process, uranium oxide is converted into uranium hexafluoride, a gaseous substance that is solidified in metal containers

and sent to the enrichment plant. During the beneficiation process, uranium hexafluorides are separated into two streams: uranium enriched to the required level and uranium progressively depleted in U-235. The final result of this stage is enriched uranium hexafluoride, which is then reconverted into enriched uranium oxide. Unfortunately, Ukraine does not have the necessary facilities for conversion and enrichment and, therefore, cannot process uranium by itself.

The fuel fabrication stage is the final step in the process of converting uranium into nuclear fuel rods. This stage involves producing pure uranium dioxide from incoming uranium hexafluoride or uranium trioxide, manufacturing ceramic uranium dioxide pellets, and creating the rigid metal framework for the fuel assembly, mostly made from zirconium alloy. The fuel pellets are then loaded into the fuel rods, sealed, and assembled into the final fuel assembly structure. Currently, Ukraine cannot produce fuel, so we used to rely on importing fuel from other countries.

It should be outlined that the production of nuclear fuel in Ukraine faces several challenges:

- insufficient uranium production to meet demand;
- lack of developed facilities to process nuclear materials;
- impossibility to produce nuclear fuel and great dependence on import.

Fortunately, our country has the potential to solve all these issues, but it will require some time. With the development of the Novoconstantinivska mineshaft, the Eastern Mining and Processing Plant claims that with government investment they could produce up to 1500 thousand tonness of uranium ore, with potential for future increases up to 2500 thousand tonness. Additionally, Ukraine has signed contracts with companies "Cameco" for conversion, "Urenco" for enrichment, and "Westinghouse Energy" for nuclear fuel manufacture. This will ensure our power plants can continue running without great dependence on import supply.

On January 17th, 2022, NNEC Energoatom and Westinghouse agreed to evaluate and qualify Atomenergomash production lines for fuel assembly production. In 2023, Ukraine planned to establish additional facilities for fuel cartridge component production and assembly, with plans to start producing fuel cartridges in 2024 and reach full capacity production in 2025. Regrettably, these plans were temporarily abandoned due to the situation taking place in Ukraine.

The future of nuclear energy looks promising in Ukrainian energy market, and achieving self-sufficiency in fuel needs is a fully achievable goal. Ukraine has the potential to become a significant player in the nuclear fuel industry and compete with other producers in the highly demanding European market.

References:

1. World Nuclear Association. "Nuclear Power in Ukraine | Ukrainian Nuclear Energy." Available at: https://www.world-nuclear.org/information-library/country-profiles/countries-t-z/ukraine.aspx. Accessed on: 11 March 2024.

2. Uatom.org. "Uranium Facilities." Available at: https://www.uatom.org. Accessed on: 11 March 2024.

3.   World Nuclear Association. "Nuclear Fuel Cycle Overview." Available at: https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/introduction/nuclear-fuel-cycle-overview.aspx. Accessed on: 11 March 2024.

4.   Sorokin, I. "Проблеми розвитку уранової промисловості." A Presentation Within the International Conference "Ukrainian Nuclear Forum 2019: Nuclear Energy – the Present State and Trends of Development". Available at: https://www.slideshare.net. Accessed on: 11 March 2024.

5.   NAEK | ENERGOATOM.   Available   at: https://old.energoatom.com.ua/index.html. Accessed on: 11 March 2024.

6.   World Nuclear News. "Energoatom sends first batch of Ukrainian-mined uranium to Canada: Uranium & Fuel." Available at: https://www.world-nuclear-news.org/Articles/Energoatom-sends-first-batch-of-Ukrainian-mined-ura.   Accessed on: 11 March 2024.

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Forward to the Future with New Ideas and Technologies

In the realm of engineering, innovation serves as the driving force propelling us toward a future brimming with possibilities. This thesis studies the transformative potential of novel ideas and cutting-edge technologies in shaping the trajectory of engineering endeavors. By examining recent advancements, emerging trends, and their implications, it delves into the pivotal role played by innovation in shaping our collective journey forward.

The relentless march of progress in engineering is fueled by a constant influx of new ideas and breakthrough technologies. From the advent of artificial intelligence and machine learning to the burgeoning field of biotechnology, innovation serves as the catalyst for pushing the boundaries of what is possible. This work aims to dissect the intricate interplay between creativity, technological advancement, and their profound implications for society (Christensen, 2016).

Moreover, how innovation serves as a cornerstone for addressing pressing global challenges, from climate change and resource depletion to urbanization and healthcare disparities. Through case studies, empirical analysis, and real-world examples, this tema illuminate how engineers are harnessing the power of innovation to devise sustainable solutions that pave the way for a more equitable and resilient future.

Furthermore, it explores the dynamic ecosystems that foster ainnovation, from research institutions and academic collaborations to industry partnerships and entrepreneurial ventures. By unraveling the mechanisms that drive innovation ecosystems, this thesis seeks to provide insights into how stakeholders can cultivate environments conducive to breakthrough discoveries and technological advancements.

Acts as a call to action for engineers, researchers, policymakers, and innovators to fully embrace the transformative power of innovation. As we find ourselves at the brink of a new era characterized by unparalleled challenges and opportunities, let us move forward with resolute determination, equipped with the accumulated wisdom of the past and the limitless potential of the future (National Academy of Engineering).

Comprehensive exploration of the role of innovation in engineering, shedding light on its transformative power and implications for society. By fostering a culture of innovation and embracing new ideas and technologies, we can chart a course toward a future defined by progress, sustainability, and social impact.

In engineering, the landscape is continually evolving, driven by the convergence of diverse disciplines and the fusion of ideas from across the globe. One area ripe for exploration is the intersection of engineering with fields such as neuroscience and cognitive science. As our understanding of the human brain deepens and technologies

like brain-computer interfaces mature, there lies immense potential for engineering to revolutionize healthcare, communication, and even human augmentation.

Moreover, the advent of quantum computing represents another frontier brimming with possibilities. As researchers inch closer to realizing practical quantum computers, the implications for engineering are profound. From optimizing complex logistical networks to revolutionizing cryptography and data security, quantum computing promises to unlock unprecedented computational power, reshaping the very fabric of our digital infrastructure.

In addition to technological breakthroughs, the ethos of innovation extends to the very processes by which we approach engineering challenges. Agile methodologies, design thinking principles, and interdisciplinary collaboration are increasingly becoming the norm rather than the exception. By fostering environments that encourage experimentation, iteration, and risk-taking, organizations can catalyze innovation from within, empowering teams to tackle complex problems with creativity and agility (Porter, 2015).

Furthermore, the democratization of technology through open-source initiatives and collaborative platforms has democratized access to knowledge and tools, enabling a broader community of innovators to participate in the engineering discourse. From hobbyists tinkering in their garages to grassroots initiatives addressing local challenges, the democratization of technology has the potential to amplify the impact of innovation and drive meaningful change at scale.

As we navigate the complexities of the 21st century, characterized by interconnected global challenges and rapid technological advancement, the imperative for innovation in engineering has never been more pressing. By embracing a mindset of continuous learning, adaptation, and collaboration, we can harness the transformative power of innovation to create a future that is not only technologically advanced but also sustainable, equitable, and inclusive (United Nations).

In conclusion, serves as a testament to the boundless potential of innovation in engineering. As we embark on this collective journey toward a brighter tomorrow, let us remain steadfast in our commitment to pushing the boundaries of what is possible, guided by the belief that through innovation, we can shape a world that reflects our highest aspirations and values.

References:

Christensen, Clayton M. "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail." Harvard Business Review Press, 2016.

National Academy of Engineering. "Engineering Grand Challenges."

Porter, Michael E., & James E. Heppelmann. "How Smart, Connected Products Are Transforming Companies." Harvard Business Review, 2015.

United Nations. "Transforming our world: the 2030 Agenda for Sustainable Development."

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Energy Saving and Efficient Alternative Energy Usage

The industrialization of the global economy has led to a rapid increase in energy consumption over the past 100-150 years. Since fossil fuels such as oil, gas, and coal account for the largest share in the structure of energy consumption, this leads to their rapid depletion and a gradual increase in the price of these energy resources. In this regard, that sustainable economic development requires measures to ensure the rational use of energy.

Due to the rapid increase in energy consumption and its depletion, it is necessary to look for alternative energy sources that are efficient, economically viable, and environmentally friendly.

One of the main directions in this regard is the use of renewable energy sources (RES), which ensure inexhaustibility and environmental friendliness. Renewable energy sources are naturally occurring energy sources whose reserves are renewed over time. The use of alternative energy sources, including renewables, is important for sustainable development and resource conservation. It helps to reduce dependence on coal, oil, and gas, reduces emissions of harmful substances, and promotes economic development. The use of alternative energy sources also reduces the negative impact on the environment and helps fight climate change, preserving resources for future generations.

Solar energy is an excellent example of a renewable energy source that offers a continuous supply, is environmentally friendly, easy to operate, and is available worldwide. Moreover, it reduces emissions of harmful gases, contributes to the stability of the power grid through decentralized production, and stimulates innovation and development of high-tech industries in the renewable energy sector.

Wind energy is the key to a stable and green future. It not only reliably provides us with free energy, but also helps reduce CO_2 emissions, making it an important tool in the fight against climate change. One of the advantages of wind energy is its independence from sunlight, which makes it effective even in cloudy or bad weather conditions.

The use of moving water streams is an important alternative for energy production and is manifested in several types of generators. The first type of generators are placed on rivers and operate thanks to natural currents, such as mini-hydroelectric power plants. The second type of generator is set up to utilize ocean or sea tides. And the third type uses the energy of sea waves. These technologies make it possible to harness the potential of water resources to produce clean energy while contributing to sustainable development and the development of renewable energy sources.

The active development of alternative energy sources, such as the use of recycled agricultural waste to produce biogas and various biofuels derived from plants, animal waste, and organic industrial and household waste, is a promising avenue for renewable fuels. These initiatives not only help to utilize waste and reduce pollution, but also highlight the potential of bioenergy as a significant sector of the alternative energy market. While bioenergy sources offer relative availability and low cost, they also present challenges such as the long recovery time of raw materials for production.

The issue of rational use of energy resources and improvement of energy efficiency is currently an urgent task for all mankind. Industrial enterprises are one of the main consumers of energy resources. The cost of fuel and energy resources represents a significant share of production costs, and in the near future this share will increase due to the growing role of automation of production processes.

Energy saving measures can be implemented at the stage of production of a product or an item manufactured in an industrial enterprise. If new equipment uses less energy resources to produce a unit of output, then such equipment should be classified as energy efficient because less energy is required to produce a unit of output.

Reducing energy consumption can be achieved by reducing non-productive energy consumption. The list of constructive energy saving measures includes: insulation of external walls of buildings; replacement of translucent envelope structures with more efficient ones; insulation of attic, unheated basement or technological floor; floor insulation; normalization of temperature and humidity conditions in unheated rooms; comprehensive thermal modernization of external building envelope, etc.

Ensuring energy security and sustainable development requires the efficient use of limited fossil energy resources. This goal can be achieved through the implementation of energy saving and energy efficiency measures, the main ones being:

1. Use of devices with low energy consumption.
2. Use of energy efficient technologies for energy generation and transportation.
3. Thermal insulation of buildings.
4. Use of renewable energy sources.

Businesses are the largest consumers of energy, but each of us can take steps to conserve energy, such as turning off lights and appliances when leaving the building, using energy-efficient appliances, regularly maintaining heating and air conditioning systems, and actively promoting the use of alternative energy sources.

People can install solar panels on their homes or use other alternative energy sources such as wind turbines or geothermal systems to reduce their dependence on traditional energy sources.

It is important to conduct information and education campaigns among the population on the importance of energy conservation, turning off electrical appliances

on time, using energy-efficient lighting systems, so that every citizen can contribute to the conservation of energy resources.

References

1. Енергозбереження і енергоефективність / ред. В. В. Пілінський ; уклад. Є. В. Вербицький. Київ : НТУУ "КПІ", 2014. 106 с.

2. Альтернативні джерела енергії - ПІВДЕНЬ ЕНЕРГО ЗБУТ. ПІВДЕНЬ ЕНЕРГО ЗБУТ. URL: https://pivdenenergozbut.com.ua/public/alternativni-dzherela-energii/ (дата звернення: 30.03.2024).

3. Olvent.ua. Енергозбереження. 10 порад як заощаджувати електроенергію | OLVENT. OLVENT. URL: https://olvent.ua/ua/statti/energozberezhennja-10-porad/ (дата звернення: 30.03.2024).

4. «Інтелектуальні системи в електроенергетиці. Теорія та практика: навчальний посібник. / Стаднік М.І., Видмиш А.А., Штуць А.А., Колісник М.А. Вінниця: ТОВ «ТВОРИ», 2020. 332 с.

5. "Щодо перспектив використання альтернативних джерел енергії на Сході України". Аналітична записка. Національний інститут стратегічних досліджень. URL: https://www.niss.gov.ua/doslidzhennya/regionalniy-rozvitok/schodo-perspektiv-vikoristannya-alternativnikh-dzherel-energii (дата звернення: 30.03.2024).

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Radio Engineering in Military Engineering: Integration of the AI model in Electronic Warfare

Radio engineering plays an important role in military research and development, providing communications, navigation, intelligence, and many other aspects of modern military operations. In modern military conflicts, where information and communications play a critical role in decision making and coordination, radio engineering is becoming a key component of successful military operations.

Radio engineering innovations enable the development of dynamic and reliable communication systems that provide the necessary information advantage and allow for effective interoperability among the various branches of the military. Specifically, military engineers specializing in radio engineering are dedicated to the development and improvement of communications, radar, aerospace control systems, and other technologies critical to the success of military operations. They are charged with developing and implementing advanced technologies that ensure smooth and secure information exchange, effective detection of enemy targets, and security of military units.

In general, radio engineering plays an important role in many aspects of military construction, providing effective communications, threat defense, and security for military operations. Examples:
- Electronic Warfare [1]
- Navigation
- Communication Systems [2]
- Radar [3]

All aspects of radio engineering are important in the military. However, in my opinion, the most prominent is electronic warfare. In today's military industry, more and more technologies are becoming available to neutralize the enemy, both point and large scale.

Electronic Warfare - is a technology used to manipulate electromagnetic energy in order to disrupt the enemy's communication, block radar systems or destroy the enemy's electronic systems. This provides the ability to weaken the enemy's communication or to change the course of war by disabling its critical systems.[3]

Unfortunately, the modern worldview has a distorted view of electronic warfare, and it is for this reason that many people underestimate this aspect in the military industry. Currently, electronic warfare consists of three main areas:
- Electronic Attack (EA) [4]
- Electronic Protection (EP) [4]
- Electronic Warfare Support (ES) [4]

One of the best known areas of electronic warfare is electronic countermeasures (ECM). They can be divided into active and passive. One of the best known areas of electronic warfare is radio electronic countermeasures (REP). They can be divided into active and passive. The main task of active REB is to counter the enemy's REB by using noise or by creating obstacles. Noise is designed to prevent the enemy from knowing the direction and speed of the target. Its main task is to deceive radar and introduce pseudo-channels. Passive ECM does not use electromagnetic energy. Rather, it uses confusion reflectors to deceive enemy electronic systems enemy electronic systems [4]

Electronic protection (EP) includes the protection of friendly ECM by electronic countermeasures. The primary mission is to distract and disorient. The capability of electronic protection depends on the frequency, antenna gain, power, and other characteristics of the ECM. [4]

And finally, support for electronic warfare. The main task of this system is to intercept enemy signals and analyze them faster. The information collected by the ES will help in further development of ECM and creation of upgrades. The system must react quickly and process the information received in real time. Having received the results, it is possible to quickly change the tactics of combat and adjust the work of other systems directly dependent on it. [4]

One of the best options to improve ECM is to implement artificial intelligence. As mentioned above, AI departments are used to make ECM function more efficiently. AI models are best suited for analyzing large amounts of information, identifying pseudo-channels, and sorting the resulting information. Of course, creating such a model requires a lot of resources as it requires a large amount of information to train it, but the prospects are great. Once fully implemented, the model will be able to be trained in real time during combat operations, thereby increasing its analytical capabilities. [5]

Unfortunately, however, this model has significant drawbacks. The command center does not have direct access to the AI model. This means that in case of an error or some other failure, a rapid response team will be required to solve the problem. In addition, creating a team to create and develop an AI model would require a fairly large amount of funding, which would be quite a blow to any country's budget. Of course, it is possible to work with private commercial companies, but in this case it is difficult to guarantee that there will be no information leaks or that the project will not be sold to another country.

There are many questions about the integration of this model, which will be answered after detailed research and analysis. Of course, problems cannot be avoided, and it is necessary to find a balance between the assistance of AI models and constant human control over them. However, if we fully learn how to use the models for military purposes, new opportunities and new battlefield tactics will open up, and similar AI models can be integrated into other systems to reduce human losses in the future. Once invented, technology goes through a complex path of development, integration, and refinement, and AI models will be no exception.

References:

1. " The World of RF for Military and Defense" - [https://www.mwrf.com/technologies/embedded/systems/article/21263247/per-vices-corp-the-world-of-rf-for-military-and-defense]

2. " Frequency Response of Wireless Probing" - [https://www.qatech.com/en/resources-performance/high-frequency-performance.html]

3. " Radar and Electronic War: Key Elements of Modern War" - [https://www.tualcom.com/radar-and-electronic-war-key-elements-of-modern-war/]

4. "Artificial Intelligence Aided Electronic Warfare Systems-Recent Trends and Evolving Applications" - [https://www.researchgate.net/publication/347631413_Artificial_Intelligence_Aided_Electronic_Warfare_Systems-Recent_Trends_and_Evolving_Applications]

5. " Unlocking the Strategic Potential: Artificial Intelligence in Electronic Warfare" - [https://www.jedonline.com/2023/09/13/unlocking-the-strategic-potential-artificial-intelligence-in-electronic-warfare/#:~:text=In%20the%20digital%20age%2C%20the,that%20might%20elude%20human%20operators]

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Metal 3D Printing

Metal 3D printing is more known as added substance fabricating. This innovation ensures the production of parts with complex geometries that are difficult or impossible to make by means of the manufacturing techniques used before. Metal 3D printing offers uncomparable flexibility, efficiency, and customization capabilities at all stages – from prototyping to full-scale production.

In quintessence, this imaginative innovation revolutionizes conventional production of parts by permitting complex metal ones to be made layer by layer from digital models. Unlike the conventional strategy of subtractive fabric cutting from a piece of metal, 3D printing makes objects from scratch, including fabric precisely where it is required [1].

It is presently utilized in numerous spheres of our lives, from prototyping and molding to the generation of parts in such businesses as pharmaceutical industry, dentistry, aviation, car, engineering, furniture and adornments, with numerous more inventive employments being found.

Metal lithography is considered one of the foremost troublesome advances revolutionizing plan and fabricating approaches. From little buyer items to huge companies, from craftsmen and creators to people, from SMEs to huge organizations, everybody is utilizing metal lithography to create a wide assortment of items.

The advancement of metal 3D printing innovation has driven to major progress in materials science. Innovations in laser and electron beam technologies as well as material science have enhanced the capabilities of metal 3D printers, enabling them to produce complex from a wider variety of metals objects faster. These developments have expanded the capabilities of metal 3D printers, increasing their speed, precision and flexibility.

Primary sorts of metal 3D printers are:
- direct metal laser sintering (DMLS);
- specific laser dissolving (SLM);
- electron bar softening (EBM).

The victory of metal 3D printers is based on the utilizing of materials such as:
- titanium
- stainless steel
- aluminum.

These metals offer an interesting and promising combination of quality, solidness and light weight, making them perfect for an assortment of applications over a range of businesses. In the automotive and aerospace industry, metal 3D printing is revolutionizing component fabrication, enabling the generation of

lightweight structures that ensure the production of lightweight, complex parts leading to more fuel efficient and high-performing vehicles and space crafts.

The medical application of metal 3D printing provides production of custom implants and prosthetics based on individual patients' needs as well as personalized surgical tools and device. This innovative technology is making modern medicine more personalized, i.e. tailoring medical treatment to the individual characteristics of each patient and resulting in improved patient outcomes.

The focal points of metal 3D printing incorporate customization, speed and less squander compared to conventional fabricating strategies making it a profitable innovation over businesses [3].

In conclusion, metal additive manufacturing is revolutionizing mechanical fabrication, offering exceptional levels of customization and effectiveness. As the innovation proceeds to progress, its applications will expand accompanied by reduced cost and greater accessibility.

References:

1. Metal 3D Printers by top3dshopinc. URL: https://habr.com/companies/top3dshopinc/articles/791828/ (accessed 29.03.2024)
2. Introduction to Metal Additive Manufacturing Introduction to Metal Additive Manufacturing. URL: https://www.hp.com/us-en/printers/3d-printers/learning-center/metal-additive-manufacturing.html (accessed 20.02.2024)
3. EPO_AM_Study_140923_Karin Terzic. URL: https://link.epo.org/web/service-support/publications/en-additive-manufacturing-study-2023-full-study.pdf (accessed 07.03.2024)

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Transient Determination: Demystifying Faults in Isolated Neutral Systems

They say curiosity is the mother of invention, and that is certainly true for my journey into the world of electrical engineering. While the fundamentals are fascinating, I am particularly intrigued by the complexities that arise in isolated neutral systems. Today, I am diving into the world of transient determination, a crucial aspect of understanding what happens when a single-phase fault occurs in these systems.

Imagine a circuit where the neutral wire is not directly connected to the ground, unlike the usual setup. This "isolated" approach offers advantages like improved reliability and reduced ground fault currents. But here is the catch: if one of the live wires accidentally touches the ground (or something else grounded), things get interesting.

This "single-phase touching" triggers a chain reaction of events that we call transients. These are temporary surges or dips in voltage or current that happen very quickly before the system settles into a steady state. Understanding these transients is crucial, as they can pose a significant safety hazard.

Why are transients so important in isolated neutral systems?

Here is the thing: even though the overall fault current might be low due to the isolated neutral, the initial capacitive coupling can cause a significant surge right after the fault. Think of it like this: the wires in the circuit act like tiny capacitors, storing electrical energy. When the fault occurs, this stored energy gets released in a burst, causing that initial surge.

But that is not all. The fault point itself often becomes an arc, a stream of electricity jumping the gap between the live wire and the ground. These characteristics of the arc, like its length and resistance, significantly influence the magnitude and duration of the transient current.

So, how do we figure out what happens during these transients?

There are two main approaches:

• **Analytical methods:** These involve using simplified models and calculations to estimate the initial current surge and its behavior. It is like creating a rough sketch of the situation to get a general idea.

• **Simulation software:** This is where things get more sophisticated. Specialized software allows us to create detailed simulations of the entire process, taking into account the non-linear behavior of the arc, the properties of the cables, and the capacitances within the system. It is like building a virtual model of the circuit and letting it play out to see what happens.

Why is all this so important?

Understanding transient behavior is crucial for several reasons:

- **Safety:** By knowing how big and how long these transient currents can be, we can design better protective devices like surge arrestors and ground fault circuit interrupters (GFCIs) to keep everyone safe in case of a fault.
- **Equipment protection:** Those transient surges can be like tiny electrical punches, damaging equipment if they are too strong. Understanding them helps us choose equipment that can withstand these punches without getting knocked out.
- **System design:** Knowing how transients behave allows engineers to design isolated neutral systems better, including choosing the right grounding impedance and implementing strategies to minimize the severity of these transients.

In conclusion, transient determination in isolated neutral systems might sound complex, but it is a crucial piece of the puzzle for ensuring safety, protecting equipment, and designing reliable systems. As I continue my journey in electrical engineering, I am excited to delve deeper into these fascinating complexities and contribute to a future where electricity is safe, reliable, and accessible for everyone.

References:

1. Dugan, R. C., McGranaghan, M. F., & Santovegna, S. (2012). Power system analysis and protection. McGraw-Hill Education.
2. Essentials of Neutral Grounding System: Ensuring Electrical Safety and System Reliability https://www.linkedin.com/pulse/essentials-neutral-grounding-system-ensuring-electrical
3. Single-phase Grounding Fault Section Locating Technology for Distribution Network Based on Rough Set Algorithm - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Structure-of-Isolated-Neutral-System-of-Distribution-Network-Where-the distribution_fig1_366303880 [accessed 16 Apr, 2024]

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Solutions to the problems related to fastening coal mine workings

A large number of coal mines in Ukraine are fixed with metal frame support systems. The design of these systems is a frame consisting of several elements, usually 3, interconnected by special support systems.

The configuration of these frames is determined either by technological reasons or by ventilation concerns, since such a mine working is always used as a ventilation channel.

The geomechanical conditions in turn indicate that, depending on how the load on the fasteners is formed, the outline of the support system should have a certain form that will provide it with maximum stability under the conditions of such loads.

In real conditions, the configuration does not always coincide with these needs. We can say that it almost never does. There are issues connected with production, there are problems connected with typification cross sections of the mine working, contours and the type-sizes of the support system. And there is the issue of the situational position of the support system in the mine working, in different mining geological conditions when some peculiarities appear making it necessary to use a frame different from the standard one.

In this regard, a huge number of mine workings are in a permanent state of repair because mining and geological conditions are constantly changing due to ongoing mining operations. The load on the support frame changes and the latter has to be repaired. Instead, a new support is installed, and the procedure for replacing supports under these conditions involves a huge amount of work, including unsafe work, which often requires big expenses. In some cases, support replacing can happen several times over the entire life cycle of the mine working. These costs can be comparable to and sometimes even greater than the capital costs that are invested at the time of excavation. The consequence of all this is a sharp increase in the price of finished products. All costs associated with the excavation are added to the cost of the products.

This determines the relevance of the problem of enhancing, under the existing rock pressures or mining and geological conditions of a certain mine taken as the basis for this study, the stability of the mine working without increasing the metal consumption of the support system.

Nowadays, in the war conditions, there is a large shortage of rolled profiles for the mining industry and those that are supplied now are much more expensive than they were in the pre-war period. The main manufacturer of rolled profiles for mine support systems was The Azovstal plant in Mariupol, so today there is no adequate replacement for the rolled profiles used in the pre-war time. This leads to the need to save resources.

This is how the idea of creating a frame contour that would ensure maximum stability with the same metal consumption of the structure without the need for regular repair and replacement of support systems arose. This will result in a significant reduction in the cost of operating the mine which, in its turn, will lead to a reduction in the cost of the final product (coal), and as a consequence to an increase in the profitability of the entire enterprise as a whole.

Methods:

1. The use of statistics - analysis of existing statistical data that is available at the enterprise to determine the form of the load and the way it is formed.

2. The analysis of the experience of other scientists and developers.

3. The main method is the finite element method with the use of special software which allows us to design an almost complete structure, put it into the model and monitor the behavior of its individual elements during the loading process.

Our main task is to develop contours and profiles that have some universal parameters appropriate to the above-mentioned industrial regional mining industry facilities which will allow conveyor production of support elements reducing their cost

To achieve this, we have to:

- assess the mining and geological conditions in which this excavation takes place and determine the most characteristic types of manifestation of rock pressure in these conditions – that is how the load on the support is formed;

- develop appropriate models, perform necessary calculations, and select a contour that will provide minimal bending moments;

- select the optimal range from the possible options in the range of minimum bending moments;

- and most importantly – develop an optimal method for calculating and selecting a model using the finite element method.

One of the solutions, and this is a proposed innovation, is to come up with a form of support that would be more stable in the average range of such conditions (in different workings of the same mine, there may be different mining and geological conditions). First of all, we have to find the arithmetical mean of such conditions. The next step is the selection of a support contour that will ensure maximum stability under these conditions due to the fact that the internal force factors that lead to the destruction of the support system will be minimal, and ideally tend to zero.

As studies show, the factor that plays the greatest role in the destruction of the support is bending moments, accordingly, the main solution to the problem studied by me will be the selection of a frame contour shape that will provide zero bending moments in all elements and at the most critical points.

So, the goal is to develop an optimal support contour that will ensure minimal bending moments in its elements for the conditions in which this mine working

operates with the possibility of scaling these results for similar conditions in nearby mines.

Approaches previously used to reduce the cost of coal by reducing the cost of operating mine workings were as follows:

• Using a combined support which is a frame-anchor system. Using anchors with a reduction in the number of frames and an increase in the distance between them.

Disadvantage. Drilling anchors (15 pieces instead of one frame) takes much longer, since the work which can be done by combines in practice is performed manually due to the high cost of the needed equipment.

• Using different types of new locks in support systems instead of standard ones.

Disadvantage. Transformation from a simple mechanism into a complex technological structure leads to higher production costs and more complex installation. This requires training of higher-class specialists, etc., which is usually not done, so the installation will be carried out with errors and subsequent problems. Consequently, the lock should be simple to manufacture and install, that is, the old standard design is still the only option.

But we have an example of a fastening system of Polish production in which, thanks to a different design of the profile, locks and frame configuration, better indicators of system stability are declared compared to domestic ones.

This confirms that the solutions to the above-mentioned problems exist and we are moving in the right direction.

The successful completion of my work should lead to a number of important results:

- it will allow constructing a model of support that will not require regular repair and replacement;
- reduction in the mine working operation time will ensure a decrease in the cost of the finished product, increasing the profitability of the entire enterprise;
- the obtained result can be scaled and used in various mining and geological conditions, including those of other countries.

References:

1. Hoek E. Practical Rock Engineering, 2000 Edition URL: http://www.rocscience.com/hoek/Practical Rock Engineering (accessed: 22.12.2023).
2. T M Barchak An overview of standing roof support practices and developments in the United States. URL: https://www.cdc.gov/niosh/mining%5C/UserFiles/works/pdfs/aoosr.pdf (accessed: 04.02.2024).
3. Skipochka S., Palamarchuk T., Prokhorets L. The concept of risk-based technical solutions for the protection of coal mine workings. URL: https://iopscience.iop.org/article/10.1088/1755-1315/1156/1/012017/pdf (accessed: 27.11.2023).

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Building Information Modeling (H-BIM)

Many projects concerning the protection, conservation, restoration, and dispersion of artistic heritage are being carried out around the world due to its growing interest as a driving force of socio-profitable development. The availability of dependable, digital three-dimensional (3D) models that allow for the planning and operation of these systems in a remote and decentralized way is presently a growing necessity.

There are many software tools to perform the modelling and complete three-dimensional attestation of the interposed monuments. Still, the Architecture, Engineering and Construction (AEC) sector has espoused the structure Information Modelling standard over the last many decades due to the progress that has been made in its rates and capabilities [1].

A BIM can be used throughout a project lifecycle to bring clarity and efficiency into a building's construction:

1. Planning. BIM software can inform, guide, and simplify design planning by allowing the use of real-world data to understand how a structure will look on the particular natural terrain.

2. Design. The design phase can be the most complex of any construction process, taking abstract design, analysis, and expansive attestation. BIM data can give comprehensive modelling that can organize construction and give pivotal information about a design's performance. It can also inform logistics, simplify scheduling and insure that all applicable labour force has access to the correct information throughout this process.

3. Construction. BIM design specifications and other documents involved in the project can largely guide and simplify construction operations throughout this phase.

4. Operation. When it comes to operations and maintenance, BIM's information-rich models and asset data can support not only them but refurbishment, expansion, and even obliteration as well [2].

A structure information model characterizes the architectural image, spatial connections, geographic information, amount and sectors of structure rudiments, cost estimates, material supplies, and design schedule. The model can be used to demonstrate the entire structure life cycle.

Furthermore, the equipment sets and their amount can be determined without difficulty. The scope of work can also be easily structured and defined. Systems, assemblies, and sequences can be shown on a relative scale within the entire installation or group of installations. Construction documents such as delineations,

procurement details, submittal processes, and other specifications can be efficiently interrelated [3].

Having reviewed the advantages H-BIM provides, we have come to the conclusion that its implementation in the cultural heritage sector is highly effective.

References:

1. López F. J., Lerones P. M. A Review of Heritage Building Information Modeling, May 2018. URL: https://www.mdpi.com/2414-4088/2/2/21 (accessed: 25. 10. 2023).
2. What is Building Information Modeling? (BIM), May 10, 2023. URL: https://www.accruent.com/resources/blog-posts/what-building-information-modeling (accessed: 22. 03. 2024).
3. Salman Azhar,, Building Information Modeling (BIM): Trends, Benefits, Risks, and Challenges for the AEC Industry, Jun 15, 2011. URL: https://ascelibrary.org/doi/10.1061/%28ASCE%29LM.1943-5630.0000127 (accessed: 29.03.2024).

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SolidWorks-Based Design and Analysis of a Planetary Gearbox for Educational Applications

Recent years have witnessed a growing emphasis on STEM education, aiming to equip students with the knowledge and skills necessary to thrive in the technology-driven 21st century. Within the realm of STEM education, computer-aided design (CAD) software has become an essential tool, empowering students to design, visualize, and analyze complex technical objects. SolidWorks, a leading CAD software platform, offers a comprehensive suite of tools for 3D modeling, simulation, and analysis, making it a valuable resource for STEM education. This research study focuses on the development of a laboratory workshop that leverages SolidWorks CAD to enhance students' STEM learning experiences.

For the study, a computer model of a two-stage planetary gearbox in the eDrawing program was chosen (look at the Fig. 1), with which you can study the construction of a technical object by immersing yourself in a virtual reality environment, which, in turn, will help visualize this process and provide an opportunity to better understand the interaction between various elements structures.
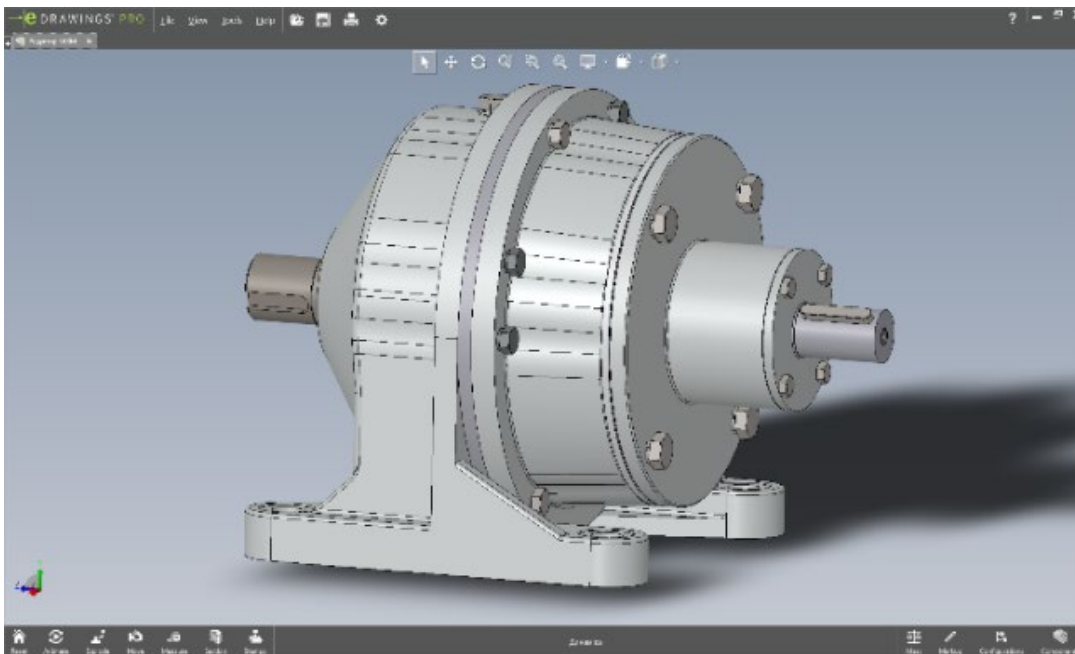
Fig. 1. Computer model of a planetary gearbox in the eDrawing program

Planetary gears are multi-link gears in which the geometric axis of at least one of the wheels is movable. Their efficiency is very high (0.9-0.98). Efficiency is the percentage of useful work that is produced out of all the work that is expended. Energy losses during the operation of any machine or mechanism are caused by

factors such as friction between interacting elements, heating of machine elements, etc.

Planetary gearboxes can achieve high gear ratios, but their dimensions are much smaller than those of worm or spur gearboxes. A planetary gearbox has one degree of freedom and always has a support link (a fixed center ring). There are also gear differential mechanisms that do not have a support link and have more than two degrees of freedom (W = 2). The gear ratio can be in the range of 6 - 450.

The rotation from the input shaft is transmitted to the sun gear, which meshes with all the satellites. The satellites rotate inside the stationary crown gear and transmit rotational energy to the driver and then to the output shaft of the gearbox. A planetary gear can be one-, two-, or three-speed, with the gear ratio depending on the number of teeth on each gear.

Planetary gears are widely used in various working and transport machines. They are used as motion transducers - gearboxes or multipliers; in speed boxes, summing mechanisms (differentials), running-in mechanisms, etc. With an appropriate choice of the scheme and number of wheel teeth, such mechanisms make it possible to obtain large gear ratios (up to 10,000), which is difficult to achieve in conventional gears with fixed axes.

Research was also conducted on a real model of a two-stage planetary gearbox in the laboratory based on the Department of Engineering and Design in Mechanical Engineering of the National Technical University "Dniprovsk Polytechnic". It was disassembled for details, to sketch the details and draw a kinematic diagram.

Through a combination of physical experiments and calculations, the gear ratios were established. The first and second stages were found to have ratios of 4 and 5.75, respectively, resulting in a total gearbox ratio of 23. To verify these theoretical values, the number of revolutions of the input and output shafts on the physical model were measured. This measurement yielded a gear ratio of 22.53. Following this, a computer model of the two-stage planetary gearbox was constructed in SolidWorks. An experiment utilizing a 3D model was conducted akin to a physical model experiment. The computer experiment yielded a gear ratio of 23 for the gearbox model.

This laboratory workshop serves as a valuable tool for educators, offering an interactive and engaging approach to learning about planetary gearboxes within a STEM curriculum. By manipulating the virtual model and analyzing gear ratios, students can develop critical thinking, problem-solving skills, and a deeper understanding of mechanical engineering concepts. Furthermore, the workshop introduces the concept of reengineering, encouraging students to explore design optimization and potential improvements.

The developed workshop will be implemented in the educational process of the Anatoliy Lyhun Scientific Lyceum.

References:

1. Malashchenko V.O., Sologub B.V. Machine details. Synopsis of lectures: teaching. manual / Ministry of Education and Science of Ukraine, National. Lviv University. Polytechnic". – Lviv: View of Lviv. Polytechnic, 2013.

2. Borozenets H.M., Pavlov V.M., Semak I.V. Machine parts / Training manual. "Condor" publishing house. Kyiv. 2021. 220 p.

Bondarenko L. Yu., Chaplinskyi A. P., Vershkov O. O., Antonova G. V. Mechanics of materials and structures / Educational method. coursework guide. VOC "Lux". Melitopol. 2020. 164 p.

3. Paul J. Schilling, Randy H. Shih. Parametric Modeling with SOLIDWORKS 2023 / KS, USA, SDC Publications, 2023

4. Paul Tran. SOLIDWORKS 2024 Basic Tools Getting Started with Parts, Assemblies and Drawings / KS, USA, SDC Publications, 2024.

5. Kuang-Hua Chang Ph.D. Motion Simulation and Mechanism Design with SOLIDWORKS Motion 2023 / KS, USA, SDC Publications, 2023.

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Adaptation of liquid rocket engine shell manufacturing technology to modern capabilities of CAD-CAM systems and 5-axis coordinate CNC machines.

In my study I have described and substantiated:

1. The planing process using a special cutting tool on a 5-coordinate CNC machine for machining spiral surfaces of liquid engines shells has been proposed for the first time.

2. The principles of programming 5-axis CNC machines for planing using modern CAM-systems [1] have been developed for the first time.

3. A mathematical model of increasing the accuracy of the control program on a CNC machine [2] for processing the spiral surfaces of the shells of liquid rocket engines has been obtained for the first time.

4. CAM-modelling of the cutting process to obtain the results of machining accuracy has been carried out.

The practical significance of the results described in the article:

1. Methods of programming 5-axis CNC machines for processing spiral surfaces of shells of liquid rocket engines by milling and planing methods were created and introduced into production.

2. Planing technology using a 5-axis CNC machine and a special cutting tool was introduced.

3. A system for measuring and analysing the shells of liquid jet engines has been introduced into production.

4. A system for correction of the control program of a CNC machine tool has been created and implemented to increase the accuracy of processing the spiral surfaces of the shells of liquid rocket engines.

Theoretical and practical achievements of the work were implemented at the following enterprises: State Enterprise "Production Association Yuzhny Machine-Building plant named after A.M. Makarov" (YUZHMASH), State Enterprise "Yuzhnoye State Design Office named after M.K. Yangel" (YUZHNOYE SDO).

The main body analyses the problems of manufacturing shells of liquid rocket engines in modern production, methods of their manufacture and control, substantiation and adaptation of the method of modelling the planing process for processing spiral surfaces of shells of liquid rocket engines. The method of programming 5-coordinate CNC machines for the planing process is described. The technique of control of accuracy at modelling of process of planing is offered.

Technologically, the classical manufacturing of a liquid rocket engine body can be divided into two stages. The first stage is external and internal turning of the nozzle geometry. The second stage is the milling of spiral surfaces (the so-called fins – the cooling channels of the shell).

One of the technological features of the second stage of production is the introduction of a special tool instead of a milling cutter.

In this case, the cutting process is more like turning or even planing than milling although all 5 coordinates of the CNC machine are used simultaneously. To program such a process, you also need to perform special actions.

The main problem with modelling the planing process in modern CAM systems is the lack of a planing operation as such. Therefore, it was decided to obtain a planing simulation process by adapting the existing 5-axis milling operation.

First, we need to justify the choice of the cutting method. For a typical case, this process requires calculating the economic component – that is, which cutting method will make our shell the cheapest without losing quality. But in this paper, we will consider the methodology for switching to multi-axis planing because it is not a standard method in modern production.

In a CAM system, the planing operation is calculated as a 5-axis milling operation, but the following features should be taken into account: planing tool geometry, workpiece and tool materials, tool control point, and kinematic capabilities of the CNC machine.

The adaptation of machine and postprocessor parameters in NX must be performed according to the machine data sheet, indicating the machine's limitations and all kinematic features and taking them into account. This will help to avoid additional errors and mistakes when developing the control on a CNC machine. One of the most important points here is to disable the machine's locking during the working movement (cutting process) without tool rotation, in our case, the planing tool. This requires an additional M-command in the postprocessor and in the machine logic.

Optimizing the control and verifying the result are perhaps some of the most important steps. Without optimization of the control using the planing process, a lot of rejects can be produced in the manufacture of the radial pressure vessel shell. This is due to the influence of the accuracy of modelling the shell itself on the accuracy of the control by the working bodies of the CNC machine when manufacturing fins (of rather complex geometry) by planing.

The result of an unoptimized control can be a deformation of the geometry of the fins or the wall of the shell itself.

The mathematical model of increase of accuracy of processing of spiral surfaces of covers of liquid rocket engines is developed, experimental researches on field samples with use of mathematical model are considered, methods of modelling and programming of the planing process for processing spiral surfaces of liquid rocket engines covers have been developed. The results of using the above-mentioned methods in production have been considered.

In the general conclusions recommendations of practical use of the developed methods and results are offered and results of theoretical and experimental researches are summarized.

References:
1. CAM-system. URL:https://www.autodesk.com/products/fusion-360/blog/computer-aided-manufacturing-beginners/ (accessed: 25.05.2018)
2. CNC machine. URL: https://cncmachines.com/what-is-a-cnc-machine (accessed: 10.02.2014)
3. Liquid rocket engine. URL: https://www.grc.nasa.gov/www/k-12/airplane/lrockth.html (accessed: 13.05.2021)

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Evaluating the Implementation of Two-Chamber Ball Mills

The pursuit of enhanced efficiency and precision in material grinding processes occupies a central place within the domains of materials science and engineering, underscored by its criticality across a spectrum of industrial applications. Material grinding, a quintessential process in the manufacturing landscape, faces persistent challenges in achieving optimal particle size with uniform consistency. The advent of two-chamber ball mills emerges as a paradigm shift, heralding unprecedented levels of efficiency and precision in the grinding of materials. The core innovation of two-chamber ball mills lies in their structural and operational design, which directly addresses the inefficiencies and limitations of traditional single-chamber mills.

The significance of this technology is underscored by the universal imperative for resource optimization and quality enhancement in manufacturing processes. The conventional approach to material grinding, often characterized by single-chamber mills, has been fraught with limitations, including suboptimal energy consumption, uneven particle size distribution, and the resultant compromise on product quality. The advent of two-chamber ball mills, with their distinctive architectural and operational modality, offers a potent remedy to these longstanding challenges.

Two-chamber ball mills represent a pivotal advancement in material grinding technology, offering enhanced efficiency, versatility, and precision in particle size reduction processes. Two-chamber ball mills, as the name suggests, incorporate a primary and secondary chamber separated by a diaphragm. Each chamber contains rotors equipped with discs carrying grinding bodies such as balls, rods, or cylinders. The primary chamber is typically charged with larger grinding media, making it suitable for the initial coarse grinding. Subsequently, the material passes through to the secondary chamber, which is charged with smaller media for fine grinding. This staged approach offers significant advantages.

The compartmentalization inherent in two-chamber ball mills enables a strategic allocation of grinding media sizes, tailored to the particle size distribution of the material at each grinding stage. Engineered to maximize energy utilization during the grinding process, these mills minimize electricity consumption and optimize production workflows, offering a cost-effective solution for enterprises seeking to reduce operational expenses. This tailored approach reduces over-grinding of finer particles in the primary chamber, thereby conserving energy and improving the efficiency of the grinding process. Empirical studies underscore the energy efficiency of two-chamber ball mills, evidencing significant reductions in energy consumption compared to conventional single-chamber mills, alongside improvements in material throughput and fineness [1].

Moreover, the precision in grinding is markedly improved in two-chamber ball mills. The separation of coarse and fine grinding stages allows for more controlled particle size reduction, resulting in a narrower particle size distribution. This is particularly beneficial for applications requiring high levels of material uniformity

and fineness, such as in pharmaceuticals and nanotechnology. The precision afforded by two-chamber mills facilitates the production of materials with specific, reproducible properties, thereby enhancing product quality and consistency [2].

From an industrial application standpoint, the benefits of enhanced efficiency and precision in grinding processes cannot be overstated. For industries such as cement production, mineral processing, and metal fabrication, the improved energy efficiency translates into significant cost savings and lower environmental impact. The precise control over particle size distribution enables the production of higher-quality materials, which can lead to improved performance of the final product.

Furthermore, the operational advantages of two-chamber ball mills, characterized by their user-friendly design and minimal maintenance demands, ensure seamless integration into existing production workflows, minimizing operational disruptions and facilitating a smooth transition to more efficient and precise grinding solutions. The user-friendly design and minimal maintenance requirements of these mills add to their appeal. Operators of all experience levels can easily operate and maintain them, minimizing downtime and ensuring smooth production workflows.

Looking ahead, the ongoing development of two-chamber ball mills is set to focus on further enhancements in energy efficiency, material handling capabilities, and the integration of digital technologies. The latter represents a frontier in Smart Engineering, offering the potential for advanced process control and optimization through the use of AI algorithms, IoT devices, and real-time monitoring systems. Such digital integrations will enable even more precise control over the grinding process, optimizing production efficiency and material quality in ways previously unimaginable.

Real-time monitoring systems would also provide valuable data for process optimization, allowing operators to fine-tune the grinding process on the fly based on specific material requirements. In essence, these digital advancements will push the boundaries of what's possible in material grinding, unlocking a new era of efficiency, precision, and intelligent control.

