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# BUILDING AND ARCHITECTURE

**Aivazian M. V.**

## **GREAT WHITE SWAN CASTLE IN SHARIVKA PARK**

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Kharkiv has lots of historical monuments, cultural and architectural showplaces, one of them being Sharivka Palace, which is also called "Sugar Castle" and "Kharkiv pearl". It is hidden in the middle of a forest 60 km from Kharkiv city.

The Palace is really spectacular; it is a part of the most beautiful architectural and park ensembles of the region, the cultural heritage of national importance.



Sharivka is a former landowner's estate in the village of Sharivka in the Kharkiv region. The construction of Sharivskiy manor on the bank of the river Merchik began in the early XIX century. The landowner Pavel Olkhovskiy had ordered the construction of the palace and had laid a large park on the slope of a two-kilometer beam. Savva Vasilievich received a village from Catherine II being

a retired major.

In 1860, Olkhovskiy lost his estate in a card game (according to another version it was just sold) to the new owners, the Hebershtein brothers from Germany. During the possession of the estate the brothers repaired the house itself, completed the greenhouses, gates, fence and house for guards. And one of the brothers, Christian - an amateur botanist, was carried away by creating a park around the manor, and filled it with exotic plants. The park area of about 40 hectares is located on the slopes of a large beam.



In 1881, the estate was purchased by the rich sugar producer Leopold Koenig, who was born and lived in St. Petersburg. He invited the famous and fashionable European craftsmen and gardeners to improve his residence. They built some buildings in Neo-Gothic style for servants, garages for cars, a large pheasant garden, and even a private power plant.

The estate acquired its final appearance both externally and internally by 1912. The central part of the building is decorated with two towers with lancet windows and crenellated roofs, reminiscent of a romantic knight's castle. The interiors of the palace are partially preserved.

The total area of the park is almost 40 hectares (including 15 hectares of forest, 3 hectares of landscapes, 3.5 hectares of lawns and lawns, 1.65 hectares of ponds and 7 hectares of structures).



*View of the garden and the surrounding forest at Sharivka Palace*



*View of Sharivka Palace on the side*



*Remaining garden in the stairs at Sharivka Palace*



*Details of interior decoration at Sharivka Palace*

The palace interior still conserves the splendor with high ceilings decorated with paintings, as well as the wallpapers that used to be reference a model of taste and style during 1880s.

Moreover to its remaining decoration from a long past time, Sharivka has a unique story connected with the baron Leopold Koenig's life. He was a very rich man, but with no luck in love. For a long time he was courting a young lady who agreed to become his wife.

Their wedding was celebrated with circus performers and ballet dancers from Saint Petersburg. After marriage, his wife started to help on Leopold's work and took care of Sharivka children school.

Diagnosed with pulmonary tuberculosis, Leopold's wife had a milestone in her life. Meanwhile the baron ordered to build a healing microclimate with an arboreal park and started to satisfy all her whims. Stories say that during a

summer the baron ordered tons of sugar to build a sugar slide for his wife ride on sleds.

After the revolution of 1917, the couple was forced to emigrate to Germany. Away from the castle and from the favourable climatic conditions provided by the baron, the young wife died after the move.

During the Soviet period, the castle was appropriated by the State. Ignoring the significance of its architecture, authorities organized a sanatorium for tuberculosis patients at Sharivka, and it operated as such until 2008.

Finally, after six years of neglect, in 2014 a new owner, the charitable foundation “Omriyana Krayina” appeared at Sharivka estate. The palace and park complex were leased. The lease is supposed to turn them into a centre of culture and arts. There are plans to establish an International Centre of Culture and Arts on the base of Sharivka palace. The Centre will attract Ukrainians and foreigners to the cultural events, exhibitions and festivals.

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### Amanheldyiev I.C.

#### WHAT DO WE KNOW ABOUT THE HISTORY OF MOSQUES ?

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The mosque has traditionally played a central role in most Muslim societies. It is not simply a building enclosing a sacred space separate from its secular surroundings, but also has the power to sanctify whatever the believer says and does there. The minaret, the dome, the gateway and calligraphy are all key elements of mosque architecture. In modern times, many changes have been introduced to the traditional concept of the mosque, therefore diminishing and distorting its main function.



Since the 7th century, mosques have been built around the globe. The first mosque was designed by the Prophet Muhammad himself within the courtyard of his home in Medina in the seventh century. It was a large courtyard surrounded by long rooms supported by columns with a palm leaf covering to provide shade during prayer which could accommodate the local congregation when they assembled for Friday prayers.

It makes sense that the first place of worship for Muslims, the house of the Prophet Muhammad, inspired the earliest type of mosque - the hypostyle mosque. This type spread widely throughout Islamic lands. From Morocco to Malaysia and Los Angeles to London, the mosque in its many forms is the quintessential Islamic building.



*he Federal Territory Mosque at Kuala Lumpur, Malaysia*      *Sheikh Zayed Grand Mosque in Abu Dhabi*

Today, as we enter the twenty-first century, many new styles of mosque architecture and decoration are appearing. One of the leading architectural and design firms in the world, Saray Design based in Delhi, Jaipur and London have, over the years, created some of the most outstanding and original ornamentation and calligraphy for mosques drawing from the rich tradition of Islamic design and utilizing their extraordinary team of master marble carvers and inlay artisans. Saray's projects include the Federal Territory Mosque of Kuala Lumpur, the Sheikh Zayed Grand Mosque in Abu Dhabi, the movable marble minbar for the Masjid Al-Haram in Mecca Sharif where the Saray artisans are currently working on the inlaid and gilded lapis calligraphy for the Al-Shamiya Extension of this most sacred site in the Islamic world.

Mosques consist of an area reserved for communal prayers, frequently in a domed building with a minaret, and with mihrab or other structure indicating the direction of Mecca. A mihrab is a niche in the wall that indicates the direction of Mecca, towards which all Muslims pray. Mecca is the city in which the Prophet Muhammad was born. No matter where a mosque is, its mihrab indicates the direction of Mecca.



*Mihrab (niche)*

The architecture of a mosque is shaped most strongly by the regional traditions of the time and place where it was built. As a result, style, layout, and decoration can vary greatly.

Over time, the walls, domes and minarets of the mosque become highly decorated incorporating three main decorative motifs: geometric, natural/vegetal and calligraphic, which incorporated inspiring verses from the Qur'an Sharif, the Islamic holy book.

Most mosques also feature one or more domes, called qubba in Arabic. A dome does possess significance within the mosque—as a symbolic representation of the vault of heaven.

One of the most visible aspects of mosque architecture is the minaret, a tower adjacent or attached to a mosque, from which the call to prayer is announced. Minarets take many different forms—from the famous spiral minaret of Samarra, to the tall, pencil minarets of Ottoman Turkey. Not solely functional in nature, the minaret serves as a powerful visual reminder of the presence of Islam.

Contemporary mosque architecture often represents a remarkable blending of styles, drawing from diverse architectural traditions to create something recognizably “Islamic,” that fulfills all the architectural requirements of a communal mosque and is contemporary in style. In Pakistan, the King Faisal Mosque, 1986 blends contemporary architecture with visual references to traditional forms. The building is strikingly modern, yet plays with the form of the tent structures of Bedouin nomads. This large mosque also incorporates Ottoman-influenced pencil-thin minarets into its modern design.

At the moment, there are five mosques in Kharkiv. Their size and appearance are slightly different from other mosques, which are located in other cities. Soft and flowing lines prevail in the design. Such materials as wood, glass and clay are used in interior decoration. The floors of some rooms are decorated with bright mosaics. One of these mosques is Kharkiv Cathedral Mosque, also known as Khavidrali Mosque (“Fatima Mosque”), is located in Kharkiv, Ukraine. The mosque was originally built on the bank of the River Lopan in 1905, but it was demolished by the Soviets in 1936, and rebuilt at the same location in 2006. But we know that Kharkiv is a developing city and in the future the importance of mosques will increase. The importance of architecture from other cultures will give more variety and will beautify the city for the better.



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### **MODERN ARCHITECTURE FOR REFUGEES**

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Today, between 59 and 67.2 million refugees, asylum seekers and internally displaced persons are trapped in a state of temporary permanence.

Shouldered by hope and the unknown, individuals and families continue to find their way across states under siege, multiple borders, and into makeshift processing centers and camps. They often reach the edges of one continent or landmass in preparation for another journey. And there, they wait. Sometimes they're imprisoned; more often they're exposed to the elements and police actions.

Architecture for security

Security has been defined as a global issue of increasing magnitude and complexity. From a need to establish safety to the desire for economic well-being, security has become a defining factor of contemporary architecture and the human condition.

Politicians, urban planners, environmentalists, terrorist groups and lawmakers have all used the issue of security to justify their actions and work.

While nations are being redefined by the unannounced arrival of millions, the effects of forced displacement continue to evolve through risk and violence in the name of security. It is troubling to see attempts at slowing down or preventing these arrivals through coercion, punishment. We are thus witness to competing interests when it comes to the definition of the refugee as human.

Architecture plays a fundamental role in redefining contemporary ethical agendas. Around the world, architects and designers are grappling with ideas to move beyond a conventional understanding of building to calculate how an individual's mobility may also help bring about security.

We might call this architecture of displacement. Here, scenes of flimsy boats filled with individuals, or a country's border marked by a fences and guns should not be regarded as challenges to surpass or ignore, but as opportunities to reassess how and why we respond to the circulation of people today.

There has been relatively little discussion as to how architecture engages with and responds to global refugee emergencies. Through art,

architecture and design, we may begin to be able to identify effective ways in which to visualize ourselves as citizens.

Working to prevent the sense of alienation from local culture that often occurs in refugee settlements, the team behind Society Lab has proposed a system that unites architecture and technology to find housing for asylum seekers. They have pointed to 28,000 vacant houses in Helsinki as a residential web that is already built and already completely incorporated into the city.

Rather than using state funds for new construction projects, Society Lab suggests financing one year of rent for refugee families in one of these vacant homes. The accompanying acknowledges the ubiquity of the smartphone, and offers users a chance to seek out and secure housing before entering the country, allowing a smoother transition in a situation that should certainly avoid inflicting any unnecessary trauma. Living for one year in these homes around Helsinki, asylum seekers have the opportunity to meet neighbors and become acquainted with the local language and culture.

Similarly to Society Lab, Enter the Void works with existing urban resources to carve out the potential for new housing and communities within our cities. The project operates with the knowledge that migration moves towards urban centers, and those urban centers possess the built remnants of business. The "void" here is made up of Germany's vacant office buildings, which are already physically integrated into functioning cities.

Enter the Void enlists the help of governments to clear the office buildings and provide furniture essentials for critical high-traffic asylum seeking time periods. The team has made use of the buildings' verticality to create a program divided by sections of floors, with public spaces such as education centers on the lower floors, and private housing and bathing areas on the upper floors. Over time, the emergency units are transformed into more permanent apartments that still facilitate interaction with the surrounding community as the lower floor public use space offers. Finally, the final product is completed with a green roof for interaction and sharing.

The team behind We House Refugees responded to the issues of stigmatization and isolation that occur when refugee housing is built under a separate typology from the local architecture. The goal of this proposal is long-term solution that actively works against prejudice by embedding itself into the existing city and community.

The "Donor Apartments" that make up this project appear from the outside like any standard apartment in a desirable urban area, except local tenants are offered a 25% rent reduction. On the inside, each unit has an "embedded refugee room" with its own front door that can be used as the tenant sees fit until times of crisis, in which they may be asked by the government to make the room available for refugees. The co-living situation is temporary, but the infrastructure of openness and relationships it creates Start with a Roof aims to create more space for asylum seekers by building

only what is necessary, when it is necessary. For his proposal, Satoshi Ohtaki suggests that when there is a surge of refugees into the country, all that is immediately needed are basic shelters. In times where need is high, robust triangular structures are built. They are livable, but made of prefabricated insulated plywood panels of a standard size that can be quickly assembled on site.

The team of architects behind IMBY has tackled some of the interpersonal challenges of seeking asylum by proposing three way collaboration among Finnish homeowners, asylum seekers, and entrepreneurs. Homeowners volunteer their backyards and entrepreneurs their expertise to build "tiny homes" for refugees within the existing developed landscape.

IMBY sidesteps the real estate market by asking volunteer entrepreneurs to create a method for wooden home fabrication, and then train asylum seekers in the construction of their own homes. For their work, trainees also receive a diploma and can later seek out additional construction jobs. The network of relationships and local hosts provides a method for integration into Finnish society that ideally creates a sustainable model for the architecture of refugee housing that is fully aware of the economic and social issues of its own reality.

Once the influx of asylum seekers slows down, these triangular structures can become the roofs of more spacious permanent homes, by lifting them on top of new units and covering them with more durable materials. Start with a Roof combines the idea of camp settlements and permanencies, removing the personal and public stressors that come with transitioning out of segregated housing and into local neighborhoods are not.

Architecture has the capacity to lessen the trauma inflicted by displacement. Refugee encampments and detention centers should no longer act as zones of exclusion, ignored by both governments and public conversation. By critically observing self-made designs that are being developed by the inhabitants of camps, it is possible to consider alternatives for designing and building self-sufficiency without resorting to violence.

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**ENERGY RECYCLING**

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Energy recycling is the energy recovery process of utilizing energy that would normally be wasted, usually by converting it into electricity or thermal energy. Undertaken at manufacturing facilities, power plants, and large institutions such as hospitals and universities, it significantly increases efficiency, thereby reducing energy costs and greenhouse gas pollution simultaneously. The process is noted for its potential to mitigate global warming profitably. This work is usually done in the form of combined heat and power or waste heat recovery.

**Forms of energy recycling**

Waste heat recovery is a process that captures excess heat that would normally be discharged at manufacturing facilities and converts it into electricity and steam, or returns energy to the manufacturing process in the form of heated air, water, glycol, or oil. A "waste heat recovery boiler" contains a series of water-filled tubes placed throughout the area where heat is released. When high-temperature heat meets the boiler, steam is produced, which in turn powers a turbine that creates electricity. This process is similar to that of other fired boilers, but in this case, waste heat replaces a traditional flame. No fossil fuels are used in this process. Metals, glass, pulp and paper, silicon and other production plants are typical locations where waste heat recovery can be effective.

Waste heat recovery from air conditioning is also used as an alternative to wasting heat to the atmosphere from chiller plants. Heat recovered in summer from chiller plants is stored in Thermalbanks in the ground and recycled back to the same building in winter via a heat pump to provide heating without burning fossil fuels. This elegant approach saves energy - and carbon - in both seasons by recycling summer heat for winter use.

Combined heat and power (CHP), also called cogeneration, is, according to the U.S. Environmental Protection Agency, "an efficient, clean, and reliable approach to generating electricity and heat energy from a single fuel source. By installing a CHP system designed to meet the thermal and electrical base loads of a facility, CHP can greatly increase the facility's operational efficiency and decrease energy costs. At the same time, CHP reduces the emission of greenhouse gases, which contribute to global climate change." When electricity is produced on-site with a CHP plant, excess heat is recycled to produce both processed heat and additional power.

Enabling technologies: Heat pumps and thermal energy storage are classes of technologies that can enable the recycling of energy that would otherwise be inaccessible due to a temperature that is too low for utilization or

a time lag between when the energy is available and when it is needed. While enhancing the temperature of available renewable thermal energy, heat pumps have the additional property of leveraging electrical power (or in some cases mechanical or thermal power) by using it to extract additional energy from a low quality source (such as seawater, lake water, the ground, the air, or waste heat from a process).

Thermal storage technologies allow heat or cold to be stored for periods of time ranging from hours or overnight to interseasonal, and can involve storage of sensible energy (i.e. by changing the temperature of a medium) or latent energy (i.e. through phase changes of a medium, such between water and slush or ice). Short-term thermal storages can be used for peak-shaving in district heating or electrical distribution systems. Kinds of renewable or alternative energy sources that can be enabled include natural energy (e.g. collected via solar-thermal collectors, or dry cooling towers used to collect winter's cold), waste energy (e.g. from HVAC equipment, industrial processes or power plants), or surplus energy (e.g. as seasonally from hydropower projects or intermittently from wind farms). The Drake Landing Solar Community (Alberta, Canada) is illustrative. Borehole thermal energy storage allows the community to get 97% of its year-round heat from solar collectors on the garage roofs, which most of the heat collected in summer. Types of storages for sensible energy include insulated tanks, borehole clusters in substrates ranging from gravel to bedrock, deep aquifers, or shallow lined pits that are insulated on top. Some types of storage are capable of storing heat or cold between opposing seasons (particularly if very large), and some storage applications require inclusion of a heat pump. Latent heat is typically stored in ice tanks or what are called phase-change materials (PCMs).

### **Current system**

Both waste heat recovery and CHP constitute "decentralized" energy production, which is in contrast to traditional "centralized" power generated at large power plants run by regional utilities. The "centralized" system has an average efficiency of 34 percent, requiring about three units of fuel to produce one unit of power. By capturing both heat and power, CHP and waste heat recovery projects have higher efficiencies.

A 2007 Department of Energy study found the potential for 135,000 megawatts of CHP in the U.S., and a Lawrence Berkley National Laboratory study identified about 64,000 megawatts that could be obtained from industrial waste energy, not counting CHP. These studies suggest about 200,000 megawatts - or 20% - of total power capacity that could come from energy recycling in the U.S. Widespread use of energy recycling could therefore reduce global warming emissions by an estimated 20 percent. Indeed, as of 2005, about 42 percent of U.S. greenhouse gas pollution came from the production of electricity and 27 percent from the production of heat.

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**Aslanowa O. D.**

### **HÄUSER FÜR DIE FLÜCHTLINGE IN DEUTSCHLAND**

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Das Hauptthema in Deutschland ist in diesem Moment eine strömende Welle der Flüchtlinge ins Land, die von den Behörden gigantische Bemühungen um den Empfang und die primäre Unterkunft für etwa 900 000 Flüchtlinge fordert. Die deutschen Behörden sind eilig erzwungen, die Maßnahmen gegen das Defizit der zugänglichen Wohnfläche zu treffen. Auf der Tagesordnung steht der wenig aufwendige Bau für alle Bedürftigen. Und hier ist jedoch nicht alles eindeutig. Die Hilfe den Flüchtlingen aus den Problemländern ist eine edle Sache, aber sie wirkt sich nicht immer positiv auf die Wirtschaft dieses oder jenes Landes aus. Die riesigen Ausgaben – darauf stoßen die Staaten zusammen, die bereit sind, die Flüchtlinge zu beherbergen. Die Investoren sind tatsächlich nicht interessiert, und die Vertreter des Serienbaus beklagen die regionalen Besonderheiten, die ihrer Meinung nach, den Massenbau erschweren.

Das Thema des wissenschaftlichen Artikels "Häuser für die Flüchtlinge in Deutschland" wird nicht nur durch die Aktualität des Problems der Flüchtlinge bedingt, die man in den Empfangspunkten nicht mehr halten darf, sondern auch durch die Möglichkeit, die Rolle der Architekten in der Verbesserung der Lebensqualität der Menschen weltweit und, insbesondere bei der Lösung der scharfen sozialen Probleme zu verstehen.



Der Andrang von Flüchtlingen hat den schöpferischen Stoß für viele Architekten auf dem Gebiet des billigen Baues gegeben. Doch viele Probleme waren nicht gelöst. Die Idee, alle Flüchtlinge in die Gesellschaft zu integrieren, die ins Land in der letzten Zeit angekommen sind, ist schwach entwickelt.

Die Aktualität der Arbeit besteht in der Orientierung der zeitgenössischen Architektur auf die ausführliche Erforschung der Besonderheiten des Aufenthaltes der Migranten, sowie auf die Fragen, wie sie sich schneller in die neue Umgebung anpassen und welche Technologien die Fachkräfte für die städtische Projektierung verwenden sollen, um diesen Prozess zu beschleunigen und es schmerzloser für die Flüchtlinge zu machen.



Die Idee der optimalen Nutzung der für die Wohnfläche brauchbaren Objekte ist das Hauptthema der Projekte der Architekten der ganzen Welt. Es gibt die leerstehenden Räume, die ungenutzten Grundstücke, die nicht bebauten Lücken zwischen den Häusern sogar in solchen dicht besiedelten deutschen Städten wie Köln, München, Hamburg oder Berlin. Und das ist die potentielle Wohnfläche für die zahlreichen Flüchtlinge, die nach Deutschland streben.



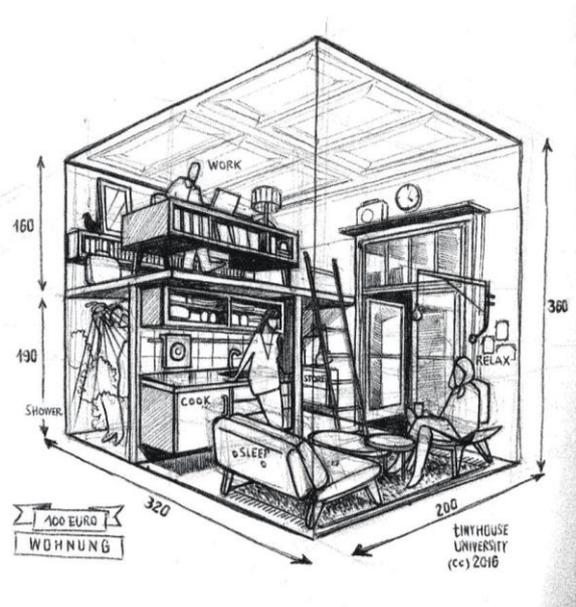
Darunter sind die Studenten der Hannover Universität, die die Modelle der Wohnräume, mehr komfortabler im Vergleich zu den Zeltstädtchen und den Container entwickelt haben, die den Migranten jetzt gewährt werden. Die Initiatoren des Projektes "Fill the Gap" (von eng. "Die Lücken

ausfüllen") bieten an, in die Lücken zwischen den Häusern speziell dazu entwickelte Wohnmodule aus Holz einzubauen. Auf fünf-sechs Stockwerken solcher Wohnhäuser, die nach dem Prinzip des Konstrukteurs gesammelt sind, kann man von 20 bis 40 Menschen unterbringen. Für die Montage der leichten Konstruktionen braucht man weniger als eine Woche.

Noch ein studentisches Projekt bezieht sich auf den alten Frachtenbahnhof im Norden Hannovers. In den nicht mehr gebrauchten Wagen kann man ziemlich komfortable Wohnfläche für die Flüchtlinge, die Lehrzentren, die medizinischen Punkte, die Kindergärten gestalten.

Der Hauptstadtarchitekt Van Bo Le-Menzel hat das Projekt des handwerklichen Hauses geschaffen, das «mit Hilfe von drei Nägeln und zwei Brettern» gebaut wird, den Titel «Tiny House University» erhalten hat und hat die Architekten, Designer und selbst die Migranten vereinigt.

Die erste Version des Minihauses vom Berliner Architekten hat den Titel Tiny100 bekommen. Seiner Meinung nach wird sie der erste Schritt auf dem Weg der Lösung der Wohnungsnot. Das teilweise aus den sekundären Rohstoffen geschaffene Haus wird für 100 Euro im Monat vermietet und wird für größere Zahl der Menschen zugänglich, als beliebiges hauptstädtisches Haus.

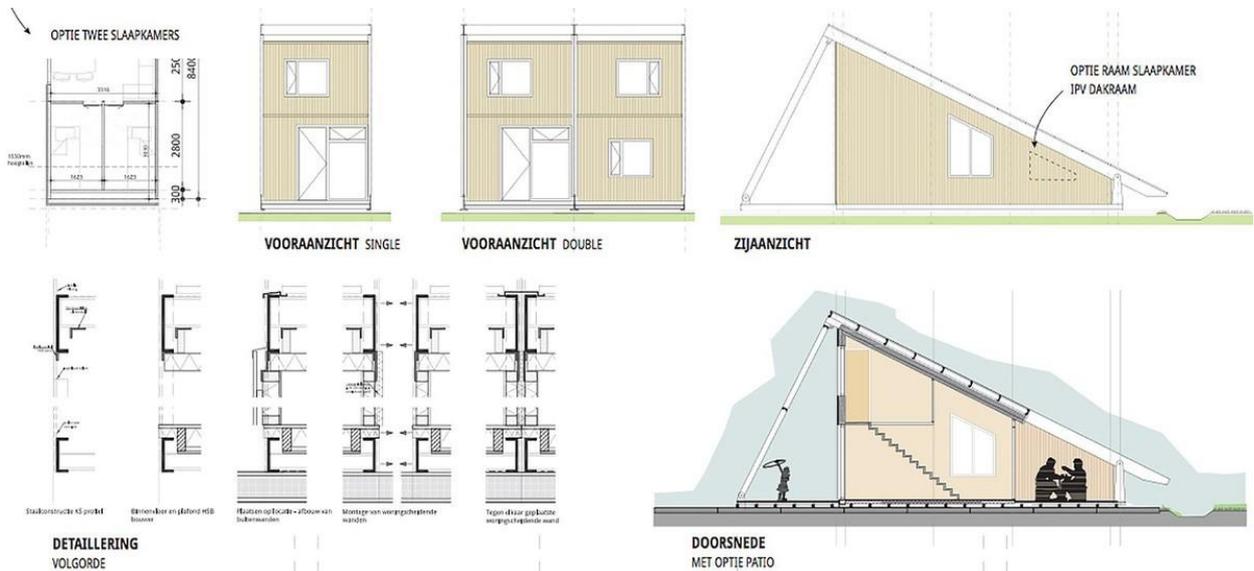


Auch, um die ganze Welt in die Folgen des ernstesten Andranges der Flüchtlinge zu integrieren, wurde das Projekt SolarCabin entwickelt, das das Design der Wohnung für die Personen darstellt, die die Zuflucht im fremden Land suchen. Die von den Fachkräften für die Flüchtlinge angebotene Wohnung hat die gigantischen Solarmodulen, die so viel Elektrizität erzeugen, die im Stande ist, die Lebenstätigkeit nicht nur eines Hauses, sondern auch aller angrenzenden Territorien und sogar eines ganzen Flüchtlingslagers zu versorgen. Das Haus hat die modulare Konstruktion, die aus Stahl oder Holz gebaut wird, das macht seine Errichtung schneller (1 Tag), einfacher (für seine Montage ist nur ein Kran nötig) und verhältnismäßig preiswert. Das Haus ist energieeffizient, das ermöglicht den zukünftigen Bewohnern die Rechnungen für die Elektrizität zu sparen.



Die Projektanten sagen, dass man "die Zuflucht" in jener Art erfüllen kann, in der sie die Umstände fordern: die Behausung kann sowohl für die kurze Frist des Aufenthaltes (bis zu 5 Jahren), als auch als ständige Wohnfläche benutzt werden (bis zu 10 Jahren) – und in der Abhängigkeit davon wird die Form des Hauses und die Zahl der aufgestellten Platten abwechseln.

Die Hexaederhäuser Hex House waren wie die schnell errichteten



Häuser mit dem zugänglichen Preis für die Elenden und Flüchtlinge vorbestimmt. Die nicht kommerzielle Gesellschaft "Architects for Society»,



die aus den Architekten aus den USA, Kanada, Europa und Ländern des Nahen Ostens besteht, ist der Entwickler des Projektes. Die konstruktiven Hauptelemente der Hexaederhäuser sind die Rohre aus dem verzinkten Stahl, die für das Fundament verwendet werden, sowie die isolierten metallischen Platten für die Wände, das Dach und die Decke, die die nachfolgende dekorative Ausstattung zulassen.

Das Projekt der Hexaederhäuser ist ergonomisch dank den Solarmodulen und dem System der Lüftung mit zwei Ventilationsgruben, die sich auf dem des überwiegenden Windes befinden. Solche Häuser befinden sich auf einiger Erhöhung. Jedes Gebäude hat die Haustreppe mit dem Vordach und die Abflüsse für Regen. Dank guter Planung hat jedes Hexaederhaus das Wohnzimmer, zwei Schlafzimmer, die Küche und die



sanitären Anlagen. Außerdem sind die Hexaederhäuser mehr standfest im Unterschied zu den kubischen Häusern.

Die Autoren des Projektes sind stolz darauf, dass die Flüchtlinge das Hexaederhaus selbständig sammeln können. Sie können getrennt voneinander, oder mit anderen «in die Waben" vereinigt gestellt werden. Zum Beispiel, in der Mitte solcher fünf vereinigten Häuser kann man den gemütlichen Raum als kleiner Hof gestalten. Die Architekten schlagen vor, das ganze Lager für die Flüchtlinge nach dem Prinzip solcher "Waben" zu schaffen.



Das Fazit ausziehend, ist es nötig zu bemerken, dass die Menschen die Stelle brauchen, wo man die Beziehungen einstellen kann, sich mit den Menschen treffen, die die gemeinsame Sprache, Religion und Gewohnheiten haben. Die Wohnungen sollen die offenen Territorien, die kleinen Wohnblöcke haben, nicht

unbedingt ideal - aber billig. Das Thema der Verbesserung der Qualität des Lebens der Menschen in der ganzen Welt und insbesondere die Lösung der scharfen sozialen Probleme befinden sich an der Spitze der Entwicklung. Die Architekten zeigen ihre Einbeziehung in die sozialen Prozesse, den Wunsch bei den Krisensituationen zu helfen und Architektur komfortabler für die Menschen zu machen.



Es waren die Ideen gezeigt, wie man schnell, billig, und die Hauptsache, qualitativ beim Mangel der Ressourcen bauen kann, Dabei kann man für die Arbeit die unqualifizierten Fachkräfte leicht heranziehen. So werden zwei Aufgaben gelöst: der Mangel der Wohnfläche und die wachsende Arbeitslosigkeit.

Der Hauptansatz aller Projekte ist die Toleranz zu den Migranten und das geöffnete Deutschland.

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**Buhera D. H.**  
**USE OF MACADAM AND MASTIC ASPHALT CONCRETE ON  
MODERN HIGHWAYS**

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Over the last years the stone mastic asphalt (SMA) is more and more applied to the machines of the top layers of the pavement. This material has specific operating characteristics, namely: durability of a layer, the lowered level of noise, resistance to formation, etc.

The SMA is the condensed Macadam and mastic asphalt concrete (MMAC) mix.

Macadam and mastic asphalt was developed in Germany in the sixties of the 20th century. The increased intensity of rutting, destruction of a road pavement owing to growth of number of vehicles and also active use of the spiked automobile tires (which are also invented in the sixties), laid the foundation for developments and tests of new road-building material.

The Macadam and mastic asphalt concrete mix (MMACM) is the artificial road-building material representing mix of mineral materials (crushed stone, sand without elimination of crushing and mineral powder), bituminous binding and the stabilizing additive.

MMACM includes 3 components in the structure:

- mineral material (crushed stone, sand, mineral powder);
- bituminous binding;
- stabilizing additive;

There are such types of MMAC:

• MMAC-20 (the largest size of grains of crushed stone is up to 20 mm). It is applied to the machines of the top layers of a road pavement of 4-6 cm thickness.

• MMAC-15 (the largest size of grains of crushed stone is up to 15 mm). It is applied to the machines of the top layers of a road pavement of 3-5 cm thickness.

• MMAC-10 (the largest size of grains of crushed stone is up to 10 mm). It is applied to the machines of the top layers of a road pavement of 2-4 cm thickness.

• MMAC-5 (the largest size of grains of crushed stone is up to 5 mm). It can be applied to thin layer surface processing of a road pavement [2].

The hot condensed crushed-stone and mastic mixes are an independent kind of asphalt concrete mixes.

The main differences of MMACs from normal asphalt concrete mixes are:

- The increased content of crushed stone (20-30% more in comparison with asphalt concrete mixes of type 'A').
- The increased content of bituminous binding (from 5.5 to 8%).