As the demand for sustainable and efficient grinding solutions continues to grow, the development of innovative technologies for two-chamber ball mills remains a focal point in engineering research. Evaluating the implementation of these mills in real-world scenarios will be crucial to optimize their effectiveness and identify areas for subsequent improvement. Future advancements may focus on refining material handling capabilities, and integrating digital technologies for advanced process control and optimization. In conclusion, two-chamber ball mills represent a cornerstone of modern material grinding technology, driving innovation and efficiency across diverse industrial sectors.

References:

1. Smith, A. (2020). Efficiency improvements in ball mills. Journal of Material Processing Technology, 55(2), pp. 104-110.
2. Johnson, D., et al. (2021). Advancements in fine grinding technologies. International Journal of Minerals Engineering, 67(4), pp. 289-295.

Section 03 Computer Science and Solutions in IT

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Frontend Developer

A Frontend Developer is a crucial player in the realm of web development, tasked with crafting user interfaces for websites and applications. Leveraging a diverse toolkit of web technologies such as HTML, CSS, and JavaScript, they transform design mockups into interactive digital experiences that users engage with daily.

Frontend development is a multifaceted discipline that demands proficiency in various technologies:
- HTML (HyperText Markup Language): The backbone of web content, HTML provides the structural framework for web pages, defining elements such as headings, paragraphs, and lists.
- CSS (Cascading Style Sheets): Responsible for the visual presentation of web content, CSS dictates the layout, colors, fonts, and other stylistic attributes to enhance user experience.
- JavaScript: As the cornerstone of interactivity on the web, JavaScript empowers developers to create dynamic, responsive web applications by manipulating page elements, handling user input, and communicating with servers.
- Frontend Frameworks: React, Angular, and Vue.js are among the most prominent frontend frameworks, offering developers pre-built components and efficient state management to streamline development workflows.
- Preprocessors: Sass and Less are CSS preprocessors that extend the capabilities of CSS by introducing features like variables, mixins, and nested rules, enhancing code maintainability and reusability.
- Task Runners: Tools like Webpack automate tasks such as bundling JavaScript modules, optimizing assets, and transforming code, thereby improving development efficiency and performance.
- Package Managers: npm (Node Package Manager) and Yarn simplify dependency management by enabling developers to install, update, and share project dependencies effortlessly.
- Version Control Systems: Git, coupled with platforms like GitHub and GitLab, facilitates collaborative development by enabling version tracking, code review, and seamless code integration across distributed teams.

- REST API: Understanding Representational State Transfer (REST) principles is essential for frontend developers to interact with backend services, fetching and manipulating data to populate web interfaces dynamically.
- Responsive Design: With the proliferation of mobile devices, responsive design has become imperative, requiring developers to ensure that web applications adapt gracefully to different screen sizes and orientations.
- Accessibility Standards: Adhering to accessibility guidelines such as the Web Content Accessibility Guidelines (WCAG) ensures that web content is perceivable, operable, and understandable by users with disabilities.
- Browser Compatibility: Frontend developers must address cross-browser compatibility issues to ensure consistent rendering and functionality across popular web browsers like Chrome, Firefox, Safari, and Edge.

In the ever-evolving landscape of frontend development, certain statistics offer insights into prevailing trends and industry norms:
- Most Popular Framework: React.js continues to dominate the frontend ecosystem, owing to its declarative syntax, component-based architecture, and robust ecosystem of libraries and tools.
- Average Work Hours per Week: Frontend developers typically dedicate 40 to 50 hours per week to their craft, encompassing coding, debugging, collaboration, and ongoing learning.
- Median Salary: The median annual salary for frontend developers ranges from $60,000 to $100,000, depending on factors such as experience, location, and employer.

There are some challenges for Beginners. Embarking on a journey into frontend development entails overcoming various challenges that novice developers often encounter:

1. Understanding Frameworks: Delving into frontend frameworks like React, Angular, or Vue.js can be daunting for beginners due to their complex concepts and steep learning curves.

2. CSS Complexity: Mastering CSS involves grappling with a plethora of properties, selectors, and layout techniques, making it challenging for newcomers to achieve desired styling outcomes.

3. JavaScript Fundamentals: Developing proficiency in fundamental JavaScript concepts such as variables, functions, arrays, and control flow is essential but may pose difficulties for beginners transitioning from HTML and CSS.

4. Debugging Skills: Identifying and resolving errors in code—be it HTML markup, CSS styling, or JavaScript logic—requires sharp debugging skills that novice developers often struggle to hone.

5. Version Control: Navigating the intricacies of version control systems like Git, including branching, merging, and resolving conflicts, can be overwhelming for those new to collaborative development workflows.

6. Responsive Design Challenges: Ensuring seamless responsiveness across diverse devices demands a nuanced understanding of CSS media queries, flexbox, and grid layouts, presenting a formidable challenge for beginners.

7. Browser Compatibility Issues: Addressing disparities in rendering and functionality across various web browsers necessitates rigorous testing and troubleshooting, posing a significant hurdle for novice developers.

8. Project Setup Complexity: Configuring development environments, integrating build tools like Webpack, and managing project dependencies using npm or Yarn can overwhelm beginners with their complexity and configuration nuances.

In conclusion, frontend development is a dynamic field that demands a blend of technical expertise, creative flair, and problem-solving acumen. By mastering the essential technologies, navigating industry trends, and persevering through initial challenges, aspiring developers can embark on a rewarding journey toward becoming proficient frontend engineers.

References:

1. *What Does a Front-End Developer Do? Complete Guide to the Front-End Developer Profession* [online]. Available from: https://frontendmasters.com/ guides/front-end-handbook/2018/what-is-a-FD.html

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Two Sides of Cybersecurity: Comparative Analysis of Pentest and Information Security Audit

With the development of digital technologies the risk of cyber attacks also increases, which requires cybersecurity professionals to acquire new knowledge and tools for information protection. Information security is a continuous process that includes penetration testing and auditing as elements of the PDCA (Plan-Do-Check-Act) cycle which involves regular assessment and improvement of security measures.

Penetration testing reveals security vulnerabilities, but it requires the client to allocate resources for their remediation. Often companies don't have the appropriate specialists which can lead to improper security management. The results of the penetration test prompt management are used to activate information protection measures and correct existing deficiencies [1].

In the case of the information security audit, the situation is more extensive, as it involves an expertise of the organization's IT infrastructure, including technical, legal and organizational aspects. The audit helps to identify strengths and weaknesses, establish priorities based on the threat model and build a plan for further security development [2]. The audit concludes with a detailed report containing recommendations for security improvement.

There are various methodologies and approaches for both penetration tests and security audits. The goals and approaches significantly differ for each measure. Penetration testing utilizes a variety of standards and methodologies, including OWASP's WSTG for web applications and OSSTM for internal and wireless networks, as well as PTES and NIST for a comprehensive approach to security [1]. These methodologies cover information gathering, configuration testing, authorisation, authentication, business logic, cryptography, APIs, physical security and regulatory requirements.

Security audits and company maturity assessments often rely on the CIS Controls methodology, especially version 8 and the COBIT-2019 framework which include models for informally determining the maturity level of organizations. The CIS methodology defines the maturity of an organization across 18 domains, classifying them into three main types: IG1 – small or medium organisations with limited IT and security resources; IG2 – organisations with sufficient resources to manage IT infrastructure and comply with regulatory requirements; IG3 – organisations with professionals from various security fields that process information under regulatory control [2].

The COBIT-2019 standard serves as a universal model for assessing IT management systems. A separate section *COBIT for Information Security* is dedicated to information security, recognizing factors of influence and adaptation to the corporate environment. It establishes four levels of information security maturity: from the absence of awareness of the importance of information security and the use of basic protection tools to a high level where information security is a part of the corporate culture with clearly defined roles for CISA and CISO, separate budgeting and developed information security management systems.

Another distinct feature between penetration testing and security auditing is the communication process with the responsible party [3]. During penetration testing, there is no constant interaction with the client. Everything is discussed at the contract signing stage and before sending the final version of the report to print when the client makes their corrections and recommendations. Otherwise, the penetration tester is left to their own devices and cannot consult with the client regarding the selection of specific targets and the choice of vulnerabilities and modules.

During an audit, there is ongoing dialogue with department heads, clarifying information about processes. Interviews with the organization's employees are also conducted [2]. Communication with employees enables knowledge assessment and determines the overall level of awareness regarding information security.

A security auditor needs to have well-developed soft skills [3]. Without polished skills in effective communication and understanding people it is impossible to obtain the necessary information. For some employees, interviews can be the most intense stress. They may become introverted and respond incorrectly to questions. The auditor's task here is to create a conducive and calm environment.

Therefore, penetration testing and information security auditing are integral parts of the overall process of ensuring information security. Auditing allows for establishing a direction for development. Penetration testing enables the verification of how successfully the processes for implementing the established direction are executed and how effectively the information security department works. The process of protecting information should begin with an audit. This step will allow for understanding the current state of the organization. Penetration testing doesn't allow seeing the full situation on a large scale and aims to check the technical component of the information protection process. Security auditing is a broader concept. It is primarily important for organizational leaders, as it results in an understanding of the organization's maturity and development trends.

References:

1. Mariam Alhamed, M. M. Hafizur Rahman (2023). *A Systematic Literature Review on Penetration Testing in Networks: Future Research Directions.* https://www.researchgate.net/publication/371526322_A_Systematic_Literature_Review_on_Penetration_Testing_in_Networks_Future_Research_Directions (Access date: 24 February, 2024).
2. AUDITBOARD. Vice Vicente (2023). *Security Audits: A Comprehensive Overview.* https://www.auditboard.com/blog/what-is-security-audit/ (Access date: 05 March, 2024).
3. BLUE GOAT CYBER (2023). *Penetration Testing vs Security Auditing.* https://bluegoatcyber.com/blog/penetration-testing-vs-security-auditing/ (Access date: 13 March, 2024).

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VPN Usage to Secure Data on Public Wi-Fi

The overall aim of this conference paper is to investigate the effectiveness of Virtual Private Networks (VPNs) in securing data on public Wi-Fi networks. This study discusses the inherent risks associated with using public Wi-Fi networks, such as unsecured connections, eavesdropping, and potential attacks.

In the digital age, public Wi-Fi networks have become widespread, providing Internet access in places where there is no mobile network coverage or where an urgent connection from a laptop is required. However, the use of such networks is associated with risks due to their low level of security. Despite the continuous improvement of protective mechanisms, many users are not aware of the precautions when using an open network.

One common threat is attacks through fictitious access points. These access points which have names similar to legitimate networks are misleading to inexperienced users. [3] Once connected, attackers can launch various attacks, like packet sniffing to capture your data, potentially stealing sensitive information, or a man-in-the-middle attack, where attacker positions themself between user and the legitimate wireless network, potentially changing the data you send and receive.
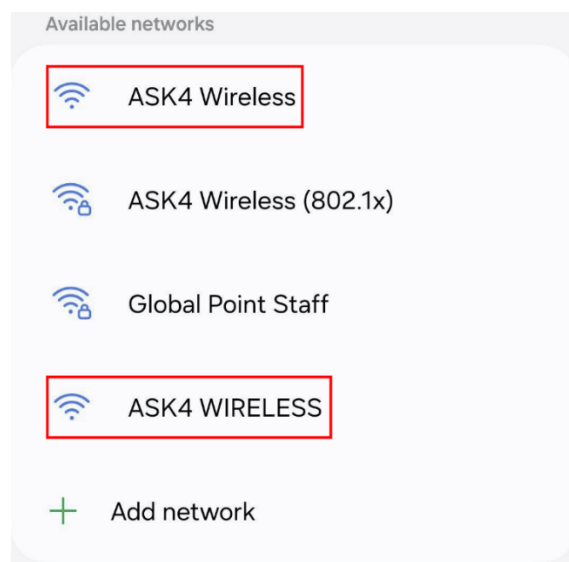
Figure 1. Fictitious access point.

In open networks, there is a risk of leaking confidential information in the absence of encryption. Unencrypted data (for example, data that travels through

the HTTP protocol) is transmitted in clear text, allowing attackers to monitor user activity [2].

A less common, but no less dangerous threat is Wi-Fi protocol vulnerabilities, like key reinstallation attacks on WPA2 protocol. Attackers can exploit these vulnerabilities to eavesdrop on all the wireless traffic passing through a compromised access point. Therefore, malicious actors can gain access to user's login credentials or credit card details [5].

By using a VPN (Virtual Private Network), users can protect themselves from most types of wireless attacks. A VPN operates by creating a virtual tunnel between the user and a remote server (controlled by the VPN provider). The tunnel uses powerful encryption mechanisms to protect information from third parties by converting it into an unreadable format throughout the journey. The information remains encrypted until it reaches the VPN server, the end point of the tunnel [1]. The server decrypts the data using an encryption key known only to it and the user, making interception and reading of the information impossible.

However, using a VPN is not without its drawbacks. It can lead to increased traffic consumption, which entails additional costs for the user. Encryption and tunneling of data can negatively affect the speed of the Internet connection [4]. When choosing a VPN service, the user should consider factors such as its location, quality of services and the maximum possible speed of the user's Internet connection.

It is also important to ensure that the VPN service adheres to generally accepted privacy standards. If the service logs all user actions, this could lead to the disclosure of their identity. To ensure maximum privacy, it is recommended to choose VPN services that strictly adhere to a "no-logging" policy and are located in countries where the law does not require storing information about users and their online activities. Otherwise, this information may be used against the user by government or law enforcement agencies.

For users who do not have in-depth knowledge of working with modern devices, it is recommended to choose VPN services with an intuitive interface.

Summarising the above, the basic safety rules when using open Wi-Fi networks include not entering confidential information, using strong encryption mechanisms and VPN connection. Following these simple rules will significantly increase the level of security when connected to open Wi-Fi networks.

References:
1. Al-Fayoumi, M., Ababneh M., Qasaimeh M. (2019). *Enhancing Data Protection Provided by VPN Connections over Open WiFi Networks*. Retrieved from: https://www.researchgate.net/profile/Mustafa-Al-Fayoumi/publication/337796232_Enhancing_Data_Protection_Provided_by_VPN_Connections_over_Open_WiFi_Networks/links/61ea135f8d338

833e3839f7f/Enhancing-Data-Protection-Provided-by-VPN-Connections-over-Open-WiFi-Networks.pdf [Accessed 26 March 2024].

2. Sangeen M., Bhatti N., Kifayat K., Alsadhan A., Wang H. (2023). *Blind-trust: Raising awareness of the dangers of using unsecured public Wi-Fi networks*. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0140366423002396 [Accessed 26 March 2024].

3. Samsung. (2023). *Intelligent Wi-Fi*. [online] Retrieved from: https://docs.samsungknox.com/admin/knox-platform-for-enterprise/kbas/kba-360034073174/ [Accessed 26 March 2024].

4. NordVPN. (2023). *Pros and cons of a VPN*. [online] Retrieved from: https://nordvpn.com/blog/pros-and-cons-of-vpn/ [Accessed 04 April 2024].

5. Mathy V., Frank P. (2017). *Key Reinstallation Attacks: Forcing Nonce Reuse in WPA2*. [online] Retrieved from: https://papers.mathyvanhoef.com/ccs2017.pdf [Accessed 25 April 2024].

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Impact of Video Games on Programming

Most programmers have played or currently play video games regardless of age. The popularity of video games is increasing, and every day more people are recognizing them as a useful tool for skill development. This publication will attempt to analyse the impact of video games on programming.

The obvious benefits include:

Logical Thinking Development. Most modern games require players to think logically, plan their moves, and anticipate future steps. These often include strategies and puzzles, helping with understanding logical algorithms and structures, as well as predicting consequences.

Problem Solving. Games frequently present challenging problems, sometimes too complex or hidden to progress further until solved. This fosters unconventional problem-solving skills or analytical thinking among most players.

Creativity. Many video games offer creative opportunities such as building or crafting, which can contribute to a creative approach in problem-solving or algorithm creation.

Motivation. Most games motivate players to learn and develop skills. When used wisely, they can motivate learning or development in programming. Many online games include leaderboards, fostering competition among learners and thereby improving programming skills through gamified learning.
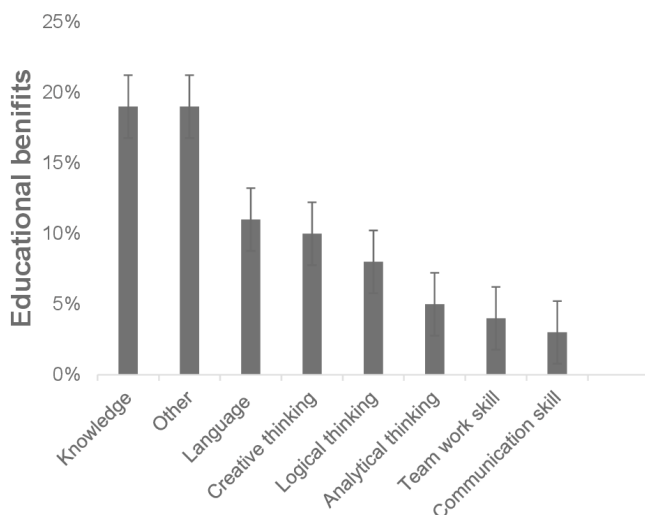
However, playing computer games also has its negative impact, among them are the following.

Dependency. It is one of the most significant drawbacks of video games, especially among children who may not have other ways to achieve high

dopamine levels. Dependency negatively impacts various aspects of life from education or work to social problems.

Illusion. There are numerous very easy games that can create a misleading perception of programming. Programming requires a lot of time and persistence.

Games ≠ Practice. Video games are not a substitute for practical activities. To become a proficient programmer, it is not enough to learn how to play, but also to practice extensively programming.

To better understand the impact of video games on programming, a survey was conducted among programmers with varying levels of experience. The survey results showed that:

72% of respondents believe that video games can be a useful tool for developing programming skills.

64% of respondents believe that video games helped them develop logical thinking.

56% of respondents believe that video games helped them develop an algorithmic approach to problem-solving.

38% of respondents believe that video games helped them develop creativity.

Scientific research has shown that the impact of video games on programming skills has both positive and negative aspects. Advantages include developing logical thinking, problem-solving skills, creativity, and motivation for learning programming. However, there is a risk of game dependency, misconceptions about programming due to the ease of some games, and sufficient practice need for real programming skill development.

The survey results confirmed that most programmers consider video games a useful tool for developing programming skills, particularly in terms of logical thinking, algorithmic approaches, and motivation for learning.

Therefore, the impact of video games on programming is complex and requires careful analysis, a balanced approach, and consideration of individual characteristics, and is not mandatory for every programmer.

References:
1. «The Influence of Video Games on Programming Skills» [Electronic resource]. Access mode: https://moldstud.com/articles/p-the-influence-of-video-games-on-programming-skills
2. «The relationship between video games, problem-solving skills, and academic performance from IT students' perspective» [Electronic resource]. Access mode:https://www.semanticscholar.org/paper/The-relationship-between-video-games%2C-skills%2C-and-Chen/92b4f90be03bc0aba612bf1838f79fdcc11dbedf
3. «Video Game Programmer Skills: Definition and Examples» [Electronic resource]. Access mode: https://ca.indeed.com/career-advice/resumes-cover-letters/video-game-programmer

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Will artificial intelligence replace artists?

The rapid development of AI provoked a hot discussion among experts and ordinary people, raising the question of how fast AI will be able to replace humans in their jobs. For example, Forrester Research forecasts that only in the US generative AI can replace about 2.4 million by 2030. These jobs will mainly include those that are easy to automate, such as technical writers, proofreaders, and copywriters.
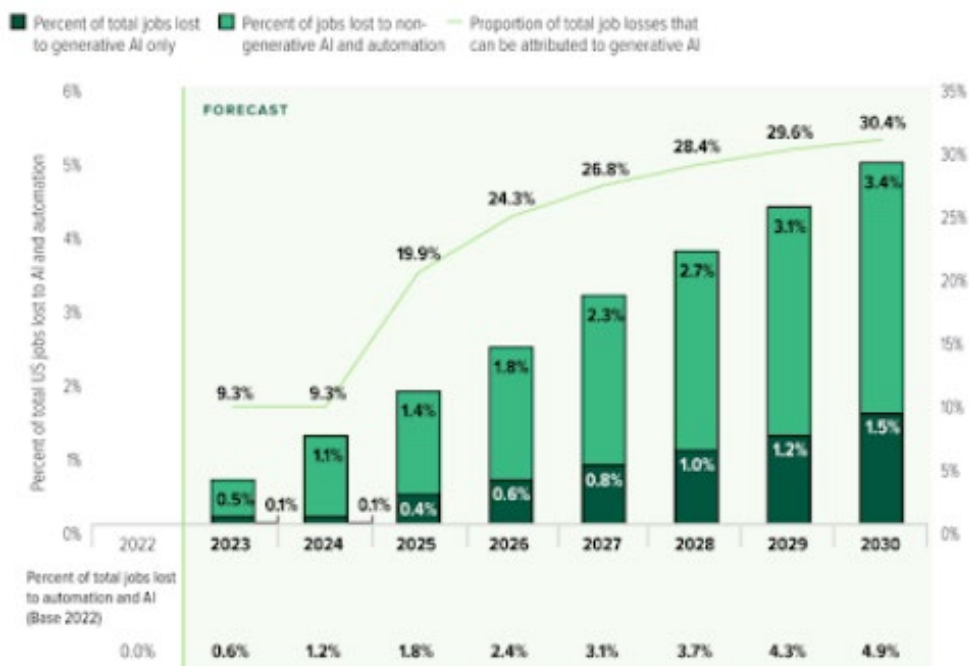
Fig.1 *Total US jobs lost to AI and automation.*

However, AI has already achieved much success in many other spheres, including the field of art. According to the data provided by the website Zipdo, 63% of art organizations predict that AI will greatly change the arts field by 2030. Moreover, even in 2021 more than 81% of successful digital initiatives in art were driven by AI, and in addition, Artificial Intelligence and Machine Learning are expected to achieve $750 million in market revenue in the arts and culture sector by 2026.

Therefore, the danger of losing jobs by artists, singers, architects and other professionals in the sphere of art due to the AI replacement by artificial does not look unreal. Some statistics shows that 55% of artists worry that artificial intelligence will eliminate their chances to get a stable income from their own artworks.

Let us look deeper into some areas of art where AI is already making progress. Painting is one of the leaders among those being influenced by AI, as some modern AI applications can easily reproduce a picturesque landscape, a beautiful portrait or any other painting after adding the required parameters and data.

As AI is not always perfect in its actions, the result cannot always satisfy users. For example, AI can draw a picture where animals and objects are merged into one body, or AI can just draw some nonsense. So, human interference is often needed to complete or modify the work. On the other hand, the AI painting "Edmond de Belamy, from La Famille de Belamy", generated by artificial intelligence, was sold at the auction in New York for $432,500.

The creator of Eternity *Park Ji-eun* compared the emergence of AI in the field of art with the emergence of photography. He mentioned that many artists worried about losing their jobs when the photography appeared. But even today people make various paintings which amaze us with their beauty.

Another area of art where the development of AI is growing rapidly is music. In 2019, approximately 20% of artists used AI to create their music. "Unlike human singers, AI members can freely express themselves and weigh in on diverse social issues because they are less vulnerable to malicious comments and criticisms," said Park Ji-yoon, CEO of Pulse 9 in the interview to The Korea Times. In addition, Hybe used artificial intelligence to write songs in six languages - Korean, English, Spanish, Chinese, Japanese, and Vietnamese, and to adjust the singer's pronunciation and tone.

All this proves that the impact of AI in music is extremely large. From a business perspective, the use of AI makes the whole project preparation process cheaper and faster, so it becomes much more beneficial for large companies. For example, in the K-pop industry, virtual groups are increasingly being released. This reduces the company costs, because virtual participants do not need money for food, training, clothes, etc. But some idols do not believe that this trend is somehow threatening. On the contrary, they think, the real singers can improve their skills learning from AI.

Can dancers be replaced with virtual characters or holograms? To be a dancer, you need to feel the music with your whole body to convey all the beauty of dance movements. And no matter how advanced AI is, «natural» emotional dancing will always be in preference.

To sum up, it is necessary to mention that keeping pace with the development of new technologies cannot be stopped or ignored. And AI can be here a great helper, making any work easier and more efficient. However, AI should be used only as a tool, a bug fixer, or a generator of new ideas, but not as a human replacement with a cheap and fast income. AI will never fully express real emotions and creativity, especially in art. Without real life experience, AI can only reproduce human templates suffering from the lack of sense and feelings that artists convey through their works.

References:
1. "AI Art Statistics: The Ultimate List in 2024" by Jasmine Katatikarn (February 15, 2024). [Electronic resource]. Access mode: https://academyofanimatedart.com/ai-art-statistics/.
2. "Generative AI «will replace 2.5 million jobs in the U.S. by 2030»" by John Isige (September 11, 2023). [Electronic resource]. Access mode: https://www.techopedia.com/generative-ai-will-replace-2-5-million-jobs-in-the-u-s-by-2030.
3. "Essential AI In Art Statistics In 2024" by Alexander Eser (August 23, 2023). [Electronic resource]. Access mode: https://zipdo.co/statistics/ai-in-art/.
4. "The End Of Originality: Is AI Replacing Real Artists?" by Elijah Clark (December 23, 2023). [Electronic resource]. Access mode: https://www.forbes.com/sites/elijahclark/2023/12/23/the-end-of-originality-is-ai-replacing-real-artists/?sh=727af9b85214.

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Creating AI Voice Models Using RVC

The topic of artificial intelligence is becoming more relevant every year. We associate AI with something good, for example, facilitating everyday tasks, but there is another side of using AI. Demanding money over the phone using the voice of relatives and acquaintances of the victim is a common phenomenon today. This study discusses the process of creating such a model from scratch. The model under consideration is called Retrieval-Based Voice Conversion (RVC).

RVCs are pre-trained models that allow rapid voice changes. Ready-made RVC models can be found on the Internet, usually in Telegram channels and forums.

For dataset development the voice recording is in one language. The next step is to develop samples in FL Studio. One sample is no longer than 10 seconds, and the number of samples is more than 100. Use the complete phrase, otherwise the model will have defects. You need to drag a track with a voice into the program. Use the "Slice" tool to cut one sample, drag the remaining track to a new "Track", and develop the required number of samples. It is better to save samples in a folder. You need to click "File", "Export", and "All playlist tracks".

To train the model, you need to use RVCNvida AI and download Python 3.10 and have a 10+GB video card. After downloading RVCNvida, you need to click the "go-web.bat" file. The console starts and a tab in the browser opens. In the "Model Inference" tab, you can test the finished model. In the "Vocals/Accompaniment Separation & Reverberation Removal" tab, you can make your dataset more qualitative and remove noise.

To train the model involving 3 steps you need the "Train" tab.

Step 1: In the first window, enter a name and leave the settings as default.

Step 2: Enter the path to the dataset in the first window and click "Process data". The console will open. "GPU" is the number of graphics cards. It is better to select "rmvpe_gpu" and click "Feature extraction".

Step 3: When you see "Save frequency", write 50. "Total training epochs" means running samples through the model. "Batch" is the AI display itself (DO NOT TOUCH IT). When you see "Save only the latest '.ckpt' file to save disk space" click 'yes' to save disk space. "Cache all training sets..." loads the entire data set into video memory.

After clicking "Train model", the training of the model begins and continues for about 4-5 hours. Then click "Train feature index" to generate a file that can be used in VoiceChanger. This file specifies the features of the model.

After downloading RVC, you need an environment to speak, such as VoiceChanger AI. After downloading and unpacking the files, select the startHttp.command file (the extension may be different, as it depends on the OS). It starts downloading in the terminal and eventually the program itself is loading. If you want to talk by voice on the phone, GoogleMeets, and MS Teams, you need to download any Virtual Audio Cabel. It is recommended to make the settings as in Figure 1, but most of the parameters are selected individually for each device.CHUNK must be selected independently. The larger the CHUNK, the longer the voice delay. It is by this parameter that you can recognize what the AI is saying to you. For example, if the 'female model' is used by a man, or a person with a harsh voice then there will be small echoes.
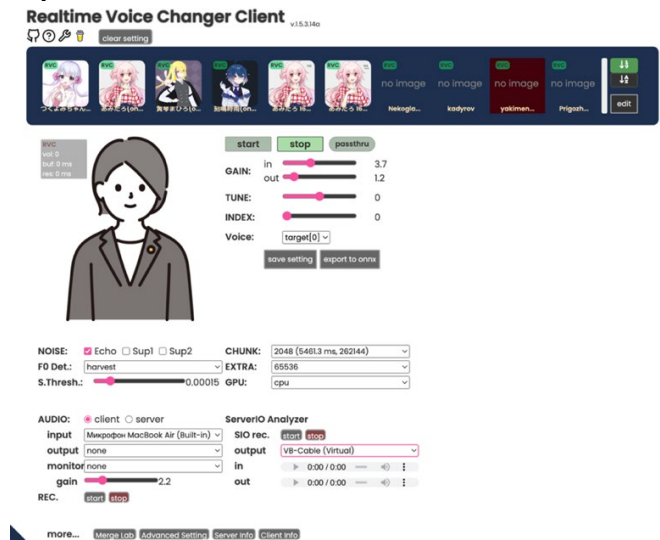
Fig. 1. Voice Changer AI program interface

To download the developed model, you need to click "edit" from the top, select "blank" and "upload". For "Model", download a file with the extension .pth, for "Index" - with the extension .index.

This study gives us an insight of how to create a RVC model from scratch and not to become a victim of a scammer.

References:

1.https://www.image-line.com/
2.https://vb-audio.com/Cable/
3.https://huggingface.co/wok000/vcclient000/tree/main
4.https://colab.research.google.com/drive/1TU-kkQWVf-PLO_hSa2QCMZS1XF5xVHqs?usp=sharing
5.https://www.patreon.com/kalomaze

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Types of Cyber-attacks and Preventive Defense Measures

A cyber-attack is an attempt by cybercriminals, hackers or other digital adversaries to access a computer network or system, usually for the purpose of altering, stealing, destroying or exposing information.

Cyber-attacks can target a wide range of victims from individual users to enterprises or even governments. When targeting businesses or other organizations, the hacker's goal is usually to access sensitive and valuable company resources, such as intellectual property (IP), customer data or payment details [3].

Types of cyber attacks

1. Malware

Malware – or malicious software – is any program or code that is created with the intent to do harm to a computer, network or server. Malware is the most common type of cyberattack, mostly because this term encompasses many subsets such as ransomware, trojans, spyware, viruses, worms, keyloggers, bots, crypto jacking, and any other type of malware attack that leverages software in a malicious way.

2. Denial-of-Service (DoS) Attacks

The act of flooding a network with false requests to disrupt business operations is known as a Denial-of–Service (DoS) attack, which is a malicious and targeted attack.

In a DoS attack, users are prevented from performing essential and routine activities such as accessing email, websites, online accounts, or other resources that operate on a compromised computer system or network. While the majority of DoS attacks do not lead to any data loss and are usually resolved without charging a ransom, they necessitate time, money, and other resources for organizations that need to restore their critical business operations.

The distinction between a DoS and Distributed Denial of Service (DDoS) attack is determined by the source. A single system is responsible for launching DoS attacks, while DDoS attacks are executed from multiple systems. DDoS attacks are faster and harder to block than DOS attacks because multiple systems must be identified and neutralized to halt the attack

3. Phishing

Phishing is a type of cyber-attack that uses email, SMS, phone, social media, and social engineering techniques to entice a victim to share sensitive information — such as passwords or account numbers — or to download a malicious file that will install viruses on their computer or phone.

4. Spoofing

Spoofing is a technique through which a cybercriminal disguises themselves as a known or trusted source. In so doing, the adversary is able to engage with the target and access their systems or devices with the ultimate goal of stealing information, extorting money or installing malware or other harmful software on the device.

5. Code Injection Attacks

An attacker can alter the behavior of a computer or network by injecting malicious code into it. This technique is known as code injection attack. Code injection attacks can in several forms: Cross-Site Scripting, Malvertising, SQL Injection, and Data Poisoning

6. Insider Threats

IT teams only see half the picture when they concentrate primarily on identifying enemies outside the company. Internal actors, such as present or former employees, are known as insider threats. They represent a risk to an organization because they have direct access to confidential information, intellectual property (IP), and the company network. They also have knowledge of company policies, procedures, and other details that could be useful in launching an attack.

7. DNS Tunneling

DNS tunneling is a kind of cyber-attack that uses DNS queries and answers to send code and data over a network while evading conventional security measures.

After gaining access, the hacker is free to carry out command-and-control operations. By slowly encoding the data in a succession of DNS answers, this tunnel provides the hacker with a means of releasing malware and/or extracting data, IP addresses, or other sensitive information.

Attacks using DNS tunneling have become more common in recent years, partly due to their ease of deployment. Even easily obtained tunneling toolkits and guidelines may be found online on popular websites like YouTube.

8. Brute force attack

A brute-force attack gets its name from the "brutish" or simple methodology employed by the attack. The attacker simply tries to guess the login credentials of someone with access to the target system. Once they get it right, they are in.

While this may sound time-consuming and difficult, attackers often use bots to crack the credentials. The attacker provides the bot with a list of credentials that they think may give them access to the secure area. The bot then tries each one while the attacker sits back and waits. Once the correct credentials have been entered, the criminal gains access [2].

What you can do to protect yourself

- ***Be on the lookout for suspicious links, attachments, and downloads***. Malware and ransomware can be embedded in links,

attachments, and downloads. Make sure a link is authentic before clicking on it.

• ***Create and use strong passwords***. You should always use strong and long passwords that are difficult to hack. Use unique passwords, meaning a different one for each account. Passwords should be at least 12 characters in length and contain numbers, special characters, and capitalized letters.

• ***Use multi-factor authentication whenever possible***. Multi-factor authentication adds an extra layer of security. If a service you are using offers multi-factor authentication, use it.

• ***Use secure internet communications***. Use sites that use "HTTPS" if you will access or provide any personal information. Don't use sites with invalid certificates.

• ***Update your anti-virus software regularly***. Make sure your anti-virus software is up to date and updates are installed regularly [1, 4].

In conclusion, the issue of defence against cyber-attacks is becoming more important every year. We have discussed the most popular types of attacks, as well as preventive measures to protect against threats. It should also be remembered that every year cyber-attacks evolve and become more sophisticated, so keep up with the news in the field of information security, and be careful when going online.

References:

1. Protecting yourself from cyber attacks. URL : https://dfi.wa.gov/consumers/cyber-attacks-tips (accessed: 21.02.2024)
2. Types of cyber attacks. URL : https://www.fortinet.com/resources/cyberglossary/types-of-cyber-attacks (accessed: 14.02.2024)
3. Baker K. 10 Most common types of cyber attacks. March 20,2024 URL: https://www.crowdstrike.com/cybersecurity-101/cyberattacks/most-common-types-of-cyberattacks/ (accessed: 10.02.2024)
4. 4 Things you can do to keep yourself cyber safe. CISA URL: https://www.cisa.gov/news-events/news/4-things-you-can-do-keep-yourself-cyber-safe (accessed: 01.03.2024)

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How to save our minds from clip thinking

In the modern information society, saturated with a flow of visual and auditory stimuli, clip thinking becomes increasingly noticeable, profoundly influencing our way of perceiving and processing information. The intrusion of short, dynamic video clips into our daily experience not only induces changes in the structure of our thinking but also prompts reflections on the potential consequences of this evolutionary shift in the cognitive sphere.

Let's consider a real-life scenario: someone plans to check TikTok briefly before bedtime. However, they get absorbed in a continuous flow of diverse content, from funny videos to educational clips. Hours may pass unnoticed as each video demands only seconds of attention. When they switch to something more serious, like reading, they may struggle to concentrate. Rapidly changing content on TikTok can make it hard to focus on longer and more complex information.

The term "clip thinking" emerged in the mid-1990s, referring to perceiving the world through short, vivid images and messages from TV news or video clips. It differs from conceptual thinking, relying on concepts and logical constructs rather than images. Clip thinking transforming the world into a kaleidoscope of unrelated information fragments [4].

The reason for the emergence of clip thinking is the advancement of modern technologies [2]. The development of applications and websites contributes to the spread of this phenomenon, which is unfortunate. Creating more engaging content promotes its marketing and sales, leading to a loss of the traditional ability to learn. Since this process is unstoppable, we need to adapt to it. I have searched the internet for various learning tools a lot, but I have not found any that help with the task of better information perception fundamentally.

My idea is to create an application that addresses this problem. I want to introduce you to the UseClip application, the layout of which I have developed. This app incorporates artificial intelligence technologies for enhanced information perception and comes with numerous useful features thanks to this technology. You might wonder why artificial intelligence. Artificial intelligence easily organizes information into bullet points and is also easily trainable.

Let's talk more about the application. After the person enters the information to be studied into a special window, they can do this in many ways, such as uploading a file or photographing it. Then, a specially formatted text will appear on the screen. The texts presented to users by artificial intelligence are creolized that is they consist of two heterogeneous parts: the verbal and non-

verbal ones. The main points are highlighted, repeated, and supported by diagrams and images for better understanding and recalling [1].

If the user has been inactive with the text for a long time during the study mode, the application asks, "Are you still there?" If the user exits, the application will remind them to return to their studies.

Methods for combating clip thinking:

1. Paradox Method

Searching for paradoxes and contradictions eradicates a consumerist approach to information and encourages reflection. For example, when a teacher presents two mutually exclusive statements, students typically pause to think. For instance: "Beethoven composed magnificent symphonies, yet he had hearing disorders. How can this be explained?" [3].

Texts in the application are categorized from easier to more difficult ones. After reviewing a specific category, the user will be given a small test. The test will involve finding connections and meanings. When the user correctly identifies the connection, it will be fully displayed to show how it is related. This will promote logical thinking and information retention.

2. Reading fictional and philosophical literature.

Reading fiction allows individuals to create their own mental images, unlike television which controls perception. Philosophical works help in building a chain from the general to the specific. Cultivating a habit of reading literature is essential, and discussing it with others reinforces understanding by promoting analysis and connections between phenomena [3]. Thus, if the user finds the presented material insufficient based on keywords, they can find additional books and materials within the application. Additionally, the user will have a chat where a conversational partner on the topic of their study will be generated for them to discuss the material.

3. Discussions and searching for alternative viewpoints.

To think deeply and consistently, one must analyze and understand the positions of people with opposing views. Participating in discussion clubs and round tables improves critical thinking skills, fostering the ability and desire to think [3]. In UseClip, there will be a forum for sharing thoughts, where anyone can express themselves or ask questions.

4. Rest Day from Information

Experts recommend taking a "Rest Day from Information" as a wise strategy in the age of information overload. On this day, avoid consuming any content and focus instead on creative activities like writing, drawing, walking, and socializing with friends [3]. To facilitate this, the app will have its own calendar where users can choose a suitable free day for themselves. The application will be unavailable on this day, and upon attempting to access it, a message will appear indicating that today is a rest day.

It is important to realize that clip thinking will not necessarily ruin our minds if we learn to balance it with a deeper and more systemic approach to

problem-solving. Utilizing diverse sources of information, encouraging critical thinking, teaching and developing analytical skills will help us maintain mental clarity and the ability to make informed decisions.

References:

1.   Kornuta O. Clip Thinking and Clip Perceptions: Teaching Methods Aspect.   URL: https://www.academia.edu/90759819/Clip_Thinking_and_Clip_Perceptions_Teaching_Methods_Aspect (accessed: 31.03.2024)

2.   Bakhtina G.P. Computerization of society and the problem of "clip thinking". URL: https://kpi.ua/en/1102-7 (accessed: 31.03.2024)

3.   Ковальчук М. Чим небезпечне кліпове мислення? URL: http://surl.li/sffxe (accessed: 31.03.2024)

4   Талан Н. Кліпове мислення: міфи та реалії. URL: https://znayshov.com/FR/11942/Pedag_visnik_Podil%20_1_2022-53.pdf (accessed: 31.03.2024)

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A Cryptographic Masking: Latest Approaches to Software Code Obfuscation

In the modern digital world information is a valuable asset and therefore a target for cyber attacks. Cryptographic masking or obfuscation serves as an effective method for ensuring the confidentiality and integrity of data. Understanding and using this method is important for countering modern cyber attacks which tend to grow at a geometric rate.

Obfuscation, a process that began in ancient times as encryption to protect the important messages of military and political leaders, has become key in programming with the development of computer technologies in the 20th century [1]. The main principle of obfuscation is to transform the program code into a form that complicates its analysis and understanding by malicious actors while not changing its original functionality [2]. The goals of obfuscation include protecting intellectual property, complicating reverse engineering, ensuring confidentiality and enhancing the security of programs.

Existing methods of obfuscation include techniques that reduce the predictability of the code, namely an insertion of dead code that doesn't carry a functional load but complicates the understanding of the code's logic, changing the control flow to reduce the predictability of the program, encrypting strings and data using cryptographic algorithms, shuffling the code and replacing the names of variables and functions with non-informative or randomly generated ones [2].

Modern methods of cryptographic masking focus on developing new more complex techniques that utilize the rapid development of technology. For example, dynamic obfuscation changes the structure of the code during execution, including dynamic generation and encryption while functional masking rewrites the code, preserving its functional purpose, but changing its external appearance. JIT compilation and the use of trace multipliers create additional barriers to reverse engineering, generating random variants of code and altering its structure. Static and dynamic signature analyses, built-in protections in development tools and cryptographically protected communication protocols help detect and counteract suspicious changes in programs [3].

The innovation of modern obfuscation methods lies in their ability to adapt to contemporary programming languages and platforms, as well as in the development of tools that can automatically implement these techniques, reducing the need for manual intervention [3].

For example, ProGuard for Java optimizes bytecode and removes unused components, while Dotfuscator for .NET protects against reverse engineering. For the C and C++ programming languages, there are obfuscation tools such as Stunnix C/C++ Obfuscator which can convert code into a difficult-to-read format while maintaining compatibility with compilers and other tools. For Python one of the well-known tools is PyArmor which encrypts Python bytecode and obfuscates names. It is important to adapt newly developed and implemented obfuscation methods to next-generation programming languages (declarative languages closer to human language) and to create tools for the automatic implementation of these techniques.

One of the new approaches to software code obfuscation is the use of quantum cryptography to create a new level of protection. Quantum obfuscation may involve the generation of quantum keys which are used for encrypting and altering the code in real-time, providing almost unbreakable protection from traditional methods of reverse engineering. This method utilizes the principles of quantum uncertainty and entanglement, making any unauthorized analysis extremely difficult as observing the quantum state changes it, thereby destroying the information that one attempts to steal [1]. This new technique will open new horizons in software protection and will be a significant step in the fight against cybercrime.

Analyzing the effectiveness of obfuscation, it can be noted that it is not a 100% guarantee of protection, but it significantly increases the complexity and cost of breaking into software. Scientific research confirms that obfuscation can effectively delay attacks, even if not stopping them completely. Cryptographic masking creates an additional layer of protection and acts as a barrier to automated tools that detect vulnerabilities, thereby reducing the risk of exploiting potential weak spots [3]. Obfuscation also protects the important logic of business processes and intellectual property from competitors and malicious actors.

However, it is worth emphasizing that this method is only one of the tools in the arsenal of cybersecurity and its application should be part of a comprehensive approach to software protection, complementing other security methods. It is also important to research the impact of obfuscation on software performance and to find the optimal balance between security and efficiency.

References:
4. Hui Xu,Yangfan Zhou,Yu Kang, Michael R.Lyu (2014). Dept. of Computer Science, The Chinese University of Hong Kong, School of Computer Science, Fudan University. *On Secure and Usable Program Obfuscation: A Survey.* https://www.researchgate.net/publication/320195377_On_Secure_and_Usable_Program_Obfuscation_A_Survey (Access date: 22 February, 2024).

5. IEEE European Symposium on Security and Privacy Workshops (EuroS&PW). Weiyun Lu, Bahman Sistany, Amy Felty, Philip Scott. School of Electrical Engineering and Computer Science, University of Ottawa, Canada (2020). *Towards Formal Verification of Program Obfuscation.* https://www.site.uottawa.ca/~afelty/dist/sad20.pdf (Access date: 04 March, 2024).

6. NCCGROUP. Nicolas Guigo (2021). *A Look At Some Real-World Obfuscation Techniques.* https://research.nccgroup.com/2021/10/12/a-look-at-some-real-world-obfuscation-techniques/ (Access date: 11 March, 2024).

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Impact of Data Analytics on Labor Market and Business

In various public and private sectors, companies collect and store large amounts of data about their customers and the products and services they offer. To utilize technical data stored and maintained on various digital platforms such as databases and data warehouses a new field called Business Analytics (BA) has emerged in recent years. BA has evolved to become part of all important business decision-making processes and has the potential to transform businesses by providing data to decision makers and helping them make strategic, operational and tactical decisions. By implementing BA initiatives within their organizations, decision makers can integrate data sources, predict trends, improve performance, view key performance indicators, identify business opportunities, and make better, more informed decisions.
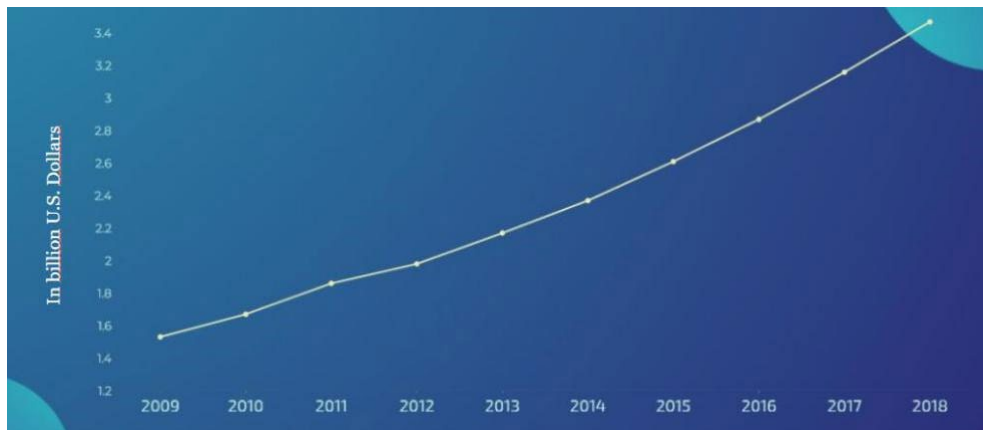
Figure 1. Revenue with business analytics (adapted from Centric digital, 2016)

Data analytics can drive the revenue growth of companies. For example, according to International Data Corporation report as a result of analytics projects for production function, the average ROI (Return on Investment) was 277%, financial management yielded 139% of ROI, and investment in analytic CRM (Customer relationship management) provided 55% [1].

Business analytics enables flexibility. It affects not only the revenue of companies, but also users' convenience and experience. Analytics includes a method known as machine learning that helps to provide more useful and relevant information for a particular user.

With the advent of business intelligence, fraud detection and prevention has undergone significant changes. Traditional manual approaches have often proven reactive and inadequate in the face of modern fraud schemes. However, using data-driven analytics, organizations can now proactively identify anomalies and patterns in real-time, strengthening risk management strategies. With machine learning and artificial intelligence, companies can detect unusual behavior, trigger alerts, and continuously adapt to changing fraud tactics. Data visualization tools further simplify complex information and accelerate decision making, while cross-departmental collaboration provides a holistic approach to risk mitigation. Business intelligence has become a critical weapon in fighting fraud, protecting finances, customer trust and overall business reputation.

In the digital transformation age, there are plenty of business analyst positions including Management Analysts, Operations Research Analysts, Market Research Analysts, Information Security Analysts etc. on the market. The number of annual openings for data analysts is growing. Data-driven decision makers, functional analysts, data systems developers, and analytics managers will be in demand in the near future.

In conclusion, data analytics has a great impact on the labor market and business nowadays. It shows a positive trend of development. Companies that make big investments in business analysis can optimize their operations and investments, set realistic targets, make informed decisions, effect changes, and improve outcomes.

References:

1. Saji K. Mathew (2018). Business analytics and business value: A comparative case study. URL: https://www.sciencedirect.com/science/article/abs/pii/S0378720617301283
2. Tuncay Bayrak (2015). Review of Business Analytics: A Business Enabler or Another Passing Fad. URL: https://www.sciencedirect.com/science/article/pii/S187704281503833
3. Dursun Delen, Sudha Ram (2018). Research challenges and opportunities in business analytics. URL: https://www.tandfonline.com/doi/full/10.1080/2573234X.2018.1507324
4. D. J. Power, C. Heavin, J. McDermott, M. Daly (2018). Defining business analytics: an empirical approach. URL: https://www.tandfonline.com/doi/full/10.1080/2573234X.2018.1507605
5. BrainStation (2021). Are business analysts in High Demand? URL: https://www.nqr.gov.in/sites/default/files/Are%20Business%20Analysts%20in%20High%20Demand_%20%282021%20Guide%29%20_%20BrainStati on.pdf
6. Centric digital (2016). 5 Reasons why business analytics will help drive revenue for your company. URL: https://www.centricdigital.com/blog/5-reasons-why-business-analytics-will-drive-revenue-for-your-company

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Methods and analysis of comprehensive web verification with external penetration testing

In modern world, any activity implies storing and processing personal, corporate or public information. Modern information systems provide appropriate information security to avoid data loss problems.

Recently, a great deal of emphasis has been placed on security breaches and data leaks. The study is focused on the analysis of the vulnerability that caused a data leak for 400 million users of the social network Twitter [2]. The infographic from IBM's annual report on the different areas and costs of data breaches is also analyzed [3]. The cost of data breaches increases every year, which can prompt attackers to conduct hacking attacks on web applications (Fig. 1).
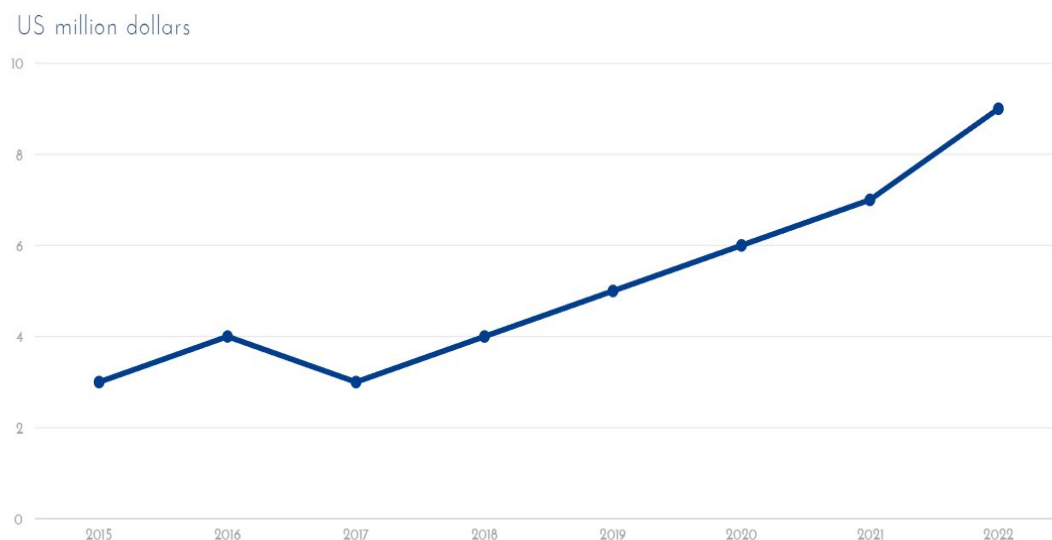
Figure 1. Average cost of data breach

Various standards and methodologies in the field of complex web verification analysis with external penetration testing as the main sources are considered. The main source is a list of recommendations from OWASP, the world's leading company for various cyber defense methods and analyses [1].

Seven of the most relevant areas that could be targeted by attacks, their vulnerabilities and verification methods are identified.

A01:2021-Broken Access Control:

1. Vulnerabilities:

- bypassing access control checks by modifying the URL (parameter spoofing or forced browsing), the internal state of the application or HTML page, or using an attack tool that modifies API requests;
- permission to view or edit another person's account by providing its unique identifier (unsecured direct links to objects);
- API access with missing access controls for POST, PUT, and DELETE.

2. Verification methods:
   - access control is only effective in trusted server-side code or serverless APIs where an attacker cannot modify access control checks or metadata;
   - apply access control mechanisms once and reuse them throughout the application, including minimizing cross-origin resource sharing (CORS).

A02:2021-Cryptographic Failures:

1. Vulnerabilities:
   - check all internal traffic, for example between load balancers, web servers or internal systems;
   - passwords are used as cryptographic keys in the absence of a function to derive the underlying password key.

2. Verification methods:
   - classify the data that is processed, stored, or transmitted by the application;
   - ensure that you encrypt all sensitive data at rest.

A03:2021-Injection:

1. Vulnerabilities:
   - the data provided by the user is not checked, filtered or cleaned by the application;
   - hostile data is used in object-relational mapping (ORM) search parameters to retrieve additional sensitive records.

2. Verification methods:
   - use positive input validation on the server side. This is not a complete protection, as many applications require special characters, such as text areas or mobile APIs;
   - for any residual dynamic requests, escape special characters using the special escape syntax for that interpreter;
   - note, that SQL structures such as table names, column names, and so on cannot be escaped, so user-provided structure names are unsafe. This is a common problem with report generation software.

A04:2021-Insecure Design:

1. Verification methods:
   - install and use a secure development lifecycle with AppSec professionals to help evaluate and design security and privacy controls;
   - create and use a library of secure design templates or ready-to-use paved road components;

- use threat modelling for critical authentication, access control, business logic, and key flows.

A05:2021-Security Misconfiguration:

1. Vulnerabilities:
   - no appropriate security enforcement in any part of the application stack or incorrectly configured permissions for cloud services;
   - unnecessary features are enabled or installed (for example, unnecessary ports, services, pages, accounts, or privileges);
   - default accounts and their passwords are still active and have not been changed.
2. Verification methods:
   - remove or do not install features and frameworks that are not used;
   - ensure that configurations are reviewed and updated to meet all security requirements, updates, and patches as part of the patch management process;
   - segmented application architecture provides efficient and secure separation between components or tenants through segmentation or cloud security groups (ACLs).

A06:2021-Vulnerable and Outdated Components:

1. Verification methods:
   - remove unused dependencies, unnecessary functions, components, files, and documentation;
   - obtain components only from official sources through secure links. Prefer signed packages to reduce the likelihood of including a modified malicious component;
   - watch out for libraries and components that are not maintained or do not provide security patches for older versions.

A07:2021-Identification and Authentication Failures:

1. Verification methods:
   - use multi-factor authentication, if possible, to prevent automated credential spoofing, brute force, and reuse attacks on stolen credentials;
   - do not send or deploy default credentials, especially for administrators;
   - use weak password checks, such as checking new or changed passwords against a list of the 10,000 worst passwords.

The results of the study show that different verification methods used to detect vulnerabilities improve the security of information systems.

References

1. OWASP Top 10 2021. URL: https://owasp.org/Top10/

2. Hacker claims to be selling twitter data of 400 million users. URL: https://www.bleepingcomputer.com/news/security/hacker-claims-to-be-selling-twitter-data-of-400-million-users/

3. Cost of a Data Breach Report 2022. URL: https://www.ibm.com/downloads/cas/3R8N1DZJ

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Navigating the Intricacies of Darknet Ecosystem: Risks, Challenges, and Countermeasures

In the ever-evolving landscape of modern society, technological and socio-cultural transformations have ushered in numerous benefits alongside emerging threats. Among these threats, cybercrime and transnational drug trafficking through darknet marketplaces stand out, demanding in-depth analysis and effective countermeasures from law enforcement and the wider public.

The darknet [1], existing beyond the reach of conventional search engines, operates through Tor (The Onion Router), providing users with anonymity and facilitating various activities, legal and illegal alike. The features of the darknet include anonymity, cryptocurrency transactions, private routers, and networks like Tor. While it plays a vital role in safeguarding privacy and anonymity, it simultaneously poses significant challenges due to its association with illegal trade and activities.

Darknet marketplaces, placed in darknet, serve as platforms for the exchange of goods and services, ranging from legal to highly illicit. The challenges for law enforcement are exacerbated by the anonymous nature of these marketplaces, coupled with the estimated billion-dollar annual trade volume, making combating cybercrime and illicit goods a daunting task.

Drug trafficking via the darknet, exemplified by the case of Hydra [2], marketplace, that was created in 2015 by two people known in the dark web under the nicknames "Satoshi" and "Observer", poses a global challenge with its use of anonymity and encrypted transactions. Established in 2015, Hydra initially thrived as a darknet marketplace for drug distribution. However, internal conflicts, managerial greed, and de-anonymization led to its collapse in April 2022. The fallout exposed private information, resulting in substantial damage and highlighting the broader implications of darknet drug trade. Hydra's history reveals the transient nature of success in illicit operations, emphasizing the risks inherent in the convergence of drug trafficking and the darknet.

Working within the darknet exposes cybersecurity specialists to a myriad of risks, including the constant threat of hackers, leaks of personal information, financial losses, and ethical dilemmas. The Tor Browser [3], with its Onion Routing providing layered encryption, is a popular choice for illegal online activities. The delicate balance between maintaining security and countering cyber threats requires continuous innovation and collaboration among cybersecurity experts. However, usually advanced hackers always stay many steps ahead. It is the constant need for improvement that makes cyber security such a necessary profession.

Current drug policies, primarily focused on eradication and punitive measures[4], have proven ineffective, fostering the growth of criminal infrastructure and exacerbating societal harm. Law enforcement struggles to combat darknet drug trade, highlighting the urgent need for innovative strategies. A future-oriented drug policy should prioritize health, harm reduction, and treatment, shifting away from criminalization and concentrating efforts on organized crime.

Global initiatives [6], dating back to the early 20th century, aim to address drug-related issues. The United Nations, with its specialized institutions and regional organizations, actively combats illicit drug trafficking. A shift toward regulating and controlling the drug market, coupled with innovative criteria for policy effectiveness, is essential. The interconnected nature of the darknet and drug trade necessitates collaborative efforts on an international scale.

Recent international efforts, exemplified by Operation SpecTor [7] in 2023, showcase progress in combating darknet drug trafficking. A combined approach, integrating digital and traditional investigative methods, as seen in Germany's efforts, has led to the closure of illegal darknet platforms. Successful operations underscore the significance of international cooperation in addressing the challenges posed by the convergence of cybercrime and drug trafficking.

The Hydra case serves as a critical lesson in understanding the vulnerabilities inherent in even the most sophisticated darknet operations. While initial success can be achieved, internal issues, greed, and lapses in security can lead to catastrophic consequences. The collapse of Hydra highlights the need for ongoing vigilance, adaptability, and a comprehensive understanding of the evolving tactics employed by darknet actors.

The role of cybersecurity specialists within the darknet landscape [5] is pivotal yet perilous. The layered encryption of the Tor Browser provides anonymity, but it also presents challenges for those tasked with countering cybercrime. The constant risks of hacking, personal information leaks, financial losses, and ethical dilemmas underscore the necessity for continuous training, collaboration, and technological innovation among cybersecurity professionals.

Traditional drug policies rooted in eradication and punitive measures have demonstrated their shortcomings, particularly in the context of darknet drug trade. A shift towards innovative strategies, emphasizing health, harm reduction, and treatment, is imperative. The Hydra case serves as a cautionary tale, urging a reevaluation of policies to address the root causes of drug-related issues and break the cycle of punitive measures.

As darknet landscapes continue to evolve, international cooperation remains paramount in combating transnational challenges. Operation SpecTor's success in 2023 underscores the efficacy of coordinated efforts. The convergence of digital and traditional investigative methods, exemplified by Germany's approach, provides a blueprint for nations grappling with darknet drug trafficking. The future requires a paradigm shift in drug policies, embracing health-focused strategies and leveraging innovative metrics for policy effectiveness.

In the convergence of cybercrime and drug trafficking on the darknet, comprehensive strategies are essential. Balancing technological advancements, effective drug policies, and international collaboration is imperative. The success of recent operations highlights the importance of ongoing efforts to combat illicit activities in the ever-evolving digital landscape. As society grapples with the challenges posed by the darknet, a forward-looking approach is crucial to safeguarding the digital future and mitigating the risks associated with cybercrime and transnational drug trafficking.

References:
1. The Hidden World: An In-Depth Review of the Darknet
https://uk.wikipedia.org/wiki/Даркнет
2. Hydra on the Darknet: The Evolution and Collapse of the Legendary Marketplace
https://uk.wikipedia.org/wiki/Гідра_(даркнет-ринок)
3. TOR: From Privacy Protection to Darknet Access
https://uk.wikipedia.org/wiki/Tor
4. The official website of the State Emergency Service of Ukraine
https://phc.org.ua
5. Cybersecurity in Action: Pentesters and Hackers in Modern Digital Combat
https://www.dw.com
6. The Global Fight: International Efforts Against Drug Addiction and Illicit Drug Trafficking
http://dspace.onua.edu.ua
7. SpecTor: The Secrets and Essence of a Unique Cyber Operation
https://24tv.ua/tech

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Heat Pump Control System for Hot Water Supply and Air Conditioning

The technology of using a ground source heat pump for a water heating system for the air conditioning needs of a building was considered.

In this case, the heat pump should work to cool the building, releasing heat into the ground, which will reduce the condensation temperature of the refrigerant to 30 ° C instead of 46 ° C or more in a scheme with a heat accumulator.

This may be possible due to the property of many soils to maintain a stable temperature of 8...15 °C at a depth of more than 2 m throughout the year.

This system is a steam compressor unit operating on the main refrigeration cycle.

For comparison, the object of study was the same one-story building with an external volume of 450 m3 and, accordingly, a living area of 180 m2, as in [1], [2].

The characteristics of heat pump units were determined using a previously developed [3], [4] and widely used by the authors method for determining the functional dependencies of the parameters of refrigeration cycles on condensation temperatures at given evaporation temperatures based on the data p, i - diagram of the selected refrigerant.

As a result, a comparison was made of the equivalent fuel costs between the old air conditioning + HA system and the new one with two heat pumps for air conditioning and hot water supply of the building, depending on the outside air temperature, taking into account the costs of drives for heat pumps of the water cooling and hot water system, as well as the circulation water pump of the air conditioning system /building heating (Fig. 1). In this case, an option was considered with adjustable water flow in the system in accordance with the control dependence formed above.

Analyzing the resulting savings of equivalent fuel, we can say about the real advantage of the new unconventional scheme for using the air conditioning system and hot water supply of the building in the warm period over the previously studied system with a heat accumulator. It should be noted that the maximum savings (18%) occur in the region of the most frequently observed summer air temperatures, while the water consumption in the system is less close to the constant water consumption during the heating period. However, the minimum savings value (13.5%) is also significant.

At the same time, due to the use of an air heat pump, which has higher evaporation temperatures (20 ° C and 30 ° C) and, accordingly, energy conversion coefficients compared to an air conditioner (10 ° C), savings of equivalent fuel separately in the hot water supply system are obtained from 35% up to 60%, not to mention the fact that the volume of heating water in the previous scheme is almost 2

times higher than the need for hot water. Therefore, the new technology eliminates the need to heat unnecessary large volumes of water, which leads to additional savings in fuel resources.

In turn, during the cold period, the air heat pump can be switched to recovering the heat of the warm air leaving the ventilation to unload the hot water supply system, by preheating the incoming cold water from 5 ° C to 11 ° C. At the same time, at least 18% of heat, and therefore fuel, is saved for the hot water system.

Thus, the use of the developed technology further increases the energy efficiency of the building's air conditioning and hot water systems during the warm period.
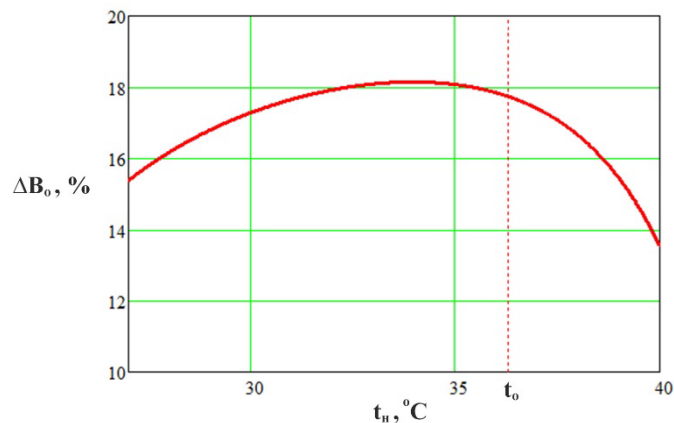
Figure 1 – Comparative savings of equivalent fuel in the new air conditioning and hot water supply scheme compared to the old one depending on the outside air temperature

References

1. Олішевський І.Г. Автоматизована методика розрахунку параметрів для нетрадиційних технологій опалення та кондиціонування будівель/ І.Г. Олішевський, Г.С. Олішевський // Електротехніка та електроенергетика. / Запорізький нац. ун-т «Запорізька політехніка». – Запоріжжя, 2021. – № 3. – С. 40-47. URL: http://ee.zntu.edu.ua/issue/view/14721
2. Олішевський І.Г. Обгрунтування метода утилізації теплоти системи кондиціонування для теплонасосної системи опалення / Г. С. Олішевський, І. Г. Олішевський // Інформаційні системи, механіка та керування / НТУУ «Київський політехнічний інститут». – Київ. – 2017. – № 17. – С. 86 – 94. URL: http://ismc.kpi.ua/article/view/102874 DOI: http://dx.doi.org/10.20535/2219-3804172017102874
3. Zhao, Z., Zhang, Y., Mi, H., Zhou, Y., & Zhang, Y. (2018). Experimental Research of a Water-Source Heat Pump Water Heater System. Energies, 11(5), 1205. https://doi.org/10.3390/en11051205
4. Fan, J., Sun, F. Z., & Gao, M. (2013). Experimental Research on a Heat Pump Water Heater Using Low Pressure Steam as Heat Source. Advanced Materials Research, 805-806, 637–644. https://doi.org/10.4028/www.scientific.net/amr.805-806.637.

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Application of Robotic Platforms in Construction Industry Processes

Nowadays, the aspects of using robotic platforms in the construction industry and their impact on increasing productivity and safety are increasingly considered worldwide. The role of robotic platforms in the construction industry is becoming increasingly important to optimize production processes and enhance productivity. Their use addresses numerous challenges and opens new perspectives for improving construction processes. For example, it is not surprising that robots are building private and tall buildings using 3D printing and modular construction: they can create modules or structural elements, simplifying and accelerating the assembly process. Robot manipulators widely used in manufacturing are also applied in construction, where robotic machines performing transportation actions are utilized. These robotic platforms enable precise and rapid task execution in construction. They enhance work efficiency and reduce the time required for various construction processes, impacting product quality, production speed and cost estimates.

The use of robotic platforms helps reduce risks for construction industry workers. They can perform tasks in hazardous conditions where the risk to humans is high, minimizing potential dangers. Integrating modern equipment into the safety system allows personnel to respond more quickly to, for instance, hazardous gas emissions, explosive areas, equipment amortization, and more. With the development of robotics and automation in the construction industry, the creation of even more efficient and versatile solutions is expected. This paves the way for further improvements in the quality and efficiency of construction. Jobs in production are increasingly being replaced by robots, executing tasks with high precision.

Automation in the construction industry is a significant development direction, but completely replacing human labor with robots in this field is currently a challenging task. Construction jobs involve a range of functions that robots can help or complement but not entirely replace. Here are some areas where robots can replace humans in construction:

- Hazardous and Heavy Work: Robots can perform dangerous tasks, such as working at heights or in hazardous conditions, minimizing risks to humans.

- Precision and Routine Tasks: Robots can efficiently carry out routine and precise tasks, such as assembling structural elements that depend on accuracy or regular bricklaying.

- Autonomous Machines and Drones: Autonomous machines can be used for material transportation or even some tasks on construction sites, while drones can be used for inspection and monitoring.

- Management and Optimization: Robots can be used for managing and optimizing construction processes, analyzing data, and proposing optimal solutions.

However, there are many tasks that require human involvement due to their complexity, non-standard nature, the need for a creative approach, or the ability to make decisions in changing conditions. Therefore, humans and robots in construction can complement each other, creating more efficient and safe processes but not completely replacing humans with robots.

The use of robotic platforms in production processes in the construction industry plays a crucial role in increasing productivity and reducing risks. Their implementation accelerates construction processes and reduces risks for workers, and the prospects for the development of this industry promise more innovations and improvements in the future.

Conclusion:

There are many tasks that require human involvement due to their complexity, non-standard nature, the need for a creative approach, or the ability to make decisions in changing conditions. Therefore, humans and robots in construction can complement each other, creating more efficient and safe processes but not completely replacing humans with robots.

References:

1. Volos Ch.K. Chaotic autonomous mobile robot for military missions / Ch.K. Volos, N. Doukas, I.M. Kyprianidis, I.N. Stouboulos, T.G. Kostis // Recent Advances in telecoimmunications and circuit design/ p.197-202

2. Volos Ch.K., Motion Direction control of a robot based on chaotic synchronization phenomena / Ch.K.Volos // Journal of automation, Mobile Robotics and intelligent systems, Vol 7(2), 2013, p. 64-69

3.What is a Cycloidal Speed Reducer? [Електронний ресурс] // Darali Drives. URL: http://www.darali.com/page17.html.

4. Xiaogeng Jiang, Robert J. Cripps A method of testing position independent geometric errors in rotary axes of a five-axis machine tool using a double ball bar /International Journal of Machine Tools and Manufacture, Volume 89, February 2015, p. 151–158

5. Xiaoqiu Xu,1,2 Han Tao,1 and Junwei Han1. Shock Mechanism Analysis and Simulation of High-Power Hydraulic Shock Wave Simulator. Research Article. Open Access. Volume 2017. Article ID 4361256 [LA1] https://doi.org/10.1155/2017/4361256

6. Yongjie Zhao, Ke Qiu, Shuangxi Wang, Ziqiang Zhang. Inverse Kinematics and rigid-body dynamics for a three rotational degrees of freedom parallel manipulator/ Yongjie Zhao, Ke Qiu, Shuangxi Wang, Ziqiang Zhang / Robotics and Computer-Integrated Manufacturing No31 (2015), 40-50 p.

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How to teach a robot

Robots and artificial intelligence are being used in many areas to make life easier for people. For example, voice assistants can be used at home or at work as assistants, automation systems can improve energy productivity and play an important role in diagnostic and medical treatment processes in the healthcare sector. With the rapid development of artificial intelligence and the diversification of its areas of use, even more innovations and new developments are expected in the future. Knowing how to communicate and work with a robot and AI is becoming an essential skill in the modern world. The aim of this article is to review the methods of robot training and prove that they are similar to humans in learning.

Artificial intelligence is a broad field that includes possibilities such as the ability to analyze complex data, identify patterns and automate decision making processes. But for it to be able to do these things, it needs to be taught. One of the well-known methods is the trial-and-error learning that allows humans to quickly teach a robot what they want it to do, with a minimal amount of effort. The idea of this method is that when the robot fails, the system uses an algorithm to generate explanations that describe what needed to be changed for the robot to succeed. This algorithm asks the robot for some feedback from the human about why it failed, and then the system uses this feedback and explanations to generate new data that it uses to fine-tune the robot. The researchers tested this technology in simulations and found that it could teach a robot more effectively than other methods. The robots trained with this method performed better, while the training process consumed less of a human's time.

For training, computer scientists can also use teacher systems to teach another machine how to perform a task. But just as with humans, the machine learner faces a dilemma: when to follow the teacher and when to explore on its own. Because it is not always possible for a robot, like a human, to copy a teacher exactly without certain skills. To solve this problem, there is an algorithm that automatically and independently determines when a student should imitate the teacher (so-called imitation learning) and when he or she should learn through trial and error (so-called reinforcement learning). This algorithm allows the student to diverge from copying the teacher when the teacher is either too good or not good enough, but then return to following the teacher at a later point in the training process if doing so would achieve better results and faster learning. This method could help researchers improve the training process for machines that will be deployed in undefined real-world situations, like a robot being trained to navigate inside a building it has never seen before.

Communication is also an equally important skill for a robot. Enabling robots to exhibit social skills could lead to smoother and more positive human-robot interactions. For instance, a robot in an assisted living facility could use these capabilities to help create a more caring environment for elderly individuals. To study this issue, researchers have incorporated certain social interactions into the basis of robotics, allowing machines to understand what it means to help or hinder each other and learn to perform these social actions on their own. The researchers also showed that their model creates realistic and predictable social interactions. When they showed videos of these simulated robots interacting with one another to humans, the human viewers mostly agreed with the model about what type of social behavior was occurring.

Conclusion. In training, robots are similar to humans. They also make mistakes and learn from them. There are many methods of training robots that will allow them to learn quicker and more effectively than humans in the future. But no matter how advanced robots become, there will always be a task they will never help us with. We will have to decide how, where and when to use such assistants.

References:

1. Zewe A. A more effective way to train machines for uncertain, real-world situations. URL: https://news.mit.edu/2023/more-effective-train-machines-uncertain-real-world-situations-0531 (accessed: 31.03.2024)

2. Zewe A. A faster way to teach a robot. URL: https://news.mit.edu/2023/faster-way-teach-robot-technique-0718 (accessed: 20.03.2024)

3. Zewe A. Giving robots social skills. URL: https://news.mit.edu/2021/robots-social-skills-1105 (accessed: 31.03.2024)

4. What is the Role of Artificial Intelligence in Communication and Complex Tasks? URL: https://algi.ai/what-is-the-role-of-artificial-intelligence-in-communication-and-complex-tasks/ (accessed: 30.03.2024)

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Biometrics: The Key to Personal Security and Convenience

Biometrics is the science that studies the unique physiological and behavioral characteristics of humans and their application for personal identification and authentication. Biometric identification is the process of using such characteristics to determine a person's identity. The essence of biometric identification technology is the collection, analysis, and comparison of unique biometric data to verify identity [1].

There are several types of biometric identification techniques including:

- *Fingerprinting:* Unique patterns on the fingertips are used for identification.
- *Facial recognition:* Unique facial features such as the shape of the eyes, nose, mouth, etc.
- *Iris Recognition:* Unique iris features.
- *Voice recognition:* Unique voice characteristics such as timbre, intonation, etc.
- *Vein Recognition:* Unique features of blood vessels and veins within the human body.

Biometric identification technology is widely used in various fields such as authentication for access to devices, access control in enterprises, identity identification in government agencies, banking, medical applications, etc.

Some of the most common and convenient biometric authentication methods are fingerprint scanning and facial recognition. Here is how it works:

Fingerprint scanning:

- *Fingerprint sensors:* These are devices, usually built into smartphones, tablets, laptops, and other devices, that are used to scan fingerprints. Optical sensors create an image of the fingerprint by illuminating it and taking a photograph, capacitive sensors measure capacitive changes caused by the topography of the fingerprint, and ultrasonic sensors use sound waves to create a three-dimensional image of the fingerprint.
- *Image processing:* The resulting fingerprint image is processed to remove noise and imperfections, and to improve contrast and clarity.
- *Template Storage and Matching:* After the fingerprint is scanned, a unique template containing the characteristics of the fingerprint is created. This template is usually stored in a secure database. In subsequent authentication attempts, the fingerprint is scanned again, a new template is created and compared to the previously stored template to confirm identity.
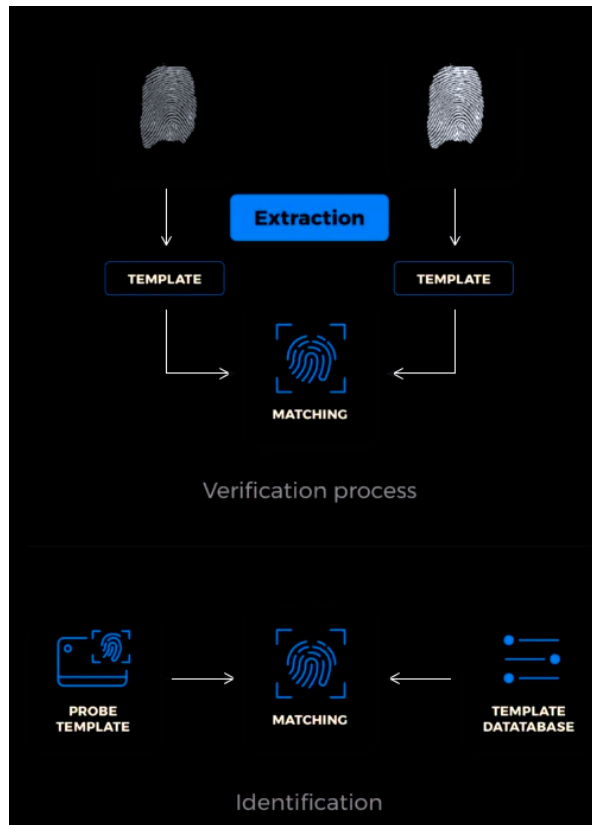
Fig. 1. Fingerprint scanning

Face Recognition:
- *Image Capture:* The camera captures an image of a person's face. This can be a single image or a video recording.
- *Face detection:* Special face detection algorithms analyze the captured image to determine the presence of a face and its position in the frame.
- *Feature Extraction*: After face detection, the image is processed to extract unique facial characteristics such as the location of eyes, nose, mouth, face shape, etc.
- *Comparison with template:* The extracted features are compared with the pre-stored face template in the database to verify the identity match.
- *Algorithms and Machine Learning:* Machine learning algorithms are often used for more accurate facial identification, which can take into account different lighting conditions, viewing angles, emotions, and changes in appearance.
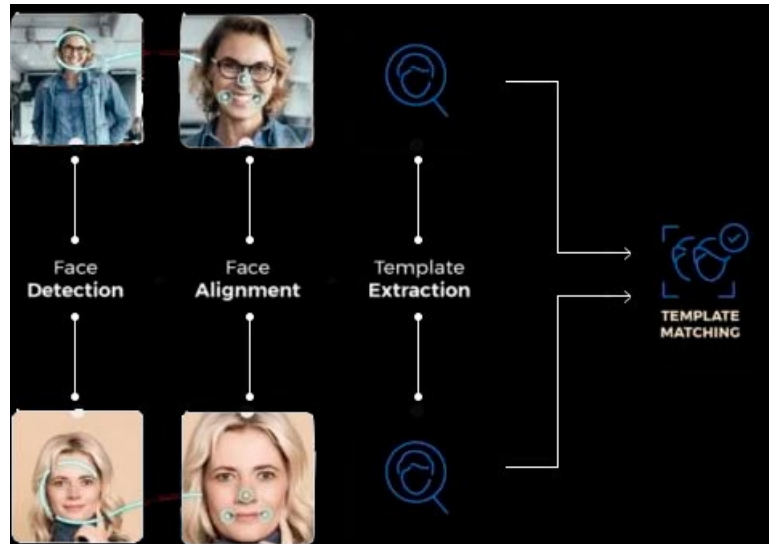
Fig.2. Face recognition

These technologies are improving over time. For example: Apple uses facial recognition differently in its iPhone, it is called Face ID. First, with the camera, you take pictures of your head from different angles. After that, the system uses these pictures to make a 3D model of your face, which helps to recognize it in the worst conditions and with greater accuracy than other phone manufacturers.

Also, iPhones have distinguished themselves in one experiment: Thomas Brewster, a Forbes journalist, in 2018 conducted an experiment where he printed an exact 3D copy of his head and tested facial recognition on 4 Android models from different manufacturers and iPhone X.

Fig.3. Thomas Brewster and his fake head

All models recognized the printed head as a real one, except for the iPhone, because there the scanning takes place in the IR range [2].

There is a similar situation with fingerprints. In 2014, at the Chaos Communication Congress hacker conference, the fingerprints of the German Minister of Defence were shown, reconstructed from official high-resolution photos from open sources [3].

Once the fingerprints have been copied, you can use Tsutomu Matsumoto's guide from 2002. It explains in detail how to make a convex fingerprint mask using gelatin, latex milk, or wood glue. Once the mask is made, all you have to do is put it on your finger and hold it up to a fingerprint scanner, the warmth of your finger will be enough for the scanner to believe the print is real [4].

These experiments prove to us that biometric authentication has its weaknesses, hence there is a lot of work to be done in the future. Biometrics holds great promise despite its current relative vulnerability. In any case, this technology is convenient, easy to use, and can serve as an additional layer of protection for your data. I suggest using biometrics as an extra layer of protection for your data, but the choice is always yours.

References:
1. Gillis A. S., Loshin P., Cobb M. Definition of biometrics. URL: https://www.techtarget.com/searchsecurity/definition/biometrics (accessed: 30.03.2024)
2. Brewster T. We Broke Into A Bunch Of Android Phones With A 3D-Printed Head. URL: https://www.forbes.com/sites/thomasbrewster/2018/12/13/we-broke-into-a-bunch-of-android-phones-with-a-3d-printed-head/?sh=e73ae2313307 (accessed: 29.03.2024)
3. Hern A. Hacker fakes German minister's fingerprints using photos of her hands. URL: https://www.theguardian.com/technology/2014/dec/30/hacker-fakes-german-ministers-fingerprints-using-photos-of-her-hands (accessed: 29.03.2024)
4. Matsumoto T. Importance of Open Discussion on Adversarial Analyses for Mobile Security Technologies. URL: https://habr.com/ru/companies/globalsign/articles/435978/ (accessed: 29.03.2024)

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Modern approaches to learning a foreign language using software

In recent years, the demand for young professionals to master a foreign language has grown significantly, and it is still continuing to grow. At the same time, the requirement to foreign language proficiency is increasing that is caused by the process of globalization and internationalization. Low level of a foreign language and English, in particular prevents young specialists to get job and build a successful career.

One of the main difficulties of learning English is developing a "vocabulary" - the necessary amount of specific lexis to use the language in the intended field. The difficulty lies not only in the number of words and idioms you need to know, but also in the specificity of the set of words for each user. For example, representatives of different professions use certain "general" vocabulary that is needed for everyone and specific vocabulary that is used only in their field of activity (names of engine parts, processes, etc.). This creates a number of challenges in learning English for work, among which acquiring specific vocabulary of foreign language in the field of study, especially by the first-year students who learn mostly basic subjects in their field of study.

However, modern technology can help to meet this challenge and solve the problems appear. Nowadays, there is a wide variety of software that facilitates the process of acquiring and memorizing new vocabulary. It offers a powerful database of methodological, practical and exam materials, online courses and lectures. Such programmes use various teaching methods: task-based practice, associationsmind-maps, gamification, watching video, etc. Prominent examples of such programmes are Alphabear 2 basrd on the use of a game form, LinGo Play which uses images to facilitate memorization, Duolingo, test-english.com. In this paper, these programmes are analyzed from the perspective of a user - a foreign language learner.

Alphabear 2 is a multi-level puzzle game by Spy Fox, which was released in September 2018. The main goal of the game is to make words choosing letter by letter, the longer the word is, the more game points a player will get. The advantages of this software include: free distribution (though the application contains some paid options), a game form of presentation of material, a time limit for answering (motivates to think faster that develops the brain), an internal dictionary (contains explanations for each of the words that the user guesses in the game), a scoring system and additional content. However, there are some disadvantages. It works only in one OS and offers only one foreign language for practice. Much pop-up advertising that can be disabled for a fee, the lack of a Ukrainian-language interface, and the possibility of purchasing game items for real money. In general, this app is

good for vocabulary practice and brain training one's, though it is not very suitable for beginners.

LinGo Pla is a powerful smartphone app that also has a web version. The way this app teaches new vocabulary is based on the constant use of new words: during training, the user is shown a new word and its translation or a picture of the object that the word means; and then immediately checks the material just presented. The number of words increases steadily during training: at the beginning of the game, the user knows one or two words, and at the end of the training session, they know more than seven. The vocabulary in the app is divided into thematic lessons, most of which need to be purchased. Among the advantages are: learning vocabulary through its visualization; a variety of vocabulary and a knowledge testing system. Among the disadvantages: a lot of content is marked as "premium", i.e. for a fee; uniformity of training methods; lack of the ability to train your own vocabulary. In general, this app will be useful for both beginners and advanced users who are willing to spend money on it.

Duolingo is one more powerful and well-known platform for learning foreign languages that has been in operation since 2011. It has a huge number of options, both free and paid. The advantages include a low entry level; implementation of learning in a game form; a variety of vocabulary and the availability of some theoretical material; recorded pronunciation of each word; user mobility; a large number of foreign languages to learn. Among the disadvantages, users strongly emphasized the following: a fixed number of attempts to make a mistake; a large number of advertisements in the free version; bugs; unpleasant updates that significantly complicate the learning process; and a mismatch between the app's real capabilities and users' expectations. Overall, the app is very good for learning the basic level of the language on your own, but it is not suitable for learning specific vocabulary and requires real money to unlock features for a comfortable learning experience.

All of this apps examined as the resources for learning foreign languages from the perspective of their efficacy, offer many different options and features. However, none of them provide full flexibility in choosing vocabulary. This makes all of the above apps inconvenient for a user with a high level of language proficiency or who needs specific vocabulary. Therefore, in order to fulfil the specific needs of users and give them complete independence in choosing the vocabulary to learn, software is needed that has the following properties: editing a dictionary with vocabulary for training, training vocabulary from several different languages, being free (preferably without advertising), having a simple and clear interface, and being offline.

Today, there are many projects and applications that meet these requirements, but most of them are commercial projects that contain a lot of advertising or are fully paid.

Given this, *Training English Words Memory* software application is a solution to the problem.

This application is a simple computer tool for learning foreign language vocabulary on your own. The application itself is presented as a set of two programs: the first (Module 1) is designed for vocabulary training, and the second (Module 2) is for creating and editing vocabulary files. Both programs have a simple design and user-friendly interface (even if you have difficulties with their use, the applications are equipped with short guides).

Module 1 functionality includes a fully implemented vocabulary training mode with many settings to suit the needs of each user. Among them, the most useful are the counters of correctly and incorrectly translated words, the endless (looped) training mode.

Module 2 is equipped with all the necessary functions for comfortable work with vocabulary files (creation and editing)

Both modules contain special tab that provide access to information about the project in general, its author, and a short user guide in pictures. In order to improve the learning process and the development of the project, future versions of the applications will: significantly expand the functionality of the training mode and add several modes; increase the flexibility of the training mode by adding new customization options; modify the way the vocabulary file is selected in both applications; and increase the number of interface languages.

The Training English Words Memory software application has many advantages over the above mentioned projects, the most significant of which are: the user's freedom to choose the language whose vocabulary he or she wants to train; free of charge and complete absence of advertising; autonomy: the applications do not require an Internet connection to work. Another significant advantage is the ease of installation: the user only needs to download and unzip the archive with the files, and the applications are ready to go.

Given all this, *Training English Words Memory* is an excellent solution to the problem of learning a foreign language in the modern age, especially if the user wants to go beyond certain vocabulary.

References:

1. Five tips to improve your English vocabulary [online]. Available from: https://learnenglish.britishcouncil.org/english-levels/improve-your-english-level/five-tips-improve-your-english-vocabulary

2. 7 Of The Best Apps For Learning English Vocabulary [online]. Available from:: https://oxfordhousebcn.com/en/7-of-the-best-apps-for-learning-english-vocabulary/

3. 'Alphabear 2' Review – Return to Great Gameplay, Puns Galore[online]. Available from:: https://toucharcade.com/2018/09/10/alphabear-2-review/

4. Language learning app LinGo Play [online]. Available from: https://www.lingo-play.com

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Methods for classifying imbalanced datasets in Fraud Detection tasks

The financial services sector is vulnerable to fraud, giving the access fraudsters to vast amounts of client data. That is why financial service companies have turned to machine learning technologies to help detect and prevent fraud. This technology, which utilizes algorithms to identify patterns in large datasets, proves to be an effective tool in fraud detection and prevention it.

Traditional methods of fraud detection often fall short in protecting clients and their assets. Thus, machine learning is rapidly becoming a crucial tool in preventing fraud and safeguarding client assets. This paper makes an attempt to classify imbalanced datesets in fraud detection tasks.

Machine learning algorithms can identify patterns in data that may be unnoticed by a human. This facilitates the detection of suspicious activities, such as unusually large transaction amounts or multiple transactions from a single account. By analyzing client data in real-time, banks can swiftly detect and prevent fraud. This helps protect clients from losses and maintains the security of the financial system.

Researching bank transactions is a crucial component of financial analysis. With the increasing volume of bank transactions, there is a need to develop effective methods for analyzing and detecting anomalous transactions that may indicate fraudulent activity. These datasets typically contain information such as the transaction time, transaction type, transaction amount in the local currency, the name of the initiating client, initial balance before the transaction, client and recipient balances after the transaction, transaction recipient identifier, and whether the transaction is fraudulent or not.

It is immediately evident that one of the main features of such datasets is categorical data (client and recipient identifiers). Since classification models can only learn from numerical data, dealing with these features can complicate data handling for these models. Therefore, these features require encoding methods for categorical features, such as Label Encoding or One-Hot Encoding.

For successful and efficient understanding of bank transaction data, Exploratory Data Analysis (EDA) needs to be conducted, involving relevant clustering methods. Exploratory Data Analysis is the process of investigating data to understand its structure, identify patterns, and extract useful information. It consists of the following stages:

1. Primary data analysis: Familiarization with the data, its structure, and types, identifying missing values, dropping columns and rows, statistical analysis of data distribution.

2. Data visualization: Displaying data through graphs, charts, scatter plots, histograms, cloud plots, providing an overview of data distribution and relationships.

3. Understanding dependencies: Identifying dependencies between different variables using correlation matrices, heatmaps, factor analysis, and other methods.

4. Data preprocessing: Detecting anomalous data, handling missing values, selecting variables for further analysis and model building.

5. Hypothesis testing: Testing hypotheses about dependencies between variables, data adherence to a certain distribution, and statistical hypothesis testing.

6. Conclusions: Formulating conclusions and recommendations based on the analysis for further use of data, model building, or additional research.

EDA is a crucial step in any data analysis project, as it helps understand the characteristics and features of the data at hand. It can assist in determining which models, algorithms, and analysis methods might be most effective for the task, as well as identifying potential issues and challenges associated with the data.

References:

1. ADASYN: Adaptive Synthetic Sampling Approach for Imbalanced Learning (https://www.researchgate.net/publication/224330873_ADASYN_Adaptive_Synthetic_Sampling_Approach_for_Imbalanced_Learning).

2. Random Forests (https://www.researchgate.net/profile/Adele-Cutler/publication/236952762_Random_Forests/links/0a85e52f509178323a000000/Random-Forests.pdf?origin=publication_detail).

3. Cost-Sensitive Learning vs. Sampling: Which is Best for Handling Unbalanced Classes with Unequal Error Costs? (https://www.researchgate.net/publication/220705031_Cost-Sensitive_Learning_vs_Sampling_Which_is_Best_for_Handling_Unbalanced_Classes_with_Unequal_Error_Costs).

4. Addressing the Curse of Imbalanced Training Sets: One-Sided Selection (https://sci2s.ugr.es/keel/pdf/algorithm/congreso/kubat97addressing.pdf).

5. Learning from Imbalanced Data by He, H., & Garcia, E. A. (2009) (https://www.academia.edu/29164932/Learning_from_Imbalanced_Data).

Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)

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Poetizing the Love in the Sonnet Sequence *Astrophel and Stella* by Philip Sidney: Genre Dimension

The last third of the 16th century in England, which was the period of the reign of Elizabeth I, went down in history as the time of the highest rise of the Renaissance culture in this country. The "golden age" of the English Renaissance coincided with the strengthening of the national humanist movement, the rapid development of drama, fueled by the genius of William Shakespeare, the formation of artistic prose based on both novelistic and novel forms and the growth of poetic genres, in particular, the sonnet.

The literary work of Shakespeare came to the fore, and all other English artists of the last third of the 16th century found themselves "in the shadow""of Shakespeare's genius. This trend affected not only drama, but also poetry.

The figure of Sir Philip Sidney (1554 – 1586) - a brilliant courtier, warrior and artist, founder of the English pastoral novel - became more clearly defined in the fields of the contemporary studies of the Elizabethan literature [1; 2; 3; 4; 5].

Ph. Sidney's contribution to the literary theory was specified in his work *The Defense of Poetr*y (1583).

The sonnet sequence *Astrophel and Stella* was written by Ph. Sidney during 1581-1582. But this creative work was first published after the author's death – in 1591. The cycle became his greatest poetic achievement, in which by artistic skill one feels a real love story.

The famous story of the relationship between Philip Sidney and Penelope Devereux, Lady Rich, daughter of the Earl of Essex, is the basis of the sonnet sequence *Astrophel and Stella*. Under certain circumstances, Penelope married Lord Rich.

Trying to overcome love, Philip Sidney left the court and secluded himself in his father's estate in Wales, where he completed his poetic creation – the sonnet sequence. The poet also married.

The queen sent Ph.Sidney to the Netherlands to help Prince William of Orange. The prominent Elizabethan was appointed governor of Flushing in the Netherlands in 1585. In 1586 Sir Philip Sidney joined Sir John Norris in the Battle of Zutphen, fighting for the Protestant cause against the Spanish. During the fight Sidney was seriously wounded. The injury led to his death 26 days later, 17 October 1586.

Associated with the lyrical hero of his sonnet sequence, Philip Sidney was memorialized by Edmund Spenser in the pastoral elegy *Astrophel*, dedicated "to the most beautiful and vertuous Lady, the Countess of Essex", Frances Walsingham, Sidney's widow.

Against the biographical backgrounds, emphasizing the final series of actions, verifying the human feelings by the life logics, Ph. Sidney's sonnet sequence poetizes the love as the ultimate manifestation of non-final personal authenticity, grasped by the art meta-logics revealed in the genre-poetic features constructing the multifold entity of *Astrophel and Stella.*

The poet forms the basis for realizing the disharmony of human life by intertwining of images of faces and stages of love with the depiction of a complex image of the beloved.

The lyrical hero manifests himself through the choice of someone else's role masks discovering his true authenticity. The author gives the heroes names that "speak" - *Astrophel* (one who loves a star, according to the Greek etymology of this complex word) and *Stella* (properly "star" in Latin). The name *Astrophel* is "internal" in relation to the author, the name *Stella* is "external' in relation to the lyrical hero's beloved. Such author's choice emphasizes the incompatibility of the lyrical hero and the beloved, which is emphasized by the multilingualism of the chosen names.

The lyrical hero's self-determination performs at the intersection of the ancient mythological and biblical plans of the symbolism of the image of a star.

The author focuses Astrophel's meditations on the gradualness of the victory of love over man as the process characteristics predicting the captivity of the lyrical hero and revealing the antinomies of human nature.

Sidney's hero accentuates the graduality of his submission to his own love. Such a contrast between the "fast" and "slow" victory of love over man unfolds into the opposition of freedom and slavery.