- Tougher requirements on the size and the form of crushed stone.
- Availability of the stabilizing additive.

Among the main advantages of MMAC are:

- Water resistance and frost resistance. They are reached thanks to the high content of bituminous binding and also the small size of residual porosity in the condensed state.

- High fatigue resistance. It is reached due to the disperse reinforcing effect of the stabilizing additive, and also the high content binding and low residual porosity.

- The raised shear-resistance. It is caused by the higher static limit of flowability at shift (in comparison with standard asphalt concrete).

- Low abrasability and resistance to the destroying influence of spiked automobile tires. It is reached due to the use as a part of crushed-stone and mastic mix of crushed stone from strong rocks and also at the expense of the high content of mastic (asphalt binding substance).

- Roughness of a pavement and high frictional properties (level of coupling of a road pavement with wheels). It promotes the increase in traffic safety of vehicles at high speeds.

- The increased crack resistance. Though the degree of resistance of crushed-stone and mastic asphalt pavement to temperature crack formation depends more on structure of crushed-stone and mastic mix, the resistance to fatigue crack formation is inherent to all MMAC.

- Low level of noise. Pavements made of MMAC differ with a lower level of noise caused by car traffic in comparison with the normal asphalt pavements (on average by 4-5 dB) [1].

The set of above-mentioned advantages of stone mastic asphalt allows to increase significantly the reserve maintenance periods of a road pavement, to increase comfort, quality and traffic safety.

Nevertheless, despite the high cost of the material and works on its paving, the use of Macadam and mastic asphalt concrete is economic and justified since MMAC can be kept within thinner pavement, and at the same time it has longer life cycle (2-3 times more than normal asphalt concrete) that reduces the operational charges of the road.

Now, in many countries of the world the Macadam and mastic asphalt concrete is widely used as a material for the top protective layers of a road pavement. The MMACMs gradually force out other types of asphalt concrete mixes intended for the machines of protective and constructive layers [2].

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**Chakalova T. Ya.**  
**GEOSYNTHETIC MATERIALS IN MODERN ROAD  
CONSTRUCTION**

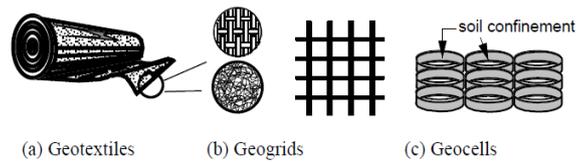
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Road construction in Ukraine is one of the biggest problems of the state. Short service life of the pavement, unreliable asphaltting and poor quality of road construction work force the Ukrainian government to invest large sums regularly in road construction. The use of modern materials in road construction can improve the quality of the road surface, reduce the number of structures and increase the capacity of transport on roads. Geosynthetic materials are one of the types of new materials for additional pavement layers for ensuring the reinforcement, drainage, protection, filtering, waterproofing, thermal protection. They are known as geotextiles, geocells, geogrids, geocomposites, geomembranes. The use of geosynthetics in Ukraine can save a large part of the budget allocated for the construction of roads and about 40% of building materials (such as stone, sand, gravel).

Geosynthetic materials are increasingly used in geotechnical and environmental engineering in the last 40-50 years. Over the years, these products have helped engineers and contractors to solve some kinds of engineering problems, where the use of conventional building materials would be limited or significantly more expensive. There is a large number of types of geosynthetic materials and methods of applying geosynthetics in geotechnical and environmental engineering.

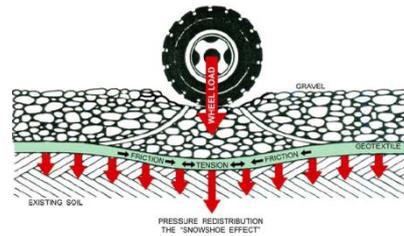
The general types of geosynthetic materials shown in Figure 1 are used to strengthen the soil, including geotextiles (in particular, woven geotextiles), geogrids and geocells. Geotextiles are continuous sheets of woven, nonwoven, knitted or stitch-bonded fibres or yarns. The sheets are flexible and permeable and generally have the appearance of a fabric. Geogrids have a uniformly distributed array of holes between the longitudinal and transverse elements. These holes give direct contact between the soil particles on both sides of the sheet [3]. Geocells are relatively thick, three-dimensional networks constructed from strips of polymeric sheet. The strips are joined together to form interconnected cells that are infilled with soil and sometimes concrete. In some cases, from 0.5 m to 1 m wide strips of polyolefin geogrids have been linked together with vertical polymeric rods used to form deep geocell layers called geomattresses.

Geotextiles can be used on the soil prior to the distribution of gravel in order to separate the soil and the gravel. In this case, two geotextile functions are used: separation of soil layers (gravel and basic soft soil); stabilization of the soil of the roadbed (provides the load on the gravel surface).



*Fig. 1. Geosynthetic materials*

The increase in the permissible load capacity achieved using a single layer of geotextile can be compared with how snowshoes support a person walking on loose snow – they distribute the load over a large area and limits the load on the underlying layer of soil, as shown in Figure 2. The large thickness of the gravel layer itself can provide the same result, but with the use of geotextiles, the thickness of the layer can be reduced. In most cases, the savings from decreasing the thickness of the gravel layer will correspond to or exceed the cost of the geotextile. In addition, the useful life of the gravel surface shall significantly increase [2].



*Fig. 2. Separation and stabilization of the soil base on the highway*

Geosynthetic materials have great potential for use as an economically efficient solution for several engineering tasks. This paper presents the current advantages of geosynthetic products in the use of these materials in reinforced concrete structures in soil and for the protection of the environment. The production of geosynthetic products allows to include the latest achievements in the field of materials science. Thus, it is expected that innovations will continue, expanding the already vast range of applications of these materials.

Strengthened by geosynthetic materials, the soil retaining walls show improved resistance to dynamic loads. This is evidenced by a number of experiments on experimental structures subjected to seismic loads. Thus, this type of structures can be economically feasible not only under static load, but also in regions with significant seismic activity. New methods of construction also expanded the possibilities of using geosynthetically reinforced soil retaining walls. They shortened construction time, costs and allowed to achieve greater aesthetic qualities of the final structure. The use of geosynthetic materials has also led to great advances in the field of ecology [1].

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**Chernaya T. M.**

### **PRESSED CONCRETE PILES IN PERMAFROST AREAS**

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People settle not only in the southern regions and in the middle belt, a large part of the population of our country lives in the harsh regions of the Far North, where very difficult climatic conditions are. But even in such areas life does not stop - cities and towns grow, where more than half of the housing is built privately. In this case, it becomes very important to erect foundations capable of withstanding complex conditions.

Permafrost is considered to be such soils that are in the frozen state for 3 or more years, they have an unstable structure, when thawed, they undergo significant subsidence as a result of disturbances in the natural structural state. The permafrost layer is divided into two parts vertically: The active layer - the surface layer of frozen ground undergoes partial thawing during the summer season and again freezes with the onset of winter. Intensive processes of thawing and freezing of the soil cause swelling, which negatively affects the stability and strength of buildings built on this soil foundation. The thickness of the active layer depends on the climate of the terrain and the geological composition of the underlying soil, it can range from 0.3 to 4.0 meters, while moving to the south, the thickness of the active layer increases significantly. The greatest thickness of the surface layer reaches in the soils, folded their sand and fragment rock, having open pores.

Compared with other types of foundations, the foundation on permafrost (pile), has significant advantages: It eliminates the need to develop natural soil in a foundation pit, which is difficult to perform due to the natural conditions of the terrain. Pile foundations in permafrost can be erected under any weather conditions, at any time of the year. The technology of the pile

foundation (dive method) is simple, accessible. Pile foundations in the permafrost conditions usually deepen to a great depth, so the danger of uneven settlement of the building and overturning of structures is eliminated. It is necessary to perform careful calculations of the depth of penetration of pile supports, taking into account the entire range of operating factors for geological and hydrogeological indicators, including the depth of seasonal freezing and thawing of soil. Particular attention should be given to frost whipping of soils that arise in silty and clay soils. Blowing out of frozen soil is fraught with uneven precipitation during seasonal thawing of the upper layers of frozen rock.

Construction of meteorological stations, warehouses, transshipment points, settlements beyond the Arctic Circle, due to complex earthwork and foundation work, has always been an expensive and technically challenging exercise. Nevertheless, similar objects were built in a rather large amount. Unfortunately, many settlements and stations were abandoned and ceased to exist, but at present the existing objects are being restored and new ones are being built, but the market economy compels very carefully to approach the issues of construction costs and the possibilities for its optimization. The level of safety and comfort of buildings being erected for living and working is of great importance, of course. The search for an optimal solution of these issues is carried out in many directions, including through the introduction of new construction technologies. One of the options that began to apply not so long ago in the permafrost areas is the installation of residential houses, economic and working buildings on screw foundations. This approach allows you to raise buildings above the level through the freezing ground quite high. Accordingly, the chilling cold will not be transmitted directly from the soil to the houses themselves.

Significantly simplifies the process of entry and exit from workers and residential buildings, moving between them on special high decking. Houses on piles do not sweep above the roof with snow, which means there is no need to often dig out doors and windows, which constantly fall asleep again. The use of screw technologies in permafrost areas can significantly reduce the cost of erecting foundations in comparison with traditional methods. All construction materials must be brought here by sea or by air. As a result, cement, brick, rubble stone, iron reinforcement for foundation and other construction works become truly "golden". In addition, it is well known that the vegetation cover in the permafrost regions is very thin and vulnerable. If it is damaged by machinery during excavation, then it will "come to life" for many years, and may never recover at all. In these conditions, the installation of screw piles, which are gently screwed into the permafrost layer through holes previously planned in the moss, does not cause any damage to the environment. At the same time, the life of such structures is estimated in decades.

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### **DRAINAGE BITUMEN CONCRETE**

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This article describes the material used mainly in the road industry – an asphalt mix, as well as an amazing kind of bitumen concrete – the drainage bitumen concrete.

Asphalt mix is a rationally selected mixture of mineral materials (crushed stone (gravel) and sand with mineral powder or without it) with bitumen, taken in certain proportions and mixed in a heated state. Bitumen concrete is a compacted asphalt mix. Often bitumen concrete is called asphalt.

Asphalt mixes and bitumen concretes, depending on the type of mineral component, are divided into crushed stone, gravel and sand. Mixtures depending on the viscosity of the bitumen used and the temperature during installation are divided into:

- hot (prepared using viscous and liquid petroleum road bitumen and laid with a temperature of at least 120°C);
- cold (prepared using liquid petroleum road bitumen and laid with a temperature of at least 5°C).

The main purpose of the asphalt mix is the creation of monolithic layers of the road surface, and less often – the upper layers of the road foundation. In addition, asphalt mixes are often used:

- for the construction of non-rigid coatings on industrial, commercial and various economic sites;
- for paving the sidewalks, pedestrian areas, bicycle paths;
- for the installation of screeds and floors inside the premises, for the creation of exploited roofs (cast asphalt mixtures are used for the specified works);

- for paving the building surrounding grounds, access roads, car parks, parking lots, as well as other open-plan objects and small areas.

The wide application of asphalt mixtures is due to the fact that this material is a cheaper alternative to cement-concrete mixtures and various ready-made materials for paving areas.

One of the amazing types of bitumen concrete is the drainage bitumen concrete.

Drainage bitumen concrete is a kind of bitumen concrete, which has an open pore system in the amount of 15-25%. Due to this, the water falling on the coating does not stagnate on its surface and, by the pore system, leaves deep into the layer, and then it is diverted to the wayside.

Drainage bitumen concrete enhances the convenience and safety of traffic. On ordinary asphalt-concrete coating, water spreads over its surface. On the draining surface, water practically does not remain on the surface and leaves through the pores depthward.

The granulometric structure of the drainage bitumen concrete is selected in such a way as to provide a residual open porosity of 15-25%. In practice, such bitumen concretes does not contain fractions smaller than 1 mm, that is, they consist entirely of rubble of fractions of 10-14 mm (40-60%), 6.3-10 mm (20-40%), 4-6.3 mm (10-30%) and 2-4 mm (10-20%).

Considering such granulometry, the choice of bitumen becomes very important. Bitumen should have the increased cohesive properties, and have a good elasticity. Usually, bitumens of increased viscosity (50-70°P) or modified bitumens are used.

Unfortunately, despite its advantages from the point of view of consumer properties, the drainage bitumen concretes in the conditions of our country have practically no prospects.

This is due to their high porosity, which, despite the use of high-quality bitumen, leads to insufficient durability in conditions of excessive moistening (the maximum number of freeze-thaw cycles is not more than 150). However, the main constraining cause is the use of anti-ice materials in the form of sand-salt mixtures. Such materials clog the pores in the drainage bitumen concrete and disable it.

The use of drainage bitumen concrete is possible in the transition to the chemical method of combating ice (the use of pure salts), as well as the organization of washing the wheels of cars at the entrance to the road with drainage pavement. However, even in this case, the pores are clogged in 2-3 years by wear products, and in order to restore their work, rinsing of pores with pressurized water is necessary with the help of special expensive machines, which essentially increases the operating costs.

In conclusion, it can be noted that drainage bitumen concrete is a kind of asphalt concrete that helps to maintain the strength and density of asphalt for many years, and further helps to save on costs for the repair. Due to this, it is highly used in the road industry.

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### **CONTEMPORARY ARCHITECTURE**

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Contemporary architecture is the architecture of the 21st century. No single style is dominant; contemporary architects are working in a dozen different styles, from postmodernism and high-tech architecture to highly conceptual and expressive styles, resembling sculpture on an enormous scale. The different styles and approaches have in common the use of very advanced technology and modern building materials, such as Tube structure which allows construction of the buildings that are taller, lighter and stronger than those in the 20th century, and the use of new techniques of computer-aided design, which allow buildings to be designed and modeled on computers in three dimensions, and constructed with more precision and speed.

Contemporary buildings are designed to be noticed and to astonish. Some feature of concrete structures wrapped in glass or aluminum screens, very asymmetric facades, and cantilevered sections which hang over the street. Skyscrapers twist, or break into crystal-like facets. Facades are designed to shimmer or change color at different times of day.

Whereas the major monuments of modern architecture in the 20th century were mostly concentrated in the United States and western Europe, contemporary architecture is global; important new buildings have been built in China, Russia, Latin America, and particularly in the Gulf States of the Middle East; the Burj Khalifa in Dubai was the tallest building in the world in 2016, and the Shanghai Tower in China was the second-tallest.

Most of the landmarks of contemporary architecture are the works of a small group of architects who work on an international scale. Many were designed by architects already famous in the late 20th century, including Mario Botta, Frank Gehry, Jean Nouvel, Norman Foster, Ieoh Ming Pei and Renzo Piano, while others are the work of a new generation born during or after World war II, including Zaha Hadid, Santiago Calatrava, Daniel Libeskind, Jacques Herzog, Pierre de Meuron, Rem Koolhaas, and Shigeru Ban. Other projects are the work of collectives of several architects, such as UN Studio and SANAA, or giant multinational agencies such as Skidmore,

Owings & Merrill, with thirty associate architects and large teams of engineers and designers, and Gensler, with 5,000 employees in 16 countries.

The Polish-born American architect Daniel Libeskind (born 1946) is one of the most prolific of contemporary museum architects. He was an academic before he began designing buildings, and was one of the early proponents of the architectural theory of Deconstructivism. The exterior of his Imperial War Museum North in Manchester, England (2002), has an exterior which resembles, depending upon the light and time of day, huge and broken pieces of earth or armor plates, and is said to symbolize the destruction of war. In 2006 Libeskind finished the Hamilton Building of the Denver Art Museum in Denver Colorado, composed of twenty sloping planes, none of them parallel or perpendicular, covered with 230,000 square feet of titanium panels. Inside, the walls of the galleries are all different, sloping and asymmetric.

The De Young Museum in San Francisco was designed by the Swiss architects Herzog & de Meuron. It opened in 2005, replacing an older structure that was badly damaged in an earthquake in 1989. The new museum was designed to blend with the natural landscape of the park, and to resist strong earthquakes. The building can move up to three feet (91 centimeters) on ball-bearing sliding plates and viscous fluid dampers that absorb kinetic energy.