Astrophel tries to comprehend the similarity of "heavenly love" and "earthly love". He states, that the earthly and the heavenly are connected not through the reproduction of heavenly harmony on earth, but through the reflection of earthly disharmony in heaven.

Ingratitude, treachery, omnipotence and destructive behavior of the beloved form the basis for comprehending love as a spiritual self-disorder of the individual: Seraphim's clothing", the black color of her eyes is perceived as a sign of the heroine's treacherous nature. However, Stella's distance from the ideal Petrarchan beauties only strengthens her charm for Astrophel.

Stella turns out to be addicted to the destructive self-manifestations. Ph.Sidney reinterprets the Neoplatonic definition of love as the "fastener of the world": the poet depicts this source as a force, generating not harmony, but disorder.

Fluctuations in the attitude towards art predetermined a way of harmonization towards the realization of the impossibility of overcoming love self-disorder through creativity.

In the chaotic world, as Ph. Sidney sees it, art is the only way to achieve temporary inner harmony. That is why the third «actor» of Sidney's sonnet sequence turns out to be the Muse. The disorder brought into the hero's life by love is compensated by the harmony acquired in creativity. The treachery of the beloved is overcome by depicting her beauty. In such a way the author manifests the Mannerist concept of the superiority of art over nature. But there are sometimes no words to describe the beauty of the beloved.

Astrophel understands his own love feeling as a source of knowledge about himself and the world, which illuminates his endless path to the ideal that cannot be embodied even by means of art.

References:

1. Власенко Н.І. Автор як наслідувач-деміург: ренесансно-маньєристична рефлексія поетичного творення/Н.І.Власенко// Наукові записки Бердянського державного педагогічного університету. Серія: Філологічні науки: зб. наук. праць / [ред.кол.: В. А. Зарва (відп. редактор) та ін.]. – Бердянськ: Вид-во БДПУ, 2017. – Вип. 12. – С.88 – 96.

2. Власенко Н.І. Співвіднесення принципів мімесису і деміургії в художній свідомості Відродження:світоглядно-естетичне підгрунтя і поетикальні абриси/Н.І.Власенко// Від бароко до постмодернізму: зб. наук. праць / [ред.кол.: Т. М. Потніцева (відп. редактор) та ін.]. – Дніпро: Ліра, 2018. — Вип. XXII. – С. 17 – 25.

3. Семешко Н. М.До проблеми формування жанрово-стильової картини англійського Відродження: «Астрофіл і Стелла» Ф. Сідні та «Аморетті» Е. Спенсера на тлі ренесансного оновлення поетичних форм/Н.М.Семешко//Наукові записки Харківського національного педагогічного університету ім. Г. С. Сковороди. Літературознавство. 2012. Вип. 3 (1). С. 122–131.

4. Fowler, A. Conceitful Thought: The Interpretation of English Renaissance Poems / A. Fowler. — Edinburgh: Edinburgh Univ. Press, 1975. — 152 p.

5. Greenblatt, S. Renaissance Self-Fashioning: From More to Shakespeare / S. Greenblatt. — Chicago: Univ. of Chicago Press, 1980. — 332 p.

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Metamoderner Diskurs und Krieg als soziokulturelles Phänomen

Die Aggression der Russischen Föderation gegen die Ukraine, die Ende Februar 2022 begann, destabilisierte radikal die gesellschaftspolitische und soziokulturelle Lage im Land und auf dem gesamten europäischen Kontinent und führte zur Entstehung der qualitativ neuen militär- politischen und soziokulturellen Realität.

Das exponentielle Wachstum der Bedrohung durch Atomkrieg und Terrorismus, die Ausbreitung und das Ausmaß des militärischen Konflikts auf dem Territorium des gesamten europäischen Kontinents weisen überzeugend auf den Beginn der Ära der „Moderne" hin Barbarei", die „Rückkehr in der Zeit" der zivilisierten Welt zu den apokalyptischen Schrecken früherer Weltkriege, die rasante Technologisierung bewaffneter Konflikte.

Der moderne philosophische Diskurs, in dem Kultur einen zentralen Platz einnimmt, wird meist im Kontext unterschiedlicher methodischer Ansätze und Narrative realisiert.

Moderne einheimische Forscher versuchen, das Phänomen Krieg im allgemeinen philosophischen Diskurs zu berücksichtigen [6, S. 105-144]. Sie interpretieren den Krieg in einem anthropologischen und ontologischen Modus „als eine Zeit der kritischen Erfahrung des Schicksals der kollektiven Existenz" [3, S. 85], „als einen Krieg verschiedener Welten, Mentalitäten, Weltanschauungen, Lebensweisen."[5, S.46], „ein Versuch zur Identität" [4, S.145].

Die Philosophie des Metamodernismus – ein philosophischer Trend, der sich in einer Reihe von Werken von Robin van der Akker, Timoteus Vermeulen, Luke Turner, Alison Gibbons und anderen ausländischen Kulturphilosophen des 21. Jahrhunderts manifestiert wurde [1; 2]. Hier unternahmen die Autoren einen originellen Versuch, die Lehrgrundlagen und konzeptionellen Postulate darzustellen, die darauf abzielen, den aktuellen Zustand der Kultur und die von ihr hervorgebrachten soziokulturellen Phänomene zu verstehen. Metamoderne wurde zu einer Art intellektueller Antwort auf die krisenhaften soziokulturellen Phänomene unserer Zeit, einschließlich des Krieges, die durch die komplexen Prozesse der Globalisierung der Welt bestimmt werden [1].

Die Philosophie des Metamodernismus fungierte als eine Art Alternative zum Postmodernismus, der in den frühen 90er Jahren des 20. Jahrhunderts die Idee des Endes der Geschichte, den Beginn einer Ära des kontinuierlichen wirtschaftlichen Wohlstands postulierte und eine nihilistische Einstellung zur Kultur und zu ethischen Normen artikulierte. Dabei lag der Schwerpunkt seiner Forschung auf den Problemen der kulturellen Atomisierung einer Person innerhalb alternativer Subkulturen, wo ihre Anhänger als Träger einer hedonistischen utilitaristischen Ethik des kommerziellen

Konsums dargestellt werden. Vertreter der Metamoderne erklären ihren Wunsch, die neuen Herausforderungen moderner Lebenswirklichkeiten durch einen scharfen Wechsel (Oszillation – Schwankung) der Denkrichtung kritisch wahrzunehmen, die ermöglicht, die sich gegenseitig ausschließenden kontroversen theoretischen Positionen der Moderne und der Postmoderne zu umfassen, wobei sie es in einer Struktur von Empfindungen synthetisiert und ein widersprüchliches, aber integrales Bild des entsprechenden, in Form eines realistischen Bildes dargestellten Objekts gestaltet [1; 2].

Basierend auf diesen Ansätzen und Prinzipien erlangte der Metamodernismus als philosophische Richtung allgemeine Anerkennung und verbreitete sich vor allem in der modernen westeuropäischen Literatur, Literaturwissenschaft, bildenden Kunst und Kinematographie, die (insbesondere letztere) in ihrer künstlerischen Schaffenstätigkeit verschiedene künstlerische Bildformen operativ anwenden, die moderne kulturelle Trends und Marken widerspiegeln und die Digitalisierungsplattformen moderner digitaler Technologien für ihren objektiven ästhetischen Ausdruck nutzen. Bei seinem Schwerpunkt auf den Problemen der Entwicklung des kulturellen Feldes, der Moral, der Ästhetik erklärt der Metamoderne sowohl die Zweckmäßigkeit einer Rückkehr zum „ganzheitlichen" Subjekt und der Individualität, als auch die Organisation der Erforschung der Kernprobleme der menschlichen Existenz und ihrer Tiefe, was in verschiedenen Formen der Kunst und Kultur geprägt sind und darüber hinaus den anthropologischen Kontext seiner Versuche des intellektuellen Begreifens der Realität der Moderne dominant definiert.

Der Mensch mit seinem mehrstufigen Komplex persönlicher Erfahrungen wird erneut zum Hauptgegenstand der Forschung, zu deren objektivem Verständnis die Metamoderne in großem Umfang künstlerische Bilder verwendet, die eine organische und integrale Einheit von Form und Inhalt darstellen. Eines der bedeutendsten und gewichtigsten gesellschaftspolitischen Phänomene der heutigen modernen Welt ist der Krieg, der als treibender Faktor für die allgemeine Destabilisierung der Globalisierung und politischer soziokultureller Prozesse fungiert und ihre soziokulturellen Errungenschaften zunichtemacht. Als neue Realität des sozialen und persönlichen Lebens verändert es dramatisch die Art und den Inhalt der Selbstreflexion des Subjekts, orientiert es auf eine aktive Suche nach dem Sinn des Lebens in der zerstörerischen Welt der bewaffneten Konfrontation und schafft eine geeignete Grundlage für die Rückkehr zu den stabilen, bewährten Praktiken der sozialen Solidarität, des Egalitarismus, der altruistischen gegenseitigen Hilfeleistung und der Spiritualität, die die Grundlage für neues soziales Kapital bilden, zum kollektiven Vertrauen als wirksames Mittel und zu sozialen Überlebenspraktiken und lehnt die relativistischen Richtlinien der Postmoderne mit ihren Konzepten ab. Die Schwankungsdaten der Selbstreflexion des Subjekts, seine bewussten und spontanen Heuristiken wirksamer Formen sozialer Organisation, um unter den Bedingungen des Krieges zu überleben, bestätigen dringende Notwendigkeit des Appells des Metamodernen an den Traditionalismus in seiner modernistischen Interpretation, an den Wunsch, gründlich in einem anthropologischen und axiologischen Schlüssel zu

überdenken, was einen weiteren Versuch einer grundlegenden synergistischen Synthese veranschaulicht. Auf diese Weise erhält die Metamoderne die Konnotationen einer neuen Zeitperiode der modernen Philosophie, die in der Lage ist, die komplexe und sich verändernde Welt der modernen Realität kritisch zu begreifen. Dabei geht es einschließlich um ihren destabilisierenden Faktor – den Krieg.

Krieg als soziokulturelles Phänomen (wie es paradoxerweise klingt) verstärkt erheblich das heuristische und intellektuelle Potenzial des Metamodernismus, der sich in seinen Erkundungen der Neoromantik, der Verherrlichung eines aktiven Subjekts mit einem tragischen Lebensende zuwendet, wobei er ein Appell an universelle menschliche Werte, die theoretischen Grundlagen des Humanismus präsentiert. Der militärische Konflikt wurde zur visuellen Verkörperung der intellektuellen Krise der Postmoderne. Andererseits beeinflusste die Postmoderne maßgeblich die Neuformatierung der Doktrin des militärischen Konflikts, die zur Entstehung einer militärischen Strategie indirekter asymmetrischer Aktionen führte, deren Kern die Eskalation der Konfrontation ohne direkte Anwendung von Gewalt, ohne Beteiligung von Waffen und technische Mittel des konventionellen Krieges abhängig von verschiedenen zeitlichen Phasen sei. Dieses Merkmal wird auch von einheimischen Forschern festgestellt [4, S.146].

In der Anfangsphase des Konflikts war die informationelle und hybride Kriegsführung als seine vorherrschende Form, die die Massenmedien als Instrument zur Eskalation der Konfrontation nutzte und der Bevölkerung ideologische (im Wesentlichen postmodernistische) Narrative der russischen Propaganda weitergab. Ihr Zweck bestand darin, die Konfrontation zu verstärken, die Grundsätze der Souveränität und Unabhängigkeit des Staates zu diskreditieren, das Misstrauen in der ukrainischen Gesellschaft gegenüber der Fähigkeit der Behörden bei ihren wirksamen innen- und außenpolitischen Kompetenzen zu verstärken.

Der Krieg hat erhebliche Auswirkungen auf den Inhalt und die Art der Weltanschauung der Bevölkerung des europäischen Kontinents, wo die pessimistische Stimmungen dominieren, die durch ständige Gefühle der Angst und Unsicherheit über die Zukunft verursacht sind, was einschließlich zum Gegenstand metamoderner Studien wird. Er gibt der Metamoderne neue Impulse für die weitere Entwicklung und analytisches Verständnis der Transformation des Kulturcodes der Moderne des globalisierten Kapitalismus, Überwindung der sozialen Atomisierung des Subjekts, Einbeziehung in einen humanistischen Kulturkontext.

Quellen

1. Metamodernism: Historicity, Affect and Depth after Postmodernism/ edited with Robin van den Akker, Timotheus Vermeulen and Alison Gibbons. Rowman&Littlefeld. 2017.

2. Vermeulen T., van der Akker R. 2010. Notes of Metamodernism/Jornal of Aesthetics and Culture. Vol. 2. – P.1-14.

3. Бистрицький Є. До онтології війни: Чому військові дії, а не мирні перемовини// Філософська думка. - 2023, №2. - С.74-98.

4. Білий О. Замах на ідентичність (Російська культура як екзистенціальна загроза Україні) //Філософська думка. - 2023, № 4. – С.145-160.

5. Бучма О. Релігійно-правовий вимір російської війни проти України на тлі суспільно-державних трансформацій XX-XXI століть//Філософська думка. – 2023, № 1. – С.45-58.

6. Війна як соціокультурний феномен. Круглий стіл //Філософська думка. 2022. № 4. – С.105-144.

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Poetizing the Love in the Sonnet Sequence *Astrophel and Stella* by Philip Sidney: Style Dimension

The perception of the personality of the author himself, the interpretation of his literary position in different epochs plays almost the very first role in the reader's reception of the work. After all, the ideas of their predecessors and their approaches to reading existing literary texts are somehow reflected in the minds of each new reader, drawing before his eyes the image of the author who created several centuries ago, often with a light historically romanticized Fleur.

A bright example of such a person is the image of Sir Philip Sidney (1554 – 1586) –   an outstanding English poet, novelist, literary critic, a man of extremely broad erudition and diverse interests. During his short thirty-two-year life, Ph. Sydney was able not only to meet "the great expectations" placed on him as a representative of the Elizabethan court elite and diplomat; he even exceeded these expectations, receiving as a result of his heroic death, the status of a national hero and a model for future generations.

The classic and non-classic literary studies dedicated to Ph. Sydney are very diverse in subject matter and vectors of research thought. An obligatory component of both traditional and recent approaches to his creativity is the recognition of the exceptional ideality of the artist and the iconization of his figure in the national culture of England. An exemplary courtier, a wise statesman, a brave warrior and a talented writer – this is the image formed during the poet's life and fixed in the collective memory of the nation after his tragic death. The considerable popularity of Ph. Sydney is evidenced, in particular, by the fact that during the first half century after his death, 207 printed references to him appeared, and by the end of the 17th century, 10 reprints of his pastoral romance Arcadia were published, the text of which, moreover, was translated into many European languages [3].

After writing the Sonnetarium *Astrophel and Stella*, in which the author's desire to enter into a creative dialogue with the popular Petrarchism at that time is felt, the sonnet genre has become the most favorite for Elizabethans. Almost all poets who worked in the period from 1590 to 1600 considered it their duty to remember Ph.Sydney at least with a word, and even better – to dedicate their work to his bright memory. Already after the poet's death, an incomplete "pirate" edition of the sonnet sequence *Astrophel and Stella* (1591) was published under the editorship of Thomas Newman with a preface by Thomas Nash. The legitimate edition of the works of Ph.Sidney, which also contained his sonnetarium, was published in 1598 thanks to the efforts of the poet's sister. It was called *The Countess of Pembroke's Arcadia*.

The 16th century became the heyday of the sonnet form in Europe. Over a hundred years, more than three hundred thousand sonnets were written there. Perhaps

the poets of the great era, marked by the new understanding of the human creativity directed by a person's mind, were attracted by the accuracy of the genre internal structure, dialectically expressing the author's feelings or thoughts in a small volume.

Conquering nature, solving the most important life tasks, people strive to achieve the highest, economically spending the funds available to them. The sonnet is an extremely accurate expression of this vital necessity and reduces it to an artistic pattern.

First published in 1591, but well known in manuscript back in the 1580s, the sonnet sequence *Astrophel and Stella* seems to have opened the floodgates of English lyrical poetry. As you can see, the more than 400-year literary reputation of Ph. Sydney's sonnet sequence as the first experimental English sonnetarium, firmly secured for its author the right to be called an innovator and trendsetter for the sonnet genre in the English literature.

The sonnet sequence *Astrophel and Stella* manifests the Mannerist mode of artistic thinking [1; 2].

Ph.Sidney reveals his involvement in the area of Mannerism by depicting the disharmony of human life, which is manifested in the motifs of the love tragicomedy, that condemns the lyrical hero-poet to the simultaneous feeling of beauty, Creation and wounds; the author emphasizes the contrast between the external boring and internal promising images of the world.

In one of the sonnets, this motif is heard: Cupid is cruel, he mortally wounds and kills. Like an insidious thief hiding in the bushes, he gets a dishonest booty:

Fly, fly, my friends, I have my death wound, fly;
See there that boy, that murth'ring boy, I say,
Who, like a thief, hid in dark bush doth lie
Till bloody bullet get him wrongful prey [5].

The Mannerist mimesis-demiurgy relation conceptualized by Ph.Sidney in *The Defense of Poesy* (1583) predicts the growth of the author's role in shaping the worldview in the sonnet sequence *Astrophel and Stella* [1; 2; 3; 4]. It is manifested in the poet's concentration on the feelings of his own heart and initiates the evaluation of the "sin" of love as something positive.

Stressing the superiority of *Manner* over *Nature*, Ph. Sidney predicts the doubt that creativity can overcome world disharmony. He depicts the irreconcilable positions of the poet who feels the truth and the poet who betrays it; in such a way the depth of artistic truth contrasts with an image that imitates the external features of artistic creativity (tropes, stamps).

Thus, the author shifts the focus of his creative activity from the rhetoric of the sonnet to new thematic layers, contrasting rhetoric and the simplicity of expressing thoughts about love.

As for the style dimension of Sidney's sonnet sequence, all types of tropes are widely represented here: metaphors, epithets, paraphrases, metonymies, symbols. Often tropes are combined with each other.

In the sonnet "Whether the Turkish new moon minded be ..." metonymies and symbols appear: "What kind of diet does Holland boast of now ?" (in the context:

how do the Dutch feel economically), "How Dutch hearts trust in the shade of an orange tree ?" (meaning: do the Dutch want to be under the rule of France, which owns Algeria, where do orange trees grow) [5].

The antinomy of external and internal is reinforced by the opposition of rhetoric and simplicity: the description of external life is given lush and elaborate tropes, while the description of internal feeling is contained in one line without tropes at all.

In the sonnet "Alas, have I not pain enough ..." the author uses the metaphorical epithet "rhubarb words" (in the meaning „healing words"), based on the symbolism of rhubarb in English culture, showing the standard of the common thought about love as a sin.

References:

1. Власенко Н.І. Автор як наслідувач-деміург: ренесансно-маньєристична рефлексія поетичного творення/Н.І.Власенко// Наукові записки Бердянського державного педагогічного університету. Серія: Філологічні науки: зб. наук. праць / [ред.кол.: В. А. Зарва (відп. редактор) та ін.]. – Бердянськ: Вид-во БДПУ, 2017. – Вип. 12. – С.88 – 96.

2. Власенко Н.І. Співвіднесення принципів мімесису і деміургії в художній свідомості Відродження:світоглядно-естетичне підгрунтя і поетикальні абриси/Н.І.Власенко// Від бароко до постмодернізму: зб. наук. праць / [ред.кол.: Т. М. Потніцева (відп. редактор) та ін.]. – Дніпро: Ліра, 2018. — Вип. XXII. – С. 17 – 25.

3. Fowler, A. Conceitful Thought: The Interpretation of English Renaissance Poems / A. Fowler. — Edinburgh: Edinburgh Univ. Press, 1975. — 152 p.

4. Sidney Ph. The Defence of Poesy/ https://www.poetryfoundation.org/articles/69375/the-defence-of-poesy

5. Sidney Ph. Astropel and Stella/ https://www.luminarium.org/renascence-editions/stella.html

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The Concept of "Kindness" in the Ethical Dimension of *The Selfish Giant* by Oscar Wilde

The issue of "belief" and "value" in Christianity as the main type of world religions has been crucial and, at some point, controversial during the whole history of the mankind, dating back to the ancient times. Most of the scientists from the sphere of religious studies such as A. Kravchuk, I. Kozlovskyy, O. Levkova, V. Tymchuk agree that the existence of "belief" as a concept always underwent challenged due to the process of sociocultural development.

As a rule, ancient rituals depicted important stages of life of the people, who used them. We may assume that forms of modern artistic forms were deeply connected with the evolution of the understanding about the world. In this context the feature of "association" played a great role, specifically, while performing or giving signals through body gestures or even primitive musical instruments (leather drums, plates, bone sticks).

According to the Ukrainian periodic edition called "Gal-info", which touches upon the issue about the relationship between religious practices and artistic initial performances, the specificity of the ancient context of the perception was way different than what is accepted in the modern society: "*In the environment of the ancient world myth was treated as a form of connection since individuals tried to percept the world using all the capability and knowledge through the materials given naturally*" [3]. From this statement it is quite clear for the modern research community that the "mythical thinking" as the special process of grasping the world as it was but at the same time creating images as codes for the connection between the "supernatural force", or "force above" and "the ordinary person", who attempted to find the spiritual and physical way of granting the loyalty and devotion towards the "unfathomable protector".

But as for the formal stability of the ritualism, oral expression was not considered the most long-term way of maintaining the cultural code since the number of interpretations was only increasing, which significantly created difficulties for a further profound study. That is the main reason why in the sphere of artistic forms the interdependence between "religion" and "literature" took place as the source of the global cultural preservation with local peculiarities depending on the periods, where "literacy" and "printing" were introduced to a variety of social communities.

And that was the point where literature became the tool with the same reason as religion – to perform the influence on the reader using textual images-codes (characters, background details) that could perfectly represent the virtual reality, originated from the objective reality around the reader. The British researcher in the sphere of interdisciplinary studies H. F. Rabbi explains the aspect of inseparability

and mutual influence of these two categories in the following manner: *"Eternal topics "life/death" "good/evil" extracted from the religious point are found in literary texts as parts of the profound philosophical dichotomy, some kind of controversy of the human nature"* [7]. Even though the relationship of the abovementioned notions was not on the same level of intensity throughout the whole history of the world, we cannot deny the benefit and glory of the interdependence due to the complexity of the human mind and unique attitude towards challenged of the lifetime and its hidden senses.

Exploring the mixture of religious features in literary works of different periods, we should mention the prominent persona of Oscar Wilde, who represented the late Victorian era (1870–1900). It should also be mentioned that Oscar Wilde himself had difficult relationship with religion, growing in the Protestant household. But regardless of this life fact, he managed to make the impossible due to the extravagancy of his works that contradicted with the general perception of "morality", "unity" – terms, masking the hypocrisy of the difficult era of social division. As the result, the collection of fairy tales was created by him at the end of the 19th century, where the aspect of Christian values coexists with the witty satirical description of the corrupted upper class in the contrast with striving and aspiring lower classes on the way to their survival.

We should point out that every fairy tale is to some extend filled with religious references that create symbols so important for the society of that time since the gap between "wealth" and "poverty" was so large that the level of snobbism hit the roof. The most relevant example of the "morale" depiction is the fairy tale called *The Selfish Giant*, where the Christian symbolic decoding is very important since the transformation takes place from "*selfishness*" to "*kindness*" and "*compassion*" as one of the key Christian values connected with the aspect of "unity" and "humane" way of life. At the beginning the author mentions the trait of the character before the act of empathy: "*He was a very selfish giant*" [10; 25], which gives the impression that the protagonist is insufferable and hideous just in the same manner as normally antagonists are, opposing the "good". But then after experiencing the wrath of nature since all the children were sent out of his garden, he is given the "confession" through the act of empathetic selflessness towards the other character – the symbol of the Savior Jesus Christ, an innocent kind little boy, who was unable to reach the top: "*The little boy wrapped his arms around the Giant's neck and kissed him*" [10; 28].

In conclusion, it should be stated that in the story Oscar Wilde wanted to show how actions rather than the appearance show values shared in the Christian tradition. Giant as the symbol of "distance", "isolation" finds the way through giving the hand to the little child (the symbol of innocence) and redeeming himself through simple yet profound act of spiritual growth.

References:

1. Любащенко В.І. ХРИСТИЯНСТВО [Електронний ресурс] // *Енциклопедія історії України*: Т. 10: Т-Я / Редкол.: В. А. Смолій (голова) та ін. НАН України. Інститут історії України. - К.: В-во "Наукова думка", 2013. - 688

с.: іл.. URL: http://www.history.org.ua/?termin=Khrystyyanstvo (дата звернення: 02.04.2024).

2. Релігія в художній літературі. *Книгарня є*: веб-сайт. URL: https://book-ye.com.ua/blog/e-shcho-chytaty/relihiya-v-khudozhnij-literaturi/ (дата звернення: 02.04.2024).

3. Релігія та мистецтво: вічна опозиція або синергія. Гал-інфо: веб-сайт. URL: https://galinfo.com.ua/articles/religiya_ta_mystetstvo_vichna_opozytsiya_abo_synergiya_409164.html#google_vignette (дата звернення: 02.04.2024).

4. Система духовних морально-етичних цінностей. *Професійна етика*: веб-сайт. URL: http://pe.ptngu.com/16.html (дата звернення: 02.04.2024).

5. Християнство. *Словник іншомовних слів*: веб-сайт. URL: https://www.jnsm.com.ua/cgi-bin/u/book/sis.pl?Qry=%D5%F0%E8%F1%F2%E8%FF%ED%F1%F2%E2%EE (дата звернення: 02.04.2024).

6. Християнство: історія християнства. *Studlancer*: веб-сайт. URL: https://stud.com.ua/57215/filosofiya/hristiyanstvo (дата звернення: 02.04.2024).

7. Rabbi H. F. The influence of religion on literature. The Journal of Jamia Ahmadiyya. United Kingdom. 2020. URL: https://majallah.jamiauk.org/2020/02/02/the-influence-of-religion-on-literature/ (last accessed: 02.04.2024).

8. Religion and literature. *Christian Classics Ethereal Library*: website. URL: https://www.ccel.org/s/schaff/encyc/encyc09/htm/iv.vii.cxxxix.htm (last accessed: 02.04.2024).

9. Schramm J. M. Oscar Wilde in context. 2013. 260 p. URL: https://www.cambridge.org/core/books/abs/oscar-wilde-in-context/wilde-and-christ/F39A054584157DA4C151A01D842311BB (last accessed: 02.04.2024).

10. Oscar Wilde. The Selfish Giant and other stories. Alma Classics LTD. 2015. 156 p. URL: file:///C:/Users/%D0%94%D0%B0%D1%88%D0%B0/Desktop/BOOKS/The-Selfish-Giant-and-Other-Stories-_Oscar-Wilde_-_Z-Library_.pdf (last accessed: 02.04.2024).

11. What Does the Bible Say About Christian Values and Christian Life? *Christian Bible Reference Site*: website. URL: https://www.christianbiblereference.org/faq_ChristianValues.htm (last accessed: 02.04.2024).

Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)

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Ways of translating tourist terms into Ukrainian

Tourist terminology is an important tool for communication for both tourist users and tourism professionals. This is due to the fact that tourist terminology is based on a generally accepted literary norm, supplemented with special terms. The most common ways of formation of terms: lexical derivation, semantic derivation, telescopy, abbreviation, borrowing. These terms are the most productive, as they allow you to quickly and effectively create new terms that meet the needs of scientific and professional activity [1]. Terminological vocabulary of any field or field of activity is a significant layer of neologisms that appear in most modern languages. Currently, the Ukrainian language does not have a fully formed terminological apparatus of the tourism sphere, which led to the emergence of a tendency to borrow English vocabulary to refer to concepts. English-language tourist terminology is used by borrowing from French, Spanish, Swedish and Dutch [2]. This is due to the fact that tourism in these countries has also developed a long time ago and has long -standing traditions.

The sphere of international tourism is one of the largest and most developed global in the world. It is inevitably influenced by all the pupils of society, including language.

One of the more common sources of replenishment of terminological vocabulary of tourism is the translation. Simme translates contributes to the emergence of equivalents of lexical units, which, or, are uniformly resolved by several languages from a single source, or are passed by several intermediates of consistently consistent consistency in the boundaries of one or another of the languages.

Thus, translating does not play a role in the development of languages. Because it is not only to transmit some information to other language, but and the testing of the possibilities of the language of the translation, its performance to transmit the opinion expressed in another language. And if in the language of translation does not lack the necessary lexical units, the sam translations are the first to create corresponding lexical equivalents in it.

The situation where there is a unambiguous and officially secured equivalent of the translation unit in the translation language, obviously does not cause some problems when translating. Whereas in the second situation, due to the lack of a conventional equivalent, there are some difficulties.

Non-equivalence is the consequences of reflecting the national characteristics of individual linguistic levels. Unbuttoned vocabulary is a lexical units in which the ethnically specific characteristic of objective reality is reflected at the conceptual and linguistic levels.

The method of solving the problem of non -equivalence can be called the process of synonymous. Synonyms refers to the selection and analysis of synonyms as a certain way of developing synonymy of industry terms, which allows to improve the practice of professionally oriented translation. This method allows you to more accurately interconnect the terms and combine them of certain areas of activity or fields of knowledge.

The adequate translation of sectoral terminology is related to the understanding and distribution of its semantic content in the original language and in translated.

And one cannot disagree with the fact that the basic translator skill really lies in the correct assignment of verbal values to units of the terminological system or other units of text, distributed and learned during their active perception in the translation process. Synonymization is important for the development of this basic skill.

Consider the main ways of translating the terms offered by Ukrainian translations:

1) Explication (descriptive translation) is a rendering of the word with the expanded explanation of the English word. This technique is used in the absence of a corresponding knowledge of the word in the dictionary and in the Ukrainian language*: custom sterminals – митні термінали, де здійснюється митний контроль; Schengen States – країни шенгенської групи.*

2) Loan-translation (word-for-word translation) – It is a translation of the English word or an expression by precise transmission of it by the Ukrainian language. Example: *Customs Service – митна служба; line watermark – лінійний водяний знак;*

3) Transcoding is a way of continuous use of a foreign word, when the sound or graphical form of the word of the original language is transmitted by means of the alphabet of translation language. Example. *management = менеджмент.*

4) Translation with the use of equivalents. Many English terms have a structure and semantics that correlates with the structure and semantics of the corresponding terms of the Ukrainian language. Such terms can be selected equivalents. Eg. *holder of visa – володар візи.*

Difficulties in translating call the terms that include words of words - then the bias. They make a special place in the affinity of the tourism sphere. Each regional region is covered by a different number of terms. Example: *person enjoying the comminity right – особа, яка має право на вільне пересування.*

References

1. Башук Н.П. Переклад безеквівалентної лексики у публіцистичних текстах. Наукові записки Ніжинського державного університету ім. Миколи Гоголя. 2016. С.14-15.

2. Білозерська Л.П. Термінологія та переклад. Вінниця: НОВА КНИГА, 2010. 232 с.

Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)

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Archaization and historicization of neutral units in a text containing obsolete vocabulary (on the example of Val. Shevchuk's novel "The meek shall inherit" and its English translation)

Translation of obsolete vocabulary has always been a challenging issue for translators. Moreover, if a text contains this type of vocabulary, even neutral words present in the same text should be considered in the process of translation more attentively.

We have analyzed the novel "The meek shall inherit" by Val. Shevchuk according to this issue. The basis of the novel is the Kyiv-Pechersk Patericon – a manuscript describing the lives of monks from the Kyiv-Pechersk Lavra that was created between 1215 and 1230 [6]. The main character, a monk named Simeon, had read the manuscript and considered it incorrect, and, therefore, decided to describe the events from his own perspective.

The novel deals with such plots of the Kyiv-Pechersk Patericon as stories about the enchanted treasure in the Varangian Cave, famine in Kyiv (which forced the residents to make bread from different plants instead of wheat), the princely monopoly on salt, the visit of Armenian doctors to Kyiv, etc. However, it cannot be claimed that the material from these stories has not undergone any changes. On the contrary, all the listed plots are reinterpreted, and the author creates the so-called "psychological travesty" [4, c. 36].

Because of the time and place described in the novel, there are a lot of obsolete vocabulary units. Archaisms (obsolete words that have full modern synonyms and were replaced by other ones because of different reasons) in the novel are more common than historicisms (obsolete words describing disappeared historical realia) since the action of the novel takes place mostly in the settings of the monastery which are quite conservative and do not change quickly.

Taking into account the stylistic peculiarities of obsolete vocabulary, as well as the differences between obsolete vocabulary systems in different languages, we can sum up that historicisms and archaisms can cause some issues in translation (since stylistically marked archaisms and non-equivalent historicisms are usually difficult to translate [7, c. 312]), especially when we consider the translation from one language into another while the languages belong to different groups (like Ukrainian and English), and the corresponding cultures have different background [5, c. 132]. The translation of Val. Shevchuck's novel "The meek shall inherit" created by V. Kholmogorova uses different translation methods and transformations (such as concretization, generalization, modulation, addition, omission, explication, neutralization, compensation, transcription, transliteration, and calque) to adapt these units.

In our research, we have to define compensation and neutralization. Compensation and neutralization are sometimes called stylistic transformations [1, c. 61]; they are opposite to each other because neutralization causes the elimination of stylistic peculiarities of a unit, but preserves its lexical meaning (for example, if we translate an obsolete word *алкати* as a usual one, *want*, it can be considered neutralization), and compensation is needed to preserve the style of the whole text. Using compensation, a translator can 1) translate one obsolete unit with another obsolete unit belonging to a different type (for example, a derivational archaism is translated with a lexical one), or with a formal or literary word (this kind of compensation is called partial), 2) add some obsolete units to the text or change the neutral words into archaisms and historicisms, or at least into more formal, literary vocabulary (this kind of compensation is considered full). The second type of compensation can also be called historicization or archaization: the first concept refers to a transformation of a neutral word into a historicism, and the second one – to a transformation of a neutral word into an archaic one.

In total, the historicization and archaization as types of compensation were applied to 13 neutral units of the novel "The meek shall inherit", but archaization is used more widely because of the general prevalence of archaisms in the novel.

Therefore, only 2 units were transferred with the help of historicization which made up 15% of the total number of full compensations. Such a translation involves the transformation of a neutral unit into a historicism while the lexical meaning of the original can also be specified, as it acquires an attachment to the realia of a certain epoch.

For example, the word *підніжок* [9, c. 11] is temporally neutral and appears in the dictionary as a derogatory term for someone who is self-deprecating and humiliating in front of others [3]. But in the translation, it is changed into the term *serf* [10, c. 13], for which the dictionary states that it means a member of the lower classes in medieval society [8], so it can definitely be considered to be a historicism describing an outdated social and political system.

There's a similar situation with the word *писання* [9, c. 6]. Its main meanings are "text written by hand" and "literary work", and there are no notes for these to reflect their temporal and/or stylistic significance, so this unit is neutral [3]. But in the translation, this word corresponds to something more specific in its meaning, *manuscript* [10, c. 7], which also has a clear temporal reference, as names a handwritten work created before the spread of printing technologies [8].

Archaization is much more common in cases of full compensation and is represented by 11 examples, i.e., 85% of the total number of full compensations. We can talk about archaization when a stylistically and/or temporally neutral unit (the one that we cannot call an archaism) is translated with an archaic or at least not neutral, but formal or literary one (so such a translation compensates the style of the text).

For example, a word *чудовний* [9, c. 6] is a stylistically and temporally neutral unit in its basic meaning (a synonym for the word *чудовий, wonderful*); this lexeme is obsolete only when it means *чудотворний* [2]. However, in the text it is used in

the meaning *чудовий* ("…отож можу дозволити собі безділля і віддаватися спокійному спогляданню неба, завжди дивного і *чудовного* (= always wonderful), через що я, може, й наклав на плечі чернечу одежу…" [9, с. 6]). But the translation of this word, *prodigious* [10, с. 7], is marked in the dictionary as a unit of the formal style [8], so we can consider it to be a stylistic compensation at least.

In addition, the emotional meaning of the text can change with its style. For example, a word *прозорливий* [9, с. 16], meaning "having or showing understanding and the ability to make good judgments", does not have any information about its temporal and/or stylistic features in the dictionary [2], while its translation, *perspicacious* [10, с. 23], is marked as "formal disapproving" [8]. The word *звір* [9, с. 118] is also stylistically and emotionally neutral if it names an animal, or can be quite an emotional description of a violent, cruel person [3], while its translation, the adjective *bestial* [10, с. 181], is described as "formal disapproving" [8].

Therefore, the archaization and historicization of neutral units in the translation of the novel "The meek shall inherit" contribute to the compensation of the style of the text, but they are presented in a relatively small number of examples, so they do not create a full "counterbalance" to translations with style-neutralizing means.

References:

1. Задорожна А. Перекладацькі трансформації як засіб досягнення еквівалентності перекладу. *Актуальні питання гуманітарних наук.* 2020. Вип. 27. Т. 2. С. 57-63.
2. Словник української мови: в 11 томах. URL: http://sum.in.ua/ (дата звернення: 30.03.2024)
3. Словник української мови: в 20 томах. URL: https://sum20ua.com/ (дата звернення: 30.03.2024)
4. Солецький О. Валерій Шевчук і бароко. *Дивослово.* 2010. № 10. С. 35-40.
5. Ткачівська М. Р. Особливості перекладу історично маркованої лексики в романі Ю. Андруховича «Коханці Юстиції». *Закарпатські філологічні студії.* 2022. Вип. 25. Т. 2. С. 130-136.
6. Чижевський Д. Києво-Печерський патерик. URL: http://litopys.org.ua/yushkov2/yush12.htm (дата звернення: 27.10.2023)
7. Шум О. Особливості відтворення стилістично маркованої лексики в перекладі (на прикладі німецькомовного варіанта роману О. Забужко «Польові дослідження з українського сексу»). *Актуальні питання гуманітарних наук.* 2020. Вип. 31. Т. 2. С. 311-315.
8. Cambridge dictionary. URL: https://dictionary.cambridge.org/dictionary/english/spear (Last accessed: 30.03.2024)
9. Шевчук В. Птахи з невидимого острова: Роман, повісті. Київ: Радянський письменник, 1990. 470 с.
10. Shevchuk V. The meek shall inherit… Kyiv: Dnipro Publishers, 1989. 303 р.

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Feminist Analysis of the Functioning Peculiarities of Political Institutions: A Study of the Role of Women in Politics and in Government Institutions

Gender equality and women's participation in political life are fundamental components of modern democratic governance. In accordance with international standards, men and women have equal rights to full participation in all aspects of the political process. The issue of gender equality in general is becoming increasingly relevant for the world, and its implementation concerns all spheres of human life. However, in practice, it is much more difficult for women to take full advantage of these opportunities. These opportunities – and ways to overcome this problem for Ukraine will be the main object of our study.

Since 1991 and up to the present day, a number of measures have been taken in Ukraine to develop gender policy. To draw an objective conclusion on the principle of gender equality in the national parliament, it is appropriate to cite official figures on the number of women in the parliament: from 3% (or 13 people) in 1990 (I convocation), 12% of women (or 51 people) in 2014 (VIII convocation) to 20.6% (87 out of 423 MPs) in 2019 (IX convocation). One of the new achievements of the equality movement is the introduction of a 40% quota for people of the same sex in local elections in Ukraine. The adoption of the Law of Ukraine «On Ensuring equal rights and opportunities for women and men» of September 8, 2005, and the Presidential Decree «On improving the work of central and local executive authorities to ensure equal rights and opportunities for women and men» of July 26, 2005 [1].

However, not everything looks so optimistic when you look deeper into these issues. If certain negative trends continue, Ukraine will not achieve gender parity in government by 2030. How can the Ukrainian parliament become an example of such parity, a success story for the generation of equality? To do this, it is necessary to revise the principles on which the Verkhovna Rada Secretariat and the Parliament itself operate, to move to the adoption of gender-oriented bills, to form parliamentary committees and the Government of Ukraine in such a way that women make key decisions on an equal footing with men [5]. We would like to note the comment of the head of the NGO «League for the Protection of Women's Rights «Harmony of Equals» O. Holub: «The adopted Electoral Code (introduction of the 40% quota – ed.) also provides for voting on open lists. Quotas work better in a system with closed lists. We cannot say that if the quota is 40%, there will be 40% of women in the Rada. Now, when we vote, we will elect a specific person, so it is impossible to predict how many women will be in the Rada,» the expert noted [3]. She added that «even in this way, it is still a very big victory, because at least the visibility of women

will be much greater. People usually choose those who are higher in the line, so more people will vote for women» [3].

We would like to pay special attention to gender equality during the war. The war poses new challenges related to the realization of both active and passive suffrage. Hundreds of thousands of women are forced to stay abroad, and some of them will not return until the post-war elections. This category of voters should be given the opportunity to vote abroad by amending the electoral law and regulating the administration of elections. Those women who do return will not be able to exercise their passive suffrage under the law, which states that only citizens who have lived in Ukraine for at least five years and have been abroad for no more than 90 consecutive days during that period can run for parliament. To eliminate this shortcoming, the Electoral Code should be amended to expand the list of exceptional cases that would not be considered violations of electoral law [2].

According to the Vice Speaker of the Verkhovna Rada of Ukraine, O. Kornienko, after the war, women in Ukraine will have more opportunities to actively participate in the country's political life. «Postwar Ukraine is also about increasing opportunities for women to engage in politics. In particular, many will return from abroad and bring with them new experience and, hopefully, an active leadership position. We have a unique chance to involve them in the political and social life of the country. To do this, as a state, we must take certain steps, including adopting new legislation on parties, amending the electoral code, and addressing the issue of greater involvement of women in public service, in particular, in high positions» [4]. The head of the Servant of the People party, O. Shulyak, noted that her party has 2,500 female local deputies. 301 women head factions. Several dozen women head territorial communities. «We are looking for a common solution on how gender quotas should work. We are analyzing the experience of the 2020 elections to avoid abuses,» noted O. Shulyak [4].

The study proved that ensuring gender equality for active participation in various political institutions (NGOs or government) is one of the typical types of evidence of democratization of the political system. However, in practice, it is much more difficult for women it is much more difficult for women to fully exercise these rights, and, for example, the war in Ukraine poses new challenges related to the realization of both active and passive suffrage. The socio-political discourse on the place of gender identity among the institutionalized practices of socio-political interaction can transform the institutional framework of the political system and determine the status of the state as a key institution in the political system of society and an actor in international politics. That is why it is so important and relevant to study the role of women in the modern political process and the functioning of government institutions based on a gender approach.

References:

1. Vrakhuvannia hendernykh aspektiv u formuvanni zakonodavstva Ukrainy. (date of access: 17.02.2024). [Consideration of gender aspects in the formation of legislation of Ukraine]. Міністерство юстиції

України – Ministry of Justice of Ukraine. URL: https://minjust.gov.ua/m/str 7596

2. Henderna rivnist za chas viiny: zdobutky ta neobkhidni zminy. (20 February 2023). [Gender Equality in Wartime: Gains and Changes Needed]. Громадський рух ЧЕСНО Public movement HONESTLY. URL: https://www.chesno.org/post/5879/

3. Zhinoche pytannia v Radi. Yak henderni kvoty zminiat parlament? (13 July 2019). [Women's issue in the Council. How will gender quotas change parliament?] BBC News Україна BBC News Ukraine. URL: https://www.bbc.com/ukrainian/features-48637941

4. Ukrainski zhinky u politytsi: vyklyky ta mozhlyvosti novykh povoiennykh realii. (22 November 2023). [Ukrainian women in politics: challenges and opportunities of new post-war realities]. Жіночий Конгрес офіційний сайт – Women's Congress official website. URL: https://womenua.today/news/ukrayinski-zhinky-u-politytsi-vyklyky-ta-mozhlyvosti-novyh-povoyennyh-realij/

5. Chy stane Parlament prykladom dlia pokolinnia rivnosti? Spilna stattia Dafiny Gerchevoi, Postiinoi predstavnytsi Prohramy rozvytku OON v Ukraini ta Zastupnytsi Holovy Verkhovnoi Rady Ukrainy Oleny Kondratiuk (24 October 2020). [Will the Parliament become an example for a generation of equality? Joint article by Dafina Gercheva, Permanent Representative of the United Nations Development Program in Ukraine and Olena Kondratiuk, Deputy Speaker of the Verkhovna Rada of Ukraine]. Офіційний портал Верховної Ради України – The official portal of the Verkhovna Rada of Ukraine https://www.rada.gov.ua/print/198765.html

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Language Game in Naming Modern Ukrainian Podcasts

The study is devoted to the language game as a specific type of the author's speech-making activity and the reception of increasing the expressiveness of the naming of modern Ukrainian podcasting. The structural and semantic features of the names of Ukrainian podcasts have been identified and analyzed.

Keywords: language game, naming, podcast, title, media space.

A podcast is an oral genre of journalism - a story, an interview, a conversation, or a music selection. Their peculiarity is that the audience of podcasters does not listen to these programs live, but can choose what to listen to and when. This method of distributing audio and video via the Internet allows anyone to create materials. This is what makes podcasting different from, for example, a radio station with professional journalists. Not only can anyone create a podcast, but it can also be made available for viewing or listening to anyone who is interested.

Podcast culture is actively developing in the Ukrainian media space. Despite the full-scale invasion, increased risks in the workplace, and deep transformational processes in journalism standards, podcast listening rates in Ukraine have grown significantly.

In the vast podcast space, where thousands of authors compete for the attention of listeners, titles become an important factor in determining its recognition and popularity, and play a key role in shaping the desire to listen to content. But how do they influence this?

First, a catchy podcast title conveys the essence of the content while attracting potential listeners. It acts as a hook, grabbing attention and generating interest. A short but descriptive title can effectively convey a topic, genre, or uniqueness, giving listeners a clear idea of what to expect. For example: "Comedian + Historian" (independent project), "GIRL TALK" (independent project), "What's the Brand" (independent project).

Secondly, the wording of the title can have a significant impact on recognizability. Phrases, slogans, or wordplay will make it memorable for listeners, and they are more likely to come back: "My thoughts are fucked" (independent project), "Divorced" (independent project), "Blah blah podcast" (independent project), "Aproshotam?" (Radio Skovoroda), "Good Bad Evil Podcast" (independent project). Headlines that evoke emotion or make you think elicit a greater response, thereby helping to strengthen the connection between content and audience. For example: "The First Time" (Radio Skovoroda), "How Did We Make Love?", "Untitled" (The Ukrainians), "Shit I Know Live" (independent project), "Who Killed JFK?" (independent project).

Thirdly, at a time when social media algorithms are driving content consumption, naming plays a crucial role in facilitating search. Adding keywords, popular topics/names, or phrases will increase the visibility of the podcast across platforms, attracting new listeners looking for relevant content. "Why Do They Kill?" (independent project), "Daddy's Cassette" (Stop! Busy!), "Voloshin's Formula" (independent project), "Ramina" (independent project).

Thus, for effective modern naming, the authors of Ukrainian podcasts successfully use the technique of language play, which allows them to enhance the expressiveness of the text and is a specific type of language activity. To attract the attention of listeners, they make the title unusual, depriving it of automatic perception: they transform established expressions, create new words, combine different styles, collide different grammatical forms, etc. Language play is a deliberate deviation from the literary norm; the author deliberately makes a violation, hoping that the addressee will decipher and appreciate this deviation. Also, creating a unique title gives a sense of identity, which will help to build a loyal audience over time. A catchy title acts as an invitation, encouraging you to check out the content. However, appeal serves as the first point of contact, and the quality and value of the content will ultimately determine its longevity and popularity. Names play a key role in shaping the path to popularity. The fact that language play is used demonstrates a number of trends: the liberation of naming, its transformation into a testing ground for new means of creating imagery, the search for convenient and original forms of realizing the author's intentions, and one of the ways to unlock the deep expressive potential of the language system.