The Centre Pompidou-Metz, in Metz, France, (2010), a branch of the Centre Pompidou museum of modern art in Paris, was designed by Shigeru Ban, a Japanese architect who won the Pritzker Prize for Architecture in 2014. The roof is the most dramatic feature of the building; it is a 90 m (300 ft) wide hexagon with a surface area of 8,000 m<sup>2</sup> (86,000 sq ft), composed of sixteen kilometers of glued laminated timber, that intersect to form hexagonal wooden units resembling the cane-work pattern of a Chinese hat. The roof's geometry is irregular, featuring curves and counter-curves over the entire building, and in particular the three exhibition galleries. The entire wooden structure is covered with a white fiberglass membrane and a coating of teflon, which protects from direct sunlight, but allows light to pass through.

The Louis Vuitton Foundation by Frank Gehry (2014) is gallery of contemporary art located adjacent to the Bois de Boulogne in Paris was opened in October 2014. Gehry described his architecture as inspired by the glass Grand Palais of the 1900 Paris Exposition and by the enormous glass greenhouses of the Jardin des Serres d'Auteuil near the park, built by Jean-Camille Formigé in 1894–95. Similar in concept to Gehry's Walt Disney Concert Hall, the building is wrapped in curving glass panels resembling sails inflated by the wind. The glass "Sails" sails are made of 3,584 laminated glass panels, each one a different shape, specially curved for its place in the design. Inside the sails is a cluster of two-story towers containing 11 galleries of different sizes, with flower garden terraces, and rooftop spaces for displays.

The new Whitney Museum of American Art in New York City by Renzo Piano (2015) took a very different approach from the sculptural museums of Frank Gehry. The Whitney has an industrial-looking facade, and blends into the neighborhood. Michael Kimmelman, the architecture critic of the New York Times called the building a "mishmash of styles" but noted its similarity to Piano's Centre Pompidou in Paris, in the way that it mixed with the public spaces around it. "Unlike so much big-name architecture," Kimmelman wrote, "it's not some weirdly shaped trophy building into which all the practical stuff of a working museum must be fitted."

The San Francisco Museum of Modern Art is actually two buildings by different architects fit together; an earlier (1995) five-story postmodernist structure by the Swiss architect Mario Botta, to which has been joined a much larger ten-story white gallery by the Norwegian-based firm of Snøhetta (2016). The expanded building includes a green living wall of native plants in San Francisco; a free ground-floor gallery with 25-foot (7.6 m) tall glass walls that will place art on view to passersby, and glass skylights that flood the upper floors of offices (though not the galleries) with light. The facades clad are with lightweight panels made of Fiber-Reinforced Plastic. The critical reaction to the building was mixed. Roberta Smith of the New York Times said the building set a new standard for museums, and wrote: "The new building's rippling, sloping facade, rife with subtle curves and bulges, establishes a brilliant alternative to the straight-edged boxes of traditional modernism and the rebellion against them initiated by Frank Gehry, with his computer-inspired acrobatics." On the other hand, the critic of the Guardian of London compared the facade of the building to "a gigantic meringue with a hint of Ikea."

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## **FEATURES OF PLANNING AND COMPUTER MODELING OF NATURAL TESTING OF BRIDGES**

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Bridges are in more difficult conditions than buildings of any destination. The nature of the load from transport and pedestrians leads to a

multivariate installation of loads on the bridge, which leads to variable and often alternating stresses at the intersections of the structural elements and the need for their testing on endurance. All bridge structures are in the open air and feel the effects of weather: temperature, rain, evaporation, snow, variable horizons of water, etc. There are leakages, frost damage and the worst enemy, a sort of "oncology" bridges - corrosion, which is aggravated by the processing of the surface of the travel section and sidewalks with chloride salts, applied to fight ice. The large length of bearing structures and their relatively tight stiffness at the same time leads to significant bending and shear forces in beam structures and, accordingly, high stresses, requiring complex calculations and careful selection of cross-sections. The variety of constructive elements that are interconnected, but at the same time bear a different functional load, dictates the need for both a large amount of design robots and field studies to verify the compliance of the designs executed by the project and regulatory requirements.

All these features determine the specifics of field studies of bridges. The purpose of field studies of bridges is to assess their technical condition and develop recommendations for their further exploitation.

Preliminary testing is preceded by a detailed survey and the study of existing information on the construction. The collection of preliminary information about the facility includes the study of: technical documentation (design, executive, etc.), design standards, load norms, data on grass conditions, preliminary surveys and tests, data on repairs, current limitations on the mass of vehicles, speed and distance between them. The measurements of the constructions consist of determining the dimensions of the sections of the bearing elements and the width of the bridge cloth and determining the thickness of the asphalt concrete coating. Visual inspection and damage assessment should reveal: damage (mechanical, force, corrosion) and deformation of bearing elements affecting bearing capacity, damage to welded and bolted joints; difficulties for the projected deformations and displacements of runoff structures and supports, settling and turning of supports. Instrumentation studies determine: the strength of concrete, coking and saturation with chlorides protective layer of concrete, steel class, quality welds and bolted joints, longitudinal profile runway structures on the lower belt.

Testing of bridge constructions occupy a key place in the system of field studies, since they create a unique opportunity to simultaneously check the quality of calculation, design, fabrication and installation of structures, to assess the actual carrying capacity and stiffness of the structure, as well as the impact on these characteristics of all types of malfunctions. Thus, the test is, perhaps, the most informative element of the quality control system of the building. According to the program objectives, volumes and methods of testing the bridges can be divided into two main types: - acceptance tests of new or reconstructed buildings and testing of the facilities being operated. The

purpose of the acceptance tests is to assess the possibility of introducing the bridge into operation under the design load, ie checking the load capacity and rigidity of the bridge structures. Such an estimate can be obtained by comparing the results of measurements of the stress-strain state of constructions when loading its load with the corresponding values determined by calculation. In accordance with the current norms [1], the tests for commissioning should be subject to: bridges from the first-time use of structures, technologies and materials; cable ties, hanging, joint and split bridges; steel bridges with spans more than 100 m, steel reinforced concrete bridges with spans more than 80 m, reinforced concrete bridges with spans more than 50 m. The most sensitive to the impact of loads from vehicles and pedestrians is a runway structure. Therefore, as a rule, the study of the stress-strain state is carried out relative to the bearing elements of run-off structures. For each specific case, the test executor (a specialized organization with appropriate permission) is a program that must be agreed upon between the customer and the design organization. As experience shows, in order to assess the conformity of the work of the building with the design conditions adopted in the project, it is enough to obtain, in the tests, in the characteristic sections of the elements of the diagram of normal stresses in the height of the section and to measure the deflections. In this case, the rational choice of measuring places and the location of the load is of great importance. The test load should be selected according to the requirements specified in [1]. All these conditions may be taken into account and checked for the selected load and its installation if it is to develop an adequate finite element model of the building in which to enter all the results of the preliminary survey and the existing existing information.

The problem of constructing an adequate model of constructions was dealt with by the following scientists Weinberg D.V., Varvak P.M., Gorodetsky OS, Deklu, Klaf R., Postnov V.A., Raytman M.I., Rosin L.A., Tymoshenko SP, Shmukler VS and others [2-4]. The choice of a model for calculating structures is determined by many factors, among which - the most accurate coincidence of theoretical results of the calculation with these tests, as well as minimization of the time costs for the creation of a calculation model.

When designing runways, various calculation models are used, which, to a greater or lesser extent, take into account the spatial nature of the work of slabs and beams of runways. The question of choosing a model is very important and is conditioned by the best coincidence of the theoretical results with the test data of the bridges, as well as minimization of the time resource required for design. Existing methods, as a rule, are divided into two groups: the methods in which the structure is conventionally divided into independent elements and methods, in which the flying structure is considered as a single structure consisting of plates and beam systems, together accept the load at any position of them on run-off structures [5]. The first group is characterized

by simplicity and visibility, however, the results may not be quite accurate, but usually go to the safety margin of the runway structure. The second group of methods more fully takes into account the relationship between the individual elements of the run and gives results more consistently converge with the experimental data obtained during the tests. However, they are more labor-intensive, therefore, appropriate software is required for their implementation. The analysis of the tendencies that occur during the simulation of the stress-strain state of runway bridge structures allows us to select PC "Lira" based on the finite element method, presented as a method of displacement. In order to conclude that the use of finite element model (CEM), which is proposed for calculations of runway structures, requires confirmation of its adequacy by comparing the obtained results of model calculation with the results obtained by other methods [5].

Studies conducted at the department of bridges have proved that the nature of experimental and theoretical deflections, determined by the methods of Lukina N.P., Kozhushko VP and the calculation of the finite-element model run-off structures, which proposed by the teachers of the department, are identical, which indicates the correctness of the model.

The use of the proposed models allows to make calculations of run-off structures taking into account their real state, that is, to take into account the change in the geometric characteristics of the sections, properties of materials, the calculation scheme and modern moving loads.

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**Dorokhova A. M.**  
**THE WAY OF IMPROVING THE ENVIRONMENT -**  
**ENVIRONMENTAL ARCHITECTURE**

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At the end of the last century, a serious problem was the sharp deterioration in the state of the environment. And only now in the mass consciousness the concept of ecological architecture has arisen. The concept of a viable architectural environment is not so new. Its roots go back to the beginning of the last century. At that time, there already existed a theory that considered replacing traditional sources of energy with alternative sources. The growth of the urban population and the consolidation of urban development attaches particular importance to the problem of creating zones of ecological comfort. The development of the city causes a reduction in the amount of clean air, water, green space and silence, which is so lacking for a modern person with his accelerated rhythm of life in cities and megacities [3].

Large settlements make significant changes to the existing wind regime of air mass movement. High-rise buildings located in the urban environment, without taking into account the wind regime can lead to the creation of undesirable vortex flows that flow around the walls of buildings. Sources of urban air pollution are almost all types of modern transport. In addition, any transport creates vibration, noise, gas contamination, dust [1].

Especially it is felt in the central part of large cities. Point development increases the density of the population and often the norms for the amount of gardening per inhabitant are not observed there. In this densified building, where buildings are located and their parking lots, there are no areas for creating recreational areas. Modern approaches to the greening of urban space allow solving ecology problems without radical methods of transforming the urban environment (without demolishing buildings to create a normalized number of green areas).

Currently, an important direction in the development of the architecture of the city is the development of modern methods of creating zones of ecological comfort in conditions of compact construction.

The problem of the impact of urbanization on the environment, being global and multifaceted, also has a psychological effect on a person. The large flow of information, flashing advertising, the deterioration of environmental indicators, as well as the accelerated rhythm of life - all these factors practically excluded the comfortable living conditions of the city's population.

Modern requirements for architectural and planning organization of zones of ecological comfort are determined by the following trends:

1. The solution of environmental problems of the city, which require the creation and improvement of large green areas;

2. In the growing role of spiritual values: the need of society to protect the national landscape, monuments of culture and nature;

3. Priority value of aesthetic requirements;

4. The development of the diversity of forms of landscape architecture, as well as the creation of new plant species that survive in the adverse environmental conditions of large cities;

5. With the introduction of new solutions for creating zones of environmental comfort, and most importantly - addressing the lack of space in the urban space to accommodate such zones.

The issue of organization of ecological comfort zones against the background of dynamic development of the city in the context of the last of the listed trends will become increasingly important.

Eco-friendly house in the forest

Other sources of the beginning of the development of the so-called "green" architecture are considered to be the 50's, when the interest in public construction increased sharply, which prompted engineers to seek more economic solutions for construction. In the West, in the 1970s, an energy crisis ensued, resulting in an increase in fuel prices throughout the world. It became the main reason for the growing interest in saving fuel and energy resources, as well as renewable energy sources, which could be used to supply heat to buildings and houses. During this period, there are many projects of buildings that function thanks to solar energy. The first such project began in 1972 in Manchester, where the construction of a demonstration energy-efficient building began.

Concept of an eco-city

In these same years in many countries of the world independently of each other there are ideas about the creation of an eco-city . Such a city would represent a stable ecological system that would receive most of the energy for existence from the Sun. Such cities could serve as a solution to the problem of saving energy resources and their lack in the developing countries of the world. Nowadays a considerable part of such projects is implemented. As an example, you can lead a village in Germany called "Sunny Park", consisting of bio-houses with solar batteries, which consume 10 times less energy than their traditional counterparts.

Ecological settlement "Sunny Park" in Germany

In this village, nothing harms anything. Even waste water is purified through plants that devour different kinds of bacteria. And such amazing buildings in the world are becoming more and more! There are all new ideas and proposals concerning the development of ecological architecture. One of the most important and very interesting of these ideas is the idea of creating houses built from straw blocks. It was proved that the straw houses are not only more economical and cheap, but also more durable and durable. As for the microclimate, in such buildings it is much more comfortable than in traditional houses.

The Straw House Now the ecological principles of architectural design are already fully formed:

1. Environmentally friendly building materials.
2. Alternative energy-saving sources of energy.

These include heat pumps, solar collectors, as well as boilers of energy-efficient and high-quality combustion of raw materials.

3. Proper Waste Management.

4. Comfortable and healthy heating (cooling) system for a person using radiating surfaces that transmit heat directly to humans through waves, without preheating the air.

5. Energy saving thanks to "warm" walls, that is, walls that are properly and well insulated.

6. Interior decoration of buildings and houses with clay plaster, wood, linoleum from natural materials. This trim ensures sufficient humidity in the room (about 50 percent), which is necessary for the health of the human respiratory tract.

7. Creation of intake and exhaust ventilation, ensuring a constant influx of clean air without the effect of a draft.

8. Rational design, compactness of shapes, correct location of light and heat-passing surfaces.

The construction of an eco-house, based on these principles, costs 7-10 percent more, but the payback is an average of 7 to 10 years, since the energy consumption in it is 90 percent lower than in a similar building of a traditional kind. In order not to be limited to calculating the saved kilowatt-hours per square meter, eco-architects try to consider the new construction in a complex way: including the created traffic flows, landscape change, the air, water and waste circulation system. According to the creators of the exhibition, sustainable architecture speaks, first of all, about the quality of life in harmony with the environment [4].

Now, ample landscaping systems are gaining popularity, which in turn are a means of realizing the availability of green spaces for the population of large cities. Competently placed mobile landscaping systems can perform utilitarian, aesthetic and sanitary-hygienic roles, as well as diversify the urban environment, making it individual and compositionally attractive.

The introduction of mobile landscaping systems in the city structure should be planned and based on the compositional structure of the city structure. The composition of the gardening of the city with the help of such systems consists of several components. The introduction of mobile landscaping systems in the planning urban structure takes place at three levels of joy-building:

1. Lay out city district, settlement, village.

Urgent environmental problems of modern cities need to be resolved at a town-planning level. The planning of urban structures should be carried out taking into account the formed urban fabric, large urban spaces and masses.

Only the application of an integrated urban planning approach can solve the problems of the lack of landscaping of modern cities.

## 2. Lay out district neighborhood.

At this level, it is necessary to solve the problems of lack of landscaping for a certain type of development, take into account the peculiarities of the terrain and the architecture of buildings, and give a unique individual look to the greened urban environment.

## 3. Territory management .

Landscaping due to mobile landscaping allows you to place the necessary number of square meters of landscaping in small areas of urban space, use the surface and territories previously not involved in organizing green spaces. Mobile mobile landscaping systems can be elements of improvement. Like small architectural forms, they contribute diversity to the urban environment [2]

Activities to improve the environment, improvement, gardening of cities and populated areas are now becoming more relevant. Landscaped spaces (garden complexes and separate areas) of a modern city are most often united in a dynamically interconnected system. The importance of natural nature in the greening of the city, the formation of its external appearance, the growth of areas under greenery, the creation of new parks, squares, boulevards, forest parks is growing.

Our generation is a generation of humanity that has entered a new era - the era of solar energy. Let's hope that the concept of the Earth as a single living organism will continue to develop, penetrating ever deeper into the minds of millions of people and forming an ecological consciousness there.