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Botofarm - Modern Info-Weapon

What is a botofarm."Prove you're not a robot" - perhaps each of us has undergone this check on the internet.

A botofarm is one person, or a group of people, equipped with available software, with the help of which a network of fake accounts, or bots, is created and managed to achieve certain goals.

Botofarm Structure. A botofarm is a company that operates from a simple home computer to a large office with numerous staff. The latter can be costly but the most effective and influential. Such companies typically conceal their activities under the guise of a marketing or SMM agency. They specialize in creating and managing bots for social networks. These bots perform tasks devised by individuals with access to the necessary hardware and software. This approach ensures their realism and uniqueness. About 50 individuals are engaged in performing such tasks for their clients online.

How a Botofarm works. Its tasks as mentioned earlier, a botofarm is a large number of fake profiles created and managed by one or a group of living people with the necessary equipment. The computer and programs are tools. It's one thing when it's just one, and another when there are several or even dozens of them. So, using all this, some real people create a huge number of bots and control them using scripts and algorithms. Alongside the vast array of possibilities on the internet, botofarms can also perform a wide range of tasks. These include social media support or flooding, traffic boosting, data gathering, cyberattacks, information dissemination, and in the context of warfare: spreading fakes, confusion, panic narratives, treacherous narratives from the enemy side.

Why Botofarms are dangerous of us. Botofarms pose a real threat to society as they use bots to create and spread harmful information. This can include fake news, insults, threats, as well as propaganda aimed at manipulating public opinion and influencing political processes. Moreover, these botofarms can utilize their bots to gather personal information and even carry out cyberattacks. Masquerading as ordinary users, botofarms actively disseminate slander, intimidation, extortion, spam advertising, and attempt to use suspicious calls to action, as well as engage in fraud and hacking attempts. These actions violate users' privacy and security, and can lead to serious consequences for their psychological well-being and trust in the online environment.

Existing Example of Botofarm Operation. Eugene Prigozhin's Troll Factory.

"The Internet Research Agency" - a Russian entity headquartered in Saint Petersburg, engaged in disinformation and opinion manipulation. It utilizes fake accounts across various platforms to serve the interests of so-called "clients",

primarily spreading pro-Kremlin narratives within Russia and beyond (military conflict in Eastern Ukraine, civil war in Syria). The so-called "Troll Factory" belonged to Russian oligarch Eugene Prigozhin. Although he vigorously denied any involvement, his connection was exposed by the investigative journalism of "Novaya Gazeta" in 2013, later confirmed by US Special Counsel Robert Mueller. However, based on its operations, the Internet Research Agency, Eugene Prigozhin, and associated media outlets were accused of meddling in the 2016 US presidential elections and inciting conflicts within the country. In 2018, criminal charges were filed in absentia against the organization and its leaders in the US, followed by sanctions. After Russia's recognition of the so-called Donetsk and Luhansk People's Republics and subsequent invasion of Ukraine, sanctions were imposed by other countries as well. In February 2023, Eugene Prigozhin, who had previously denied his connection to the "Troll Factory", admitted that he had conceived, created, financed, and long managed it, commenting on these actions as defending the Russian internet space from aggressive propaganda and anti-Russian Western theses.

How to protect yourself from Botofarm activities.

Responsibility for ensuring security lies with internet resources. They must create reliable security systems to protect users from bots, suspicious traffic, and other threats. However, this is a complex task as botofarms constantly evolve, attempting to bypass security measures. Some tips to ensure your safety:

1. Caution in accepting friends: Check profiles before adding them as friends. Avoid unknown and suspicious profiles.

2. Carefulness with messages and links: Avoid opening suspicious links and providing personal information to strangers.

3. Filing complaints: Report suspicious activity to administrators. Use complaint filing mechanisms or account blocking.

4. Bot recognition: Learn to recognize signs of bots. Pay attention to inactive profiles and standard messages.

5. Protective software: Install protective software and browser extensions to block suspicious sites and links.

Botofarm is indeed a modern internet weapon, and bots are its "bullets". They ruthlessly destroy the network. It's a "shadow" business that spares no one and is interested only in its own gains.

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The Sonnet Sequence *Amoretti* by Edmund Spenser: Peculiarities of Poetizing the Love

In the sonnet sequence *Amoretti* Edmund Spenser is not limited to the pursuit of spiritual love and the creation of a mentally ideal female image; the poet tries to find a solution to the Petrarchist contradiction between spiritual and physical love through the institution of a church wedding [1; 2; 3; 4].

The images of the lover and his lady combine both individual features of their true prototypes of Spenser and Elizabeth, and the literary tradition of describing the beloved and his beloved. Although the poet gave his lady an angelic character (the topos of Donna Angelicata), he only emphasizes her purity and innocence, but still in most cases she is perceived as a real person. Out of respect for tradition, in his sonnet sequence the poet depicts the trials of his beloved, similar to the trials of the heroes of previous Petrarchist poets. However, this is complemented by a description of one's own real experience. Thus, in Petrarch's poetry the topos of the Cruel Beauty is in most cases connected with the contradictory inner states of the lover: he praises the virtues of his lady and at the same time is unable to suppress his beloved's physical desire, which then made the Petrarch disappointed. In such a situation, a lover, because of his unfulfilled hopes, will inevitably consider the lady nothing more than "cruel justice." However, Petrarch's love texts were full of conventions, and very rarely they were personal, confessional in nature. In this respect, Spenser is closer to Petrarch than most true Petrarchists: in *Amoretti*, the lover seeks to resolve his internal conflict, he sees the goal of his courtship in an eternal union with his beloved, and therefore Petrarchist topoi of Donna Angelicata and Cruel Beauty to solve your own artistic task.

The above suggests that Spenser's contribution to the art of the English sonnet is difficult to overestimate: his poems are perfect in terms of rhythm, musicality, accuracy of form and depth of content, giving the impression of simplicity and solemnity at the same time. At the same time, thanks to the author's organization of the order of poems, end-to-end images, the general theme of love and beauty, detailed lyrical plot, diary of character, *Amoretti* is an independent sonnet sequence, while being part of the lyrical cycle *Amoretti and Epithalamus*.

Emphasizing the heroine's purity and innocence, the poet gave her an angelic character, and if, according to the lover, she became an angel, she had to despise earthly love and ignore the poet as an earthly being, which could not help but cause him frustration. In such a situation, because of unfulfilled hopes, a lover will inevitably consider his beloved a Cruel Beauty. Thus, unlike Petrarch, who complained about the cruelty of Laura in her life and initiated the glorification of the

angelic likeness of the beloved after her death, Spenser combined two topoi in the description of the real Elizabeth. It should also be noted that, compared to his previous English sonnetists, Spenser in *Amoretti* paid much more attention to the topos of the Lady Angel.

In Petrarchists, the self-manifestation of the cruel beauty in most cases is associated with the contradictory inner states of lovers: they glorify the virtues of the beloved, but at the same time unable to suppress the attraction caused by the heroine; however, in the life of poets did not need to change the state of affairs, moreover, in all probability, in fact, they did not have such a favorite. On the contrary, in *Amoretti* the lover seeks to resolve the internal conflict that arose in him.

Thus, it is very important that in the process of courtship, the influence of the beloved and the interaction of the lover with her are a great example of practical Neoplatonism. Unfortunately, so far such a negative impact on the lover by the beloved has not attracted the attention of researchers, who prefer to focus on the activities and initiatives of the lover.

Just as the physical and spiritual beauty of a loved one affected a lover's soul, separation from a loved one also had a strong effect on him, allowing him to use parting as a stepping stone, allowing him to climb the ladder of love and achieve what he could not achieve before. To avoid suffering, a lover can create an imaginary image of his beloved and enjoy her beauty. As a result, the lover begins to climb the ladder of love. Spenser did not blindly follow the traditions in the process of creating love lyrics, but did not break with them. When Spenser wrote his poems, he was influenced by the works of his prominent predecessors; later his love lyrics were considered classics of the genre and, along with other works, formed a tradition as a dynamic system that constantly influences followers and followers who perceive Spenser's love lyrics as Spenser himself perceived the poetry of his predecessors.

Spenser made an invaluable contribution to the development of English love poetry, for example, the poet transformed the sonnet sequence into a more cohesive sonnet cycle and created such an important genre structure as the lyric cycle. Thanks to Spenser, the idea of a happy marriage also became one of the ideological foundations of English literature on the subject of love.

Spenser's sonnets are characterized by cheerfulness, radiance, fullness of light. This mood is conveyed here by saturating the poem with appropriate visual images and metaphors of fire: life fire (living fire), rays (bright beams), the flow of desire (ftorme), light (light). The light palette of Spenser's sonnets, their lightness and lightness contrasted with the gloom inherent in previous English poetry, the weight of the poem.

Even Spenser's grief is easy and overcoming. The victory of the spiritual principle, which Spenser preferred, determines the choice of metaphorical images. Spenser's poetic gaze is turned to heaven, and it is with them that he measures the appearance of his beloved. The beauty of his beloved for him - a combination of pride and gentleness. In addition to the characteristic English poetry of related stanzas, which Spenser tried to restore in his sonnets, the national color is manifested

in descriptions of nature, with the characteristic English climate change of seasons, frequent storms, gloomy weather.

The sonnet sequence *Amoretti* is characterized by a correlation between the spiritual and the sensual. In the sonnets the author's position is connected with the reception of Petrarchism, but E. Spenser sees his purpose in presenting a new philosophy of love, considering it in the unity of spiritual and physical components and considering marriage a prerequisite for its implementation. The motif of the beauty's cruelty and the hero's suffering from undivided love, the image of a "woman warrior" who defeats a man are elements of the system of Petrarchism. But in the context of Edmund Spenser's metaphysical worldview, they acquire a changed sound. The poet uses them as a starting point to create their own poetic decisions and brings to the fore reciprocity and happiness. The very situation "hero – lady" is an external reflection of the theme of metaphysical unity of lovers. For them, happiness is love, which is possible with spiritual and physical unity. A reflection of the theme of metaphysical unity of lovers is the correlation of images of the cycle in certain paradigms. A lady can be associated with "Deity, saint, angel, heavenly light" and at the same time with "warrior, beast, tyrant, torturer"[5].

This paradigm corresponds to the dualism of the Lady's perception, which reveals the root cause of the dramatic conflict. A stylistic device that allows the author to emphasize the conventionality of the artistic reality of sonnets is the use of special language constructions (for example, the representation of the Lady in the image of a bloodthirsty "beast", "torturer"). However, despite the conditionality of the painting depicted by the author himself, there is some indisputable conviction in it. After all, it was this "cruel" attitude towards the hero that the Lady stimulated his spiritual development. The special merit of the author - in the widespread use of tropes and stylistic devices (metaphor, metonymy, antonomasia, epithet, hyperbole, oxymoron, comparison, antithesis, allusion, symbol, allegory, comparison, lexical and intoxicating repetition, inversion, "wrong" sentence structure, etc.). Edmund Spenser's sonnet sequence *Amoretti* took a well-deserved place in world literature, becoming a masterpiece in honor of his beloved woman.

References:
1. Щербина М.А. Життєвий шлях та творчі пошуки Едмунда Спенсера / М.А.Щербина //Ренесансні студії. 2010. Вип. 14–15. С. 73–96.
2. Dasenbrock, R. W. The Petrarchan Context of Spenser's "Amoretti" / R. W. Dasenbrock // Publications of the Modern Language Association of America. — Vol. 100. — No. 1. — 1985. — P. 38–50.
3. Dunlop, A. The Unity of Spenser's "Amoretti" / A. Dunlop // Silent Poetry: Essays in Numerological Analysis / Ed. A. Fowler. — London: Routledge, 1970. — P. 153–169.
4. Ebreo, L. Dialogues of Love / Tr. C. D. Bacich, R. Pescatori /L. Ebreo. — Totonto; Buffalo; London: Univ. of Toronto Press, 2009. — 464 p.
5. Spenser, E. Edmund Spenser's "Amoretti and Epithalamion": A Critical Edition / Ed. K. Larsen / E. Spenser. — Tempe: Medieval & Renaissance Texts & Studies, 1997. — 291 p.

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The Concept of Space in the Discourse of Design

The concept of space, when reflected ontologically, has been the subject of many scientific researches performed in different areas and laying the foundations for revealing its flexibility open to interpretation [1; 2].

The dynamic and relative structure of space is considered as a special volume that provides changeability and diversity to live, by producing different meanings with reference to culture and value from the perspective of the interpreter. The limits and variety of sense-making models and the experiences, staged in the space, predict meanings produced in these horizons.

Such different scopes of comprehension and the conceptual work shaped and diversified with imposed meaning and function have been analyzed by many philosophers, sociologists and designers. In addition to exposing the relations of space evolving according to the human demands with changing time and geography, the researchers carried out studies by questioning the changing and transforming effects of space on individual and society and made explanations within this framework.

Considered as a deep and multi-dimensional volume that encompasses all life in its broadest sense, space has always had an important place in our lives by expressing both the cities of countries in each geography that has become spatial and micro and macro spaces as *open/ closed* spaces where life is staged.

While macrospace covers the whole city and the living spaces within the social life, the microspace includes all indoor/outdoor spatial designs. The concept of housing, which is one of the basic needs, refers to a defined and closed area as a field of communication in terms of function and location, as well as security, protection from natural conditions, sleep, eating, drinking, social and daily life.

Accommodation spaces are determined by the design demands of individuals and it is a microspace area in which the user shapes and changes by constantly interfering with the design process while living. Therefore, the flexibility of the space shapes the multidisciplinary design and the relationship of space with an innovative perspective, with the dialectics of what necessities bring and the necessity of those brought.

All these lines of interpreting the concept of space manifest its connection with the discourse of design, where it acquires fluid forms and volumes.

Space in design is a multifaceted topic that encompasses various directions and fields - interior design, landscape design, industrial design, website design, architecture, urban planning. Space in design is the perception, experience, and use of both tangible and intangible elements in a particular environment, not just the physical dimension.

Physical space in design focuses on the material dimensions, proportions and structure of architectural and interior spaces. It is about realizing how spaces, such as scale, form, volume, and movement, interact to create functional and aesthetically pleasing environments. Architects and designers carefully consider spatial relationships and layout to optimize convenience, efficiency, and comfort.

Cultural and social norms are closely related to space in design. Different cultures, worldviews, and perceptions of people may have different meanings of space and its significance, which can influence design preferences, traditions, and patterns of spatial organization. Designers should take into account cultural diversity when creating spaces that meet the different needs and preferences of users.

Space in design depends on the human perception of the environment and experience. The way people perceive and interact with space has a significant impact on their emotions, behavior, and overall well-being. Designers often use the principles of environmental psychology to create spaces that evoke certain feelings or reactions, such as calm, excitement, or productivity. Factors such as lighting, color, texture, and spatial sequencing play a crucial role in shaping the user experience in a space.

In today's design discourse, more and more attention is paid to the flexibility, comfort, and adaptability of space to accommodate a variety of uses and requirements that may change over time. Designers should explore various innovative approaches, such as modular design, adaptive furniture systems, and flexible zoning strategies, to create dynamic environments that can be easily changed or converted as needed.

Taking into consideration concerns about the sustainability of the environment around us, space in design also encompasses considerations of energy efficiency, resource conservation and climate change resilience. Sustainable design aims to minimize the environmental impact of buildings and spaces while maximizing their long-term performance and comfort for occupants. Concepts such as passive design, green infrastructure, and ecological urban planning are an integral part of creating environmentally responsible spaces.

The emergence of digital technologies has expanded the concept of space in design to include virtual and augmented reality. Designers are using digital tools and simulations to more effectively visualize, analyze, and communicate spatial concepts. Virtual environments enable immersive and interactive design processes, allowing designers and customers to interact with the space before it is built and facilitating the process of creating and designing spatial models.

In general, the concept of space in design is a well-developed field that can encompass a variety of directions, approaches, and considerations. Whether it is physical, cultural, or digital space, it plays a fundamental role in shaping the environment and influencing the human world and the interaction within it.

References:
1. Design Discourse. History, Theory, Criticism/ ed. V. Margolin. – The University of Chicago Press, 1989. – 302 p.
2. Discourses of Space/ ed. by J.Pieldner and Z. Ajtony. – Cambridge Scholars Publishing, 2013. – 332 p.

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Word for word translation of medical terms

The processes of integration of national research works in the world resource of scientific and technological progress, which tends to globalization, determines close interactions between lexical units of different languages with the processes of borrowing and the definition of terms in the structure of terminology, timeliness, and lexical and semantic structure. The terms confidently occupy their positions in the vocabulary of scientists, scientific works and communication at international congresses, conferences, symposia. Therefore, the translation of English-language medical terms that would reproduce lexical, structural and semantic characteristics of medical discourse. Equally important is the choice of method and type of translation of English -language medical terms, determining the optimal translation tool to achieve the above goal. In this research work, we will look at two methods of translation of English -language medical terms: loan translation and word for word translation [1].

The literal translation allows you to reproduce the semantic meaning of the term without changing the structure of the original. But this method has its disadvantages, the method is not used when the external phonetic sequence of the term is stored, but the semantic meaning of the linguistic element disappears. Therefore, this method requires translation.

A literal translation can translate a phrase externally similar to the original term, but its meaning will be different or the opposite situation where the use of a literal translation may lead to a violation of the standards of use in the Ukrainian language when translating the common variant. In this research work, the method of literal translation translated English-language medical terms, which amounted to 21% of lexical units from the total number of terms and main linguistic material [2].

Consider several examples of translation of medical terms by literal translation: *The most serious complications include blindness, encephalitis (an infection that causes brain swelling), severe diarrhoea and related dehydration, ear infections, or severe respiratory infections such as pneumonia.* Medical terms *Brain Sweling, Severe Diarrhoea, Severe Respiratory Infections*, when translated, retains their structural structure – brain edema, severe diarrhea, severe respiratory infection.

Worldwide, TB is One of the Top 10 Cause of Death and the Leading Cause from A Single Infecto for Agent (Above HIV/AIDS). The next term Single Infection Agent is translated by the unchanging the structure of the phrase – the only infectious agent. *The Virus Infects the Respiratory Tract, the Three Spreads Througout the Body.* The compound medical term of the Virus Infects The Respiratory Tract, when translated, retains as its lexical–semantic importance and structural structure–a viral infection of the respiratory tract, which does not interfere with the norms of use of phrases in the Ukrainian language.

Diagnosing multidrug–resistant and other resistant forms of TB (see Multidrug–resistant TB section below) as well as HIV– associated TB can be complex and expensive. In this example, HIV– Associated TB translates each component of a compound medical term– face– associated tuberculosis. Literal translation is used to translate different genre discourse. In the above examples, when applying the method of literal translation of English –language medical terms, it was possible to translate 67 lexical units (21%), which shows the feasibility of using the method for translation of medical terms.

Occasionally the same notion can be translated in different words – for example, опоясуючий герпес– shingles and herpes zoster. Terminological synonymy is not developed as much as in other layers of vocabulary, but, nevertheless, it exists. Examples of it are words such as гематома – haematoma and bruises; грудна клітка, грудина – thorax, chest cage, chest; побічні ефекти (реакції) – side effects, adverse reactions; ліки (препарати) – medicine, medications; лікування – treatment, medicine); аналіз – analysis, test, evaluation; пневмонія – pneumonia, pneumonitis, історія хвороби – case report, history of exposure.

When translating the names of organizations and their abbreviations, we should first translate the full name of the organization, and then shorten it to the abbreviation. The translator should be careful, because the equivalent of the abbreviation may already exist in the language of translation: The National Health and Nutrition Examination Survey (NHANES) – Національна програма перевірки здоров'я та харчування (НППЗХ), The National Center for Health Statistics (NCHS) – Національний центр медичної статистики (НЦМС), The Centers for Disease Control and Prevention (CDC) – Центри контроля та профілактики захворювань (ЦКП), Research Triangle Park – Трикутник науки, RTI International, NC – Ар–тіай Интернэшнл, неприбуткова організація. The difficulty of analysis lies in the fact that the term is a conservative phenomenon. It is quite difficult to identify something new and unusual. In addition, terms often do not consist of a single word, but are a combination of words, each of which has its own transformation during translation. Medical texts are characterized by a peculiar construction of sentences. Often the structure of the English expression from medical area is replete with complex grammatical constructions (infinitive and gerund), which complicates the definition of logical emphasis in the sentence. All this leads to ambiguity in the translation of the text.

References

1. Пєшкова Т. Особливості перекладу німецькомовного тексту медичної літератури. *Філологічний дискурс*. Вип. 8. Хмельницький, 2018. С. 166–174. URL http://nbuv.gov.ua/UJRN/Sdzif_2013_11_41

2. Сайко М. Проблеми перекладу медичної термінології українською мовою. Актуальні проблеми філологічної науки: сучасні наукові дискусії: матеріали Всеукраїнської науково–практичної конференції, м. Одеса, 22–23 березня 2019 року. Одеса, 2019. С. 90–92.

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Violation of Language Norms in the Dnipro Mass Media

The study is devoted to the identification of cases and specifics of violations of language norms in the mass media of Dnipro. Violations of lexical, morphological, stylistic, etc. have been identified and characterized. levels of literary language norms in the information space.

Keywords: mass media, language norm, information space, media.

The media is an important channel of communication that shapes society's awareness and influences language culture. The relevance of the problem of violating language norms in the media in Dnipro today acquires special significance, as the media plays a crucial role in shaping the national consciousness of society and influencing the informational and linguistic spaces. The research involved analyzing typical violations of language norms in journalistic texts, identifying the reasons for such violations, and studying the impact of these violations on the perception of information by readers or listeners. Possible goals include specifying the mechanisms of language norm violations in the media, determining ways to avoid them, and promoting standards of linguistic culture in journalism in the city of Dnipro.

The city of Dnipro has a developed media environment, including magazines, television, radio, and internet publications. However, violations of language norms in mass media can reflect the quality of the linguistic environment and the standards of professional journalism. The source materials for the research included content from "Dnipro TV," "Suspilne," "Dnipro Vechirniy," and "Meta." The violations found in the materials indicate the need for their correction and improvement of the text. Pleonasms, or redundant words, can increase the volume of the text without providing additional information. Russicisms may arise due to the influence of neighboring languages or unfamiliarity with the Ukrainian language. Cases of tautology (repeating semantically identical or similar words) also lower the quality of the text. Mistakes were found in grammar, spelling, punctuation, as well as stylistic inaccuracies, etc.

The most common language violations in the Ukrainian language are Russicisms. Under the influence of the Russian language for many years, they have infiltrated our speech and replaced Ukrainian words. Reasons leading to violations of language norms in journalism include lack of professional training, carelessness, time pressure, etc.

Eradicating Russicisms from the language of the media is a challenging but achievable task that requires a systematic and comprehensive approach.

According to the new orthography, many loanwords that were previously written with a hyphen will now be written together. These are words with the first part: "веб" (web), "віце" (vice), "поп" (pop), "лейб" (label), "максі" (maxi), "міді" (midi), "прес" (press), "фольк" (folk), "міні" (mini), "преміум" (premium), "топ" (top), "флеш" (flash). Journalists, who are already accustomed to writing "press conference" and "press service" with a hyphen, may find it particularly challenging.

Violation of lexical language norms in the headline of the article can occur. For instance:

"A grin is a particular facial expression that expresses mockery, ironic attitude towards someone or something. Therefore, it is better to use 'smile'. Sometimes journalists may use terms carelessly or incorrectly, especially if they do not pay enough attention to the proper choice of words."

To address these common violations among media professionals in Dnipro, several steps can be taken:

1. Language education: Allocate sufficient time for language education, attend language courses, seminars, workshops, language contests, etc. This will help improve language culture and awareness of language norms.

2. Orientation towards national media: Look to national Ukrainian-language media as a model, which promote correct usage of the Ukrainian language and the eradication of Russicisms and calques.

3. Utilization of language resources: Verify doubtful words using available language resources.

4. Thorough editing: After writing the text, dedicate time to editing it. Read the text carefully, paying attention to every word or phrase.

The violation of language norms in the media in Dnipro is a widespread problem that requires attention and measures for resolution. Various violations of lexical, morphological, and stylistic language norms have been identified. Understanding the reasons and consequences of these violations will help develop effective strategies for their elimination.

References:

1. https://suspilne.media/708158-u-krivomu-rozi-policejski-vratuvali-astruba-zi-zlamanim-krilom/

2. https://dv-gazeta.info/dneprnews/ryatuvalniki-distali-domashnogo-ulyublentsya-z-7-metrovogo-kolodyazya.html

3. https://news.meta.ua/uk/news/v-obiimakh-sontsia-ta-ditiachikh-posmishok-raionchik-u-dnipri-zacharovue-travnevoiu-krasoiu-foto-3314603/

4. https://dnipro.tv/news-dnipro/oberezhno-skaz-rudokhvosti-kydaiutsia-na-domashnikh-tvaryn-i-liudei/

Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)
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The Concept of Experience in the Discourse of Design

The concept of experience is becoming more and more relevant and significant in modern design, as society and trends are increasingly inclined to rethink traditional approaches [1; 2]. Design shapes users' perceptions and influences their interactions with products and services. Examining the concept of experience from the perspective of philosophy, psychology and design, the article reveals key aspects that define experience as a central element in the process of creating user interfaces and products. The research shows that understanding experience allows designers not only to create aesthetically appealing solutions, but also to approach design with emotional, cultural and social contexts in mind. Ultimately, the findings emphasize that taking into account the concept of experience allows for more cohesive and meaningful design solutions that contribute to improving human interaction with technology and the environment.Usually, the concept of "Experience" in the context of design is considered as comfort in the further use of a product or service, but in fact this concept is much wider and is focused not only on the comfort of the user, but in principle, what emotions the user should feel from the design object. In order to achieve a certain emotion from the user, in the design special attention is paid to the aesthetic component, ease of use, positioning of the product, relevance to current moods in society and other more specific characteristics.

At the same time, the concept of "Design" is not only the aesthetics of the product, but also the innovation of the idea and construction of the object of development.

When we talk about comfort, we primarily mean a feeling of convenience, safety and pleasure. Experience plays a key role in determining these aspects. For example, when we use a product or service, our experience includes perceptions of its ergonomics, design, functionality, and quality. If these aspects meet our expectations and provide usability, we feel comfortable. Thus, previous impressions can determine our expectations about a certain situation or place, and accordingly, affect our sense of comfort. Also, our knowledge and skills allow us to effectively adapt to new conditions and maximize our well-being. For designers and architects, understanding experience as a measure of comfort is critical. When creating spaces and objects, they must take into account not only aesthetic aspects, but also how these objects will interact with the user in everyday life.

Aesthetic experience is a key aspect of our perception of the world around us. It is a feeling of beauty, harmony and pleasure that arises in us when we perceive various objects, phenomena and works of art. Aesthetic experience includes the perception of forms, colors, textures, sounds and other elements that create an impression of beauty and a sense of emotional satisfaction. An important

characteristic of aesthetic experience is its subjectivity. What one person perceives as beautiful and exquisite may not evoke the same impressions in another. Aesthetic design can evoke a wide range of emotions - from admiration and joy to peace and meditation. Beauty can inspire us, lift our spirits and evoke deep inner feelings.

Experience can be a powerful channel in product advertising, as it creates an emotional connection with potential consumers and can influence their perception and attitude towards a brand or product. Understanding how consumers experience the experience of using a product allows you to emphasize its benefits and importance in their lives. One way to use experience in advertising is to create stories or scenarios that demonstrate how a product can improve a consumer's life. These stories create an emotional connection with the audience and help them imagine themselves in the role of a product user.

In today's world, where technology, tastes and consumer demands are constantly changing, it is important to understand how these trends affect the user experience and how they can be used to improve products and create a competitive advantage. Experiences can also reflect sociocultural trends and values. For example, growing attention to sustainable development and environmental issues can influence the choice of products in which consumers will be interested. Therefore, it is important to understand these values and respond to them in product development and advertising campaigns.

Analyzing the concept of experience from different perspectives, such as philosophy, psychology and design, we understand that successful design requires a deeper understanding of users' needs and expectations, as well as taking into account their emotions and the context of use. Understanding such a concept as "Experience" allows us to better adapt our design solutions to the needs of users. Taking into account emotional, cultural and social contexts helps to create not only aesthetically appealing products, but also those that meet real needs and contribute to better interactions with technology and the environment.

References:

1. Design Discourse. History, Theory, Criticism/ ed. V. Margolin. – The University of Chicago Press, 1989. – 302 p.
2. Krippendorff K. Design Discourse/ https://www.researchgate.net/publication/349581484_Design_Discourse/fulltext/603705424585158939c9f545/Design-Discourse.pdf

Section 04 Humanities: Challenges and Issues (Legal Studies, Social Studies, Philosophy, Pedagogics, Law, Applied Linguistics, Theory and Practice of Translation)

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Fake news in modern Ukrainian mass media

The study provides an interpretation of "fake news" compared to "false news" is provided. Emphasis is placed on fakes that were distributed on the Facebook social network to create and replicate hoaxes. The article contains an analysis of experimental studies in Ukraine related to the creation of fakes. One of the experiments of the Regional Press Development Institute (2018) is described in detail, during which a fake press release about the danger of ball lightning was sent to the editorial offices of mass media in the southern regions of Ukraine. The peculiarities of the technology of creating a fake message were revealed and the reaction of the Ukrainian mass media was traced. It has been proven that fakes in the media space can be not only in the format of news information, but also messages that arise as a result.

Key words:*fake, fake news, fact check.*

Modern journalism faces various problems that affect its quality, objectivity and role in society. It has a huge impact on society. The mass media have the power to impose certain thoughts, imagesand, even, dreams. It is not for nothing the media calls "fourth power". Thanks to the development of technology, mass media are taking new forms, looking for new ways to influence our consciousness.

Researchers addressed attention on spread fake information, in particular questions its typology, origin and influence on public opinion. The phenomenon of "fake news" in the mass media of the world is not new, though him rapid development is characteristic of the 21st century. Synonymous to concept "fake news" is "journalistic duck" or the Latin phrase "non testatur" (NT) - "not tested". We have reasons formulate that fake in journalism is a kind of untruth information, which deliberately is created in information space special platforms or persons with purpose purposeful impact to a certain audience.

Influence fakes on mass consciousness demonstrates model propaganda tools of the Italian researcher Ben Nimmo. In 4D, he calls four positions: Dismiss, Distract, Distort, Dismay. Or vectors, in his opinion, determine the content of the information that is used for creation fake materials.

It is worth considering fake messages in flightity. Research by Deutsche Welle (internationalamedia organization) demonstrates that fake news has tended to become a must-have element to createhoaxes and "distorted reality", in particular in politics. Thanks to the mass media, during the 2019 elections in Ukraine, disinformation from external and internal sources became a tool to influence public opinion. In addition, the most active role in this influence was played by social networks, in which alternative facts of a false nature were created and replicated.

An important feature used by the creators of fakes is the blurring of clear boundaries between real and virtual space. In this context, G. Pocheptsov rightly notes: "The fakes came seriously and for a long time. It will be difficult to get rid of them, since technical platforms have made it as easy as possible to generate content for everyone, and they themselves avoid the responsibility for the authenticity of messages, which was the case with traditional media.".

One of the experiments was conducted by the Regional Press Development Institute. So, in 2018, a fake press release about the danger of ball lightning was sent to the editorial offices of mass media from the Kherson, Donetsk, Zaporizhzhia, Luhansk, and Mykolaiv regions. This text is signed by the so-called World Oceanic and Atmospheric Administration (NASA), which does not actually exist. The project aimed to check whether Ukrainian journalists adhere to professional standards when searching for and disseminating news information. The organizer of the experiment, A. Romanyuk, notes that about 200 different mass media, including all-Ukrainian ones, wrote about ball lightning.

A. Romaniuk named the following features of the fake press release, which was massively believed by the Ukrainian media:

1) plausible information source (according to Google Trends, more than 5 thousand users from the southern and eastern regions at the end of July 2018 were interested in information about ball lightning);

2) "authoritative" organization (Ukrainian division of the World Oceanic and Atmospheric Management Organization);

3) half-truth (the press release contained two true theses: about the nature of ball lightning and about the fixation of 118 temperature records in the world in the summer of 2018);

4) replacement of concepts (National Oceanic and Atmospheric Administration (NASA), the abbreviation of which name created associations with the name of the world-famous US National Aeronautics and Space Agency);

5) advice from so-called experts;

6) contact person for communication (fictitious contact person is indicated - Victoria Musii).

Analyzing the fact-check trend, fakes can take the form of comments under real news, and personal opinions, for example, some active group in social networks or a famous blogger. Such channels of promotion and distribution of the fake are aimed at giving a false fact informational weight, introducing it to various channels of influence, in order to reach as many end users of this information as possible. It is worth noting that it is social networks that have now become the medium of active replication of fake news, because it is about interpersonal communication and trust in messages without doubt and preliminary inspection. Accordingly, fakes in the media space are not only news information, but also messages that arise as a result.

Fake journalism has become a reality in the media space of Ukraine, and at the same time, it is an anti-trend that modern fact-check resources have come forward to combat. There is no doubt about the need for their expert research, because among

the audience, in the intensive information flow and constant information noise, the opposite effect occurs - information overload. Fact-chek, which has become a proven and influential tool in a short period of time investigations, should become one of the strategic directions of journalism and needs further scientific research in Ukraine in view of the trends of the digital age.

References:

1. Gorokhovsky O. M. (2017). Faktchek yak trend rozsliduvan: mozhlyvosti ta perspektyvy. Dnipro: Lira.
2. Kicza M. O. (2016). Fejkova informaciya v ukrayinskyh socialnyh media: ponyattya, vydy, vplyv na audytoriyu
3. Pocheptsov G. (2018). Pochepcov G. Fejkov mnogo, teorij fejkov eshhe bolshe. Retrieved from: https://ms.detector.media/trends/1411978127/feykov_mnogo_teoriy_feykov_esche_bolshe/
4. Romanyuk A. Yak sotni media v gonytvi za kulovymy blyskavkamy zapustyly fejk. Retrieved from: https://detector.media/infospace/article/140132/2018-08-14-yak-sotni-media-v-gonitvi-za-kulovimi-bliskavkami-zapustili-feik/
5. Nimmo B. (2015) Anatomy of an Info-War: How Russia's Propaganda Machine Works, and How to Counter It. Retrieved from: https://www.stopfake.org/en/anatomy-of-an-info-war-how-russia-s-propaganda-machine-works-and-how-to-counter-it/

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The key role of Ukrainian culture in the struggle for national identity

Today, in the context of not only military, but also mental and existential contradictions with Russia, it is important to preserve and develop Ukrainian culture. It is necessary for a clear understanding of the differences between the Kyivan-Russian and Moscow-Russian mentalities.

The popularization of everything Ukrainian and the dissemination of information about Ukraine's cultural heritage helps to draw the world's attention to our country. One of the important areas of struggle now is the destruction of the myths that impose the idea that Ukrainian culture is derived from Russian culture. In this publication, we will look at a few examples from Ukrainian culture that undoubtedly show the difference in the mentality of Ukrainian society compared to that of Russian.

The first source to turn to is folklore. It is folklore that shows the way of thinking of a society and their way of life. As Valentyn Ryabenkyi, a leading engineer at the Institute of Cultural Studies of the National Academy of Arts of Ukraine, wrote in his research paper: "Russia, as the daughter of wild nomads and the successor of the Golden Horde, has lived and continues to live by plunder, destruction of others and violence."[1, p.10] The nomads were characterized by a conquering lifestyle, which was undoubtedly reflected in oral folk art.

For example, let's compare the ritual song traditions of Ukraine and Russia in the winter cycle. Ukrainian carolers kindly and jokingly ask for a treat:
"Koliad, koliad, koliadnytsia,
A good cake with poppy,
But not so good without poppy,
Give me a penny, uncle." [2]

At this time, the Russian song sounds somewhat threatening and cruel:
"Kolyada, kolyada,
Who won't give us a cake,
We'll take the cow by the horns,
Who won't give us a pie,
We'll give him a lump in the forehead,
Whoever won't give us a nickel
We'll give him a neck on the side." [3]
This shows the difference in humor and friendliness between Ukrainians and Russians toward their own people.

One of the most eloquent examples of rudeness in Russian culture is the difference in the names of the wedding process. Russians use the name "brak" (marriage), which is also a word that explains something defective.

At this time, Ukrainians use the word "shlyub"(marriage). The word "shlyub" originates from the Old Slavic word "sjub"[2], which meant a solemn promise. In addition, Russians say "to marry On someone," unlike Ukrainians who say "to marry With someone." The word "odruzhuvatysya"(to marry) means "to be friends," "to be companions," and this can only be done "with whom," not "on whom." The Russian version indicates dominance over someone inferior, in this case, a woman. The question of how women are treated in Russian culture has always been somewhat disrespectful. Women in Ukraine are glorified in ritual songs, love lyrics, even in fairy tales, and are referred to in diminutive and affectionate forms: little star, the sun. In Russian art, such glorification of female beauty, aesthetics, and the importance of women is not found in the same volume as in Ukraine. It also shows the difference in social equality and respectful attitude towards others. This is evidence of the Asian roots of the folklore of Russians, who, in addition to Scythian-Samratian and other nomadic peoples of origin, survived five hundred years in Tatar-Mongol captivity, integrating the values of physical strength, power, authoritarianism, and dehumanism into their thinking and language, folklore, and lifestyle.

Fairy tales are also a great indicator of a country's mentality, because this is what a person is brought up on and the values that are laid down through fairy tales in childhood. Ukrainian fairy tales were built on the idea that the protagonist must be smart, hardworking, and persistent to get the desired result. Heroes defeat evil with the help of love, intelligence, and other personal abilities. Such fairy tales instill in children at a young age the need for self-development and the desire to improve themselves, and make them understand that you are responsible for your own success. At the same time, Russian fairy tales tell us about Yemelya, who lies on the stove, does nothing useful in life and only waits for his wishes to come true.

Thus, society has been accustomed since childhood to the fact that someone (the king, the state, parents) should give them everything. In addition, there is a tendency not to develop and implement one's own by following the example of others, but to live off the wealth of others. Also, Mykola Kostomarov, a historian and ethnopsychologist, said that Ukrainian folk songs tell about the real state of affairs, the real history, no matter how unpleasant it may be, while Russian songs tell about the embellished and distorted history [3].

In addition, the works of Ukrainian literature are filled with national liberation sentiment and a thirst for freedom. Ukrainian writers have never been afraid to express their own position and opinions about the government, laws, and regimes. At the same time, Russian works glorify the authorities and completely obey them. Ukrainian historian Volodymyr Viatrovych called the ability to organize mass protests "the most striking manifestation of the differences between Ukrainians and Russians [4]. An important component of Ukrainian culture has always been the desire for freedom and the struggle for independence at the cost of one's own life.

Ukrainians must now actively develop, study, and popularize their own culture among European countries in order to break the stereotype that Ukraine and Russia are "brotherly nations" forever. It is our duty now to enrich our culture and make it widely known to others. Only by turning to culture and history, which has been rewritten many times, can we fight for our own freedom and independence from the aggressor country.

References:

1.   Рябенький В.С. Україна — Росія: культурологічні відмінності. 2017. – с.10.

URL: https://dspace.nau.edu.ua/bitstream/NAU/36727/1/%D1%94%D0%B2%D1%80%D0%B0%D0%B7%D0%B8%D0%B9%D1%81%D0%BA%D0%B0%D1%8F%20%D1%82%D0%B5%D1%80%D0%B8%D1%8F%20%D1%80%D0%BE%D1%81%D1%81%D0%B8%D0%B8.pdf

2.   Українська народна пісня «Коляд коляд колядниця – URL: https://www.pisni.org.ua/songs/233910.html

3.   Російська народна пісня «Коляда коляда» - URL: https://nashydety.com/veselye-kolyadki-dlya-detej-i-vzroslyx/

4.   Історія виникнення сім'ї і шлюбу та їхні особливості. URL: https://osvita.ua/vnz/reports/culture/11119/

5.   Костомаров Н. Две русские народности // Основа. —1861 р. — №3. — С. 33-80. URL: http://litopys.org.ua/kostomar/kos38.htm

6.   В'ятрович.В. Через Майдани до свободи. Найяскравіший вияв відмінностей між українцями та росіянами. 2022 рік 11 травня. URL: https://lb.ua/blog/volodymyr_viatrovych/516426_cherez_maydani_svobodi.html

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Translation of complex medical terms

Modern English terminology is heterogeneous in composition and origin. All this requires research and classification of terminological vocabulary. Medical terms constantly replenish the lexical-semantic system of language in accordance with the development of the scientific and technical process in the field of medicine both within the country and on a global scale. Features of the development of medical terminology are also interdisciplinary interaction of different fields of science. So medicine is in close interaction with biophysics, biochemistry, genetics, etc. They form highly specialized, inter -sectoral, general scientific terms. The medical term as a lexical unit can be in the form of a term -word and term -word combination. Many terms are of Greek or Latin origin. Types of medical terms:

1. Simple Terms / Non -Fixed / - Terms consisting of only one word: hormon
2. Terms / affixes / - terms created with affixes, suffixes and prefixes: suffix: acidic, prefix-suffix: reactant, prefixed: anemia
3. Complex terms - terms consisting of two words and written together or through a hyphen: atherosclerosis
4. Terms – phrases – terms consisting of several components: Visual acuity – visual acuity [2].

Terms, like ordinary words, are mostly formed on the basis of the existing words and roots of general literary and special vocabulary. Among the terms, there are all the structural types of words that are characteristic of a given national language.

As part of one–word medical terms, there are three main structural types of terms: simple, affixed and complex terms. Under simple (or root) terms, it is customary to understand one–word terms, the basis of which coincides with the root: *index, back, balm, cell, cancer, diet, disease, neck, nerve, pill, raw, sac, vein, womb, cast, sole, sore, rib, lap, leg, lichen, limp, mole, mucus, nape, navel, plica, pile, pox*; affixed terms include one–word terms, the stem of which contains a root and affixes: *discomfort, deterioration, abnormality, implant, incision, coefficient, resorption, resuscitation, intrabronchial, messenger, rubber, saponification, widening, wetting, revaccination, poisoning, rotator, reproducibility, malingerer, marantic, fetid, sensibilization*; complex terms include one–word terms that contain at least two root morphemes: *aid–man, airproof, bedfast, biodegradation, bloodstream, bottle–fed, brainstem, cardiography, cardiovascular, deadborn, deadmute, fiberscope, radiogenetics, lymphoblast, lysine– cystinuria, magnetocardiography, plethysmography, self–analysis, hysterocolposcopeagar–tube, gallstone* [1].

The simplest and at the same time the most common type of compound terms in the English terminology is a two–component attributive phrase, consisting of a nuclear element – a noun in the nominative case and an attributive, defining element. Common types of two–component terms in the English medical vocabulary are.

Complex medical terms consist of two words that are interconnected through a hyphen or together.

Complex words are:

1. Complex words formed from simple bases.

2. Complex words in which at least one component is derived from the other.

3. Complex words in which at least one of the components is an abbreviated basis.

4. Complex words in which at least one of the components is a complex word [2].

Let's consider some examples of medical discourse with structural terminals of medical activity. To do this, consider the article of all –time health about tuberculosis:

In Accordance with Who Guidelines, Detection of MDR/RR–TB Requires Bacteriological Confirmation of TB and Testing for Drug Resistance Using Rapid MOLECULARTS, CULOTURES.

The term Guidelines consists of two Guide and Lines noun bases, and the definition of a complex term is a complex medical term.

Consider the article about sepsis from online health care sources:

Prevention of Infection in the Community Involves Using Hygiene Practices, Such As Hand Washing, and Safe Preparation of Food, Improving Sanitation and Water Quance and Availness AT HIGH RISK, AS WELL APPROPRIATE NUTRATION, INCLUDING Breastfeeding for Newborns.

The lexical speech unit of Breastfeeding in its structure has two bases of Breast and Feeding. Also, the difficult period of Newborns consists of two roots New and Borns. Both medical terms in their structure are complex.

Early Fluid Resuscitation to Improve Volume Status Is Also Important in the Initial Phase of Sepsis Management. In Addition, Vasopressors May Be Required to Improve and Maintain Tissue Perfusion

Summarizing the above examples with complex medical terms in popular science medical discourse, it should be noted that complex medical terms reflect the most active lexical processes in the language and medical field. Professional medical terminology uses general ways and formats to form professional terms, as for common words, separating their content in the productivity of medical vocabulary.

References

1. Гудзь А. Новий англо–український українсько–англійський медичний словник. Київ: Арій, 2020. 480 с.

2. Ісаєва О., Назаренко–Крейн Т. Лінгвостилістичні особливості медичної термінології української та англійської мов. *Науковий вісник Ужгородського університету.* Серія: Філологія. Вип. 1 (41). Ужгород,2019. С. 66–70. DOI: 10.24144/2663–6840/2019.1(41).66–70.

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The Lexico-Semantic Field "Ukraine" in the Historical Novel of Volodymyr Kilchensky "The Taste of Freedom"

"And Ukraine did not love either the tsar or the master, but composed for itself a cossack, that is, a brotherhood, where everyone, joining, was the brother of others..." Volodymyr Kilchenskyi wrote his novel about this.

"The taste of Freedom" is a historical novel by our compatriot, modern Dnipropetrovsk author, member of the National Union of Writers of Ukraine, Volodymyr Andriyovych. It was in this way - broadly and full-heartedly - that at first glance this quite earthly man decided to enter the literature, who, however, cherishes in his soul such a rare for our time humanity and love for his native land.

The relevance of the study of the lexical-semantic field "Ukraine" in this historical novel lies in the fact that understanding the connections between the historical past and the present is an important component of the formation of the national consciousness of the entire society. Highlighting the connections between language and history, language and personality and their mutual influence will always be timely.

The author of the novel was always interested in the events that took place in Ukraine in the 17th century. It was against the background of these events that he created a work of art about the life and struggle of his compatriots for the freedom and independence of Ukraine. The novel transports the reader to the 17th century, when Ukraine fought for the right to exist. In the center of events are the Cossacks, who were forced by a difficult fate to take up arms and defend their will. Joining the Cossack-insurgent army of Bohdan Khmelnytskyi, the four brothers, who are the heroes of this work, proved their ability to win. Volodymyr Kilchensky manages to show not only the courage of the Cossacks in the fight against the enemies, but also to convey the most subtle experiences and deep feelings inherent in the Cossacks.

In order to understand the historical origins of the Cossacks in Ukraine, the author of this novel had to turn to the thorough works of famous historians Mykola Kostomarov, Andriyan Kashchenko, Mykhailo Hrushevskyi, Dmytro Yavornytskyi, Ivan Krypyakevich.

Also, the toponym "Ukraine" runs through the entire novel as a "red thread", the characteristic of which the author connects with the desire of the Cossacks for liberation from Polish oppression and the awareness of their personal role in the protection of this territory.

The author insists that: "... the Cossacks defended their rights with all their might, and since there were more and more of these people in Ukraine, the powerful rulers of the neighboring countries were already afraid of them. In need of protection

from the Tatars, Cossack rights gradually began to be recognized by local landowners and representatives of the authorities. This is how the Cossack state, the Cossack rank, was formed at the end of the 16th century, and many people began to join the Cossacks in order to enjoy rights and privileges. Now the Cossacks are gaining great power and becoming an important social factor."

We would like to note that the author emphasized the importance of preserving the family and native land, saying about: "The stormy 17th century... Ukraine suffers from Tatar attacks. Even in his youth, Andrey had to take up arms to protect his native home. But when Andrei's father died during another raid, the boy swore to take revenge on the enemy! Leaving his beautiful wife and children at home, Andriy and his brothers set off for Sich, and soon together with the Cossacks - for the liberation war against the Polish-Lithuanian Commonwealth in the ranks of Bohdan Khmelnytskyi. Victories and difficulties await him, dangerous campaigns and fierce battles, lightning attacks, sinful love on the paths of war and a long road to his native home..."

What struck us most in the novel were the words of Fedor's father, who told the boys about past events and reflected on the fate of Ukraine. "After the negotiations with Muscovy, things did not get any calmer. Again, some gravitated towards Poland, others towards Muscovy, and there were also those who looked in the direction of the Crimean Khan.

- Oh, children, it will be difficult for you to live in such a shaky world. Where will your young heads lean?".

Drawing a historical parallel to the present, we can conclude: nothing has changed, we still choose our freedom, and we are still influenced by at least three parties. But Ukraine existed, exists and will exist, because it is above all. The Cossacks proved it with their history and we will prove it with our actions!

References:

1. Boyko O.D. History of Ukraine: Handbook. - K.: Publishing center "Akademiya", 2002. - 656 p.

2. Kilchenskyi V. Taste of freedom: a historical novel. – Dnipro: Ukrainian Writer Publishing House, 2012. – 592 p.
https://www.rulit.me/books/prismak-voli-read-486056-1.html

3. Kotlyar M., Kulchytskyi S. Handbook of the history of Ukraine. - K.: Ukraine, 1996. - 463 p.

4. Krysachenko V.S. Ukrainian studies: Textbook-guide: In 2 books. Book 1 / Foreword by P. P. Kononenko. - K.: Lybid, 1996. - 352 p.

5. Khomenska I. Verbalization of the concept of Ukraine in the Ukrainian artistic discourse. - Kyiv: on the rights of the manuscript, 2016. - 267 p.
https://enpuir.npu.edu.ua/bitstream/handle/123456789/40885/Khomenska_dis.pdf?sequence=1&isAllowed=y

6. https://bookclub.ua/read/Kilchenskiy/

7. https://knyhobachennia.net/?category=3&article=3209

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Dezentralisierungsreform In Der Ukraine Und Die Kommunale Selbstverwaltung: Vorkriegszustand Und Nachkriegsperspektiven

Die Dezentralisierungsreform in der Ukraine führte zu einer Umverteilung der Macht zwischen staatlichen Behörden und Selbstverwaltungsbehörden und veränderte die Form der territorialen Organisation auf subregionaler und lokaler Ebene.

Die Umsetzung der Reform war durch soziale, wirtschaftliche und politische Ereignisse im Land bedingt. Diese Ereignisse führten zu Veränderungen in der öffentlichen Verwaltung und zur Einhaltung europäischer Standards in Übereinstimmung mit den Grundsätzen und Bestimmungen der Europäischen Charta der kommunalen Selbstverwaltung.

Die Prämisse der Reform war eine große Anzahl subventionierter Haushalte der kommunalen Selbstverwaltungen – 90 Prozent der territorialen Gemeinden wurden auf Kosten des Staatshaushalts unterstützt, eine übermäßige Zentralisierung der Befugnisse der Exekutivbehörden sowie finanzieller und materieller Ressourcen, eine ineffiziente Kommunalpolitik, Korporatisierung der Selbstverwaltungsbehörden, Geschlossenheit und Intransparenz ihrer Tätigkeit, eine geringe Volksmacht, Monopolisierung staatlicher Behörden im Bereich der Landbeziehungen, Verschlechterung der Qualität und der Verfügbarkeit öffentlicher Dienstleistungen, Verschleiß von Heizungs-, Abwasser-, Wasserversorgungsnetzen und des Wohnungsbestandes sowie das Risiko von Katastrophen, die vom Menschen verursachten werden, demografische Krise: Bevölkerungsalterung, Entvölkerung ländlicher Gebiete und monofunktionale Städte [1].

Daher war der Reformationsprozess erwartet und unumkehrbar. Das Ministerkabinett der Ukraine und die Werchowna Rada der Ukraine haben den entsprechenden Regulierungsrahmen auf der Grundlage der Verfassung der Ukraine [2] und der Gesetze der Ukraine „Über die kommunale Selbstverwaltung in der Ukraine" [3] und „Über die freiwillige Vereinigung territorialer Gemeinden" und andere.

Das Konzept der Reform der kommunalen Selbstverwaltung und der territorialen Machtorganisation in der Ukraine erhielt den inoffiziellen Namen „Dezentralisierung", was den Prozess der Übertragung eines Teils der Funktionen und Befugnisse höherer Führungsebenen auf niedrigere Ebenen (von zentralen Exekutivbehörden auf lokale Exekutivbehörden und Selbstverwaltungsbehörden), im weitesten Sinne - Schwächung oder Abhebung der Zentralisierung bedeutete. Die wichtigsten Arten der Dezentralisierung waren: politische, administrative und haushaltsmäßige.

Die politische Dezentralisierung hängt mit der Situation zusammen, in der politische Macht auf subnationale Verwaltungsbehörden übertragen wird.

Die administrative Dezentralisierung besteht in der Übertragung von Entscheidungsbefugnissen, Ressourcen und Verantwortung für die Arbeit einiger Arten sozialer Dienste.

Die haushaltsmäßige Dezentralisierung ist die vollständigste und transparenteste Art der Dezentralisierung, da sie in direktem Zusammenhang mit der Haushaltspraxis steht. Sie bedeutet die Übertragung von Ressourcen vom Zentrum an die Orte. Je nach Umsetzungsform wurde die Dezentralisierung in Devolution, Delegation, Dekonzentration und Devestition unterteilt [1].

Die Reform der kommunalen Selbstverwaltung und der territorialen Machtorganisation in der Ukraine zielte auf Selbstverwaltungsbehörden und die Schaffung eines neuen Systems der administrativ-territorialen Organisation ab, das in subregionale und grundlegende Ebenen unterteilt war. Demnach wurden in der Ukraine auf der Grundebene 1.470 vereinigte territoriale Gemeinden (nachfolgend VTG genannt) gebildet – 410 Stadtgemeinden, 1.960 Siedlungsgemeinden und 627 Dorfgemeinden, darunter: 410 Städte, 1.960 Siedlungen und 26.261 Dörfer. Auf subregionaler Ebene umfasst das System der administrativ-territorialen Organisation 136 Bezirke, in denen 119 Bezirksräte und 119 Bezirksverwaltungen tätig sind [4].

Die kommunale Selbstverwaltung in der Ukraine ist das staatlich garantierte Recht und die tatsächliche Fähigkeit einer territorialen Gemeinde – der Bewohner eines Dorfes oder einer freiwilligen Vereinigung in eine Dorfgemeinde von Bewohnern mehrerer Dörfer, Siedlungen, Städte – selbstständig oder unter der Verantwortung der Behörden und Beamten der kommunalen Selbstverwaltung zur Lösung von Fragen von lokaler Bedeutung im Rahmen der Verfassung und Gesetze der Ukraine [3].

Die moderne reformierte Struktur der Verwaltungsbehörden vereinigter territorialer Gemeinden ist in der Regel typisch für das ganze Land. Es sieht wie folgt aus: An der Spitze der vereinigten territorialen Gemeinde steht ein von den Bewohnern der Gemeinde gewählter Vorsitzender. Er übernimmt die allgemeine Leitung des Rates und des Exekutivapparats. Zu den Verwaltungsbehörden der VTG gehören: der Rat der VTG – die von den Bewohnern gewählten Abgeordneten, das Exekutivkomitee – das vom Rat gebildet wird und unter seiner Kontrolle steht. Zu den Mitgliedern des Exekutivkomitees gehören auch Starosten – Vorsitzende ehemaliger Dorfräte, die bei den Wahlen gewählt wurden. Das Exekutivkomitee besteht aus Abteilungen und Diensten, die rechenschaftspflichtig sind und unter der Kontrolle des Rates stehen. In der Regel handelt es sich hierbei um die Abteilung Wirtschaft, Finanzen, Wirtschaftsentwicklung und Investitionen. Abteilungen für Gesundheitswesen, Bildung, Kultur, Jugend und Sport, Abteilung für Stadtplanung, Architektur und Kapitalbau, Abteilung für Wohnungs- und Kommunalwirtschaft, Verbesserung und Umweltschutz. Stadtplanungskatasterdienst, Dienst für Minderjährige (Kinder). Familien- und Jugendsozialdienstzentrum.

So wurde am Vorabend der groß angelegten Invasion der Russischen Föderation in der Ukraine die Reform der kommunalen Selbstverwaltung und der territorialen

Machtorganisation in der Ukraine eingeleitet. Dank der Territorialreform entstand ein neues System der administrativ-territorialen Organisation, bestehend aus alten Bezirken, vereinigten territorialen Gemeinden und Bezirken, und bereits während der militärischen Aggression der Russischen Föderation wurde in der Ukraine das Kriegsrecht eingeführt und 183 Militärverwaltungen geschaffen [4].

Als letzte Phase der Reform gilt die Einführung von Änderungen der Verfassung der Ukraine und die Verabschiedung einer Reihe von Gesetzen zur Kontrolle der Tätigkeit der Selbstverwaltungsbehörden und zur Bereitstellung territorialer und allgemeiner Planungsschemas für neu gegründete Gemeinden.

Es ist auch notwendig, die Bildung von Exekutivbehörden der Regional- und Bezirksräte sicherzustellen und den Status der kommunalen Staatsverwaltungen von den Behörden mit allgemeiner Zuständigkeit in die Kontroll- und Aufsichtsbehörden im Exekutivgewaltsystem mit der Aufgabe, die Tätigkeit der territorialen Gemeinden der zentralen Exekutivbehörden im betreffenden Gebiet zu koordinieren, die Verteilung der Befugnisse zwischen Selbstverwaltungsbehörden auf Basis- und Regionalebene, kommunalen Staatsverwaltungen und territorialen Behörden zentraler Exekutivbehörden sicherzustellen, zu ändern [1].

Da die Dezentralisierungsreform noch nicht abgeschlossen ist, gibt es heute zahlreiche Probleme und Herausforderungen im Zusammenhang mit der Zeit des Kriegsrechts und dem Wiederaufbau der Gebiete und des Staates als Ganzes nach dem Krieg. Unserer Meinung nach wird es in der Nachkriegszeit notwendig sein, die Arbeit auf die Verbesserung der institutionellen Komponente des Konzepts zur Reform der kommunalen Selbstverwaltung und der territorialen Machtorganisation in der Ukraine zu konzentrieren, nämlich: die Verfassung der Ukraine zu ändern, einige Gesetzgebungsakte zu ergänzen, das Inkrafttreten bereits verabschiedeter Gesetze der Ukraine sicherzustellen, die bis zum Ende des Kriegsrechts verschoben werden.

Quellen

1. Das Konzept der Reform der kommunalen Selbstverwaltung und der territorialen Machtorganisation in der Ukraine: genehmigt durch Beschluss des Ministerkabinetts der Ukraine vom 1. April. 2014 Nr. 333-p URL: https://zakon.rada.gov.ua/laws/show/333-2014-%D1%80#Text.

2. Verfassung der Ukraine: Gesetz der Ukraine vom 28. Juni 1996. Informationen der Werchowna Rada der Ukraine (WWR), 1996, Nr. 30, Art. 141. URL: https://zakon.rada.gov.ua/laws/show/254%D0%BA/96-%D0%B2%D1%80#Text.

3. Über die kommunale Selbstverwaltung in der Ukraine: Gesetz der Ukraine vom 21. Mai 1997 Nr. 280/97-BP. URL: https://zakon.rada.gov.ua/laws/show/280/97-%D0%B2%D1%80#top.

4. Überwachung der Reform der kommunalen Selbstverwaltung und der territorialen Machtorganisation: Stand: 10. Februar 2021 / Ministerium für Entwicklung von Gemeinden, Territorien und Infrastruktur der Ukraine. Kiew, 2021 16 Uhr URL: https://decentralization.ua/mainmonitoring.

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Stylistic Interpretation of the Story *Winter Dreams* by F. Fitzgerald

Relevance. Any piece of literature is a complex system that the author creates using appropriate stylistic means. And stylistic interpretation helps decode this system. Interpretation unites perception, comprehension and explanation.

Issues related to stylistic interpretation were covered in the works by S.Yermolenko, I. Kovalyk, L. Matsko, V. Karaban, L. Bilityuk, S. Sotnykova, R.Zorivchak, A. Naumenko and others.

F. Scott Fitzgerald is one of the greatest American writers, his style is unique and gives an interesting material for stylistic interpretation.

The correlation between stylistic interpretation and analysis. Stylistic interpretation is an integral part of stylistic analysis. These two concepts are inseparable. Stylistic interpretation reveals the full range of stylistic devices used by the author, and at the same time helps interpret their functions in the work of fiction.

The Author – the Literary Work – the Reader Relationship. Interpretation is always a creative work, and every reader should be a creator. The reading of the work does not necessarily result in the reader's direct perception of what the author has conveyed. Interpretation is always a version that can be refuted and rejected.

Stylistic devices serve various purposes in Fitzgerald's writing. They help create an enchanting atmosphere, convey complex emotions and themes, provide social commentary, and immerse readers in the world he depicted [2].

metaphor	He had spent his childhood between London and New York trying to separate the real from the unreal. the liberation from webs of tangled emotion
simile	There she was, in a dress like ice-water, made in a thousand pale-blue pieces, with icicles trickling at the throat. Some of the caddies were poor as sin and lived in one-room houses.
epithet	desperate humor and the unhappiest eyes monstrous conviction sinister circle, succinct, unobtrusive

[1]

Symbolism plays a significant role in Fitzgerald's works. He used symbolic elements to represent abstract concepts or deeper meanings. The author employed symbolism in the titles of his short stories to enhance their meaning and provide a glimpse into the themes explored within the stories (*Crazy Sunday, Winter Dreams, A New Leaf*).

Detachment enables Fitzgerald to create more detailed descriptions of his personages and atmosphere:

The man was tired — not with the exaltation of fatigue but life-tired, with his lids sagging and his beard prominent over the blue shadows near his mouth…
Judy Jones, a slender enamelled doll in cloth of gold: gold in a band at her head…
Judy Jones, a slender enamelled doll in cloth of gold: gold in a band at her head…

[1]

The writer used:

antithesis – to compare and contrast the characters with opposing qualities or attributes;

oxymoron – to depict contradictions and ambiguities of human experiences, relationships, or emotions.

antithesis	Nothing was impossible – everything was just beginning! "What a remark!" Judy laughed sadly - without sadness…
oxymoron	beautifully ugly

[1]

One of F. Fitzgerald's favourite stylistic devices is **aposiopesis.** Functions: it creates emotional intensity and used to represent unspoken thoughts or unspeakable truths within the narrative.

He flew to the game after all. He left yesterday morning — at least I think — … I suppose not… — if I were only sure —
Why, I knew her, I knew her. She was –
It was human to risk the toss between failure and success, but to risk the desperate gamble between adequacy and disaster –

[1]

The author used **gradation** to create a sense of atmosphere, mood, and to give an impressive description to his characters. **Polysyndeton** serves the same function.

F.Fitzgerald's narration-forming arsenal includes **stylistic repetition** and **rhetorical question.**

gradation	Handsome! He's an archangel, he's a mountain lion, he's something to eat. It was the resentment of the professional toward the amateur, of the community toward the stranger, the thumbs-down of the clan.
polysyndeton	Irene was light-haired and sweet and honorable, and a little stout, and she had… There was a fish jumping and a star shining and the lights around the lake were gleaming…
stylistic repetition	…she said "I'd like to marry you", she said "I love you" – she said – nothing.
rhetorical question	Was she sincerely moved – or was she carried along by the wave of her own acting?

[1]

Stylistic interpretation helps reveal the idea of a literary text by decoding functions of the stylistic devices used in a literary work;

Interpretation is always a version which can be disproved.

Fitzgerald's language is rich with stylistic devices. The writer pays attention to the psychological state of his personages; he creates a specific atmosphere with the help of **gradation and polysyndeton**. A specific feature of the story style is the use of syntactic constructions: **detachment, polysyndeton, aposiopesis and gradation, antithesis**. Also there are a lot of **metaphors, epithets, similes**. Most frequently used stylistic devices are **aposiopesis, stylistic repetition, metaphor, detachment.**

References:

1. Fitzgerald F. S. Winter Dreams/ F. S. Fitzgerald. - Juniper Grove, 2009/ - 26 p.
2. Semeshko N. Stylistic Interpretation of Short Stories by F. S. Fitzgerald/ N. Semeshko// Anglistics and Americanistics. – 2020. –   No.1(17). – P. 117-123.

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Peculiarities of grammatical structure of scientific and technical texts

One of the most important means of understanding and translating English-language scientific and technical text is the grammatical component. Translation of technical texts shows that the English language sentences are characterized by complex syntax. That is why the ability to analyze complex sentences is the necessary one for a translator. Particularly difficult for analysis are compound sentences that do not have a conjunction. When disassembling a sentence of this type, you first need to find the first preposition and a subject to it, and then – the second preposition, and so on to the end.

In scientific and technical materials in English, you can find a number of grammatical features. The scientific and technical language uses the same syntactic structures and morphological forms as in other functional styles. However, a number of grammatical phenomena are noted in this style more often than in others, some phenomena, on the contrary, are not common in it, the others are used only with the characteristic lexical "filling"[1].

Hidden definitions are also numerous attributive groups that are used in large numbers in scientific and technical materials. Examples: *a mechanically timed relay (механічно встановлене реле), a relay which is mechanically timed (реле, яке встановлено механічно). Such definitions make it possible to point to a variety of features of an object or phenomenon: medium-powered computer (обчислювальна машина середньої продуктивності): silicon rectifiers (кремнієвий діод).*

The infinitive and infinitive structures take a special place. The infinitive is the main form of the verb that serves as the basis for the formation of all other forms for all grammatical times. The infinitive only calls the action, but does not indicate time and person. The translation of the infinitive into Ukrainian depends on its function in the English sentence. The infinitive can perform the following functions [2].

1) Subject: For example, *Particular Spare Part Was Very Important.*

2) Parts of the preposition: for example, *The Idea of the Shop's Head Was to Use this Machine.*

3) Circumstances: For example, *to this equipment he needs to be very attentive.*

4) Definition: For example, *The Part to Set Was Very Small.*

5) parts of the preposition in the reverse of to be likely (unlikely): *This Equipment is Unlikely to Be Quite Safe.*

Separately, the translation of "double control" cases is distinguished. In English-language scientific and technical literature, the phenomenon of double control has become widespread because it helps to achieve more briefness of expression. The ability to use such a speech tool is the result that in English the distinctive endings of nouns are absent. Thus, different prepositions can relate to the

same noun, in fact, without controlling it, because they do not change the shape of this noun.

The infinitive is always accompanied by a part of "to". However, there is a phenomenon in the language as the so-called separated infinitive. Such an infinitive occurs when the proportion of "to" is separated from the verb by the adverb. Example: *To further assure the gripping of rope a simple form of clip is used. – Щоб ще більше забезпечити кріплення канату, використовуються захвати простої конструкції.* The form of a separated infinitive can often be used to clarify certain conclusions or provisions.

Eliptic structures express the idea that has not been fully decorated. When translating such constructions in Ukrainian or Russian, it is necessary to fill the sentences with those grammatical elements that it default in it. Example: *Some parts can move quicker if the user wants them to. – Деякі частини можуть рухатися швидше, якщо споживач захоче цього.*

Also, the elliptical structures include the Whatever. Then the adverb is passed. Example: Also, the elliptical structures include the Whatever. Then the adverb is passed. Example:*Whatever the results of the tests, the new techniques will require combined work of workers, engineers and research teams. – Якими б не були результати, нова технологія потребуватиме колективної роботи робітників, інженерів та дослідників.* In addition, in English-language texts one of the most common elliptical structures is the turns with if in any word or several words. Elliptical designs of this type are often used with particles or pronouns that are mainly uncertain. Example: *If anything, this indicates an absolutely new phase in the development of cosmic flights. – Якщо це про щось і говорить, так тільки про те, що це абсолютно нова фаза в розвитку космічних польотів.*

The lexical composition of English-language scientific and technical material is characterized by the wide use of terminological combinations and terms (as well as phrases and clichés), and in addition, the presence of words that denote the names of companies, brands of various technological equipment, the location of this or that enterprise, etc. As a rule, such lexical units are not subject to translation, but are transferred in their original form or in transliteration. A cliché is a stereotypical word or phrase. They include idioms, stable combinations or sets of ready-made expressions. Therefore, in the framework of technical translation, a specialist usually faces specific documents: instructions, catalogs, description of the work of mechanisms or devices, certificates, drawings, scientific materials, etc. The task of the technical translator is to convey the content of highly specialized technical documentation, providing enough information so that people can understand it properly.

References

1. Коваленко А. Я. Науково-технічний переклад: навчальний посібник для шкіл з поглибленим вивченням англійської мови, ліцеїв, гімназій, коледжів. Тернопіль: Видавництво Карп'юка, 2001. 284 с.
2. Коптілов В. В. Теорія і практика перекладу : навчальний посібник. Київ : Юніверс, 2003. 280 с.

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Constructing Personal Narratives of Faith in the Renaissance Literature: Creative Reception of the Gospel Parables

To cross the Rubicon between the second and the third millennia A. D. as a historical and cultural watershed, denoted by the post-modernist disclosure of both the raciocentrism restrictions and the deconstruction limits, the post-non-classic thought initiates a post-secular rediscovery of the unmediated communicability, revealing the faith as a pre-cognitive source of the personality [6]. The ultimate communicative intention has been reconstructed by the different lines of developing both post-structuralist and post-phenomenologist revisions of the subjectivity model, objectified as an impersonal cognitive structure by classic and non-classic ontologies, into the correlations of "the subject's authenticity" (M. A. Mozsheyko) with the non-objectifying self-experience of a person, including:
- the argumentation for the inexhaustible human intent of communion with Creator in J. Derrida' s explication of the apophatic way of defining God's name [2];
- the attempt to continue "the discourse with God beyond being" [4] in E. Levinas' ethics of responsibility;
- the renewal of Christian asceticism as the landmark of a person's voluntary actability in M. Foucault's definition of the intents "to think otherwise" as the initiatives of entering the discursive field "for the constitution of ourselves as autonomous subjects" [3];
- the reflective extension of the personhood phenomenality, revealed by the ability to communicate, in J.-L. Marion's phenomenological meta-description of the givenness of the personal existence of both the Self and the Other as God's gift [5].

Emphasizing the unfeasibility of a person's self-manifestation beyond the communication ultimacy, eliminated from "the cultural meta-narrations" (J.-F.Lyotard), intended to objectivize the patterns of the depersonalized monologic subject, all these vectors of reflecting the human appeal to God as "the ethical demand for an ethical Creator" (B.P.Bowne) renew the interpersonal dialogue vertical, not comprehended by theocentrically oriented rationalism and hidden by anthropocentric rationalization of its horizon. In such a way the late Postmodernism argues for directing a person, trying to come out of the meta-narrative dead lock of monologism, to the sphere of narration [7], formed by the Self and the Other in the dialogic interaction, transmitting the mode of communicating authentically to verbalize "the narrative identity" (P. Ricoeur) as the primary form of manifesting the irreducible personality.

Marked by realizing the early XXI century as a reality after Post-Modernity, a trajectory of the contemporary thought, establishing a new configuration of the personal self-definition, predicts the reconstruction of both aesthetic landmarks and poetic arsenal of the Renaissance narration-forming activity inspired by the cultural initiative *ad fontes* and performed to correlate dialogically the theocentric direction and anthropocentric orientation of a person's history reinterpreting the evangelistic parables.

The late-traditionalist aesthetics of constructing the personal narratives of faith and their artistic multifold entity, denoting the transition from traditionalism to historicism, were established in the field of forming the English novel founded in the era of Elizabeth I (1558 – 1603) and marked by the creative reception of the Gospel topos of the Prodigal Son as a frame of both author's and hero's self-reflection.

The *Prodigal Son* is an eternal plot of world culture. The parable is studied in several directions, with the help of various methods and approaches of linguistic, sociocultural, and literary studies. Researchers allow a broad understanding of the symbolic meaning of the parable of the Prodigal Son. The Gospel plot can be accurately reproduced in a literary work, or transformed at the level of images of heroes or other elements of the work.

John Lyly, recognized as the author of the first novel of Elizabethan England, *Euphues, the Anatomy of Wit*, became an innovator introducing the motif of the Prodigal Son into the novel narration. He became important in the search for a novel character of a new type. The hero of the novel was in the process of searching for ideals, not their static embodiment. It does not test the hero for the immutability of his properties in the face of various tests, but depicts the evolution and development, the spiritual transformation of the hero. Such an innovation significantly influenced the creativity of R. Greene.

The parable in works of art is subject to the creative individuality of the author, his consciousness, as well as the social, historical, and cultural trends of the era. The Prodigal Son's motif is constantly changing. We have analyzed the variability of the reception of the motif of the Prodigal Son on the material of Robert Greene's novel *Groatsworth of Wit, bought with a million of Repentance*.

While identifying innovative genre-forming frameworks, introduced by Robert Greene in his final creative work, and features of his style as the dimensions of the author's self-manifestation, we should recognize that the writer's creative experiment actualizes the general aesthetic principle of the English Renaissance novel, that is the correlation of poetic *mimesis,* detached from the natural logic, with rhetoric *genesis,* realized to state the artistic meta-logic [1]. Such a complex model of the literary activity provides the departure from the romance poetics in different ways marked by John Lyly (*Euphues*), Philip Sidney (both versions of *Arcadia),* Thomas Lodge (*A Margarite of America*), Thomas Nash (*the Unfortunate Traveller),* T. Deloney's (*Thomas of Reading*) and Robert Greene himself.

The main antithesis of the novel is "sin – repentance". R. Greene changes its traditional interpretation, endowing Roberto with an incurable disease, which becomes the impetus for his appeal to God's mercy, his only salvation.

214

The artistic space of the novel is structured around a change of environment, from a rich parental home to a wasteful lifestyle; from the intellectual circles of writers again the same wasteful way of life. The connection with the special experience of R. Greene is also obvious.

As we can see, the motif of the Prodigal Son manifests itself at the novel's plot and plot levels, the organization of artistic time and space, and the system of characters.

R.Greene's artistic thinking changes from Mannerism to Baroque, the novel *Groatsworth of Wit, bought with a million of Repentance* embodies the structure of the exemplum genre.

Traditionally, the following elements are traced in the structure of the parable: The son leaves his father's house, the trials he faces on his way, his return home. Also, two sons are most often present, their morality is opposed, this is one of the main features of the reinterpretation of the parable in literary works. But in R. Greene's novel there is no structural component of forgiveness, the father does not forgive Roberto and deprives him of his fortune.

The novel has a structural series consisting of the following elements: the introductive characteristics of prodigal sons – Roberto and Lucanio and their father Gorinius, external conflict – dispute between father and sons regarding inheritance, internal conflict - Roberto's jealousy and his inner struggle with it and greed, the choice of fate - Roberto's transition to the side of evil, planning to take money from his brother, running away from home - Roberto's encounter with drunkards, debauchery and swindlers after the death of his father, the journey - finding himself after the plan to deceive his brother failed, suffering - left without a wife and squandering his dramaturgical fees, Roberto falls to his deathbed from drunkenness, understanding the sense of his father's last penny.

The novel lacks models of Roberto's return to his father and parental forgiveness. The hero dies next to the letter to his wife, never having received an answer. The author uses intertextual genres to close the novel in order to embody the instructive meaning of the parable of the Prodigal Son.

According to the canons of literary construction, R. Greene's novel *Groats-Worth of Wit, Bought with a Million of Repentance* has all the signs of compositional integrity, that is, exposition, plot, action development, culmination, solution and epilogue.

The author builds the novel by combining both prose and poetic micro-projects, each of which can have its own existence, but follows the main storyline and carries out the main idea, which is to encourage the reader to leave the sinful life and return to the true life according to the Commandments of God.

R. Greene demonstrates his innovation in the combination of different genre forms (love song, sonnet, fable, short story) that are parts of his novel and fill it with additional semantic colours.

In the last subsection, attention was paid to the important biographical events of R.Greene's life that shaped his personality and his unique literary skills.

We found out that Robert Greene was a brilliantly educated and very gifted man who had a great career in literature, but because of his ambitions and passions, he quickly lost his health and died at the age of about 34. But in such a short and very turbulent life he was, in fact, the most prolific writer of his time (at least in England), with thirty published pamphlets, six plays and more than eighty songs and poems. The future world genius of drama, William Shakespeare, was inspired by his works, and even borrowed some plot ideas, for which he was accused of plagiarism.

The epilogue of the *Groats-Worth of Wit, Bought with a Million of Repentance* is of great interest to our time, because in this part researchers find a lot of material concerning the biographies of the main characters in the literary life of England in the 1580s and early 1590s. Some people see here the first literary biography of Shakespeare, as well as falsifications regarding the authorship of the novel and, especially, the authorship of the epilogue. But we saw the author's sincere repentance and his appeal to God, with a call to all his friends and readers to do the same!

References:

1. Власенко Н.І. Співвіднесення принципів мімесису і деміургії в художній свідомості Відродження:світоглядно-естетичне підгрунтя і поетикальні абриси/ Н.І. Власенко // Від бароко до постмодернізму: зб. наук. праць / [ред.кол.: Т. М. Потніцева (відп. редактор) та ін.]. – Дніпро: Ліра, 2018. — Вип. XXII. – С. 17 – 25

2. Derrida J. Faith and Knowledge. The Two Sources of 'Religion'at the Limits of Reason Alone/ J. Derrida//Acts of Religion [Translated by G.Anidjar]. – New York and London: Routledge, 2002. – P. 1 – 78.

3. Foucault M. The Hermeneutics of the Subject: Lectures at the Collège de France 1981 – 1982/M.Foucault [Translated by G. Burchell]. –Picador, 2005. – 608 p.

4. Lévinas E. Totalite et infini: essai sur l'extériorité/ E. Lévinas. – Paris: Le Livre de Poche, 1990. – 346 p.

5. Marion, J. - L. God without Being. Translated by Th. A. Carlson. Chicago – London: The University of Chicago Press, 1991. – 344 p.

6. Patsan V. O. (Archbishop Eulogius of Novomoskovsk) The Metaphysics of the Personality: the Ways of Defining the Self-Experience/ V. O. Patsan (Archbishop Eulogius of Novomoskovsk)// The 10th International Scientific and Practical Conference «Science and Society» [Held by Scieuro in London 23–30 May 2017]. – London: Scieuro, 2017. – P. 107 – 119.

7. Ricoeur P. The Conflict of Interpretations: Essays in Hermeneutics/ P.Ricoeur. – Northwestern University Press, 1974. – 512 p.

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John Dewey's Educational Philosophy

John Dewey was an influential philosopher, psychologist, and educator whose ideas profoundly shaped modern educational theory and practice. Central to Dewey's educational philosophy is the concept of experiential learning and the importance of active, hands-on engagement in the learning process. However, within his broader philosophy, Dewey also emphasized the social aspects of education.

While Dewey's contributions may not be as prominent in contemporary educational policy, they continue to hold significance across various educational domains [4]. Dewey's educational philosophies and contributions have exerted considerable influence on educators over time [4]. His belief that children, rather than content, should be the primary focus of education has deeply resonated with educators who embrace his principles regarding effective learning [3].

The scholar viewed education as a social process, emphasizing the role of interaction and collaboration in learning. He believed that students learn best when they are actively engaged with others, whether through cooperative group work, classroom discussions, or community projects. In Dewey's view, the classroom should function as a miniature society, where students learn not only from the teacher but also from their peers and the surrounding community.

John Dewey saw the classroom as a community of learners, where students work together to solve problems, explore ideas, and construct knowledge collaboratively. He believed that learning is a shared experience and that students benefit from interacting with diverse perspectives and experiences. In this sense, Dewey's educational philosophy promotes a democratic approach to learning, where all voices are valued and respected.

Dewey emphasized the importance of teaching students to think critically and solve real-world problems. He believed that education should be practical and relevant to students' lives, and that learning should be focused on developing the skills and knowledge needed to navigate the complexities of the modern world. Dewey's approach to education encourages students to ask questions, seek answers, and think creatively about solutions to the challenges they encounter.

Each student's individual interests, talents, and abilities were recognized to be the most important in Dewey's philosophy of education. He advocated for a personalised approach to education, where teachers tailor instruction to meet the unique needs of each student. In Dewey's view, education should be student-centred, with a focus on promoting the growth and development of the child. Dewey's curriculum transcends a mere set of subjects or studies; instead, it encompasses a diverse array of activities and experiences. Subjects, in his view, serve merely as condensed representations of human activities. Dewey does not advocate for pre-

established curricula; instead, he encourages curricula to emerge naturally from students' impulses, interests, and experiences [2].

The crucial component of Dewey's educational philosophy centres on his conception of the teacher's function. As scientists E. Achkovska and S. Miovska highlight: "The role of the teacher in Dewey's educational theory is defined within the framework of its understandings of experience and development. The value of the systematized and defined experience of the adult mind, as Dewey points out in his book 'The Child and the Curriculum', is in interpreting the child's life as it immediately shows itself, and in passing on to guide or direction" [1, 63]. The teacher must learn to psychologically analyse the unique personality of each student and consistently act as their mentor. These two responsibilities, according to Dewey, are paramount for educators and should take precedence when interacting with students [2]. Additionally, E. Achkovska and S. Miovska assert that teachers must primarily comprehend the characteristics of childhood and the individual nature of each child. Interpreting a child's nature, as Dewey suggests, involves considering their strengths and weaknesses in the context of their development and the dynamic nature of their experiences. Thus, it is erroneous for teachers, particularly those adhering to traditional educational approaches, to view children merely as immature individuals who must quickly shed this quality to become mature adults.

Overall, John Dewey's social educational philosophy emphasises the importance of collaboration, community, and active engagement in the learning process. His ideas continue to influence educators around the world, shaping contemporary approaches to teaching and learning that prioritise student-centred, experiential, and socially relevant education [5].

In summary, John Dewey's ideas are important in modern education because they provide a foundation for student-centred, experiential, and socially relevant approaches to teaching and learning. By emphasizing critical thinking, collaboration, personalized instruction, and social justice, Dewey's philosophy continues to shape educational practices that prepare students to thrive in an ever-changing world.

References:

1. Achkovska Leshkovska E., Miovska Spaseva S. "John Dewey's Educational Theory and Educational Implications of Howard Gardner's Multiple Intelligences Theory." In: International Journal of Cognitive Research in Science, Engineering and Education. 2016. Vol. 4, No.2, 57-66.

2. Dewey J. The Child and the curriculum. In Archambauld, R.D.(Ed.). John Dewey on Education. Chicago and London: The University of Chicago Press, 1974. P. 339-358.

3. Schiro M. S. Curriculum theory: Conflicting visions and enduring concerns. (2nd Ed.). Los Angeles: Sage Publications, 2012. 297 p.

4. Theobald P. Education Now: How Re-thinking America's Past Can Change Its Future. Colorado: Paradigm, 2009. 220 p.

5. Williams M. K. *John Dewey in the 21st Century.* Journal of Inquiry & Action in Education, 9 (1), 2017. P. 91–102.

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Semantic classification of English medical terms

The structural and semantic characteristics of the term are interrelated, so the semantic analysis of medical terminology is no less important than studying the structural characteristics of the term. Semantic classification is necessary to determine the target value of the term.

The semantic classification of terms includes: 1. Terms with the definition of anatomical organ of a person. 2. Terms with the determination of the name of the disease. 3. Terms with the determination of biological fluid of the human body. 4. Terms with the definition of signs and symptoms of the disease. 5. Terms with the determination of the microbiological pathogen. 6. Terms with the definition of immunological principles. 7. Terms with the determination of epidemiological indicators and ways of spreading infection. 8. Terms with determining the organization of health care activities. 9. Terms with the definition of laboratory-diagnostic practice. 10. Terms with determination of manipulation and medical procedures. 11. Terms with the determination of drug names and duration of medical treatment courses [1].

The first semantic classification group includes the following examples:

Tuberculosis (tb) is caused by bacteria (mycobacterium tuberculosi) that most ofnn affect the lungs. In this example, The Lungs medical term denotes the lungs - the anatomical organ of the human body.

The second group includes the terms that determine the name of the disease:

Tuberculosis (tb) is caused by bacteria (mycobacterium tuberculosis) that most ofnn affect the lungs.

In this sentence, Tuberculosis is the term, which means the name of the disease – tuberculosis. *Rheumatic Heart Disease Is The MOST COMMONLY ACQUID Heart Disease in People Under Age 25*

The next group of medical terms is combined by a semantic characteristic of the designation of biological liquids of the human body.

Common Symptoms of Active Lung TB Are Cough With Sputum and Blood at Times, Chest Pains, Weakness, Weight Loss, Fever and Night Sweats.

Sputum terms, Blood are examples of medical terms denoting biological fluids (sputum, blood).

The following example is the semantic certainty of medical terms with signs and symptoms of the disease: *Common Symptoms of Active Lung TB Are Cough With Sputum and Blood at Times, Chest Pains, Weakness, Weight Loss, Fever and Night Sweats.* The large number of medical terms is related to the immunological semantic definition of lexical units of linguistic material.

The next group of terms has a semantic characteristic – epidemiological definition and is related to epidemiological terms and indicators of the epidemiological process: *Measles is caused by a virus in the paramyxovirus family and it is normally passed through Through Direct Contact and Through the Air.*

The epidemiological pathways of the spread of infection through direct contact and through the air in this example are defined by English –language medical terms Passed Through Direct Contac, Through the Air.

The following medical terms are combined by a single semantic characteristic – the definition of the activity of the organization of health care services. *IT is MOST FREQUENTLY A SERIORY Complication of Infection, Particularly in Low– and Middle–income Countries WHERE IT REPRESENTS AAJOR CAUESE OF MATERNALLY AND NEONATAL AND MORBIVYA*

The indicator of the provision of health care services is an indicator of maternal and childhood morbidity and mortality – Material and Neonatal Morbidity and Mortality.

The next group of medical terms determines the terms of laboratory–diagnostic activity. Consider the following example: *In Accordance with Who Guidelines, Detection of MDR/RR–TB Requires Bacteriological Confirmation of TB and Testing for Drug Resistance Using Rapid MOLECULARTS, CULOTURES.*

Modern English terminology is heterogeneous in composition and origin. Conducting research activities in the search for a semantic sign of the term, resulting in lexical units classified into categories and groups is important in translation when translating English –language medical terms [2]. The medical term as a lexical unit can be in the form of a term–word and a term–word combination. We have demonstrated that English–language medical terms are subordinate to the generally recognized classification of terms by structural–grammatical distribution and structural characteristics on simple, complex and complex.

According to the study, groups with terms denoting epidemiological indicators (20%) and symptoms of the disease (19%) were the most numerous groups. The smallest group is represented by a group of terms denoting biological fluids (2%).

References

3. Городецька Ю., Мазур О., Шеремета К. Особливості перекладу англомовних інструкцій до медпрепаратів української мовою: прагматичний аспект. *Лінгвістика.* Вип. 31. Херсон, 2018. С. 192–197.

4. Єщенко Т. Медичний термін як засіб лексичного вираження текстової категорії інформативність. *Вісник Національного університету «Львівська політехніка».* Серія «Проблеми української термінології». № 890. Львів: Вид–во Львівської політехніки, 2018. С. 42–45. URL: http://nbuv.gov.ua/UJRN/VNULPUT_2018_890_9

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L'essence et la structure d'un mythe politique

Depuis longtemps, le mythe fait l'objet de nombreuses études scientifiques. La pratique politique moderne montre que le mythe se transforme en un outil efficace pour influencer la conscience de masse et est donc considéré comme un élément essentiel dans la structure de la vision politique du monde. Dans la recherche scientifique, le concept de mythe politique constitue un outil important pour clarifier les spécificités de l'activité politique, du comportement politique, des conflits politiques, etc.

Un mythe politique est un reflet complet, simplifié, pour la plupart irrationnel, dans la conscience individuelle et de masse de la réalité politique et des valeurs sociales fondamentales, une sorte de moyen symbolique de leur interprétation.

Éléments structurels :
• stéréotype d'une certaine situation ;
• contenu d'une expérience spécifique ;
• un ensemble d'images allégoriques.

Les signes d'un mythe politique moderne sont : l'universalité, le conservatisme, la bipolarité, le caractère personnifié et manipulateur, le soutien symbolique et les stéréotypes mentionnés ci-dessus.

Selon la durée de l'influence, on distingue les mythes dits « à court terme » et « à long terme » (éternels).

Des mythes à court terme sont créés pour mettre en œuvre des tâches politiques spécifiques. Ce sont des « mythes d'un jour » ou des pseudo-mythes car ils ne sont pas enracinés dans la conscience humaine.

Au contraire, des mythes « éternels » sont inscrits dans la structure de la mentalité du peuple.

La conscience sociale est mythifiée avec l'aide de diverses institutions. Ces éléments de forme en politique sont le rituel, la coutume, le culte, la personnalisation du pouvoir, etc. Les spécificités du fonctionnement de ces formes déterminent les traits mythologiques de l'espace politique. C'est pourquoi le mythe politique devient l'outil le plus efficace dans les périodes de crise du développement social – guerres, révolutions, réformes, etc. Avec l'aide d'un mythe, la société peut restaurer l'image détruite du monde et la maîtriser à nouveau.

La création d'un mythe politique implique l'émergence de quelque chose de nouveau qui n'existait pas auparavant sous une forme actualisée. Dans ce processus, trois composantes de contenu du mythe politique sont distinguées : précieuse, motivationnelle et communicative-significative, grâce auxquelles ses caractéristiques se manifestent.

Les sujets d'un mythe politique peuvent être certains groupes politiques (partis, mouvements, associations), communautés ethniques, autorités étatiques, individus (dirigeants politiques), etc.

Régnant dans la sphère de l'inconscient collectif, le mythe affecte de manière significative la conscience de masse. La grande majorité des gens pensent principalement en images, ne perçoivent que les extrêmes, c'est pourquoi les constructions stéréotypées du mythe (« nous – eux », « bien – mal », « propre – étranger », « héros – ennemi ») fonctionnent efficacement sur le terrain. de la fabrication de mythes politiques.

Les mythes politiques modernes se propagent grâce aux médias de masse (journaux, radio, télévision, Internet). Le mythe et la communication de masse contribuent à la formation du phénomène d'identité globale, d'implication dans tout ce qui se passe dans le monde. Le temps mythologique et les blocs d'information de la communication de masse, présentant « tous les temps et tous les espaces à la fois » (par exemple, dans les journaux télévisés), combinent le passé, le présent et le futur en un seul alliage. En outre, les médias eux-mêmes constituent une puissante source de création de mythes.

Enfin, la spécificité des mythes politiques dépend du type de mentalité de la société. Le lien entre la mentalité inhérente à la société et les mythes correspondants est retracé. Ainsi, les archétypes ont la plus grande influence sur la conscience des Ukrainiens : la domination du passé sur l'avenir, l'égalité, le destin, le « retour éternel ». Leur point commun est leur orientation positive vers l'avenir : « la renaissance de la nation » ; « une loi pour tous ». De nombreux mythes sont présents dans la vie politique de la société ukrainienne moderne. Leur nature et leur degré de propagation dépendent de la mentalité ukrainienne, des archétypes concernés et de la situation politique spécifique. Leur nature et leur degré de propagation dépendent de la mentalité ukrainienne, des archétypes concernés et de la situation politique spécifique. Les mythes proposés à la société par diverses forces politiques concernent la vision du développement futur de l'État, le système politique, les processus électoraux et d'autres événements importants de la vie politique, de la politique étrangère et intérieure de l'Ukraine.

Comme nous pouvons le constater, un mythe politique est un attribut de tout système politique, puisque le gouvernement a un besoin constant des symboles qui en seront la personnification.

Références :

1. Шайгородський Ю. *До визначення сутності поняття «політичний міф»*: web-site. URL: http://dspace.nbuv.gov.ua/bitstream/handle/123456789/26549/07-Shaygorodskiy.pdf?sequence=1(дата звернення: 05.03.2024)

Section 05 Actual Problems of Economy and Sustainability of Economic Development, Management, Globalization and Eurointegration of Industries

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ChatGPT for Strategic Decision-Making

New technologies are created and implemented in our fast changing world. Developed by OpenAI, ChatGPT was launched in Ukraine in November 2022.

ChatGPT can give a large amount of data in a structured and logical way, allowing humans to filter and organize options, offering innovative solutions, raising efficiency, and improving decision-making processes and search capabilities by providing natural language [4, 5].

It is generally agreed that AI technologies may affect management processes at the strategic, functional and administrative levels. For example, at the strategic level, ChatGPT may help managers to make decisions in specific situations thanks to recommendations given [4]. Our research focuses on using ChatGPT in management, or rather in decision-making area of management.

Little research has been undertaken to study the impact of ChatGPT on the quality of decision-making in strategical management. Investigation in this field started in 2023 and further research is needed.

Strategic decision-making is a complex and important process in organisational management where company's leaders make decisions about the direction, goals, and long-term growth of the organization. Accordingly, characteristics of strategic decision-making include long term, big impact, relating to the external environment, innovations and developments [3].

In addition, strategic decision-making implies analysis, evaluation of risks, and strategic discussion. Moreover, strategic decisions frequently include working with stakeholders, such as customers, employees, and the society. However, it is worth paying attention that the implementation of unsuitable strategic decisions can cause financial setbacks, reduced market presence, or a decline of trust to organisations from stakeholders. For this reason, ChatGPT with its abilities of analysing the information and statistics data may be useful for making correct decisions for organizations [1].

The list of benefits and challenges of ChatGPT in organizational management given in Table 1 is the result of literature analyses on the topic [3, 4, 5].

ChatGPT has both benefits and challenges for organizations like any innovative technology. Generative AI may improve some area of business management and develop decision-making. There is a definite possibility that generative AI can lead to revolutions in management theories, especially, in the field of decision-making. However, it entails new challenges of introducing a new innovative structure into the organisation.

One of the most important tasks of research is comparing how decision-making is done by human and AI technology regarding search space, interpretability of the decision-making process and outcome, amount of the alternatives, decision-making speed, rationality and bias to thoughts (Table 2). This comparison is the result of literature analyses in the field of studies [2, 4, 6].

Table 1: Benefits and challenges of ChatGPT in business management

Benefits	Challenges
• strengthening customers satisfaction, experience, relationships, engagement; • improving service quality; • fostering customer loyalty; • automation of customer support; • personalized marketing; • analysing extensive commercial data; • improving human resources and talent management; • improving knowledge management and collaboration; • cost savings; • generating high-quality content; • a virtual assistant or interactive chatbot; • a simulation tool	• limited contextual understanding; • lack of industry-specific knowledge; • ethical problems and bias; • security vulnerabilities and limited data privacy, compliance; • limited customization; • dependence on technology; • complex to integration; • scalability challenges; • user experience design; • limited adaptation to cultural differences and regulatory compliance; • limited accountability and responsibility; • not protected intellectual property; • lack of mental model alignment

Table 2 demonstrates that humans have limits like small space for decision-searching, not ability to evaluate the large amount of alternatives, small speed of decision-making. Moreover, differences in experience or emotional state may reduce quality of rationality, and humans have risk to bias their thoughts. At the same time, AI technology is faster than human, has opportunity for a well-specified decision search space, makes the large amount of alternatives thanks to using algorithms and can struggle with ambiguity.