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**Dubrovskaya A. D.**  
**STRESS-STRAIN BEHAVIOUR OF DUCTILE AND BRITTLE**  
**MATERIALS**

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The article presents one of the important aspects of analysis and design of structures related to deformations caused by loads applied to the structure. We will look at the deformations of structural elements such as the rod and plate under the axial load, and also reveal the phenomenon of fatigue, which leads to the failure of structural and engine components after a very large number of repeated loads, even though the stresses remain in the elastic range.

Materials can be classified as either being ductile or brittle, depending on their distinctive strain characteristics [1].

Any material that can be subjected to large strains before it fractures is called a ductile material. Mild steel is a typical example. Engineers often choose ductile materials for design because these materials are capable of absorbing shock or energy, and if they become overloaded, they will usually exhibit large deformation before failing.

Besides steel, other metals such as brass, molybdenum, and zinc may also exhibit ductile distinctive strain characteristics similar to steel, whereby they undergo elastic difference behavior, yielding at strain hardening, constant stress, and finally necking until fracture. In most metals and some plastics, however, constant yielding will not occur beyond the elastic range. One metal where this is the case is aluminum. Actually, this metal often does not have a well-defined yield point, and consequently it is a standard practice to define a yield strength using a graphical procedure called the offset method. Normally for structural design a 0.2% strain (0.002 in./in.) is chosen, and from this point on the  $\epsilon$  axis a line parallel to the initial straight line portion of the differences strain diagram is drawn. The point where this line intersects the curve defines the yield strength.

Realize that the strength is not a physical property of the material since it is a stress that causes a specified permanent strain in the material. In this article, however, we will assume that the yield strength, yield point, elastic limit, and proportional limit all coincide unless otherwise stated. An exception would be natural rubber, which in fact does not even have a proportional limit, since stress and strain are not linearly related.

Wood is a material that is often moderately ductile, and as a result it is usually designed to respond only to elastic loadings. The strength characteristics of wood vary greatly from one species they depend on the moisture content, age, and the size and arrangement of knots in the wood. Since wood is a fibrous material, its tensile or compressive characteristics parallel to its grain will differ greatly from these characteristics perpendicular

to its grain, and consequently tensile loads are almost always intended to be applied parallel to the grain of wood members.

Materials that exhibit little or no yielding before failure are referred to as brittle materials. Gray cast iron is an example, having a stress-strain diagram in tension. For example, a fault 152 MPa occurred due to a microscopic crack, which then spread rapidly across the specimen, causing complete fracture. Since the appearance of initial cracks in a specimen is quite random, brittle materials do not have a well-defined tensile fracture stress. Instead the average fracture stress from a set of observed tests is generally reported. Brittle materials exhibit a much higher resistance to axial compression [2].

The modulus of elasticity is a mechanical property that indicates the stiffness of a material. Materials that are very stiff, such as steel, have large values of  $E$  (200 GPa), whereas spongy materials such as vulcanized rubber have low values. Values of  $E$  for commonly used engineering materials are often tabulated in engineering codes and reference books. The greater the modulus, the stiffer the material, or the smaller the elastic strain that results from the application of a given stress.

For most metallic materials, elastic deformation persists only to strains of about 0.005. As the material is deformed beyond this point, the stress is no longer proportional to strain (Hooke's law), and permanent, nonrecoverable, or plastic deformation occurs. The transition from elastic to plastic is a gradual one for most metals; some curvature results at the onset of plastic deformation, which increases more rapidly with rising stress.

Another mechanical property that may be important to consider is hardness, which is a measure of a material's resistance to localized plastic deformation (e.g., a small dent or a scratch). If a specimen of ductile material, such as steel, is loaded into the plastic region and then unloaded, elastic strain is recovered as the material returns to its equilibrium state. The plastic strain remains, however, and as a result the material will be subjected to a permanent set. For example, a wire when bend (plastically) will spring back a little (elastically) when the load is removed; however, it will not fully return to its original position. Here the specimen is loaded beyond its yield point  $A$  to point  $A'$ . Since interatomic forces have to be overcome to elongate the specimen elastically, then these same forces pull the atoms back together when the load is removed. Consequently, the modulus of elasticity,  $E$ , is the same and therefore the slope of line  $O'A'$  is the same as line  $OA$ . With the load removed, the permanent set is  $OO'$  [3].

If the load is reapplied, the almost in the material will again be displaced until yielding occurs at or near the stress  $A'$ , and the stress-strain diagram continues along the same path as before. Although this new stress-strain diagram, defined by  $O'A'B$ , now has a higher yield point ( $A'$ ), a consequence of strain hardening, it also has less ductility, or a smaller plastic region, than when it was its original state.

Yield strength, or the yield point, is defined in engineering and materials science as the stress at which a material begins to plastically deform. Prior to the yield point the material will deform elastically and will return to its original shape when the applied stress is removed. Once the yield point is passed some fraction of the deformation will be permanent and non-reversible. Knowledge of the yield point is vital when designing a component since it generally represents an upper limit to the load that can be applied.

For brittle materials fracture occurs with a deformation of only a few percent, and the ultimate strength of plastic materials under single-base compression is not revealed. We can say that elastic materials withstand very high compressive stresses, and the resolution can come as a result of the presence of tangential stresses in sloping areas.

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**Dudanets Y. A.**

### **A REVIEW OF DESIGN CONSIDERATIONS IN GLASS BUILDINGS**

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In the past few decades, the use of glass in buildings has remarkably increased. As a result, several transparent buildings have been constructed, in which the materials have almost disappeared. Given that the advancement of architecture is inextricably linked to the acquisition of general knowledge on future developments, this study was conducted to predict the paths of development that glass structures are likely to take in the future. Investigations such as this increase the possibility of advancing both design and construction at the same speed as technology [1]. To achieve this goal, this study evaluates the present situation by investigating new possibilities and assessing their effect on the development of glass buildings. The findings of this study show that the durability, safety, appearance, and efficiency of transparent buildings can be improved through continuous refinement of designs, replacement of aged elements, prompt repair of damaged protective coatings, and greater exploitation of double-sided screens.

Glass has been used in construction since approximately 2000 years ago [4]. In recent decades, the application of this environment-friendly

material has been developed in the field of construction because of the following characteristics of glass: very high compressive strength, resistance to corrosion, recyclability,

3development of computers and programs, growth of the demand for the architecture of thinner and more transparent structures [2].

More transparent buildings have been constructed, in which the visual presence of materials has decreased. To refine the design and construction of transparent buildings and modify their structural behavior, both before and after damage, as well as all the remaining opportunities, should be carefully identified. For this purpose, this study analyzes the opportunities presented by recent advancements to improve both the appearance and efficiency of glass buildings. It then predicts how each novel approach can affect the future of transparent buildings.

The results of the study indicate that scientific and technological progress opens up the opportunities to select the optimum solutions in the course of an interactive design process, to replace aged elements and repair transparent protective coatings in a very short time. Moreover, through the application of revolutionary reversible adhesives, transparent double-sided screens can be fully exploited in glass buildings. Thus, advancements in science and technology ensure that the next generation of transparent buildings are more beautiful, more durable, safer, and even more useful [3].

Facetted shell structures are applied to avoid the high production cost of double-curved glass. In these structures, the facets form a smoothly curved surface:

A facetted shell structure with three-way vertices carries loads via membrane stresses in the facets and distributed shear along the edges. Thus, a high stiffness-to-weight ratio is maintained, and stress concentrations are avoided.

Nevertheless, the forces in the connections of a facetted shell differ from those of a smooth dome. In a smooth dome, the connections transfer loads primarily via in-plane forces, which leads to relatively low stresses. In a plate shell, facets are locally bent under distributed loads, thereby leading to higher stresses in the connections.

Thus, the form of structures and the bending techniques of glass affect the appearance, cost, and lifetime of glass structures [5]. For example, the forms compatible with adhesive joints or those that decrease the number of connections lead to more transparent structures . Moreover, the fabrication cost can be reduced through the appropriate segmentation of double-curved surfaces into a plane or single-curved panels. Efficient forms can reduce the aging effect by decreasing the exposed length of interlayers or in permanent high stresses. In addition, the different techniques of forming glass offer various possibilities. However, each form or forming method also presents some constraints, which need to be considered in designs with glass.

Accordingly, more efficient glass structures can be constructed when the limitations are well known and when the potential of forms is exploited.

Advancements in science and technology can improve both the efficiency and appearance of transparent buildings for the following reasons:

–The future generation of glass structures can be designed more carefully.

–The weight of transparent buildings can be reduced by selecting the optimal solutions in the course of an interactive design process.

–More options can be made available to designers by fine-tuning the existing techniques of design or manufacturing.

–The aged elements can be replaced by incorporating both the de-bond-on-demand joints and alternative load paths into the design.

–Transparent protective coatings that can warn of their wounds can self-heal in a very short period of time.

–The harmful effects of static fatigue can be lessened using innovative methods of replacement and quick repair.

–The next generation of reversible adhesives can provide the opportunity to fully exploit transparent, double-sided screens in all glass buildings.

Designers who are updated with the latest advancements in science and technology have more chances to keep up with new developments. Assessing the effectiveness of both existing and innovative solutions can help them optimize their designs. In addition, a conceptual framework for in-depth research, which is needed to overcome the remaining obstacles, can be provided given that the limitations of each solution can also be discerned through the assessment. Lastly, when more obstacles are removed, more glass can be used in construction, so that less can be more than before.

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**Fedorchenko S.**  
**BUILDINGS THAT BREATHE AND THINK**

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Mankind is rethinking how we build the structures we live and work in – and that, in turn, is changing the way our cities look and feel.

Using striking technical breakthroughs in complex computation and highly sensitive manufacturing, designers are moving closer to making lightweight buildings that can move, and perhaps even think and feel. Instead of hard, polished building faces, emerging prototypes from some of the world's research centres suggest future cities might begin to resemble artificial floating forests.

Rather than a civic plaza made from polished stone, new public gathering spaces could be softly layered, their resilient woven fabrics arranged in multiple hovering skins. Instead of clear skies and open air, our atmosphere could be filled with lacy mesh work that filters air and renews the environment.

Technical crafts made possible by new research in thermodynamics are now presenting remarkable new opportunities for architectural designers to work with air, gas and fluids as building materials. Yale mechanical engineer Michelle Addington has vividly documented control systems for dynamic plumes of heating and cooling air that enclose building surfaces, and has demonstrated that similar convection patterns occur around human bodies. Addington's vision implies that tangible air currents and gaseous concentrations of carbon dioxide and oxygen around the buildings we live and work in could become practical building materials for tomorrow's architecture.

Similarly, new clothing by Amsterdam couture designer Iris Van Herpen elevates beyond the surface of the body and extends into surrounding space, extending tendrils and plumes and interacting with the layers of the air that surrounds us. Making these invisible currents visible, thermal cameras such as those first used by the Quebec filmmaker Philippe Baylaucq will soon be available to designers. Baylaucq's cinematography suggests that the energy concentrating and dispersing around our bodies might become a tangible part of future public urban space.

In the hands of new researchers, these kinds of subtle energy exchanges might develop even further to become part of new artificial living systems. Exploring new chemical reactions within dynamic gaseous and fluid environments, British and Danish artificial life researchers such as Rachel Armstrong and Martin Hanczyc are designing "proto cells" – a mix of chemicals which behave in a similar way to regular cells. They oscillate, move, and generate skins of delicate material that could one day be used to clothe a building that grows and renews its own coverings.

The emerging qualities in this experimental work could guide the practical design of new architecture. An expanded range of screens and canopies built with minutely balanced filtering layers could work with convective air and currents of heating and cooling air encircling a new urban architecture. Within this kind of city "fabric", the thermal plumes emitted by each human occupant offer a new form of energy to be captured and used to operate entirely ductless buildings.

#### Fertile fabric

Some of these technologies are already being implemented in emerging cities. Alexander Rieck is one of a group of visionary designers who have contributed to Masdar Eco City, a desert-surrounded oasis in Abu Dhabi where garden-filled laneways and rooftops have been designed to make the world's first carbon-neutral city. A vast central cluster of opening and closing solar powered "sunflower" umbrellas capture the sun's rays during the day and fold at night releasing stored heat in a continual cycle. By following the projection of the sun, continuous shade is provided to the main plaza of the city.

The American designer Mitchell Joachim of Terreform is working to engineer living tissues into viable buildings. Terreform's plans for a vast site covering Brooklyn's Navy Yard shows a densely interwoven fertile fabric of elevated walkways, plazas and buildings made from hybrid composite materials that include engineered animal tissues, living trees, and lightweight manufactured screens, all manicured like a fantastic topiary.

When we think of designing complex forms of cities, how might particular shapes make a difference? If architects continue to follow the historic traditions that have guided North American and European building designs, we will continue to see trim, clean, stripped surfaces and dense, crystalline forms - pure cubes and rectangles adorned by an occasional sphere or dome as special centre pieces. These shapes evoke a language similar to that of ancient philosopher Plato, who described the world as coming from an inner core of pure geometric forms.

However, there are good reasons to pursue the opposite of these kinds of stripped forms. The shapes that are common within life-giving forests and jungles are the opposite of abstract cubes and spheres. The densely layered forms of a jungle are often made of diffusive, deeply interwoven material that expand and interact with their surroundings. A new city capable of handling unstable conditions – where it could shed heat, cool itself, and then rapidly warm up and gain heat again – might look like a forest. Each building could be made from dense layers of ivy-like filters and multiple overlapping layers of openings.

The experimental buildings illustrated here often tend to be characterized by delicacy. They increasingly move from older forms of a static, rigid world into the dynamic and sensitive qualities of a living metabolism.

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### **ARCHITECTURE OF GREAT BRITAIN**

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The origins of architecture in the UK began with the first Anglo-Saxon Church built in 597. The British architecture incorporates a variety of styles, ranging from Roman architecture to constructivism and Art Deco.

Starting from 1180 to 1520 in England flourished the Gothic architecture, which came to the Kingdom of France and quickly developed their unique features. The outstanding representatives of the Gothic school are such architectural monuments as the Canterbury Cathedral and the Westminster Cathedral, which is the burial place of kings since William the Conqueror. Since the time of the hundred years, war building in England decreased significantly, developed very slowly, and did not play an important role due to its location protected by the sea and an underdeveloped fleet. In contrast to French Gothic style of architecture, the English Gothic style is not closely associated with the design, it still retains its flat, rectangular shape, which were filled with a great number of details. Since then, the predominance of improving the existing style began in England, by the complexity of the decorations of the ceilings and increasing the already enormous Windows. The representative of such developments are the oldest English Oxford and Cambridge universities. Soon began to gain popularity the commercial corporation who bought "Banquet halls". They started to attach luxurious chapels to cathedrals, and constructions of temple gradually declined.

After the Gothic style in the architecture of Great Britain came the Baroque style, which in England was compared to the rest of the major architectural styles of the middle ages. The Baroque style stuck to foreign artists, among which is dominated by portrait painters than architects. The result was due the recognition of French culture of the XVII century and Versailles as an art center, there were frequent visits of the English, among and Christopher Wren who was a mathematician, scientist, architect, who was the author of the St. Paul Cathedral. Paul in London. The Royal court made orders for the projects of creating Baroque formal gardens of the French

landscape architect andré Le nôtre. But the situation of Britain is only a secondary episode.

A turning point in the architecture of Britain was the change in the Royal dynasty. The throne of England was occupied by the Stewarts. In the XVII century, a wired style in the architecture of Britain was Classicism. The post when the Queen went to the Anne of Denmark, she made by Inigo Jones, court architect who has undergone the teachings of Palladio, to the land of great Britain. Inigo Jones was the project Manager of the Queen's house in Greenwich to Queen Anne. During the Great fire of London there burned down more than 13,200 houses and 87 churches including the Cathedral of St. Peter. This event was for architects a field for experimentation, particularly for Christopher Wren. After the bourgeois revolution and reconstruction, the initiative passed to the bourgeois owners of the country. The new Cathedral was a feat of engineering with the desire of the bourgeoisie to greatness and to demonstrate their own power. Christopher Wren was a supervisor of more than fifty projects on creation of the income of churches in the ashes, which was the first massive construction of sacred buildings after the reformation and the emergence of Anglicanism. Christopher Wren created the national version of classicism in the European manner, and this idea he wanted to realize the implementation of the new layout of the city. In his new style, Ren combined the styles of Baroque and Gothic features, a bright representative of this style became the Marine hospital at Greenwich.