Table 2: Comparison of AI technologies and human decision-making

Decision-making conditions	AI technologies decision-making	Human decision-making
The decision search space	Well-specified decision search space with objective functions	Loosely defined decision search space
Interpretability of the decision-making process	Interpretation of decisions is difficult	Decisions are explainable and interpretable

and outcome		
Amount of the alternatives	Provides a large amount of alternatives thanks to using algorithms	Limited ability to evaluate a large amount of alternatives
Decision-making speed	Comparatively fast	Comparatively slow and has time constraints
Rationality of decision-making	Machine learning use algorithms without emotions and can use incorrect information	Has cognitive limitations, differences in experience, attention, context, and emotional state and can use incorrect information
Bias to thoughts	Can struggle with ambiguity, has a multi-level decision policy	Can be biased to every conclusion

ChatGPT is able to learn behaviour from humans, because it is machine learning technology. However, little is known about the sensitivity of generative AI to unpleasant questions or sentences, and how it can influence its further work. ChatGPT is sensitive to framing and selecting reference points of information. As result, it can perform poorly with ambiguous information [2].

In conclusion, ChatGPT and human have both benefits and limits in decision-making process. Thus, it is important to combine both abilities, because they may complement each other and make the decision-making process better [1].

Conclusions. ChatGPT may improve decision-making process for organisations with its abilities of analysing the information and statistical data. At the same time, like other innovations, ChatGPT may entail new challenges when implementing a new technology in management structure. For this reason, it is worth combining human and AI technology abilities of decision-making in strategic planning.

References

1. Basir A., Puspitasari E.D., Aristarini C.C., Sulastri P.D., Almaududi Ausat A.M. Ethical Use of ChatGPT in the Context of Leadership and Strategic Decisions. Jurnal Minfo Polgan. Vol. 12. № 1. 2023. P. 1239-1246. URL : https://www.jurnal.polgan.ac.id/index.php/jmp/article/view/12693/1789.

2. Chen Y., Andiappan M., Jenkin T., Ovchinnikov A. A Manager and an AI Walk into a Bar: Does ChatGPT Make Biased Decisions Like We Do. 2023. p. 33. URL : https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4380365.

3. Jusman I.A., Almaududi Ausat A.M., Sumarna A. Application of ChatGPT in Business Management and Strategic Decision Making. Jurnal Minfo Polgan. Vol. 12. № 2. 2023. P. 1688-1697. URL : https://www.jurnal.polgan.ac.id/index.php/jmp/article/view/12956/1933.

4. Korzynski P., Mazurek G., Altmann A., Ejdys J., Kazlauskaite R., Paliszkiewicz J., Wach K., Ziemba E. Generative artificial intelligence as a new context for management theories: analysis of ChatGPT. Central European Management Journal. Vol. 31 № 1. 2023. P. 3-13. URL :

https://www.emerald.com/insight/content/doi/10.1108/CEMJ-02-2023-0091/full/pdf?title=generative-artificial-intelligence-as-a-new-context-for-management-theories-analysis-of-chatgpt.

5. Rane N.L. Role and Challenges of ChatGPT and Similar Generative Artificial Intelligence in Business Management. 2023. URL : https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4603227.

6. Yash Raj Shrestha, Shiko M. Ben-Menahem, Georg von Krogh. Organizational Decision-Making Structures in the Age of Artificial Intelligence. California Management Review. Vol. 61. Issue 4. 2019. P. 66-83. URL : https://journals.sagepub.com/doi/epub/10.1177/0008125619862257.

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The Impact of Cultural Differences on Marketing Strategies

In marketing, the influence of consumers cultural differences relates to product promotion, choosing distribution channels and target audience for international companies. Organizations resort to innovations in management when successfully implementing a marketing campaign. Recent studies show that cultural characteristics of countries have both positive and negative impacts on the initiation of international activities of company [1, 2]. The paper examines some aspects of national differences, their advantages and disadvantages, and the consequences of the direct influence of cultural characteristics on world-known organizations. In this research, we address such elements of culture as language, religion, traditions, and taboos.

Ensuring effective translation and localization of information is one of the biggest challenges in global marketing. To reach your target audience in other countries, it may not be enough to simply translate marketing materials word for word. Localization is the process of modifying content to fit the language, culture, and regional preferences of the target market. Translation plays a crucial role in making marketing content accessible to an international audience. Idioms, metaphors, and cultural allusions are just some of the elements that translators must consider, as they may not have an exact translation in the target language. In addition, they should make sure that the tone, style, and content are in line with the cultural norms and preferences of the target market.

Another important aspect of cultural sensitivity is religion. Religious beliefs have a significant impact on people's attitudes, values, and behavior. In general, the religions practiced in a society influence attitudes toward owning and using goods and services. Religious traditions may prohibit the use of certain goods and services. For example, Muslims are not allowed to consume alcohol or pork, and Hindus are not allowed to eat beef because they worship cows. It is less clear how religion affects the use of goods and services that are not explicitly prohibited by religious laws. In this case, religious values shape a person's emotional experience, cognition, and psychological well-being, which influence the purchase decisions that people make afterwards [3].

Traditions and taboos shape marketing strategies. For example, in many Asian countries, the number four is unlucky, so it is customary to avoid it in numbers of cars, houses, even on packaging. However, for some European countries number four is a lucky number. Companies should not forget about such seemingly innocent things, as they carry significance for the inhabitants of various countries.

McDonald's is an example of a company that gained tremendous benefits from globalization. The chart (Figure 1) illustrates the growth of the number of McDonald's restaurants around the world from 2013 to 2022 [4]. Such popularity indicates a successful international marketing campaign.
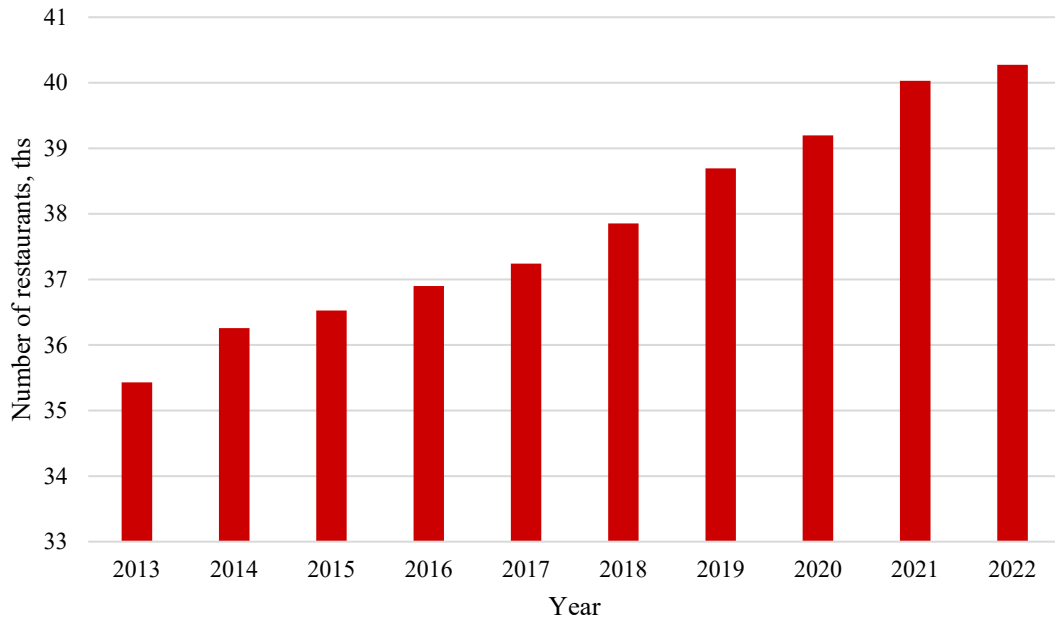
Figure 1. Popularity growth of McDonald`s

The company conducts a two-way marketing campaign:

1. Standardization

The corporation sells the same food items, like McFlurry, McNuggets, McChicken, Happy Meal, or Filet-O-Fish, everywhere it operates. Certain plan and image of stability give a positive reputation to the business. As a result, this strategy has helped McDonald's achieve economies of scale, saving a significant amount of time and money.

2. Adaptation

This approach can be compared to localization. The company's marketing mix allows the company to adapt to the specific needs of the local market in terms of price, distribution channels, and promotion strategies. McDonald's can reach a larger audience worldwide, however, promotion and distribution costs will increase.

Further research on the development of culturally sensitive strategies that require adaptation efforts, and a nuanced understanding of various cultural environments are of particular relevance.

All cultural differences determine the behavior and preferences of consumers and must be considered when forming a company's marketing strategy. The impact of cultural differences on marketing strategies has both positive and negative aspects. On the positive side, adapting marketing approaches to cultural preferences increases the relevance and attractiveness of products fostering deeper connections and trust with local consumers. Additionally, a culturally sensitive approach provides a competitive advantage, allowing for effective engagement with diverse markets and

potential expansion of the customer base. However, delving into cultural nuances adds complexity and costs to marketing campaigns.

References

1. Ya Gao (2023) The influence of cultural differences on marketing strategies of MNEs. *8th International Conference on Social Sciences and Economic Development (ICSSED 2023)*. https://doi.org/10.1051/shsconf/202316302036

2. Kavya Gorti, Sijo S. George (2020) Effect of culture on marketing strategies. *International Journal of Management and Commerce Innovations*, 7 (2), 980-985. URL: https://www.researchpublish.com/upload/book/EFFECT%20OF%20CULTURE-8382.pdf

3. Mahesh Patel (2004) Influence of religion on shopping behaviour of consumers-an exploratory study. *ABHINAV*, 1 (5). URL: https://www.academia.edu/5350694/INFLUENCE_OF_RELIGION_ON_SHOPPING_BEHAVIOUR_OF_CONSUMERS_AN_EXPLORATORY_STUDY

4. McDonald`s. Official website. URL: https://corporate.mcdonalds.com/corpmcd/investors/financial-information.html#accordion-fc2bb55684-item-1456d85cbe

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Brand and Its Value for the Company

Nowadays, the market is saturated with goods and services in a wide variety of areas, types, and price categories. It is becoming increasingly difficult to enter the market and convince consumers that you are the best, most modern and professional. Therefore, the brand is becoming the most important management tool for achieving long-term financial success. In today's world, a brand is a condition for the existence of a product as a whole. A brand is a factor in securing consumer loyalty. It becomes important for its owner as an expensive asset of the company, and for the consumers as a factor that allows them to identify the product. In this way, the process of creating and managing brands is becoming a priority today.

There is no exact and single definition, but a brand is a unique name, term, symbol, image, or combination of these elements designed to identify the goods or services of a particular manufacturer and differentiate them from those of other companies. Brand value lies in its recognition by consumers and positive associations with it.

It creates an attractive and trustworthy image for consumers, evokes certain emotions associated with the product, and forms a group of regular customers who associate their lifestyle with the brand [1].

One of the tasks that a strong brand can help to solve is to increase the competitiveness of an enterprise, improve its financial position, corporate culture and attract more loyal customers. Not every Ukrainian company is ready to implement its tools in its operations and spend additional funds on planned actions to ensure consumer loyalty. Nevertheless, branding is one of the most important resources of a company.

Unlike goods and services, a brand is not created in production. It is formed in people's minds, providing an emotional connection between functionality and product perception.

The main purpose of using a brand is to create a unified way of thinking for a group of people that should contain all the necessary qualities that ensure its uniqueness and maximum usefulness.

The more consumers are aware of a brand, the more they trust it, the more loyal fans and customers it will have in the future.

If consumers have a clear perception of the brand as prestigious, useful, affordable, the brand will require much less investment in advertising in the future. It will also help to increase the company's shareholder value and competitiveness.

A successful brand helps to achieve the company's main goals, namely increasing sales, the number of loyal customers, financial development of the business and increasing competitiveness.

There are hundreds of companies around the world that are also successful brands. People buy their products and services. The proof of the brand success is the estimated value of the companies. Here are the 8 most valuable brands as of 2024 [2].

Table 1. The world's most valuable brands (adapted from Brand Finance Global 500).

Apple	$ 516.6 billion
Microsoft	$ 340.4 billion
Google	$ 333.4 billion
Amazon	$ 308.9 billion
Samsung	$ 99.4 billion
Walmart	$ 96.8 billion
TikTok	$ 84.2 billion
Facebook	$ 75.7 billion

Apple is an example of a very successful brand. It is a manufacturer of technologically reliable devices. Billions of people around the world trust it. Almost every third person uses one or another Apple device. Buying from Apple, customers know that they will receive a high-quality and reliable product [3].

To conclude, a good brand is a huge asset and your brand is what people say about you. It is much easier to exist in the market with a powerful brand.

References:
1.   Brand as a tool for modern business. [Electronic resource]. – Access mode: URL: http://surl.li/qymkl (date of application: 26.02.2024).
2.   Brand Finance. Global 500. [Electronic resource]. – Access mode: URL: https://brandfinance.com/insights/global-500-2024-report (date of application: 10.03.2024).
3.   The essence of branding and its role in enterprise competitiveness [Electronic resource].   –   Access   mode: URL: http://www.economy.nayka.com.ua/pdf/12_2019/158.pdf (date of application: 10.03.2024).

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Exploring Effective Approaches
to Enterprise Management and their Impact on Efficiency

In the fast-changing world of modern business, evaluating effective enterprise management is a cornerstone of success. Since companies grapple with the challenges of globalization, technological advancements, and shifting market demands, the need for adaptable, efficient, and sustainable business practices has never been more pronounced. Consequently, analyzing management approaches plays a pivotal role in assessing the efficiency and sustainability of businesses.

There is a broad spectrum of management strategies, ranging from incentive-based systems to punitive measures, each exerting a distinct influence on organizational productivity, employee satisfaction, and overall performance. The debate over the most effective management strategy is ongoing, reflecting the diverse nature of businesses, their goals, and their cultural contexts. Incentive-based approaches, for example, leverage rewards and recognition to motivate employees, fostering a positive work environment that encourages productivity and innovation. On the other hand, punitive measures rely on the enforcement of rules and the application of consequences to deter undesirable behavior, aiming to maintain order and discipline within the organizational structure. The choice between these strategies or the balance thereof can significantly impact the trajectory of a company's development, its internal dynamics, and its competitive edge in the market.

A fundamental argument supporting efficient enterprise management revolves around the effectiveness of incentives compared to punishments within the workplace. Likewise, examining incentives, encompassing rewards, recognition, and positive reinforcements, offers clear advantages over punitive measures in fostering a conducive work environment. According to neuroscience, rewards tend to be more effective than punishments in motivating to act, whereas punishments are more effective in deterring people from acting [1].

In addition, the impact of incentives extends beyond individual motivation, influencing broader organizational dynamics. Positive reinforcement strategies can foster a culture of appreciation and recognition, where employees feel valued for their contributions. This cultural environment encourages more open communication, greater collaboration, and a willingness among employees to go above and beyond their basic job requirements. In contrast, a reliance on punitive measures can create a culture of fear that stifles open communication and inhibits risk-taking, both of which are critical for creativity and growth.

The first pillar of this argument focuses on the motivation and productivity underscored by the significance of incentives. Research has consistently shown that incentives have a positive impact on employee motivation, leading to higher levels of productivity. For instance, companies offering performance-based bonuses or recognition programs often observe increased output and a motivated workforce. In stark contrast, punitive measures tend to create an environment driven by fear, potentially stifling creativity and diminishing overall productivity.

Performance-based bonuses, recognition programs, and other forms of positive reinforcement are not merely financial transactions; they serve as tangible acknowledgements of an individual's value to the organization. For instance, when companies offer performance-based bonuses, they directly link rewards to individual or team achievements, thereby incentivizing higher performance. Recognition programs, on the other hand, may offer non-monetary rewards, such as awards, public acknowledgements, or career advancement opportunities, which can be equally, if not more, motivating for certain employees.

This direct link between effort and reward fulfills several psychological needs, including the need for achievement, recognition, and a sense of belonging, all of which contribute to heightened motivation levels. When employees see a clear pathway between their performance and tangible rewards, they are more likely to exert additional effort and commitment towards their work. This enhanced motivation not only boosts productivity but can also encourage innovative thinking and problem-solving, as employees are more inclined to look for efficient and creative ways to achieve their goals.

Moreover, analyzing incentive-based approaches contributes significantly to higher employee engagement and overall satisfaction [4]. Since employees feel appreciated and rewarded for their efforts, they tend to be more engaged, leading to lower turnover rates and higher retention. Conversely, punitive measures might instil short-term compliance but can breed resentment and disengagement in the long run, negatively impacting the organization's culture and performance.

Conversely, punitive measures, while they might enforce short-term compliance, can have detrimental long-term effects on employee engagement and satisfaction. Punitive environments can breed resentment, disengagement, and a culture of fear, where employees are more focused on avoiding mistakes than on contributing positively. This fear-based approach can diminish job satisfaction, as employees may feel undervalued and unrecognized, leading to a decline in engagement and an increase in turnover rates. High turnover not only incurs direct costs in terms of recruitment and training but also affects organizational knowledge and morale.

However, it is crucial to recognize that while the emphasis on incentives has clear advantages, the role of discipline and accountability within an organization cannot be completely discounted. Effective management requires a balance between incentives and punitive measures, where the latter are applied judiciously and in a manner that supports the overall positive culture of the organization. Punitive measures, when necessary, should be fair, transparent, and aligned with

organizational values, ensuring that they contribute to a culture of accountability without undermining trust and motivation.

Striking this balance ensures adherence to standards and norms while fostering a positive and productive work environment. It is this balance that underpins the long-term success of an enterprise, facilitating sustained growth, innovation, and competitiveness. Businesses that successfully navigate this balance, prioritizing incentivization while maintaining effective accountability mechanisms, are well-positioned to thrive in the complex and ever-changing landscape of modern business.

In conclusion, the efficacy of enterprise management approaches profoundly influences organizational outcomes. The superiority of incentives over punishments in the workplace becomes evident when considering motivation, employee satisfaction, and organizational culture. Businesses aiming for sustained efficiency and growth should prioritize incentivizing their workforce while striking a balance between incentives and punishments. Thus, this balance ensures adherence to standards while fostering a positive and productive work environment, ultimately contributing to the long-term success of the enterprise.

References:

1. Tali Sharot (2017) What Motivates Employees More: Rewards or Punishments?. Available at: https://hbr.org/2017/09/what-motivates-employees-more-rewards-or-punishments (Access date: 28/02/2024).
2. Chris Vaden (2004) Punishment: Benefits, Risks, and Alternatives in a Business Setting. Available at: https://core.ac.uk/download/pdf/58825199.pdf (Access date: 28/02/2024).
3. Michael Moffa. Reward vs. Punishment as Workplace Tools: You Think You Know How to Use Them? Available at: https://www.recruiter.com/recruiting/reward-vs-punishment-as-workplace-tools-you-think-you-know-how-to-use-them/ (Access date: 28/02/2024).
4. Oliver Schilke(2023) Reward vs. Punishment: How to Motivate Employees to Explore. Available at: https://egade.tec.mx/en/egade-ideas/research/reward-vs-punishment-how-motivate-employees-explore (Access date: 28/02/2024).

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**Healthcare financing
in the context of the rehabilitation system development in Ukraine**

Since the beginning of the full-scale invasion of Ukraine, the healthcare system has been facing new challenges. The number of people in need of medical care is growing, medical facilities are being destroyed, and the demand for rehabilitation services is growing rapidly. All of this has a direct economic impact on the healthcare system and requires additional funding for an already unfunded system.

Given the current situation, the continuation of hostilities on the territory of Ukraine, economic and social problems in society will lead to an increase in the need for rehabilitation services among the population of Ukraine.

According to the Ministry of Veterans Affairs of Ukraine, the number of combatants, their families and families of fallen soldiers as a result of Russia's full-scale invasion may reach more than 5 million people [8].

According to the National Health Service of Ukraine, from January 2023 to November 2023, more than 440 thousand referrals for services in the area of "Outpatient Medical Rehabilitation" and more than 200 thousand referrals for hospitalization for medical rehabilitation were created. These figures reflect the total number of referrals for services to military personnel and civilians.

For comparison, in 2022, more than 390 thousand referrals for services in the area of "Outpatient Medical Rehabilitation" and more than 140 thousand referrals for hospitalization for medical rehabilitation were created, in 2021, – more than 200 thousand referrals for "Outpatient Medical Rehabilitation" and more than 70 thousand referrals for hospitalization for medical rehabilitation, and in 2020, – 16 thousand and 3 thousand respectively [1].

There is a clear trend towards an increase in referrals for rehabilitation services (Figure 1).

For 2024, according to the Draft Law of Ukraine "On the State Budget of Ukraine for 2024", UAH 203.4 billion is allocated for healthcare financing [3], UAH 158.8 billion is allocated to finance the Medical Guarantees Program. For comparison, in 2023, UAH 206.8 billion was spent on healthcare financing, and UAH 142.7 billion was allocated to finance the Medical Guarantees Program [2].
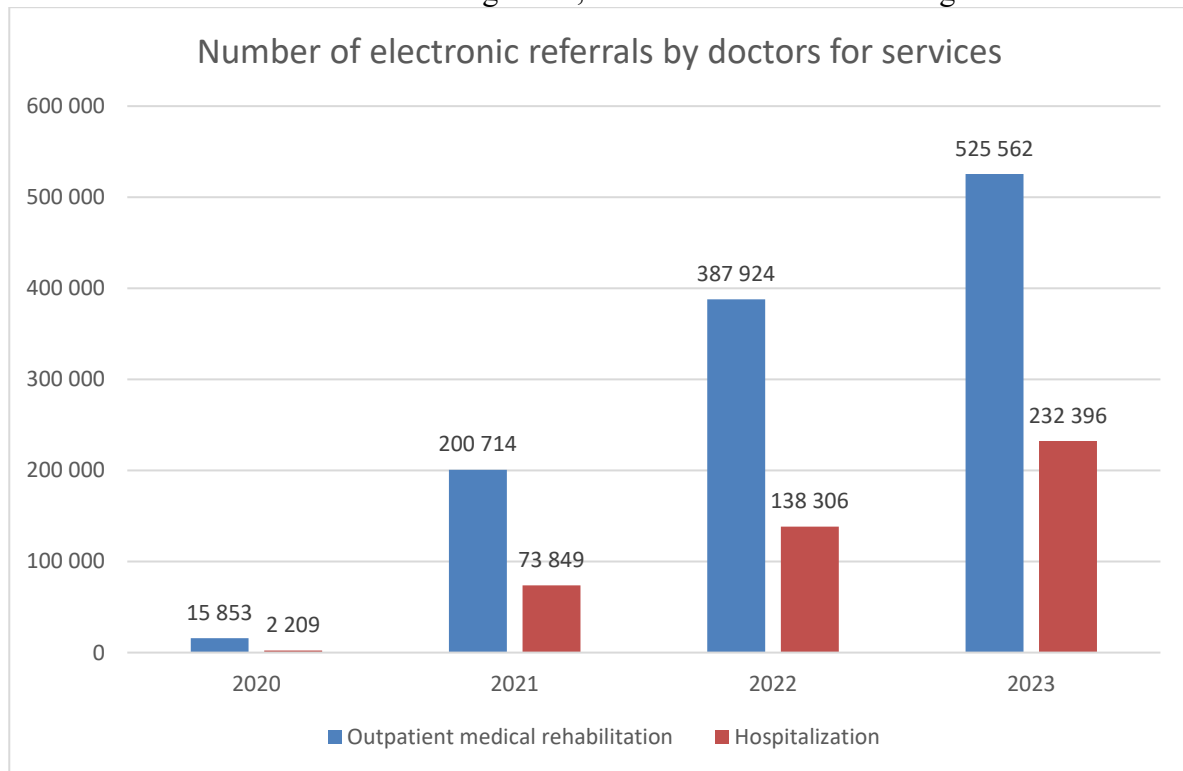
Figure 1. Number of electronic referrals created by doctors for medical rehabilitation services

In 2022, healthcare expenditures amounted to UAH 215.3 billion, and the cost of the medical guarantees program amounted to UAH 146.3 billion. [4]. A year earlier, in 2021, healthcare expenditures amounted to UAH 159.1 billion, and expenditures on the medical guarantees program amounted to UAH 124.5 billion. [6].

The data shown in Figure 2 demonstrate that, in general, healthcare expenditures have been on a downward trend since 2022. It is worth noting that the expenses for the Medical Guarantees Program in 2024 increased by more than UAH 16 billion compared to the previous years of 2022 and 2023. Given the overall budget cuts and the increase in expenditures on the medical guarantee program, it is clear that such measures were made possible by reducing expenditures in other areas, including administrative costs. It is also important to note that payments to medical care providers under the Medical Guarantees Program in 2022 in the area of Medical Rehabilitation (service group No. 52, No. 53, No. 54) amounted to UAH 2,285,276, and in 2023 to UAH 4,099,960,245 for the same area and service group. Expenditures increased by more than UAH 4 billion [5].

Total public spending on health care in 2023 amounted to UAH 206.8 billion (in 2022 - UAH 215.3 billion) or almost USD 5.7 billion (in 2022 - USD 7.4 billion). In dollar terms, healthcare spending fell by up to 30%. This indicator more realistically reflects the challenges of the efficient provision of medical care. Rising consumer prices will continue to affect healthcare tariffs in 2024. In addition, services dependent on imports of medicines, medical devices, and consumables will be at risk.
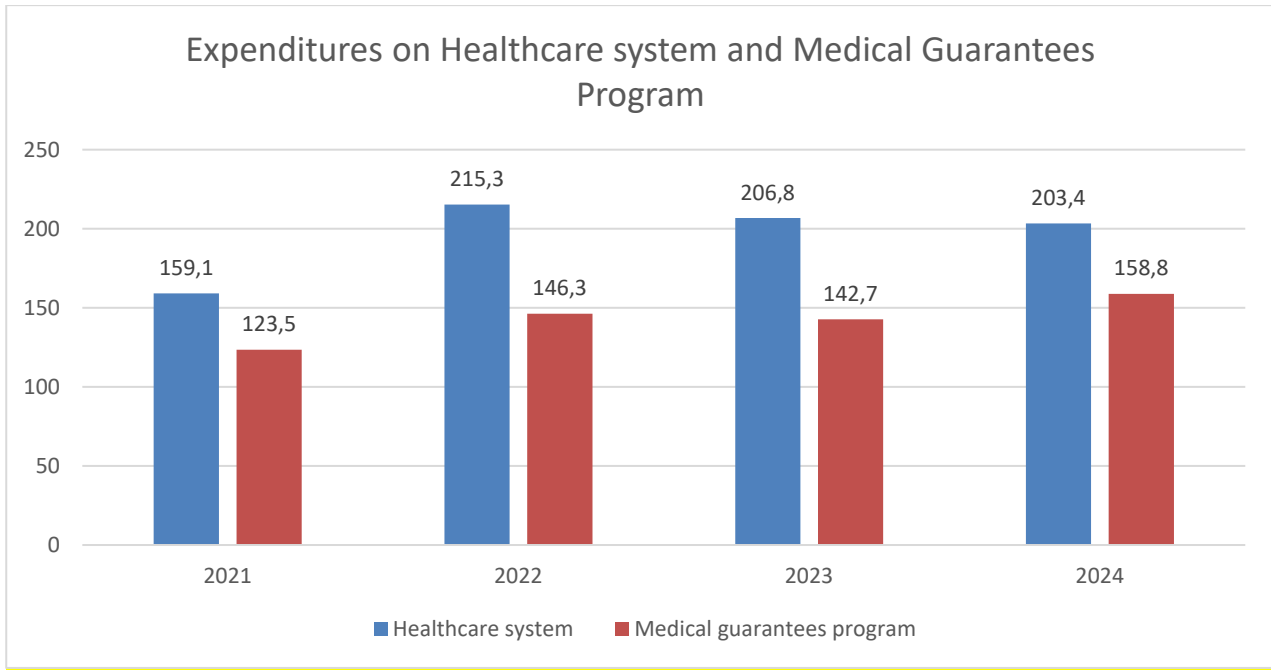
Figure 2. Expenditures on the Healthcare system and the Medical Guarantee Program in billions of UAH

Total public spending on health care per capita decreased from USD 159 to USD 116, and public spending on healthcare as a percentage of the Gross Domestic Product (GDP) declined from 4.2% to 2.8% (the median in Europe is 5%), which pushed Ukraine back to the level of 2019.

In this context, it is equally important to pay attention to the Law of Ukraine "On State Financial Guarantees of Healthcare Services for the Population". Paragraph one of Chapter 5 of Article 4 states that the amount of funds from the State Budget of Ukraine allocated for the implementation of the Medical Guarantees Program is annually determined in the Law of Ukraine "On the State Budget of Ukraine" as a share of the GDP (in percentage terms) in the amount of not less than 5% of the GDP of Ukraine. Expenditures on the Medical Guarantees Program are protected budget items [7].

From 2019, the effect of the aforementioned first Paragraph of Chapter 5 of Article 4 was suspended by the relevant laws. The reason for this was the inability to allocate at least 5% of Ukraine's GDP to implement the Medical Guarantees Program. A corresponding law is expected to be adopted for 2024, as the draft Law of Ukraine "On the State Budget of Ukraine" for 2024 approved by the Cabinet of Ministers allocates more than UAH 158.8 billion for the Medical Guarantee Program. It is 2.03% of the country's GDP.

To summarize, the healthcare system suffers from underfunding. It has a significant impact on import-dependent services, medicines, and consumables. The sharply rising costs of new areas of medical services, such as medical rehabilitation, also have a considerable impact. Finding new sources of funding for healthcare and

restructuring and optimizing current expenditures is a priority for the current and coming years.

References:

1. Аналіз ведення електронних направлень лікарями первинної та спеціалізованої допомоги. *Е-дані*. URL: https://edata.e-health.gov.ua/e-data/dashboard/service-requests (дата звернення: 31.03.2024).

2. Бюджет-2023: на фінансування охорони здоров'я передбачено 207 млрд гривень. *Міністерство Фінансів України*. URL: https://mof.gov.ua/uk/news/biudzhet-2023_na_finansuvannia_okhoroni_zdorovia_peredbacheno_207_mlrd_griven-3804 (дата звернення: 31.03.2024).

3. Бюджет 2024 року. *Міністерство Фінансів України*. URL: https://mof.gov.ua/uk/budget_of_2024-698 (дата звернення: 31.03.2024).

4. Мінфін: у 2022 році видатки на охорону здоров'я становили 215,3 млрд гривень. *Міністерство Фінансів України*. URL: https://www.mof.gov.ua/uk/news/minfin_u_2022_rotsi_vidatki_na_okhoronu_zdorovia_stanovili_2153_mlrd_griven-3908 (дата звернення: 31.03.2024).

5. Оплати надавачам медичної допомоги за програмою медичних гарантій. *Е-дата*. URL: https://edata.e-health.gov.ua/e-data/dashboard/pmg-pay (дата звернення: 31.03.2024).

6. Про державний бюджет україни на 2021 рік. *Офіційний вебпортал парламенту України*. URL: https://zakon.rada.gov.ua/laws/show/1082-20 (дата звернення: 31.03.2024).

7. Про державні фінансові гарантії медичного обслуговування населення. *Офіційний вебпортал парламенту України*. URL: https://zakon.rada.gov.ua/laws/show/2168-19/ed20230101#Text (дата звернення: 31.03.2024).

8. Interfax-Ukraine. Лапутіна: ветеран, який повертається з перемогою, має бути рушієм позитивних змін у країні. *Інтерфакс-Україна*. URL: https://interfax.com.ua/news/interview/830543.html (дата звернення: 31.03.2024).

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Potential economic benefits of legalizing cannabis in Ukraine

The first steps towards legalizing cannabis in Ukraine began long before the war. Finally, in December 2023, the Verkhovna Rada voted in favour of the Draft Law on Regulation of the Turnover of Plants of the Cannabis Genus for Medical, Industrial, Scientific and Technical Purposes to create conditions for expanding patients' access to the necessary treatment of cancer and post-traumatic stress disorders resulting from the war [3]. The very title of the draft law makes it clear that legalization is primarily aimed at developing the medical use of cannabis. The law does not provide for recreational use. The war and the sharp increase in the number of veterans in need of symptomatic treatment played an important role in accelerating this process. Estimates of the potential number of patients who will need such treatment, as well as the experience and statistics of foreign countries, will be used to assess the possible economic impact.

In recent years, some countries have introduced special laws and programs that allow patients to use cannabis products in various forms to alleviate the symptoms of many serious diseases that lead to disability. As a result, cannabis has been used to effectively relieve chronic pain, muscle spasms and spasticity in patients with multiple sclerosis or spinal cord injury, as well as for patients suffering from neurogenic pain caused by nerve damage and other causes [5]. Patients with terminal cancer and AIDS also benefit from the use of cannabis to relieve nausea and vomiting, as well as to stimulate appetite and weight gain [4]. However, there is no single list of pathologies that can be treated with cannabis-based products, as they are not a cure, but rather palliative treatment. It is up to doctors to decide under what circumstances cannabis should be prescribed and which patients can benefit from this treatment.

According to the US analysts at Grand View Research, the global cannabis market was worth $323.9 billion in 2021. By 2030, the average growth rate of the cannabis cultivation market could exceed 21% and by the next decade, the market could reach $1.844 trillion. To understand, this figure corresponds to the annual value of all goods and services in countries such as Saudi Arabia or Spain [1].

The United States is a prime example of the impact of cannabis legalization on the economy. In 2019, taxes collected by 37 of the 50 states exceeded $1.7 billion. Two years later, the total dollar revenue more than doubled. During this time, the number of states that have legalized cannabis for recreational and medical purposes has increased. In the European market, the Czech Republic is a good example. In 2021, sales of medical cannabis here increased by 63%. Czech patients received 109 kg of medical cannabis, while in 2020, this figure was 67 kg [1]. In Germany, where

medical cannabis has been legalized for six years, the market is estimated at more than €300 million. The Ukrainian market could grow to €250 million by 2028 [2].

There are more than 6 million people in Ukraine who need medicines based on medical cannabis, according to Gennady Shabas, head of the Ukrainian Medical Cannabis Association [2]. Mykhailo Radutsky, chairman of the Verkhovna Rada Medical Committee, estimates the market of potential patients at a much lower figure, about 2 million patients with cancer, epilepsy, military personnel with PTSD symptoms, people with Parkinson's disease and other serious illnesses [2].

All of these calculations are very inaccurate in the context of Ukraine, as production requires significant financial investments, which are extremely difficult to find in times of war. It also takes into account the fact that it takes at least one and a half to two years to receive the first profit from sales. The production of medicines is also not so simple, as they have the potential to replace drugs already on the market or partially reduce their sales. The process of manufacturing a new cannabis-based drug requires a preliminary drug registration procedure, clinical trials, and licensing. All these steps also incur financial costs for pharmaceutical companies. The potential economic benefit could profit from the production and sale of cannabis for recreational purposes, but this is not allowed. The United States and European countries are showing a significant increase in the production and sale of cannabis for recreational purposes. These figures have reached the production volumes of medical cannabis and, in some cases, significantly exceed them.

In the case of Ukraine, the most significant economic benefits will be potential foreign economic investment in production, profits from the sale of licenses, taxes, and, to a lesser extent, job creation due to the high level of automation in production. An additional incentive factor could be the low cost of production and thus, Ukraine could become a highly competitive supplier due to the value of the final products.

References:

9. Економічна правда. Нічого наркотичного, лише бізнес. Що дасть Україні легалізація медичного канабісу. *Економічна правда.* URL: https://www.epravda.com.ua/publications/2023/08/17/703307/ (дата звернення: 08.04.2024).

10. Крицька І. Верховна рада легалізувала медичний канабіс. як буде працювати нова фарміндустрія на декілька мільйонів пацієнтів (потенційний обсяг ринку – €250 млн) – forbes.ua. *Forbes.ua | Бізнес, мільярдери, новини, фінанси, інвестиції, компанії.* URL: https://forbes.ua/money/verkhovna-rada-legalizuvala-medichniy-kanabis-yak-bude-pratsyuvati-nova-farmindustriya-na-dekilka-milyoniv-patsientiv-ta-koli-chekati-bumu-investitsiy-22122023-18073 (дата звернення: 08.04.2024).

11. Проект Закону про регулювання обігу рослин роду коноплі (Cannabis) в медичних, промислових цілях, науковій та науково-технічній діяльності для створення умов щодо розширення доступу пацієнтів до необхідного лікування онкологічних захворювань та посттравматичних стресових розладів, отриманих внаслідок війни. *Верховна Рада України -*

Законотворчість. URL: https://itd.rada.gov.ua/billInfo/Bills/Card/39783 (дата звернення: 08.04.2024).

12. Regulation of nausea and vomiting by cannabinoids and the endocannabinoid system. *Science Direct*. URL: https://www.sciencedirect.com/science/article/abs/pii/S001429991300753X (date of access: 08.04.2024).

13. Systematic review: efficacy and safety of medical marijuana in selected neurologic disorders report of the guideline development subcommittee of the american academy of neurology. *Neurology*. URL: https://www.neurology.org/doi/full/10.1212/WNL.0000000000000363 (date of access: 09.04.2024).

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Loyalty programs as a tool of customer loyalty management

In today's dynamic business environment, where competition is constantly growing and customers are becoming more demanding, customer loyalty management is coming to the forefront as an integral part of a company's success. Regardless of whether a firm operates in the B2B or B2C market, maintaining and developing customer relationships is key to long-term growth and competitiveness. In a saturated market and with a high level of product similarity, customer loyalty is becoming a unique advantage that can provide a company with leadership. As a result, companies are rethinking their marketing strategies, shifting the focus from simply attracting new customers to building serious long-term relationships that help maintain a high level of loyalty.

Loyalty can be defined as the personal identification felt by the client in regards to the performance of a product or service, and how this feeling drives the client's behaviour. In addition, loyalty can be also defined as a state of mind, a set of attitudes, beliefs, desires, etc. Loyalty is closely related to performance: having the right product or service, at the right price and at the right time and place. It also involves a connection and successfully satisfying the client's needs [1, p. 110].

Given the multifaceted nature of loyalty, customer loyalty management can be described as a focused and organized effort by a company to increase the number of repeat customers through an integrated approach and efficient allocation of resources. This process also includes assessing the level of customer loyalty and developing measures to strengthen it, with the goal of creating stable customer relationships.

One of the most popular loyalty management tools used by companies around the world is loyalty programs.

The term "loyalty program" captures a variety of marketing initiatives, including reward cards, gifts, tiered service levels, dedicated support contacts, and other methods that positively influence consumers' attitudes and behaviors toward the brand or firm. Some of these programs provide a price discount or short-term financial incentive, which enhances the economic utility of the offering by compensating consumers for higher volume or more frequent purchases [2, p. 258].

Loyalty programs have a variety of formats and features depending on the means used:

1. Discount programs. They offer vouchers and one-time discounts, and have both cumulative and non-cumulative formats. In cumulative programs, the more purchases and expenses you make, the bigger the discount. But discount programs are often criticized for not building loyalty enough, as there are many consumers who go from one company to another for a discount.

2. Points accumulation programs: Customers earn points for purchases that can be redeemed for rewards. Popular with airlines and hotels, these programs motivate customers to make repeat purchases.

3. Rewards programs: Reward customers with products unrelated to their original purchases, expanding their knowledge of other products. This helps to draw attention to the diversity of the company's product range. For example, is a leading electronics manufacturer, Samsung offers a loyalty program called Samsung Rewards. It rewards customers for purchases using Samsung Pay, etc. with points that can be redeemed for other Samsung products or gift codes. Such integration encourages users to use not only mobile payment technology but also other services of the company [3].

4. Partnership programs: Customers choose a reward from a range of offers not only from the company but also from its partners, which helps to individualize the interaction and increase loyalty by choosing the most attractive options. Such programs, in various variations, can also be designed to add value to customers by building strong friendships without relying on material rewards.

5. Appreciation programs: Offer customers more than they expect by providing additional benefits or services. They are mostly used in the service sector, such as car washes or beauty salons, to build loyalty and attract new customers through positive experiences. For example, the Australian airlines Quantas has launched the Qantas Frequent Flyer program. This goes beyond just flying. Customers can earn status credits for hotel stays and car rentals, and even pool points with family members for shared benefits [4].

Effective loyalty programs reduce the degree of price sensitivity in the minds of customers, and they are willing to pay more than usual. In addition, loyalty is always accompanied by an increase in the number of purchases, improved company reputation, and brand awareness. Businesses that use outdated loyalty discount programs need to replace them with more modern ones that combine several factors at once and allow them to build long-term partnerships with customers.

References:

1. A review on customer loyalty as a main goal of customer relationship management / R. Asgarpour et al. Jurnal teknologi. 2013. Vol. 64, no. 3. URL: https://doi.org/10.11113/jt.v64.2279 (accessed: 25.03.2024).
2. Henderson C. M., Beck J. T., Palmatier R. W. Review of the theoretical underpinnings of loyalty programs. Journal of consumer psychology. 2011. No. 21. P. 256–276. URL: https://foster.uw.edu/wp-content/uploads/2016/07/6_Henderson_Beck_Palmatier_2011.pdf (accessed: 25.03.2024).
3. Samsung rewards. Samsung Help Center. URL: https://order-help.us.samsung.com/hc/en-us/articles/6462501408403-Samsung-Rewards (accessed: 27.03.2024).
4. Efflandrin R. Qantas Frequent Flyer program. What it is and how it works. Wise. URL: https://wise.com/au/blog/qantas-frequent-flyer-program (accessed: 27.03.2024).

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Underrated Introverts

It is common knowledge that managers are very sociable. A manager is someone who "easily gets in touch with other people, adapts well to new situations, is open to external objects, and seeks to increase their connections with them" [4]. This is also the definition of an extrovert, according to the Pharmaceutical Encyclopedia.

In fact, managerial qualities depend on many factors, ranging from character to experience and working conditions. The most important qualities that determine the ability to manage are self-criticism, selectivity, determination, efficiency, independence, discipline, and initiative [5]. The determining factors are the ability to predict the development of events, to calculate all possible consequences, thus minimising risks, as well as stress resistance, i.e. the ability to withstand emotional stress and pressure [6].

Thus, the skills required by managers (also known as the main functions) are planning, organising, motivating and controlling. Reflecting on the reasons for the failure and success of various organisations, Henri Fayol and his associates saw them as based on the inability of management to understand and define the scope of their responsibilities, as well as imperfect relationships between different departments and uncertainty of the areas of responsibility of managers and employees. The solution was to describe the types of managerial work (managerial functions) inherent in all managers, regardless of their field of activity and organisational level [1].

Are only extroverts really effective managers? According to Francesca Gino, an Italian-American behavioural scientist, introverts can even be better leaders than extroverts, especially if their employees are naturally proactive [3]. We often expect corporate executives to fit certain stereotypes of an extroverted leader: charismatic, expressive, and outgoing. However, there are introverted CEOs - calm, reclusive and observant - who prefer to stay in the shadows.

Future research plans for academics may address the extent to which introverts can truly adopt extroverted behaviours before taking on a leadership role, and more corporations will hopefully adopt policies that support good listeners as much as they support good talkers.

Extroverted leaders can actually have a negative impact on company performance, especially if their subordinates are also extroverts. This is because new ideas cannot develop into profitable projects; everyone contributes their ideas, but the leader is too busy to listen to them. An introverted leader, on the other hand, is more likely to listen to and process the team's ideas. However, if an introverted leader manages a bunch of passive subordinates, a staff meeting can turn into a Quaker meeting: lots of contemplation, but hardly any talk. Therefore, an extrovert manager will be effective in such a team [3].

Introverted managers often have to face challenges and prejudice that affect them and their professional careers. Introverts may be perceived as indifferent because they tend to listen and process information internally (having an "internal dialogue" with themselves) before sharing their thoughts. The valuable ideas of introverts may be overlooked, as their approach is seen as detached. Introverts may find it difficult to work in an open office where constant social interactions are required, which can make them feel pressured to adapt to an extroverted style, which can hinder their productivity.

Introverts do not demonstrate a pronounced assertiveness or charisma, and they are rarely seen in leadership positions. Introverts may appear indecisive and slow because they tend to analyse a situation carefully before making a decision. This limits the potential of introverts and their ability to obtain a leadership position [2].

We have conducted our own survey among management students of the Dnipro University of Technology. The results of the survey show that almost half (53.3%) of the surveyed students are ambiverts, a quarter (26.7%) are pronounced introverts, and the remaining 20% are pronounced extroverts (Figure 1). Among the surveyed students, half have a phlegmatic temperament type, which is a fairly favourable temperament for management (ranked second out of four in terms of favourability), while the most suitable temperament type is sanguine, with a share of 31.3%. The share of cholerics is 12.5%, and of melancholics is 6.3% (Figure 2). For the most part, students choose psychology of management, business communications and conflict studies as their favourite subjects. The majority of the surveyed students identify sociability, responsibility, perseverance, focus, and organisation as their strengths. Students choose Management for various reasons, but most of them consider this speciality to be universal.
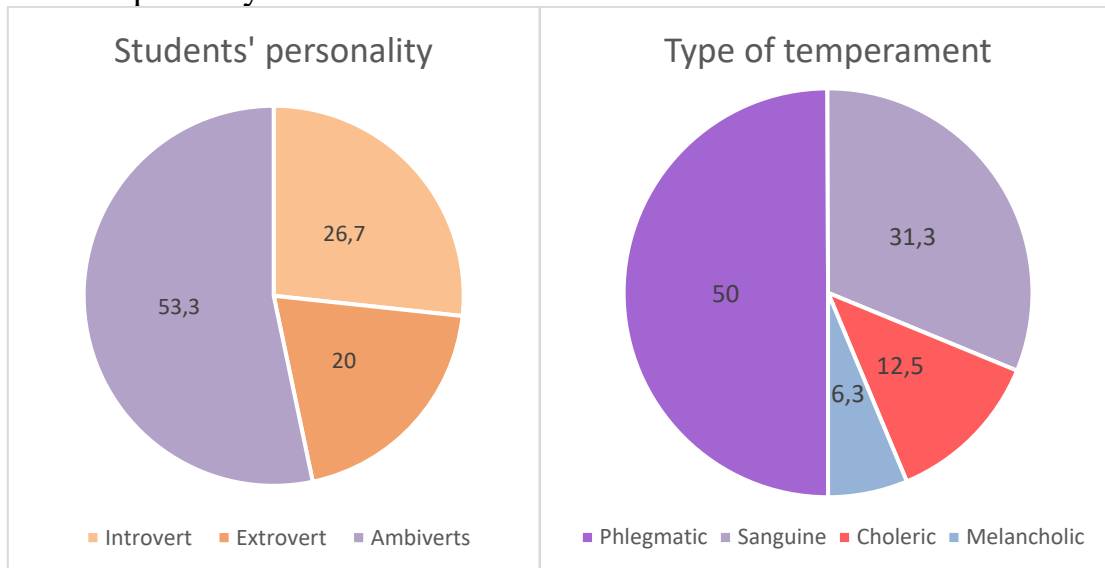

Figure 1 - Structure of respondents by orientation towards the external/internal

Figure 2 - Structure of respondents by type of temperament

The results of the research show that managerial success is determined by a set of qualities that include both extroverted and introverted traits. While it is generally

recognised that a manager should have the ability to communicate, goal orientation, organisational skills, initiative and other criteria are also important for successful leadership. There is no one-size-fits-all template for a leader, and different types of leadership can be effective depending on the characteristics of the team. Prejudice against introverts in management can lead to an underestimation of their potential, so it is important to support a diversity of leadership styles and recognise the individual strengths of each leader.