At the end of the eighteenth century, the UK experienced the industrial revolution. It resulted in strong changes in the structure of many British cities. Country village estates, oak, quiet surroundings with mills, ponds, eyes turned to the country of metallurgical furnaces, factories, docks and industrial landscapes as well as smoky cities. The face of the country formed not architects and engineers. The streets of English cities were flooded with extremely cheap minimalist two-storey buildings with the chaotic location of high density and confusing layout. These homes were built in a hurry. The monotony and poverty of the inhabitants made these areas the prototype of the future industrial slums.

In the nineteenth century in England there began a search for a wired architecture, as well as the struggle between Germany, France and England for supremacy in the invention of the style of European Gothic. But the restoration of medieval architectural forms took the first place in the UK.

In the XX century, some English architects took interest in the style of the Modernism that emerged before the First World War and came from continental Europe. After the Second World War, the English architecture changed greatly. The rigor of the forms, started to dominate it was only the matter of costs of the projects, however, in times of economic instability in England new architectural currents such as brutalism started to appear. High-tech architecture, stone and brick domestic buildings gave way to strict on a high building of glass and metal, so there appeared such styles as

postmodernism, and the modern High-Tech. Now, the style of postmodernism is implemented in many shopping centers and office complexes.

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### **ACHIEVEMENTS OF THE UKRAINIAN SCHOOL OF APPLIED GEOMETRY**

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The Ukrainian School of Applied Geometry was founded by Professor S.M. Kolotov (1880–1965) who taught and prepared 32 Philosophy Doctors. He was the author of the method of transformation of projections by the way of an auxiliary rectangular and oblique-angled projection. The distinctive features of the Ukrainian scientists' works consist in applications of the methods of Applied Geometry for the solution of practical problems in various areas of science and engineering. The geometric modeling of objects, processes and phenomena has been carried out with the purpose of their optimization.

Different schools of Applied Geometry in Ukraine:

Kyiv National University of Building and Architecture

The majority of problems solved at the Kyiv National University of Building and Architecture refer to construction and architecture. So the author and his disciples investigated the problem of architectural envelopes, carried out a geometric analysis and gave the geometric interpretation of main conditions and requests for their design. As the prototype of architectural covers we analyzed the geometric form of some surfaces of natural origin with the purpose to determine the principles which can be used in architectural analogues. The two problems at the geometric design of surfaces composed from curved or planar patches were formulated: the primal problem consists in breaking the surface into patches by the way of exact and approximate parqueting; the inverse problem consists in the creation of surfaces out of portions of beforehand given surfaces. Many disciples of the author dedicated their theses to the geometric modeling of thin-walled covers. A number of optimization problems of designing awning, guy and pneumatic constructions both of low and high pressure were solved. Some researches are dedicated to constructions under transformation. Three theses are dedicated to the optimization of the form of a cutting machine tool used for the destruction of

rocks. One work is dedicated to laying-out fabrics in tanning industry, the other to forecasting landslides. Two more works are dedicated to the visual perception of environment. As a new speciality 'Technical Aesthetics' was introduced; there were defended two theses: one doctoral thesis was dedicated to geometric principles of artistic design; another Philosophy Doctors. thesis addressed problems of geometry and semiotics of aesthetic self-descriptiveness. Altogether 63 Philosophy Doctors. theses and 7 doctoral theses were defended under the direction and supervision of the author.

#### National Technical University (KPI)

The 'Descriptive Geometry, Engineering and Computer Graphics Department' at the National Technical University (KPI) has 6 Doctors and 19 Philosophy Doctors. The basic trend of research of this scientific school is the development of methods for geometrical modeling of objects, processes and phenomena. In Prof. V.S. Obukhova's doctoral thesis (National Agrarian University) nonlinear projections were applied to line congruences of first order as well as to a number of straight lines. This led to a group of nonlinear models of higher order. A method of incidences in dual representation has also been developed. On the basis of intersecting given subsets of multitudes (straight lines, curved lines, surfaces) ruled surfaces of third and fourth order were obtained and investigated. Also methods of nonlinear transformation were developed. Practical utilization of the created surfaces was demonstrated at samples of working tools for agricultural machines, at the design of products with curvilinear forms, and the development of cutters with variable geometry, attaining riffling surfaces, etc. In 9 defended philosophy doctors and 1 doctoral theses Obukhova's students treated ideas of their teacher.

#### The Kharkiv School

As subject of research of Prof. Kutsenko, the leader of the Kharkiv school, an array of tasks was selected. The solution of these tasks becomes much simplified via using a basic method in descriptive geometry and reflections on projections. Indeed, the experience in developing algorithmic solutions for applied tasks disclosed that for the process of achieving expected results it would be useful to consider the 'internal' projecting nature of these tasks. Therefore the solution of the primary task often consists in achieving calculations pertaining to the creation of a layout (i.e. projection) by means of computer graphics. In this respect the research of the Kharkiv school of geometry is developing in three directions: in the first one a projecting method is developed for the calculation of special integrals in radial energy transmittal in space from one surface to another. The projection method used during integration allows refraining from the traditional "pacing" over surfaces; the second direction is associated with the development of a projection method for the identification of enveloping parametric families; the third direction treats the development of a projection method for geometrical modeling of parallel multitudes with the possibility of calculating their integral characteristics.

All aforesaid testifies to the fact that scientific research of Ukrainian scientists and teachers covers a wide range of problems of geometric modeling of objects, processes and phenomena. As a rule, the results of Philosophy Doctor and doctoral theses have been applied at different design institutions, research organizations and in industry. Apart from scientific articles and monographs, new results have also certified with Ukrainian certificates of authorship and patents.

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**Ignatenko P. V.**

### **FACTORS OF DEVELOPMENT OF ARCHITECTURE OF HIGH-RISE BUILDINGS**

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The high cost of land in major cities, coupled with economic efficiency of high-rise buildings has led to the rapid development of high-rise buildings of urban areas. High-rise construction, in addition to the obvious economic benefits (increase in density and energy savings), has an important artistic aspect of high-rise buildings are expressive compositional dominants in the skyline of the city.

Not accidentally, many cities and countries have many years of architectural competition, arguing about whose skyscrapers higher and original forms. As symbols of technological progress, wealth and prestige, high-rise buildings contribute to the economy, business and tourism. These circumstances led to the high importance of the new composite and design ideas in the creative process of forming high-rise buildings, as well as the accuracy of selecting optimal building envelope in each case.

Trends in the development of high-rise architecture in the modern period such that compositional and aesthetic issues of design of the external envelope of buildings gradually come to the fore among all the others.

This is due to the interaction of several factors.

1. High prestige esthetic and expressive exterior architectural forms of tall buildings, often being symbols of cities and States.

2. Principle constructive-technological feasibility of the buildings up to a height of 1200 m, is able to have a very complex geometric shape and cross section due to new calculation methods, design solutions and structural materials, allowing to improve the reliability of static work structures with

complex loading conditions, including in regions with high seismic and wind activity.

3. The Independence of the external architectural forms of tall buildings from its principal constructive scheme (the outline of the internal load-bearing frame).

4. The development of the concept of a universal inner space, suggesting the independence of the external architectural forms of tall buildings from its internal functional space-planning structure.

5. Development of new materials, as well as technological feasibility in difficult plastic outer enclosing envelope of the building, thus expanding the spectrum of artistic expressive possibilities of architectural forming.

6. Continuous improvement of technical systems of fire safety, fiber optic communications, computer networks and energy-efficient technologies, contributing to an extremely compact placement of internal communications, lower operating costs, and increasing information and energy equipment of buildings and allows the building to respond adequately to changes in external and internal environment.

When the real prospect of a significant and regular funding buildings (a typical situation in the case of the construction of a unique high-rise buildings in various countries of the world) qualitative novelty of architectural forms of the shell and its aesthetic perfection have become major factors in determining the choice of a particular variant of the architectural and artistic concept of the exterior of the object.

Projects and buildings of outstanding masters of modern architecture are perfect when measures of merging together the plastic expressiveness and technological merits of the shape of high-rise buildings.

In modern conditions, architects should have a broader and more complex set of compositional techniques aimed at improving aesthetic expression and the variability of possible solutions of shells of high-rise buildings: responsible for the creation of a full-fledged artistic and unique in its architectural forms of the building-character, able for decades to determine the face of the city (namely, to those it applies to each high-rise urban dominant), is extremely high.

The architect who designs the very expensive and technically challenging high-rise construction, there is no right on the composite error.

However, the lack of a unified system of theoretical basics of architectural shaping of tall buildings, insufficient knowledge of ways of modeling composite architectural forms of tall buildings hinder research in this area, as well as the development of qualitatively new pre-design architectural and design concepts, which ultimately prevents the creation of complete works of high-rise architecture.

The study authors allows to say that a qualitative leap in the development of high-rise architecture is possible only when the binding interaction of six major factors-conditions.

1. The Dynamic growth of public (national, corporate, religious etc.) identity, expressed in the appearance and rapid development of positive ambitious aspirations. The desire of society as a whole, or its specific social strata to identify and fix its priority position in the social hierarchy in certain historical periods of development of the country and brings to life the emergence of the masterpieces of world architecture, delighting successive generations in periods of social (and therefore architectural) calm. Therefore, the total-public architectural ambitions are an important stimulus for the development of a new architectural wave.

2. Expression of these ambitions through Architecture and not through any other art form (e.g., film or painting), or together with them. In a society or certain groups should be formed corresponding to Architecture as the main source of information about the status, potential and dynamics of development and achievements of society (corporations, etc.). All this leads to the appearance of the buildings-symbols of nature with the outstanding architecture and unique characteristics. Such buildings with its unusual shape, giant size and high quality construction stand out from surrounding buildings.

3. Architectural embodiment of the social ideas of ambitions in a very large (in some countries is a priority!) financial investments in the process of designing and construction of objects-symbols, which at a cost typically in the range not one of the annual national budget, but are the pride of entire generations.

4. Best natural climatic conditions (no seismicity, the absence of strong winds, low rainfall, little humidity, a stable and optimum temperature, suitable soils, etc.).

5. High technological and cultural level of development of social relations, contributing to the high quality of construction and post-construction operation and preservation of the unique architectural sites.

6. Developed international communication, business, trade, tourism, intensive financial flows.

The loss of any of the conditions makes the establishment of innovative high-rise architecture highly problematic or impossible.

Currently, the main problems of the conceptual architecture of high-rise buildings are in the opening of the artistic potential of morphogenesis (development of new methods and techniques of modeling forms with previously unknown artistic and aesthetic qualities).

As was written in the book «How to Build Skyscrapers», the main problems of "practical architecture" down to selection, financing and quality construction of the best option of the architectural solutions planned high-rise buildings. While the search for customers and investors, is becoming an important separate area of the complex and diverse process of creating works of architecture and almost the main link in the work of the modern architect.

In comparison with music, painting and sculpture architecture has a material basis, having tremendous cost: in some cases, only the construction

materials of the buildings are tens of millions of dollars, and the construction of the facility — more than a billion. It is therefore understandable desire of the owner and builders of high-rise object is ultimately to reduce the price, accelerate and simplify the process of its construction.

As a result, the vast majority built and under construction today in different countries the world of high-rise buildings (up to 97-99%) can be classified as "commercial real estate", the essence of which is determined by the principle: "With a minimum of funds to construct a building, the area of which you can quickly and profitably to sell". Of any "architectural excesses" in this formulation of the question could not be considered.

And only a small number of "skyscrapers" (1-3%) belongs to the category "architecture exclusive", when a task is economic payback of buildings is not the main or non-existent, while the emphasis on image, the task of creating works of symbolic architecture.

Analysis of more than 1,700 high-rise buildings, built in various countries of the world, has helped to identify the most characteristic compositional features that define the current architecture of the main mass of high-rise buildings.

1. Simple, primitive, very simplified form of the total volume of the high-rise object (the notorious faceless "functional glass box").

2. Complete absence or extremely limited use of individual attractive architectural details outer shell.

3. Mass use of unitized cladding facade elements (bent metal rods and panels, and glass) a simplified form.

4. Large glazed facade surface with no details that cause a sense of monotony (forming negative homogeneous field of visual impact) and the severity (the overall tone of the glazed surfaces — dark).

5. The Lack of structure of the outer shell of a high-rise building areas (elements), contrast in form, color, tone, texture, large glazed surfaces.

6. Often, the occasional bad location the high-rise volume (complex high volume) in the urban structure from the standpoint of zoning, environmental and urban composition.

All of the above features together define the sharply negative attitude of the population, including professionals, to high-rise construction.

Prospects of progressive development of the architecture of tall buildings: from economic architecture "functional glass shelves" to the expressive architecture based on the fractal model and the crystallographic principles of formation and in appearance resembling organic natural formation — bioform.

There comes a time when the psychic-energy effect of the spatial environment, not its functional essence, will be the determining factor in the development of high-rise architecture.

The main direction of professional activity of architects-"high altitude" will be the development of new and effective ways of improving the plastic

expressiveness of modern high-rise architecture as well as predictive modeling architecture of the buildings of the future.

In our time, when the aesthetics of building materials overshadowed the aesthetics of shaping, so appreciative of individuality and the plastic expressiveness of the architectural solution high-rise buildings can only be achieved through the use of advanced compositional techniques of the "game form" in the framework of modern construction technologies.

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### **INFLUENCE OF DEFECTS OF METROPOLITENE TUNNEL FRAMES ON THEIR OPERATIONAL INDICATORS**

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Tunnels are the most responsible, complex and expensive artificial transport facilities, which are designed for long-term use. The main bearing structure of the tunnel - its frame - fixes the mining and perceives all types of operating loads. The conditions of the tunnel architecture are complex and varied. Factors influencing the operating conditions of a tunnel pattern can be divided into four groups. These are external natural and climatic conditions, design characteristics, construction characteristics and operating conditions of the tunnel. Let's dwell on each of these groups.

The natural and climatic conditions are of primary importance not only for choosing design solutions during the construction of a tunnel, but also during its exploitation. Particular attention should be paid to the engineering-geological conditions in the immediate vicinity of the tunnel zone [1]. Thus, the cause of the deformation of the tunnel during its operation may be karst voids in the mountainous array. These voids in the form of caves, caverns, grottoes arise under the influence of mechanical and dissolving effects of

water. Especially dangerous karst voids, which are filled with water that can lead to a sudden breakthrough of water in the tunnel.

And in spite of the fact that deep tunnels with concrete and reinforced concrete frameworks are more likely to be located below the groundwater level, water from the neighboring water-saturated areas, and sometimes from the horizons above, can enter the tunnel.

The properties of the rocks surrounding the tunnel base during the time under the influence of various factors may change, thereby changing the conditions of the static operation of the setting. There are many cases when, after prolonged exploitation of the tunnel, the soil massif was subjected to landslides or drafts, causing deformation of the frames and leading even to their destruction.

The structural characteristics of the tunnels include: the length of the tunnel, the number of parallel lines, their cross-section, the plan, profile, materials and design solutions of the portal, portals, waterproofing and drainage, etc. Thus, some constructive solutions, which are fully justified in technical terms at the design stage and economical in construction, may subsequently prove to be ineffective because they require increased constant supervision and increased operational costs. For example, concrete tunnels under the conditions of production have a large number of work seams (concrete seams), in which there may occur the material uniformity in terms of density and water resistance. The arrangement of large sections of a deep tunnel without temperature and sedimentation seams leads to the formation of transverse cracks in the reinforced concrete frame.

One of the main reasons for water filtration in the tunnel is the disadvantages in the arrangement of waterproofing [2]. Such defects may not be detected in the process of production, but during the operation water filtration will occur in these areas.

The largest number of places of water filtration in tunnels of deep foundation is located on the side parts of the tunnel, and in the tunnels of shallow foundation almost at the level of the tunnel tray and near the ceiling. As it can be seen from Figure 1, the filtration points are close to the insulation joint and the concrete seam, and arise from the tightness of the seam and the insulation joint.

In some cases, the filtration at stations at some time spontaneously decreases and disappears. Often after disappearing in one place, it appears in a different one. Such a phenomenon can be explained by the local self-compacting of concrete, the reason of which may be the blockage of pores in it by impurities contained in groundwater.

Industrial defects, which are the result of the poor quality of construction work carried out, reduce the operational reliability of existing tunnels. The experience of exploitation shows that the appearance of chips and intense cracking in a concrete frame usually indicates the presence of voids over its outer surface.

Cross section of the deep

Cross section of the tunnel of shallow foundation

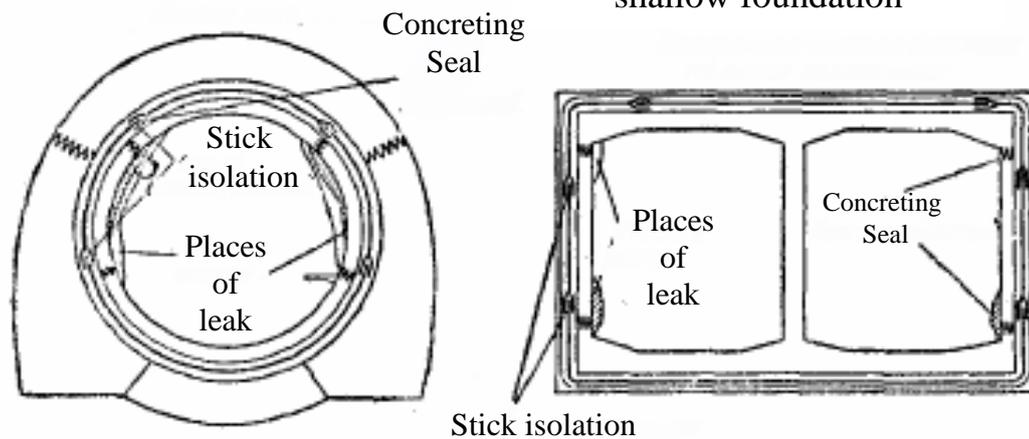


Figure 1 - Scheme of filtration sites location (in the cross-section)

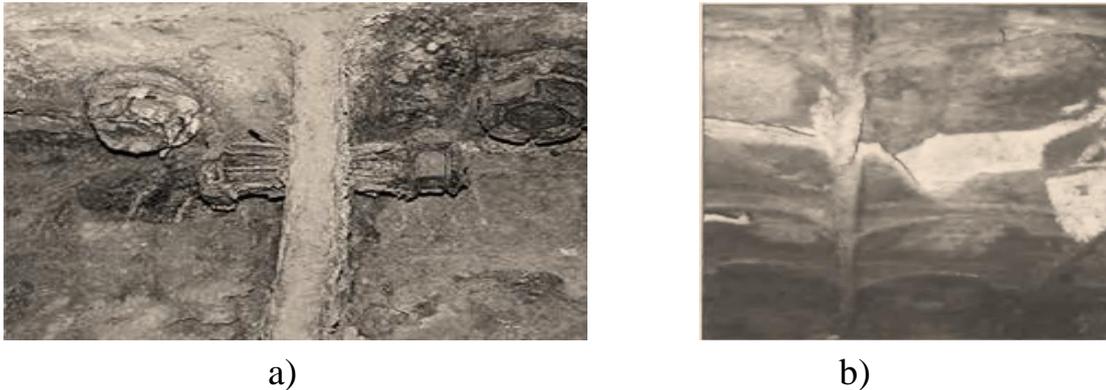
The operating mode of the tunnel also affects the working conditions of the entire tunnel, so it is important to have normative guidelines on the operation, maintenance and inspection of underground tunnels for timely identification, evaluation and elimination of problems. But this is the main problem in Ukraine. At present, we have a number of normative documents that regulate the survey of the individual vision and groups of structures at different stages of their existence, as well as DBN V.2.3 - 7 -2010 “Metropolitanians” [3]. However, there are no clear instructions and documentation on the rules for inspection and correction of defects and damage in the operation of underground tunnels in Ukraine. This is a big drawback.

V. Garber [4] offers a fairly complete list of damages caused to structures of underground facilities, as well as the situations that can affect the safety of trains and the passage of passengers, as well as the most characteristic deformations.

Analyzing these data we can say that the most characteristic defects are: exceeding the allowable norms of the size of crack opening in the stretched zone and crushing of concrete in the compressed zone; damage from the influence of aggressive environments - corrosive destruction of concrete with the formation of a rust layer, which is accompanied by a decrease in the cross section of the reinforcement and the violation of its adhesion to concrete; the deformation of individual rings of blocks or sections of the setting, which manifests itself in the form of destruction of the filling of joints between the elements of the frame and the appearance of cracks in the road concrete.

The most dangerous, testifying to overvoltage and large structural deformations, are horizontal cracks, cracks or fracturing of filling joints, which arose during operation and continues to evolve. Particular attention should be paid to defects that are repeated on a number of rings of the same

plot. This is the main feature indicating the need to verify the reliability of the structure as a whole.



*Figure 2 - Defects of cast-iron tubes of underground tunnels*

The most dangerous are the defects caused by mistakes made at the stage of exploration and design. These include cracks in the longitudinal and radial edges, in the backbones of the tubes due to the inconsistency of their geometric parameters with the operating load, leaks in the joints and bolted joints (Fig. 2a) due to the discrepancy of the used sealant with the magnitude of the hydrostatic pressure. The main types of manufacturing defects of cast iron tubing frames are manifested in the form of leakage in joints and bolted joints due to the poor quality of joints and the absence of sealing washes in bolted joints. In the ring edges of the tubes, cracks may occur due to the efforts of the shaft jacks, and due to the low-quality of anticorrosion treatment, as well as corrosion of bolts.

The peculiarity of manifestation of operational defects in the cast iron is chemical and electrochemical corrosion of the tubing and bolted ligaments. Untimely measures to prevent this degradation process can lead to an irreversible decrease in the design cross sections of tubers and the appearance of emergency situations (Fig. 2b).

Summing up the material examined, we can conclude that the defects considered are far from complete if we take into account many types of adverse external influences on tunnel constructions and conditions of operation of buildings, as well as the quality of their construction and maintenance. Not only the timely detection of all defects is important, but also an analysis of the origin and the degree of danger of each defect for a particular structure with an assessment of the severity of the consequences of their development.

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**Indiukov A. S.**

**THE ROLE OF STABILIZING ADDITIVES IN THE FORMATION OF  
THE PROPERTIES OF MACADAM AND MASTIC ASPHALT  
CONCRETE**

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Specific composition and structure of Macadam and mastic asphalt concrete (MMAC) requires mandatory presence as the main components the strong crushed stone with improved (cubical) grain form, the ‘volume’ bitumen and a small amount of stabilizing (usually fibrous) additive for a disperse reinforcement of the binder. On the thickness of the bituminous layer separating the mineral grains of the mix, it is practically impossible to draw a clear boundary between bulk and structured bitumen. However, there is a difference between them, since the main purpose of the stabilizing additive is to hold thicker films of hot bituminous binder on the surface of the rubble and prevent it from peeling and escaping from the mix at high process temperatures during preparation, transportation and stacking. Unlike the asphalt-concrete mix containing from 50 to 60% of chippings, in MMAC its volume reaches 70-80%. To keep it on the surface of chippings, it is necessary to have a special stabilizing additive type of fiber in the mix. MMAC is an independent variety of asphalt concrete, providing, in contrast to other types of mixtures, both watertightness, shear stability and roughness of the upper coating layer. The residual porosity of the packed MMAC layer can be less than 1%, but the shear stability and roughness of the coating remain at a high level. The original specification of the material makes it possible to lay it in thin layers and, accordingly, a smaller amount of this high quality asphalt mix will be required per square meter of the surface. Therefore, MMAC is more cost-effective than traditional materials for the upper layers of road surfaces, although it contains more expensive and high-quality components. Depending on the size of the chippings used, Macadam and mastic asphalt concrete mixes and asphalt concrete were classified into the following types:

- At a grain size of up to 10 mm – MMAC-10
- At a grain size of up to 15 mm – MMAC-15
- At a grain size of up to 20 mm – MMAC-20.

These mixes are recommended for the application of upper layers of coatings from 3 to 6 cm in thickness on the roads of any technical category and city streets in I-V road and climatic zones. To keep hot bitumen on the surface of grains of mineral material during intermediate storage and transportation of Macadam and mastic asphalt concrete mixes, special structuring (stabilizing) additives are introduced into their composition to increase the thickness of the binder films. The type and properties of these additives are of great importance in order to provide the required binder content and improve the quality of the mixture. The stabilizing effect is manifested in the ability to prevent segregation and peeling off of the bitumen binder at high process temperatures. Initially, as stabilizing additives, predominantly asbestos fibers and rubber crumbs were used, which allowed injecting up to 7% bitumen into the mixture of MMAC. Then, for technical, economic, scientific and ecological reasons, the range of stabilizing additives was expanded. Cellulose, polymer and mineral fibers, special thermoplastic polymers and derivatives of silicic acid began to be added to MMAC. These materials also proved capable in some degree to retain a larger volume of bitumen in the mixture and protect it from delamination. The search for effective stabilizing additives suitable for making mixtures and improving the quality of asphalt-concrete coatings continues to this day, as indicated by the appearance of new types of stabilizers, which are not considered in this publication. Currently, stabilizing additives based on cellulose fibers are widely used due to their manufacturability and relatively low cost. It is known that cellulose is a product of processing of plant raw materials and represents a chain structure consisting of  $\alpha$  or  $\beta$ -cellulose molecules that is insoluble in water. The true density of pure cellulose is 1.58 g / cm<sup>3</sup>. The additives produced on the basis of cellulosic fibers for road construction have the following commercial names: VIATOP, TOPCEL, TECHNOCEL 1004, ANTROCEL, HASCEL, etc. DOLANIT, DCRET and FORTA made of acrylic fibers, until recently were present on the market and were offered for use as additives in asphalt-concrete mixes.

To the stabilizing additives, technical requirements for heat resistance, humidity and uniformity are most often presented. Sometimes recommendations are given on the geometric dimensions of fibers, the specific surface area and the distribution of fiber sizes along the length. The effect of stabilizing additives involves increasing the thickness of the bitumen films, which ensures the quality and uniformity of the asphalt-concrete mixtures. As a stabilizing additive in the mixtures of MMAC, it is recommended to use a homogeneous short-fiber cellulose fiber having in the composition not less than 50% fiber in length from 0.5 to 1.9 mm. The

suitability of unadjusted fibers (acrylic, mineral, etc.), as well as other additives (rubber powder, polymers, etc.), should be previously justified by laboratory tests. Fibrous additive should be homogeneous, without impurities, resistant to heating to a temperature of 220°C and have a moisture content of not more than 8% by weight. It must comply with the requirements of the relevant technical documentation of the manufacturer, agreed and approved in accordance with the established procedure.

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**Izvekov O. S.**

## **CLASSICISM, CLASSICAL REVIVAL, NEOCLASSICISM**

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The classical "orders" are a kind of architectural grammar, first developed in Greece then adapted and extended by the Romans. The orders determine the shape, proportion and decoration of the basic architectural elements: the vertical, supporting column consisting of its base, shaft and capital and the horizontal supported entablature divided into three parts: the architrave, frieze and cornice.

There are three distinct orders in Ancient Greek architecture: Doric, Ionic, and Corinthian. The Doric order is considered the earliest and the simplest of the orders which is characterized by short, faceted, heavy columns with plain round capitals and no base. The Ionic order is distinguished by slender, fluted pillars with a large base and two opposed volutes in the echinus of the capital.

In the V - IV centuries BC, Greek order forms reached proportional perfection and there appeared the Corinthian order which is regarded as the most elegant of the three orders characterized by a slender fluted column having an ornate capital decorated with two rows of acanthus leaves and four scrolls. It was used in both public buildings and large dipteral temples.



The Romans adapted all the Greek orders and also developed two of their own: the Tuscan and Composite, basically modifications of Greek orders. The Tuscan order has a very plain design, with a plain shaft, and a simple capital, base, and frieze. The Composite order is the most sophisticated, a combination of Ionic grace and Corinthian ornamentation. Its columns are tall and slender, its capitals have bountiful acanthus leaves and its entablature sports an ostentatiously sculpted frieze and cornice.

The Romans also invented the superposed order. A superposed order is when successive stories of a building have different orders. The heaviest orders were at the bottom, whilst the lightest came at the top. This means that the Doric order was the order of the ground floor; the Ionic order was used for the middle story, while the Corinthian or the Composite order was used for the top story. The most famous ancient example of such an order is the Colosseum at Rome, which had four storeys of superposed orders.



Romans borrowed the order system from Greece, changing it not only formally, constructively and morphologically, but also gave it its own semantic and figurative sounding. Ancient Greek and Roman orders were completely different in the cultural sense and therefore expressed a different content.

Different orders were applied for different types of buildings and structures. The grandiose ensembles of temples and forums were designed to form the image of a strong and great world empire to translate Roman state ideology into its vast territories. Vitruvius wrote that the proportions of the ancient Roman building were "correlated with one of its parts", which was taken as the main one, that is, served as a module.

Whereas the orders were essentially structural in Greek architecture, in Roman architecture where the arch was often dominant, the orders became increasingly decorative elements. During the Empire, of the three orders, five were formed creating a single modular canon. After the official change of the state religion by Emperor Constantine I and the transfer of the capital of the empire to Constantinople, the Roman order system, just like the Greek one, gradually turned into an "archive".

In the history of architecture, there were a number of periods when the classical orders in architecture revived, but not in its original form. Each time there were some formal changes and new semantic content. I think that the reason for such "revivals" is the complex nature of the order architecture as such and its innate ability to express completely different artistic and social meanings. Architects turned to it in different social and cultural conditions, and again it miraculously revealed the ability to develop and adapt to the renewed tasks of architecture.

In the Renaissance, architecture was used as a traditional language for expressing a new humanistic content of culture. The rebirth of Classical architecture was originated in Florence in the early 15th century and spread throughout Europe. The basic design element was the order. There was a revival of ancient Roman forms, including the column and round arch, the tunnel vault, and the dome. This concern for proportion resulted in clear, easily comprehended space and mass, which is a distinguishing feature of the Renaissance style.

Each successive generation came to the orders with fresh eyes and defined them anew. **Neoclassical architecture** is the revival of Classical architecture during the 18th and early 19th centuries. Neoclassical architecture is characterized by grandeur of scale, simplicity of geometric forms, Greek especially, Roman detail, dramatic use of columns, and a preference for blank walls.

Russia's Catherine II transformed St. Petersburg into an unparalleled collection of Neoclassical buildings. By 1800 nearly all new British architecture reflected the Neoclassical spirit. The French Neoclassical movement was focused on an extremely faithful reproduction of Classical forms. It was a style fit



for kings, emperors, and revolutionaries alike. In the United States Neoclassicism continued to flourish throughout the 19th century, as many architects looked to make the analogy between the young country and imperial Rome when designing major government buildings.

Michael Rouchell, a New Orleans architect and designer writes: “The problem that architects confront today is their belief that using classical architecture is regressive, a return to the past, and therefore is not suitable for a modern society. It is better to think of classicism as a language that is adaptable to whatever new circumstances are presented. This has always been the case with Classicism from its very earliest beginnings”.

Finally, it is necessary to look back at classical architecture of the Late Nineteenth and Early Twentieth Century, the point where modernism began to dominate and notice how technically advanced classical buildings were at the time.