References:

1.А.В. Бардась, М.В. Бойченко, А.В. Дудник. / Менеджмент: навч. посіб. – Д.: Національний гірничий університет, 2012. – С.59-63 From https://ктеп.kiev.ua/wp-content/uploads/2019/12/Bardas-A.-V.-Menedzhment.pdf (date of access 18.03.2024)

2. Ben Rand Is Your Workplace Biased Against Introverts? 2024 From https://hbswk.hbs.edu/item/is-your-workplace-biased-against-introverts (date of access: 18.03.2024)

3. Carmen Nobel Introverts: The Best Leaders for Proactive 2010 From https://hbswk.hbs.edu/item/introverts-the-best-leaders-for-proactive-employees (date of access: 18.03.2024)

4. Гончаренко С.У. Український педагогічний словник. – Київ: "Либідь". – 1997–
 С. 374. From https://lib.iitta.gov.ua/106820/1/Гончаренко.%20Педагогічний%20словник%20%281%29.pdf (date of access 18.03.2024)

5. Пузирьова П. В. Базові підходи до формування принципів і методів управління персоналом підприємства / П. В. Пузирьова // Формування ринкових відносин в Україні. – 2010. – № 6. – С. 158–162. From https://er.knutd.edu.ua/bitstream/123456789/15551/3/frvu_2010_1_Puzyrova_pp_158-162.pdf (date of access 18.03.2024)

6. Степаненко Н. В. Особливості становлення професійно значущих якостей майбутніх менеджерів / Н.В. Степаненко // Вісник КІБІТ. – 2008. – № 2 – С. 12–14. From https://seanewdim.com/wp-content/uploads/2021/02/Zubenko-I.R.-Identification-of-the-professional-qualities-of-an-e-commerce-manager.pdf (date of access 18.03.2024)

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Implementing Sustainable Development Goals: Experience of Successful Companies

The success of modern companies today is determined not only by their financial status but also by their contribution to addressing the most pressing social and environmental issues. The key factor of this success becomes the concept of sustainable development (SD).

The concept of SD in contemporary management is defined as a comprehensive strategy that considers the interconnection of economic, environmental, and social aspects of a company's activities. The economy reflects companies' ability to maintain stable financial indicators, ecology – their responsibility for the environment and preservation of natural resources, and the social aspect signifies a caring attitude towards employees, consumers, and the community.

The United Nations Conference on the Human Environment held in Stockholm in June 1972 can be considered the first step in the establishment of the concept of SD at the intergovernmental level [5]. The concept of SD refers to the development that satisfies current needs without compromising the ability of future generations to fulfill their own needs.

Figure 1 demonstrates the 17 fundamental Sustainable Development Goals (SDGs), adopted by all United Nations member states in September 2015 that form an integral component of the 2030 Agenda for Sustainable Development.

In order to implement sustainable development goals in business activities, the company Sustenuto that provides support to enterprises in integrating Sustainable Development Goals into their operations proposes the following action plan [1]:

1. Initially, prioritize relevant SDGs based on the company's industry, location, and operations.
2. Formulate specific company goals aligned with the corresponding SDGs. This involves setting goals for priority SDGs and adapting them to the organizational context or adjusting the current sustainable development strategy.
3. Implement SDGs by identifying specific actions related to the company's core activities that can achieve the established goals. Group actions according to priority SDGs to maximize impact.
4. Evaluate the effectiveness of implemented actions in achieving sustainable development goals by analyzing initiatives and their impact on specific aspects of sustainable development. This includes assessing results and identifying potential improvements to strategies and activities.

1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH	4 QUALITY EDUCATION	5 GENDER EQUALITY
6 CLEAR WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSRTY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS			

Figure 1 - The 17 Sustainable Development Goals (adapted from UN DESA goals)

Many companies are already actively engaged in achieving these goals, developing and implementing energy efficiency programs, improving waste management systems, and reducing greenhouse gas emissions.

To give an example, an American multinational corporation Nike is a leader in sustainable development in the sportswear industry. Initiatives like "Move to Zero" and "Reuse-a-Shoe" integrate environmental consciousness into Nike's core operations, aligning with the United Nations Sustainable Development Goals (UN SDGs) [3]. By using recycled materials and promoting the circular economy, Nike contributes to SDG 12: Responsible Consumption and Production. Nike also supports SDG 3 (Good Health), SDG 5 (Gender Equality), and SDG 8 (Decent Work and Economic Growth) through initiatives promoting physical activity and equal employment opportunities. Furthermore, Nike aims to reduce greenhouse gas emissions by 70% and fosters partnerships for sustainable development to achieve SDG 13 (Climate Action) and SDG 17 (Partnerships for the Goals).

LEGO, renowned for its belief in the transformative power of play, advocates for the integration of play into global education and early childhood development, aligning with SDG 4: Quality Education. Since 2003, the company has partnered with the United Nations through the Global Compact, utilizing SDGs as a foundation for positive impact.
LEGO's approach motivates children to learn through play, thereby rendering complex ideas more clearly. Through close collaboration with local communities and stakeholders, LEGO places a strong emphasis on promoting sustainability, particularly focusing on SDGs 4 (Quality Education), 12 (Responsible Consumption and Production), 13 (Climate Action), and 17 (Partnerships for the Goals). For instance, in 2018, they introduced a LEGO wind turbine model to educate children about climate change and renewable energy sources [6].

Ukrainian enterprises are actively engaged in addressing the issue of sustainable development, which has garnered increasing global attention. According

to Interfax, about 80% of them have strategies and plans for sustainable development as of 2021 [4]. Among them is LLC Interpipe, a prominent trading entity in Ukraine specializing in the trade of pipe and wheel products within the domestic market, and exporting to regions including the Middle East, America, and Europe.

Interpipe integrates sustainable development goals into its operations by combining innovative technologies with new approaches to steel production [2]. It endeavors for market leadership through innovation and digital transformation, enhancing efficiency and reducing waste (SDGs 8 – Decent Work and Economic Growth and 9 – Industry, Innovation and Infrastructure). In alignment with pan-European directives, Interpipe is committed to reducing greenhouse gas emissions by 55% by 2030 and ultimately achieving climate neutrality by 2050 (SDG 13 – Climate Action). Furthermore, the company actively contributes to local educational and technical training initiatives, invests substantially in employee capacity-building endeavors, and prioritizes workplace safety standards (SDG 4 – Quality Education). In addition, it maintains close collaboration with local authorities and stakeholders to advocate for community sustainability and provide support to employees during challenging circumstances (SDGs 11 – Sustainable Cities and 17 – Partnerships for the Goals).

To conclude, the adoption and implementation of Sustainable Development Goals are imperative for modern businesses, demonstrating their commitment to addressing crucial social and environmental issues. Companies such as Nike, LEGO, and LLC Interpipe serve as examples of how integrating sustainable development principles into their operations contributes to achieving SDGs while promoting economic growth, environmental stewardship, and social well-being. As sustainability practices become more widespread among businesses, they play a pivotal role in shaping a more sustainable and equitable future for future generations.

References

1. How to Integrate the SDGs in Your Sustainability Strategy. [Electronic resource]. – URL: https://sustenuto.com/insights/how-to-integrate-the-sdgs-in-your-sustainability-strategy/ [Accessed: March 15, 2024].
2. LLC Interpipe. Sustainability Progress Report, 2022, Ukraine. P.23-24. [Electronic resource]. – URL: https://interpipe.biz/esg/Group_Report/Annual_Report [Accessed: March 15, 2024]
3. Nike Sustainability. Move to Zero. [Electronic resource]. – URL: https://www.nike.com/sustainability [Accessed: March 15, 2024].
4. Statistics of Ukrainian companies implementing SDGs. [Electronic resource]. – URL: https://interfax.com.ua/news/general/779145.html [Accessed: March 15, 2024].
5. The 17 Sustainable Development Goals (SDGs). [Electronic resource]. – URL: https://sdgs.un.org/goals [Accessed: March 15, 2024].
6. The Lego Group. Sustainability Progress Report, 2023, Billund, Denmark. P.39. [Electronic resource]. – URL: https://www.lego.com/en-us/sustainability/reporting?locale=en-us [Accessed: March 15, 2024].

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Black Swans and Risk Management Strategy

The theme of epistemic restriction implies the limits of our perception and the boundaries of knowledge. The scientific community accepts the model of paradigms proposed by the sociologist and historian of science Thomas Kuhn, and it is a consensus in explaining the development of science, which occurs in leaps and bounds. T. Kuhn explained the development of science through significant changes when there was an anomaly that could not be resolved by the existing methodology [1]. Anomaly causes a crisis. New theories appear to solve anomalous problems and form new paradigms that partially or completely replace the old ones. A paradigm shift is known as "black swan".

The black swan theory introduced by the American economist, philosopher and essayist Nassim Nicholas Taleb has modernised and expanded Kuhn's model, finding new explanations for the causes of global changes. A black swan is an event characterised by rarity and impossibility of prediction that makes a significant difference in our lives.

The name "black swan" refers to the fact that until the XVII century Europeans believed that all swans were white. The discovery of the black swan changed the way Europeans viewed the world. When we do not know something, we think that it does not exist and even cannot exist. We boldly negate the very possibility of the existence of something exceptional that goes beyond the boundaries of experience.

In his book *The Black Swan: The Impact of the Highly Improbable*, N. Taleb introduces another concept: the grey swan. This concept is not as popular as the black swan, but it is important for understanding N. Taleb's view of explaining crises: the global financial crisis of 2008 - 2013 is about both grey and black swans. A grey swan is an unlikely but predictable event that usually has no place in forecasting models. The difference between a black and a grey swan lies within the cognitive capabilities of the subject.

People think that if an unlikely event occurs, it will be an exception to the rule, and therefore we can ignore it. Plans, strategies and forecasts depend on expectations. The probability of something drastic happening is extremely small, so it seems like you can take a chance. N. Taleb opposes such an approach. He believes that human Platonising nature causes these fundamental mistakes [2]. We take into account only what we like and reject what we do not. N. Taleb criticises risk managers for making their strategies vulnerable to randomness and uncertainty, often simply ignoring the most significant factors.

In many spheres, uncertainty is a key factor of analysis. It does not necessarily cause losses. Managers often focus their attention mainly on what poses a potential danger. However, they also need to consider the other side of uncertainty.

In areas such as the publishing business with uneven distribution of profits, where a small number of authors account for half of all book sales, and where the winners-take-all principle applies, it is necessary to take risks.

For example, you have an idea for a book. A book with an interesting and relevant topic, in your opinion, has a chance to reach the top of bookstore sales. You are planning to publish it at the expense of a publishing house and are wondering whether you should take on the long work of writing it. If the book does not become popular, you will not spend anything except time on it. You will not lose money, because you do not plan to invest in it. Without risking anything essential, you have a chance to reap great benefits.

Another thing is whether it is worth taking similar risks in business areas where money is at stake. N. Taleb advises to distinguish between uncertainty with a positive opportunity for risk and uncertainty, when the measurement of risk probability is meaningless. The securities market is a large-scale heterogeneous structure with various risk areas. N. Taleb suggests applying The Barbell Strategy. The Barbell Strategy is a balancing act in the risk field, for example, to keep 90% of assets in "safe" securities and 10% in securities with a high risk of both price growth and rapid depreciation. This strategy is low-risk, and it gives you the opportunity to catch a positive black swan [3, 4].

According to N. Taleb, we need to distinguish between grey and black swans, opportunities for risk and complete uncertainty, where there are no approaches except for the recognition of the dominance of chance. We can prevent only grey swans, and if the necessary data are available, we can assess risk. We treat areas of black swans (completely unpredictable events) with caution because nothing is predictable with such events. If the black swan area carries a risk with a positive outcome and small losses, then this swan can be beneficial for us. Managers must choose the right approach on a case-by-case basis. It is important to remember that there is no universal advice.

References:

1. Kuhn, Thomas S. (2012). The Structure of Scientific Revolutions. 50th anniversary. Ian Hacking (intro.) (4th ed.). University of Chicago Press. p. 264.N.

2. N. Taleb The Black Swan: The Impact of the Highly Improbable. Penguin Random House UK. 2008. –446 p.

3. Antifragile: Things That Gain From Disorder Penguin Random House UK. 2013. - 544

4. https://fourweekmba.com/barbell-strategy-taleb/

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Digital brand management: strategies for online presence and interaction with the audience

The digital age has fundamentally changed the way brands are perceived, interacted with and managed. With the proliferation of online platforms and the rise of social media, brands have unprecedented opportunities to engage with their audiences in real time and on a global scale. However, this digital landscape also presents unique challenges, including increased competition, rising consumer expectations and the need to constantly innovate and adapt their strategies.

To help address these challenges comes an aspect of traditional brand management, namely digital brand management. It is defined as the process of managing and maintaining a brand's online presence in order to drive business growth and build trust and credibility with growth and build trust and credibility with customers.

This includes digital brand marketing strategy development and implementation, creating and distributing engaging content, managing social media accounts, and analysing data to track the effectiveness of efforts. It is important to align digital branding with the company's overall brand identity and messaging and to continuously monitor and adapt to changes in the digital landscape. The main goal of digital brand management is to create a unique and consistent brand experience for customers across all digital channels, which helps to maintain unity and consistency in brand perception [2].

In today's increasingly competitive environment, building and maintaining a strong online presence is becoming a constant necessity as consumers increasingly prefer online interaction with brands. Effective digital brand management allows organisations to deliver a consistent and compelling brand presence across social media, websites, apps and more. This helps build brand awareness and makes it easier for customers to find and engage with the brand.

One of the key online presence strategies is to create and optimise a web presence. This includes developing and maintaining a brand's website, which is the centre of its online ecosystem. The website should not only be aesthetically pleasing and easy to navigate, but also search engine optimised to ensure it ranks highly in search results.

Along with creating a website, it is important to use SEO strategies to help raise the brand's website in search results and increase its visibility to potential customers. This includes the use of keywords, content optimisation and technical aspects of the website.

A content strategy defines how your business will create, publish and manage content across all online channels. Incorporating a content strategy into your digital

brand management enables you to consistently deliver relevant, engaging and valuable content. This attracts a larger and more loyal audience, positioning your business as an authority in the industry. To do this, you need to publish short articles, videos (for example, on YouTube) and infographics [3].

Another important strategy is social media marketing. This involves creating and managing brand profiles on various social media platforms such as Facebook, Instagram, Twitter, TikTok and others. These platforms provide brands with the opportunity to interact with their audience, post interesting content, reviews and answer questions, which helps to increase brand awareness and connect with customers. Social media is also a place for consumers to share their brand stories widely with peers. Such stories have a greater impact because they are often narratives and dramas that are more persuasive than arguments, as consumers also tend to organise information in such formats [1].

For businesses that sell goods or services, e-commerce is a good strategy to consider. It allows a brand to create an online store in the form of a website or mobile app where customers can easily find and purchase their products or services. E-commerce provides a convenient and efficient way for customers to make purchases, allowing them to do so from anywhere and at their convenience. A brand can use a variety of e-commerce strategies, such as personalised offers, loyalty programmes, customer reviews and others, to attract and retain customers, increase sales and take its brand to the next level.

Besides building online presence strategies, it is important to engage with the audience. Real-time interaction with customers, their feedback, comments and reactions on social media platforms and websites, as well as organising webinars and online events, are essential elements of a brand strategy.

This interaction is aimed at creating an active community around the brand, which helps to increase customer loyalty and enhance customer engagement with the brand. Consumers' perception of the brand as a social partner capable of listening to their needs and feedback makes a great contribution to creating a positive image of the company. In addition, this interaction allows the brand to actively influence the formation and development of consumer preferences and behaviour, which affects its competitiveness and profitability.

Careful study of audience feedback and reactions allows the brand to maintain a high level of customer satisfaction, making the necessary adjustments to the brand's digital strategy. Interaction with the audience also opens up opportunities to develop personalised approaches to each customer, which helps build closer and longer-term relationships.

Overall, effective audience engagement is an essential component of successful brand management in the digital age, which requires companies to pay constant attention to the needs and expectations of their audience, as well as flexibility in implementing new tools and technologies to communicate with them.

It is vital that brands prioritise transparency, authenticity and ethical practices when building their online presence and engagement strategies to build trust and credibility with consumers in an increasingly scrutinised digital environment.

In conclusion, effective digital brand management requires a strategic and multifaceted approach that encompasses online presence, audience engagement and strategic innovation. By seizing the opportunities of the digital age and addressing the challenges that arise, brands can define themselves in the marketplace and succeed in a competitive digital environment. Through constant adaptation, innovation and a commitment to authenticity, brands can build strong connections with their audiences and thrive in today's business environment.

References:

1. Gensler, S., Völckner, F., Liu-Thompkins, Y. & Wiertz, C. (2013). Managing brands in the social media environment. Journal of Interactive Marketing, 27(4), pp. 242- 256. doi: 10.1016/j.intmar.2013.09.004 (accessed:: 25.02.2024).
2. What is digital brand management? URL: https://beresponsive.com/what-is-digital-brand-management/ (accessed: 25.02.2024).
3. What is digital brand management? URL: https://www.bynder.com/en/glossary/digital-brand-management/ (accessed: 25.02.2024).

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Transformational Leadership in Business

The pace of change in the modern business world is rapid and unrelenting. New technologies, competitors, market forces, and customer expectations are continuously reshaping industries. For companies to adapt and flourish in these turbulent environments, effective leadership is crucial. Specifically, transformational leadership enables organizations to evolve and succeed in fast-changing business environments.

Firstly, transformational leaders promote innovation and new perspectives. Unlike transactional leaders who rely on incentives, transformational leaders inspire followers by stimulating the development of their creativity. For instance, when Steve Jobs returned to Apple in the late 1990s, the company was struggling and lacked vision. Jobs pushed designers to reimagine Apple products and develop breakthrough offerings like the iMac, which was an all-in-one colorful computer for the consumer market. The iMac's revolutionary design helped revive Apple and pushed the entire computer industry in a new direction [1].

Fig.1 - Apple Stock Price 1996-2000 highlighting launch of iMac (Adapted from https://www.macrotrends.net/stocks/charts/AAPL/apple/stock-price-history)

Similarly, Ukrainian logistics company Nova Poshta created an online platform to engage partners in developing innovative solutions together with their R&D team. This facilitates networking and emergence of new products. By championing experimentation in this way, transformational leaders in both Apple and Nova Poshta empower innovation.

In addition, Jeff Bezos urges Amazon developers to maintain a startup mentality to drive constant innovation, even as the company has grown into a giant corporation. By championing experimentation and creative thinking in this way, transformational leaders empower their organizations to promptly adapt to new technologies and market conditions [2].

Another example is when Reed Hastings founded Netflix in the late 1990s, retail video rental stores like Blockbuster dominated the industry. Yet Hastings envisioned an innovative business model of DVD rentals ordered online and delivered through the mail. Despite initial skepticism, this transformational vision enabled Netflix to pivot successfully from mail-order DVD rentals to video streaming in 2007, and then to a global production house of original content. By stimulating radical innovation in this way, transformational leaders allow companies to evolve with changing market environments [6].

In addition, transformational leaders construct agile organizations designed for rapid change. Rather than adhering to rigid hierarchical structures, they streamline bureaucracies, decentralize authority, and use cross-functional teams to encourage flexibility. This organizational nimbleness facilitates the quick flow of information and ideas so the company can respond swiftly to threats and opportunities.

A case in point is Netflix and its high-autonomy culture which has enabled the company to transition smoothly from DVD rentals to streaming to original content production as market landscapes shifted. Unlike hierarchical organizations where decisions flow vertically through many management layers, Netflix utilizes context-setting and decentralized decision making. For instance, there is no vacation policy - employees decide when they need breaks. This organizational agility based on employee empowerment provides the agility needed to adapt rapidly.

In contrast, former market leader Blockbuster maintained a traditional hierarchical structure where local store managers lacked authority and major decisions were made at the executive levels. This bureaucratic organization left Blockbuster slow to react to market changes and unable to leverage new streaming technologies quickly enough. The company filed for bankruptcy in 2010 [3]. The contrast in fortunes between Netflix and Blockbuster underscores how transformational leadership enables organizational dexterity required for turbulent times.

Similarly, Nova Poshta set up an open "NovaTech" innovation space to test new solutions with partners. The scale and diversity of this initiative signifies transformational leadership's emphasis on organizational adaptability.

Finally, transformational leaders invest substantially in developing human capital through mentoring, training, and elevating employees to reach their full potential. Unlike transactional leaders focused on short-term outputs,

transformational leaders take a long-term perspective centered on nurturing talent. For example, Reed Hastings uses techniques like work stretch assignments and keeper tests to strengthen employees' critical thinking and judgment skills at Netflix. By giving challenging assignments outside their core roles, leaders assess how employees respond to unfamiliar problems. This talent development furnishes the organization with seasoned, versatile leaders ready to tackle new obstacles.

Likewise, Microsoft experienced tremendous growth under CEO Satya Nadella due to his emphasis on employee development programs. He championed initiatives like LearnTV which provides on-demand training videos for workers to gain new skills. And Microsoft's Leadership Development Roadmap promotes internal mobility so employees gain exposure to diverse roles and departments [4]. By believing in people's ability to learn and grow, Nadella transformed Microsoft's culture and empowered the organization to return to rapid growth after a stagnant period.

Failing to develop human capital in this way risks leaving companies unready for the future. For instance, traditional automakers like General Motors struggled to compete as the industry shifted toward electronic vehicles. Due to lack of retraining programs, GM's long-time mechanical engineers lacked electronics expertise. In contrast, newer company Tesla actively trained all employees - from factory workers to designers - on the latest EV battery and software systems. This focus on human capital development enabled Tesla to lead and shape the electronics automotive era [5].

In conclusion, transformational leadership is indispensable for companies operating in turbulent, fast-changing business environments. Transformational leadership is not only a style that inspires positive changes in a company's personnel, but also a process of realizing the need for renewal (change), creating a new vision, and implementing new principles through the institutionalization of change. By stimulating innovation, adaptability, and human development, transformational leaders allow organizations to evolve rapidly.

Companies that have dedicated themselves to developing transformational leadership skills across all levels will be well-positioned to turn disruption into opportunity and flourish far into the future.With visionary guidance and an empowered workforce, businesses can thrive amidst the most chaotic times. The road ahead is filled with twists and turns, but transformational leadership provides the crucial navigation needed to steer companies through the storm toward a prosperous future, cultivating talent and building a powerful global workforce.

References

1. Jobs, W. (2015). Steve Jobs: In His Own Words. Agate B2.
2. Kantor, J., & Streitfeld, D. (2015). Inside Amazon: Wrestling big ideas in a bruising workplace. The New York Times, 15.
3. Satell, G. (2014). A Look Back At Why Blockbuster Really Failed And Why It Didn't Have To. Forbes.

https://www.forbes.com/sites/gregsatell/2014/09/05/a-look-back-at-why-blockbuster-really-failed-and-why-it-didnt-have-to/?sh=39cd21841d64

4. Strauss, K. (2016, September 20). These Are The Skills Bosses Say New College Grads Do Not Have. Forbes. https://www.forbes.com/sites/karstenstrauss/2016/05/17/these-are-the-skills-bosses-say-new-college-grads-do-not-have/?sh=8cc790754916

5. Tasler, N. (2017). The end of management: What great managers do differently. Wiley.

6. Thompson, D. (2014, June 20). Netflix's Original Content Strategy Is Paying Off. The Atlantic. https://www.theatlantic.com/culture/archive/2013/10/netflixs-original-content-strategy-paying/309735/

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Micromanagement Or Macromanagement: Which Style You Need

Nowadays, the up-to-date issue of management is unclear leadership. Recently, a great deal of emphasis has been placed on the situation where a leader is harming an organization. One of the recent studies shows that 44% of business professionals consider poor leadership a demanding challenge in their work [2].

The present study addresses micromanagement and macromanagement styles, analyzes their advantages and disadvantages, and seeks to understand why business people often micromanage.

Micromanagement is a management style that involves excessive interference in the work of subordinates, controlling their every step, and not giving them the opportunity to realize themselves as individuals.

Being engaged in micromanagement, a manager:
- deals with operational tasks, not general strategy;
- is concerned with the work process more than the result;
- does not know how to delegate;
- treats every employee's mistake too strictly, constantly questioning their competence;
- turns to subordinates too often, demanding detailed reports on the work performed;
- interrupts the work of others due to excessive intervention and control;
- behaves self-confidently, but in fact, is very afraid of making mistakes as a manager.

Micromanager psychotype is characterized by:
- too high self-confidence and belief in one's own uniqueness, the desire to show these traits to others and prove one's irreplaceability;
- dependence on management – the desire to intervene and excessive control of the lives of subordinates;
- self-doubt, humiliation of others as a result of lacking the skills to increase self-esteem in other ways;
- the control of every stage of the process due to mistrust of others.

Reasons for micromanagement:
- lack of management skills;
- definite personality psychotype;
- supervision of a new employee or intern;
- violation of the deadlines.

To stop being a micromanager, it makes no sense to give too detailed instructions for each simple task. If there are doubts about how the subordinates are going to perform the work, it is simply necessary to find out how they plan to

perform it and not to insist on your own plan. It is worth concentrating not on the shortcomings of subordinates, but on their strengths, developing and using them to the maximum, providing the appropriate task. An effective reward system to motivate subordinates, conditions for the rule of principles of mutual respect and mutual assistance usually give good results. Mistakes cannot be avoided, they are one of the best ways to learn. When innovative ideas of subordinates are encouraged, they can optimize the company's processes. Providing stable feedback is a must.

Micromanagement is important both for beginners who are going through a period of adaptation in order to better understand the specifics of the work and employees who are not ready to make independent decisions. It is also necessary to control all the steps of subordinates during a crisis in order to quickly overcome the situation and prevent negative consequences when subordinates make rash decisions.
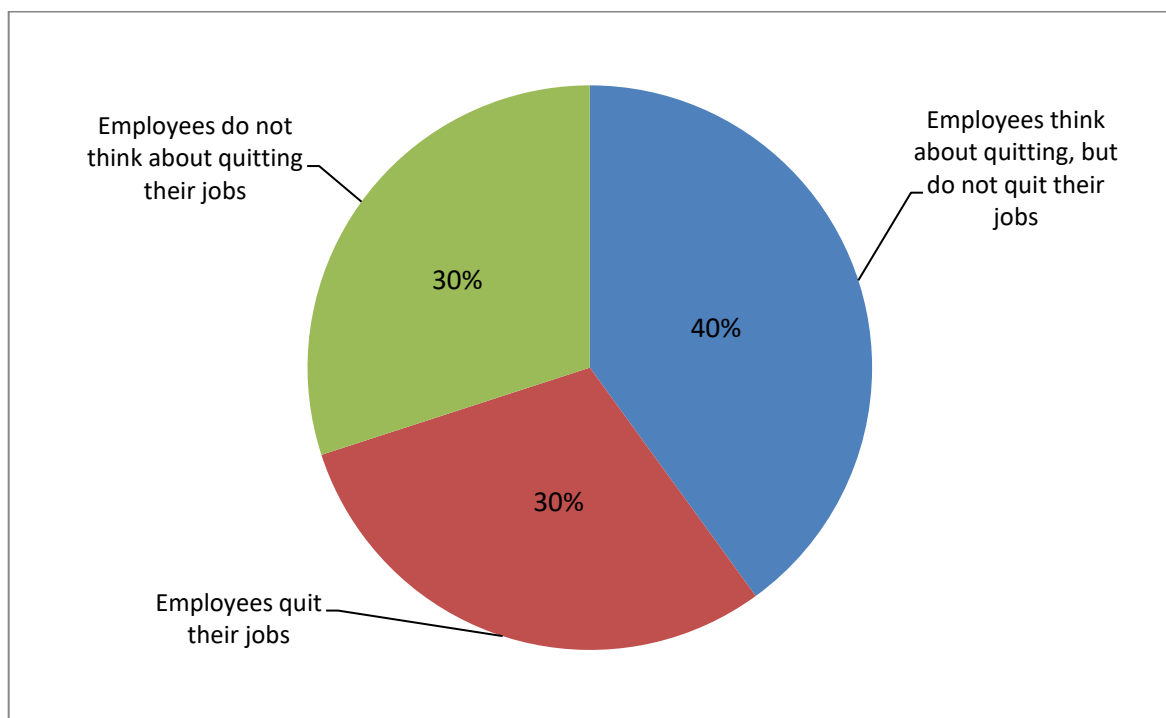

Figure 1 - The impact of micromanagement on people [1]

However, there are a number of disadvantages of micromanagement. Subordinates can fall into depression, due to which they stop showing initiative, and this reduces the opportunity to improve work efficiency. Deterioration of communication between subordinates and possible conflicts interfere with productive work. Generation of insecurity among subordinates leads to a loss of interest in the effective performance of the task, and sometimes to their sabotage. Constant pressure from the micromanager leads to inability of subordinates to make decisions independently. Inability to perform tasks in a timely manner is due to the need to constantly check and improve one's work. For a micromanager, there is not enough time for successful feedback. There is a high probability that subordinates will quit their jobs, because they understand that it is impossible to work in such conditions, and over time, only the weakest will remain (Fig.1).

Macromanagement is a management style that involves focusing the manager's attention on the general strategy, giving subordinates the opportunity to independently make decisions that correspond to this strategy. Macro managers are also called managers of macros. They allow subordinates to independently decide the way in which they perform work, sometimes allow them to choose their own work schedule, if they successfully perform the work.

Macromanagement has undeniable advantages. It improves the company's productivity by focusing on overall efficiency, provides subordinates with an opportunity to prove themselves that will most likely lead to more effective work. There is also time to provide full feedback and help in the event that the subordinate cannot independently complete the assigned task.

Macromanagers do not interfere with subordinates giving them independence and not oppressing them. Subordinates work without excessive control. They make innovative decisions independently that leads to the search for new ways to perform tasks more efficiently. Besides, there is a possibility of mutual assistance between subordinates as a result of the non-interference of the macro-manager in every detail of the task performed.

However, macromanagement has several disadvantages. Sometimes it is impossible to provide feedback to subordinates due to lack of knowledge in this area. Information on the problems of subordinates will not be provided in a timely manner due to remoteness from subordinates. The additional level of bureaucracy may complicate the communication process.

The results of the study show that macromanagement is more successful for large enterprises. For small businesses, micromanagement can be better because the number of people is less and the manager will have enough time to help subordinates. Finding the balance is very important.

References:

1. Ciappei A (2023) Micro vs Macro managment https://www.linkedin.com/pulse/micro-vs-macro-management-alessandro-ciappei. Accessed 18 March 2024
2. Sindell T, Sindell M (2016) 4 ways effective leaders deal with incompetent people. https://www.entrepreneur.com/article/283996. Accessed 24 March 2024

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Modern Electronic Manufacturing in Ukraine: In-house Service vs. Outsourcing

In the contemporary landscape of electronic manufacturing, businesses in Ukraine face critical decisions regarding the management of their production processes. This article delves into the pivotal choice between maintaining in-house manufacturing services versus outsourcing to external entities. Drawing upon insights from industry experts and scholarly research, the analysis revolves around eight central pillars: cost considerations, the imperative for high-quality personnel, production volumes, infrastructure resilience, certification requirements, inter-project communication, intellectual property protection, and geopolitical considerations.

Firstly, the cost dynamics of electronic manufacturing stands as a formidable challenge for companies in Ukraine[1]. The capital-intensive nature of modern manufacturing necessitates substantial investments in infrastructure, technology, and human resources. Whether opting for in-house operations or outsourcing, businesses grapple with the financial intricacies inherent in acquiring and maintaining cutting-edge equipment, as well as the expenses associated with skilled labor and regulatory compliance.

Secondly, the pursuit of excellence in electronic manufacturing hinges significantly on the caliber of personnel involved. Skilled professionals are indispensable for ensuring product quality, optimizing production processes, and navigating the complexities of rapidly evolving technologies. The article scrutinizes the viability of cultivating an in-house workforce capable of meeting these exacting standards, juxtaposed against the potential benefits of leveraging the expertise of external specialists through outsourcing arrangements.

Thirdly, the scale of production emerges as a decisive factor in shaping the manufacturing landscape in Ukraine. High-volume output is essential for realizing economies of scale, driving down unit costs, and maximizing profitability. However, achieving and sustaining such levels of production demands substantial resources, from extensive operational infrastructure to efficient supply chain management. The article evaluates the feasibility of maintaining requisite production volumes internally, contrasting it with the flexibility and scalability afforded by strategic outsourcing partnerships.

The necessity for additional infrastructure to mitigate the impact of blackouts adds a layer of complexity to the decision-making process[2]. The reliable power supply is essential for uninterrupted manufacturing operations, prompting businesses to invest in backup systems and contingency plans to safeguard against potential disruptions.

Certification requirements, such as ISO9001, loom large in the considerations of electronic manufacturers in Ukraine. Adherence to internationally recognized quality standards not only enhances the marketability of products but also signifies a commitment to excellence and customer satisfaction.

Moreover, the protection of intellectual property (IP) emerges as a critical concern for electronic manufacturers in Ukraine. Whether conducting in-house production or outsourcing, safeguarding proprietary technologies and designs is paramount to preserving competitive advantage and preventing unauthorized replication or theft.

Lastly, geopolitical considerations, such as trade agreements, sanctions, and political stability, exert significant influence on the strategic decisions of electronic manufacturers in Ukraine. The article explores how geopolitical factors impact supply chain management, market access, and overall business resilience.

In essence, the decision between in-house manufacturing and outsourcing in Ukraine's electronic industry encapsulates a multifaceted calculus of cost, expertise, production scale, infrastructure resilience, certification requirements, inter-project communication, intellectual property protection, and geopolitical considerations. Through an in-depth exploration of these critical considerations, this article aims to provide insights and guidance for businesses navigating the complexities of modern electronic manufacturing paradigms in Ukraine.

Additionally, environmental sustainability emerges as a growing concern within the electronic manufacturing industry. Companies must navigate regulatory requirements, resource conservation, and waste management practices to mitigate their environmental impact. This article examines strategies for implementing eco-friendly manufacturing processes, such as reducing energy consumption, minimizing waste generation, and adopting recyclable materials. By prioritizing sustainability initiatives, electronic manufacturers in Ukraine can enhance their brand reputation, attract environmentally conscious consumers, and contribute to global efforts towards a greener future.

Supply chain resilience has become increasingly crucial in the wake of global disruptions, such as the COVID-19 pandemic. Electronic manufacturers in Ukraine must assess the vulnerabilities within their supply chains, diversify sourcing strategies, and implement contingency plans to mitigate risks posed by unforeseen events. This article explores the importance of supply chain visibility, collaboration with suppliers, and the adoption of digital technologies, such as blockchain and predictive analytics, to enhance resilience. By fortifying their supply chains, companies can better navigate disruptions, maintain operational continuity, and sustain customer satisfaction amidst turbulent times.

Thus [3], the integration of emerging technologies, such as Internet of Things (IoT) devices and artificial intelligence (AI) systems, presents both opportunities and challenges for electronic manufacturers in Ukraine. This article explores how embracing innovation can enhance productivity, product functionality, and market competitiveness, while also addressing potential risks and implementation complexities.

References:

1. " On the Outsourcing Dynamics in the Electronics Sector: The Evolving Role of the Original Design Manufacturer " -
[https://www.researchgate.net/publication/235256584_On_the_Outsourcing_Dynamics_in_the_Electronics_Sector_The_Evolving_Role_of_the_Original_Design_Manufacturer]

2. "19 electronics manufacturing process challenges and solutions " -
[https://katanamrp.com/blog/electronics-manufacturing-process/]

3. " Competitive advantage of IT and effects on strategy and structure: Knowledge-intensive vs manufacturing industries" -
[https://www.researchgate.net/publication/247831979_Competitive_advantage_of_IT_and_effects_on_strategy_and_structure_Knowledge-intensive_vs_manufacturing_industries]

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Color Psychology in Marketing

The main method of studying the environment for humans is visual perception. That is why the color of an object directly determines how a person will perceive it. The perception of a product by color is an integral part of the success of a brand or advertising campaign. In the era of information technology, in particular the development of online shopping, when a person cannot touch the product, color plays a crucial role. With its help the manufacturer can show that the product has certain competitive advantages, for example, it is environmentally friendly, or belongs to the premium segment. In a world overloaded with information, advertising needs to stand out, and color is a great tool for determining the target audience and product features.

For each color, there are generally defined certain associations and emotions that they evoke. Red is the color of action and attention. It can be used to show importance, danger, or urgency. There are so many well-known companies that use this color, for example, Coca-Cola, Netflix, Levi's and other brands. Blue is used to create an image of reliability and professionalism. It can also be associated with calmness and purity. Famous brands that use the blue color are Ford, Samsung, and Intel. Green is the color of nature and regeneration. It is associated with freshness and growth. In marketing, it is used to create an ecological and healthy impression. Green can also be associated with harmony and calmness. Ecco, Sprite, tic tac are well-known brands that use this color in their design.

Fig.1 Factors by which consumers choose a product (adapted from KISSmetrics infographic)
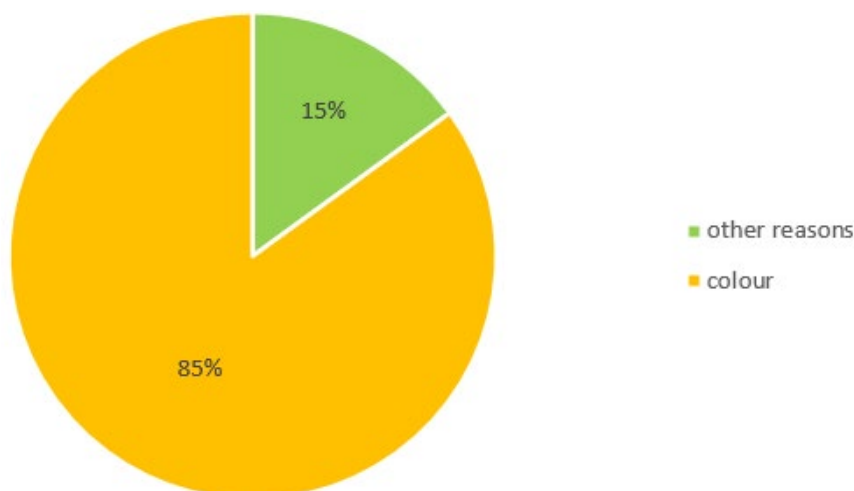
A KISSmetrics research (a web analytics platform) shows that only 15% of customers do not put color as the main factor for choosing a product [1].

The same study shows that colors can be divided into several groups: for impulsive buyers, red, orange and black colors are more attractive; dark blue or turquoise are preferred for a limited budget; the standard buyer is attracted to colors such as pink or sky blue (Table 1).

Table 1 - Customer color preferences

Impulsive shoppers	Shoppers on a limited budget	Standard buyers
Orange	Dark Blue	Pink
Black	Turquoise	Sky Blue
Red		Rose

Due to the fact that each color evokes certain associations in a person, it is very easy to manipulate on this. If we take a product and paint it green, it is perceived as fresh and environmentally friendly. If we make the packaging black or dark purple, the product will be associated with something premium. White or blue will cause a feeling of purity and usefulness.

Many recent studies show that people have certain associations with companies and their colors in their logos [3-4]. We conducted a survey among the students of Dnipro University of Technology. The data indicate that when mentioning the red color, the first thing that comes to mind is the Coca-Cola brand (25% of consumers mention it), another 25% fall on McDonald's, 50% of respondents choose other companies, among them: Kit-Kat, Old Spice and others (Fig. 2).

Fig.2 Consumer associations with certain brands when mentioning red

An example of the use of color for positioning a product segment is the Brocard
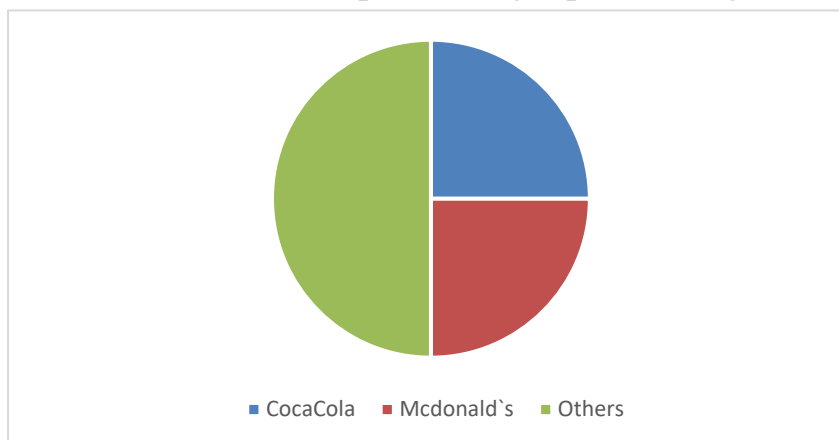
store, its design is dominated by black and white colors, which underlines its premium nature. If we compare it with the Eva store, in which the price segment of the product is much lower, we will see that bright orange and green colors are used in the design, which hints at friendliness to the buyer.

In general, this research shows that color is an integral part of successful marketing. This tool has a great impact on the consumer's choices, emotions, and perceptions. The use of a certain color for a product can completely change it in the eyes of the consumer, make it more relevant and sellable. Understanding the psychology of color in marketing is a crucial element for any business. Using the right colors in marketing can evoke the right perception.

References:
1. KISSmetrics Infographic: How Do Colours Affect Purchases? Available from: https://strategylab.ca/kissmetrics-infographic-how-do-colours-affect-purchases/
2. Martinez, L. M., Rando, B., Agante, L., & Abreu, A. M. True colors: Consumers' packaging choices depend on the color of retail environment. 2021 Journal of Retailing and Consumer Services, 59. Available from: https://www.sciencedirect.com/science/article/pii/S0969698920313801
3. Page T., Thorsteinsson G., Ha J. G. Using colours to alter consumer behaviour and product success //International Journal of Contents. 2012 Available from: https://accesson.kr/ijcon/assets/pdf/2133/journal-8-1-69.pdf
4. Caivano, José Luis, and Mabel Amanda Lopez. "Chromatic identity in global and local markets: analysis of colours in branding." Journal of the International Colour Association 1.3 (2007): 1-14 Available from: https://ncscolour.co.za/images/natural-colour-system/online-training/jose-luis-caivano/2007coldes.pdf
5. Yu, Chung-En, Selina Yuqing Xie, and Jun Wen. "Coloring the destination: The role of color psychology on Instagram." Tourism Management 80.(2020) Available from: https://www.sciencedirect.com/science/article/pii/S0261517720300364
6. Khattak A., Khan Khalil Y., Shah., Haider A., Yasir K., Yasir Khan Shah M., Wali Khan A., Khattak S., September 2020 Color Psychology in Marketing Available from: https://escholarship.org/content/qt67v2q6g3/qt67v2q6g3.pdf

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Modern marketing communication trends

In today's world, where technology is rapidly evolving and consumers are constantly changing their views and requirements, marketing communication are in a state of constant transformation. The growing influence of social media, changes in the way people perceive advertising, and the growing importance of environmental and social responsibility are all affecting strategies and approaches to marketing communication. In this context, understanding and analyzing current trends in marketing communication is becoming critical for businesses seeking to remain competitive and effectively engage with their audiences. In this study, we will try to characterize and analyze the most significant and influential trends that shape the future of marketing communication in the modern world.

Thus, the main trends that are being actively implemented in the communication strategies of many companies are artificial intelligence, VR and AR, and personalization. If we focus on Ukrainian producers, we can see that many of them are implementing social responsibility in their communication policies and trying to promote Ukrainian identity and culture. Let's take a closer look at each of these trends.

Artificial intelligence: In the rapidly evolving consumer sphere, people are looking for quick solutions and assistance. Companies are turning to chat-bots and AI-powered virtual assistants as the primary means of interaction, allowing brands to connect with customers in a timely manner [1]. This not only guarantees quick responses, but also facilitates a seamless and personalized customer experience. With conversational AI, these chat-bots engage customers in a natural conversation, answering queries, providing recommendations, and increasing overall satisfaction.

VR and AR: As companies recognize the potential of virtual and augmented reality, they are increasingly integrating these technologies into their marketing strategies. They understand that VR and AR can enhance the engagement, enjoyment, and memorability of their marketing efforts. By leveraging these tools, brands can craft dynamic and immersive experiences for their target audiences. This departure from conventional marketing signifies a strategic shift, with businesses purposefully embracing VR and AR to captivate audiences, foster brand loyalty, and distinguish themselves in a technology-driven era.

Personalization: One of the key trends in marketing communication channels is personalization. Personalizing content allows you to accurately identify the needs and interests of each customer and provide them with relevant information, which helps to increase engagement and conversions. To personalize your content, you need to collect and analyze data from various sources, such as CRM, web analytics, social media, and surveys. Integrating different data sources allows you to get a complete

picture of your customers and effectively tailor your communication strategy for each individual case [2]. This approach not only increases marketing effectiveness, but also increases customer satisfaction and loyalty, encouraging them to make repeat purchases and recommend your brand.

Social responsibility: Another trend that can now be seen especially in the activities of Ukrainian brands and companies is massive social responsibility. While previously companies supported social and charitable initiatives selectively, today both small and large brands have adapted their activities to benefit the country. In addition to simply transferring funds, brands are coming up with promotions to engage their audience more [3]. Massive social responsibility not only allows companies to fulfil their corporate responsibilities to society, but also creates a positive image that attracts new customers and strengthens the connection with existing audiences.

Promoting Ukrainian identity and culture: After 24 February, local brands' collections were mostly dedicated to Ukrainian culture. The desire to dissociate ourselves from everything Russian has triggered a new wave of popularization of our culture and traditions. Brands are releasing special collections, communicating about our history and playing with well-known symbols. This not only helps to attract new consumers, but also helps to support national identity and increase patriotic sentiment in Ukrainian society. By encouraging people to give preference to their own cultural values and traditions, these brands become symbols of national pride and self-identification. Moreover, the promotion of Ukrainian culture through fashion contributes to its preservation and development, creating a platform for highlighting our uniqueness at an international level.

Conclusion: As we mentioned at the beginning, marketing communication are now playing a critical role in the way companies interact with their audiences. Today, we've looked at a number of key trends that are shaping the future of marketing communication, but we shouldn't forget that these trends are constantly changing. Artificial intelligence, virtual and augmented reality, personalization, social responsibility and promotion of Ukrainian identity and culture – these trends not only reflect modern technological capabilities, but also open up new opportunities to increase the efficiency and depth of interaction with the audience. Achieving success in this competitive environment requires companies to constantly update and adapt to new technologies and consumer values.

References:

1. 6 Future Marketing Trends That Will Define 2024. URL: https://www.impactmybiz.com/blog/future-marketing-trends/#interactions (accessed: 29.03.2024)
2. How can you use emerging trends in marketing communication channels? URL: https://www.linkedin.com/advice/0/how-can-you-use-emerging-trends-marketing-communication (accessed: 22.12.2023)
3. Trends in wartime communication and marketing. URL: https://bazilik.media/trendy-v-komunikatsiiakh-i-marketynhu-voiennoho-chasu/ (accessed: 29.03.2024)

Розширюючи обрії

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