Some were engineering marvels in their

own, such as the Manufactures and Liberal Arts Building of the 1893 Chicago World's Fair designed by George Post.

The Manhattan Bridge is a large suspension bridge that spans the East River in New York. A close examination of its steel framed towers reveals elements that suggest cornices, brackets and finials, and therefore can be considered a great example of classical architecture.

To sum it up, I would say that architects must continue to innovate, and building technology must continue to evolve, but we must pick up all the lost knowledge and wisdom of classical architecture that was forgotten.

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## Jesipow A. O.

### **DIE FORSCHUNG VON PRINZIPIEN UND TRADIZIONEN DER ENTWICKELNDEN KOMPOSITION MODERNER STÄDTEN**

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Historisch-zonale Differenzierung der Baukörpergestaltung, die Strukturdifferenzierung beständiger Elemente und die Analyse deren Zusammenwirkung verfolgen das Ziel, die gemeinsame Gesetzmäßigkeiten einer zusammengesetzten Raumeinheit der Stadt festzustellen, die sich im Folge einer dauerhaften sukzessiven Evolution der Komposition historischer Baukörpergestaltung gezeigt [1]. Dies ermöglicht die Bestimmung einer zukünftigen Entwicklung von historischen Städten. Das Ergebnis der durchgeführten Analyse ist die Entwicklung eines logischen Modells der Kompositionseinheit der historischen Stadt. Eine führende Rolle spielt dabei die Baukörpergestaltung der historischen Stadt. Die Kompositionseinheit der Stadt versteht man als die Synthese von den zwei Aspekten [2]:

1. Eine indirekte Wahrnehmung der Stadteinheit mit den Elementen der logischen Analyse, die das Verständnis für die Stadt im Bewusstsein als eine gemeinsame Funktion, ein gemeinsames Gegend, ein gemeinsames Raum und ein gemeinsamer Gehalt schafft, das die Baukörpergestaltung widerspiegelt.

2. Eine angenommene Einheit der Stadt, die von ihrer Gestaltung bestimmt wird und von den Faktoren der Architekturformen bedingt ist und die schließt ein:

- die Faktoren von der in einer gleichen Zeit angenommenen Einheit (eine statische Annahme einer Ansicht, einer Silhouette, einer Gesamtheit von Objekten und Stadtdominanten);

- die Faktoren einer konsequent angenommenen dynamischen Einheit (Fußgängerzone und Verkehrsader), die die Zusammensetzung der Strukturelemente in einem dynamischen Prozess schafft, indem sich eine konsequente Vorstellung über die planerische Organisation der Stadt gestaltet.

Diese zwei Aspekte einer zusammengesetzten Einheit der Stadt bestimmen die Gestaltung ihrer harmonischen Baukörpergestaltung, die als die Zusammensetzung einer historischen und einer modernen Strukturen betrachtet wird. Die Analyse der Stadtentwicklung und die Forschung deren planerischen Komposition zeigen, dass die Planung einer modernen Stadt entwickelt sich nicht so, wie es die Entwicklung der vorherigen Siedlungen verliefen [3]. Wenn die Stadt von vorigen Generationen von Baumeistern allmählich gebildet wurde. Die Baumeister verwirklichten sukzessive Entwicklung von städtebaulichen Traditionen. Heutige schnelle Bebauung des Territoriums moderner Städte entwickelt sich oft ohne Berücksichtigung von historischen Traditionen. Die Projektanten mussten seit Langem quantitative Merkmale akzentuieren, was zur Unterbrechung in der Aufbaustruktur verschiedener Zeitperiode führte. Die durchgeführten Untersuchungen beweisen, dass die Aufbaustrukturen verschiedener Zeitperiode in Bestand einer Zusammenwirkung ständig sind. Diese Zusammenwirkung trägt ein positiver und ein negativer Charakter [4,5]. Die Regulierung dieser Zusammenwirkung muss alle Seiten dieses Prozesses berücksichtigen und wird durch folgende Prinzipien bestimmt:

- das Entwicklungsprinzip auf die Schaffung von Bedingungen für die weitere Kompositionsgestaltung deren Aufbaustruktur ist gerichtet;

- die Vereinigung von historischen und modernen Tendenzen der Zusammenwirkung der Gestaltungen verschiedener Zeitperiode;

- das Prinzip einer Teilung der Strukturen verschiedener Zeitperioden. Dieses Prinzip dient für die Widerspiegelung von modernen Traditionen und Tendenzen der Entwicklung moderner Städten;

- die Prinzipien des Zonenmodells. Diese Prinzipien gewährleisten den Verbundaufbau von Modernstädten.

Das Ergebnis der durchgeführten Analyse über die Rolle und Stelle von den historischen Formen in der Komposition der modernen Stadt ist die Ausarbeitung der Methode einer morphologischen Analyse der Stadtkomposition, die auf einer prinzipiellen Lage beruht. Der Sinn dieser Lage liegt darin, dass das objektive Bild der Komposition nur geschaffen werden kann, wenn die historische Stadt als ein räumliches Organismus betrachtet wird, das sich von den alten Zeiten bis unsere Zeit wie eine

harmonische Komposition entwickelt. Diese Methode schließt folgende Operationen ein:

1. die Durchführung einer retrospektiven Analyse einer Baukomposition der Siedlung für die Bestimmung von Besonderheiten deren Gestaltung und individuellen Tendenzen der sukzessiven Entwicklung.

2. die historisch-zonale Differenzierung des ganzen Stadtterritoriums für die Bestimmung des Charakter bei der Zusammenwirkung verschiedener Strukturen in den verschiedenen Zeitperioden und einer konkreten historischen Struktur der modernen Stadt.

3. die Bestimmung des zusammengesetzten Typ der Baukörpergestaltung einer Stadt und die Analyse der Charakters einer Vereinigung und einer Verteilung von den Strukturen verschiedener Epochen.

5. das Ergebnis der Vereinigung von den erhaltenen Bestimmungen ist eine Baukörpergestaltung eines Gestells der historischen Stadt.

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### **Khalupyak Y. O.**

#### **ROMANTIC PAINTINGS OF CASPAR DAVID FRIEDRICH**

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Caspar David Friedrich (5 September 1774 – 7 May 1840) was a 19th – century German Romantic landscape painter, he is generally considered the most important German artist of his generation.

Friedrich experienced a life of up and downs; his life began and ended harshly with a few happy years in between.

Young Friedrich did not have the carefree childhood most people enjoy. Before the age of thirteen he had witnessed the death of his mother, sister and favorite brother who had risked his own life to save Friedrich during an ice-skating accident.

Many art historians and psychologists believed that such events greatly impacted the content of his art and shaped him into the emotional painter he was known to be. His love of landscapes was evident early on in his career and his work demonstrated his belief in the power of God through nature.

Shortly after gaining recognition for winning the Weimar competition, Friedrich exhibited his first major painting, *The Tetschen Altar or The Cross in the Mountains* in around 1806. It caused widespread controversy for its religious confusion; Friedrich kept the crucifixion of Christ as a background detail to serve the greatness of the landscape.

He was elected member of the Berlin Academy but never received full professorship, believing his political standpoint (anti-French/Napoleon) held him back.

In 1818 Friedrich married Caroline Bommer with whom he had three children. Their union might have inspired a brief newness in the artist's style which drew the attention of the Russian royal family who provide a loyal patronage to the artist for several years.

He lost his patrons however as his happiness was replaced with his obsession of death and the afterlife.

Friedrich suffered a stroke that left him slightly debilitated in his hand. As a result, he painted predominantly in water color and sepia ink. However, his work fell from popularity and shortly afterward he died in 1840 [1, 21–25].

When you are looking on his pictures, you want to fly above the forests that wake up and fall asleep, and above the rivers covered by fog, to touch the cold mountains. They evoke a feeling that nature whispered to the author fairy-tales that he put on the canvas.

One of my favorite pictures is "Stages of life". A picture is felt as a living one. An author depicts little children and their parents by the seashore. At some moment it is felt as though an old man suddenly turns up in the picture. He is welcomed by the father of the family. It appears to render dynamic to all the canvas. You at once can see the whole picture – motions of the children, watchfulness and circumspection of the woman and a dialogue of the men. In course of time, looking at the old man, you understand the most important thing –he looks in the sea for a long time and waits for his ship. The biggest ship represents him. It symbolizes completion of life and a one way voyage. The small sailing-vessels represent the children, beginning of the way. It appears they are not ready for flotation yet, as far as they feebly hug the shore. Ships in distance are a symbol of the man and the woman. A woman`s figure on the canvas is full of dynamics – the same way the wind tilted the sails of the ship to the left. The man`s ship is static, that gives a feeling of valor

Caspar David Friedrich changed the face of landscape paintings with his intense and emotional focus on nature, and became a key member of the Romantic Movement.

As Romanticism invoked, Friedrich demonstrated piety to God through nature, the diminished strength of man in the larger scale of life, and great emotion.

Some of Friedrich's best known works and most easily recognizable paintings include *Cross in the Mountains*, *Wanderer above the Sea of Fog* and *Two Men Contemplating the Moon*. In such paintings the artist's mood and love for nature cannot be failed to notice.

To Friedrich, nature was not just a backdrop to fill the space behind portraits, for him nature itself took center stage. He sought the spirituality through the contemplation of nature, extending the bounds of trees, mountains, hills and crashing waves beyond just a beautiful view. They now had significant spiritual meaning.

Sadly, Friedrich was, for the most part, misunderstood in his time. As an artist, he struggled to gain full comprehension from the public and critics of his time, but he continued to paint according to his own artistic convictions, not for approval. He experienced a significant amount of success during his high days, even being commissioned by the Russian royal family [2, 56-58].

"He was indeed a strange mixture of temperament, his moods ranging from the gravest seriousness to the gayest humor ... But anyone who knew only this side of Friedrich's personality, namely his deep melancholic seriousness, only knew half the man. I have met few people who have such a gift for telling jokes and such a sense of fun as he did, providing that he was in the company of people he liked." –said Von Schubert, a philosopher and friend of Friedrich's.

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**Kisten K. O.**

### **TRADITIONAL CHINESE ARCHITECTURE**

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The architecture of China is as old as Chinese civilization itself. Since the Tang Dynasty, Chinese architecture has had a major influence on the architectural styles of Korea, Vietnam, and Japan. This system of construction could perpetuate itself for more than four thousand years over such a vast territory and still remains a living architecture, retaining its principal characteristics.

A very important feature in Chinese architecture is its emphasis on bilateral symmetry, which signifies balance. Bilateral symmetry and the articulation of buildings are found everywhere in Chinese architecture, from palace complexes to humble farmhouses. The buildings are typically planned to contain an even number of columns in a structure to produce an odd number of bays.

Classical Chinese buildings, especially belonging to nobility, were built with an emphasis on breadth and less on height, featuring an enclosed heavy platform and a large roof that floats over this base, with the vertical walls not well emphasized. This contrasts Western architecture, which tends to grow in height and depth. Chinese architecture stresses the visual impact of the width of the buildings.

The halls and palaces in the Forbidden City, for example, have rather low ceilings when compared to equivalent stately buildings in the West. Their external appearance suggests the all-embracing nature of imperial China, but this, of course, does not refer to pagodas.



According to traditional Chinese architecture, buildings or building complexes enclose open spaces within themselves. These enclosures serve for temperature regulation and venting the building complexes. Although large open courtyards are commonly found in northern Chinese architecture, the concept of an "open space" surrounded by buildings, can also be seen in the southern building structure known as the "sky well". Southern sky wells are relatively small and serve to collect rain water from the roof tops and restrict the amount of sunlight that enters the building.

As China is subject to violent earthquakes it was not safe to build a high stone building. Sturdy wooden pillars can better withstand earthquakes than stone walls. Most buildings are typically erected on a solid stone or brick base. The base was often raised a couple of feet to prevent possibility of flooding. Structural stability was ensured through the use of heavy beams and roofs, which weigh the structure down. Large wooden structural beams are used as load-bearing columns for primary support of the roof and lateral beams for framing buildings and supporting the roof. Curtain walls are not structurally important or load-bearing, they are used to delineate rooms or enclose a building.

One of the most important elements in traditional Chinese architecture is Dougong. It is a unique structural element of wooden brackets which are fitted together by joinery alone, due to the precision and quality of the carpentry. The system is a series of interlocking beams cut to precise measurements. So, when compressed under the weight of heavy timber roofs, the construction is strong enough to withstand earthquakes. By using a large

number of pieces in the design, the weight is shared and so individual elements are not prone to splitting.

These semi-rigid structural joints allow the timber structure to resist bending and torsion under high compression. The lack of glue or nails in joinery allows the buildings to slide and flex while absorbing shock, vibration, and ground shift from earthquakes without great damage to its structure. Brackets could be hung under eaves, giving the appearance of graceful baskets of flowers while also supporting the roof. Dougongs are usually painted in red or yellow complementing the patterns.



The traditional Chinese roof is constructed by laying diminishing lengths of roof timbers fixed on top of each other with purlins at the ends. The whole roof rested on a series of orthogonal timbers that ran between the evenly spaced pillars that were jointed rather than nailed together. A cantilever arrangement was used to support over-hanging eaves. The whole roof was covered

with alternating lines of concave and convex terracotta tiles, although in earlier days rural areas used thatch.

In the design of roofs there is a key division between northern and southern China. In the north, roofs have to cope with a heavy burden of snow, while in the south more shade is needed, so southern roofs are more curved and elaborate. These roofs may have the eaves so curved that the corners point upwards (flying eaves) and reach the same height as the top of the roof. The roofs were painted according to the rank of the buildings. Imperial palaces were made with a gold roof.



The roof ridges often have clay figures of deities and animals including dragons and a man riding a hen; these brought luck to the house and its occupants. The more prestigious the house the more creatures there are on the roof ridge.

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work

### **Kondratenko S. K.** **NEW ACROPOLIS MUSEUM**

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It is not a secret, that our humanity has the greatest cultural heritage from different monuments of architecture to sculpture and pictures. Many countries all over the world try to save their own culture, traditions, masterpieces and history in every possible way. Nowadays it is very important to show new generation the history from the beginning of times or just introduce travelers how beautiful every place in the world can be.

The example of a place where a large number of national treasures has been concentrated is the capital and a cultural center of Greece – Athens. This city contains a lot of museums and public centers which can introduce fascinating details of life and culture since ancient times. From a large variety of museums to visit, I want to highlight one, which has his own story of creation.

The first museum of Acropolis was built in 1874 year and underwent a moderate expansion in the 1950s. However, successive excavations on the Acropolis uncovered many new artifacts which significantly exceeded its original capacity. After several years there was proposed the idea of holding a competition for the best project of new museum of Acropolis.

Located in Greece, Athens in the historic of Makryianni district, the Museum stands not far from Parthenon (monument of ancient architecture, an ancient Greek temple which is located in Athenian Acropolis). It is rather interesting that an architect Bernard Tschumi, who won this competition, decided to make a design of this museum, which is rather similar to Parthenon. It should be stated that the Parthenon Gallery offers a 360-degree panoramic view of the Acropolis and modern Athens.

To tell about program and functional features, museum has 8,000 square meters of exhibition space and a full range of visitor amenities. The Acropolis Museum presents the story of life on the Athenian Acropolis and its surroundings by uniting collections formerly dispersed in multiple institutions, including the small Acropolis Museum built in the 19th century. The rich collections provide visitors with a comprehensive picture of the human presence on the Acropolis, from pre-historic times through late antiquity.

Designed with spare horizontal lines and utmost simplicity, the Museum is deliberately non-monumental, focusing the visitor's attention on extraordinary works of art. With the greatest possible clarity, the design translates programmatic requirements into architecture.

As about the collection of museum, it consists primarily of works of sculpture, many of them architectural pieces that originally decorated the monuments of the Acropolis, so the building that exhibits them is a museum of ambient natural light. The use of various types of glass allows light to flood into the top-floor Parthenon Gallery, to filter through skylights into the archaic galleries, and to penetrate the core of the building, gently touching the archeological excavation below the building. The collection is installed in chronological sequence, from pre-history through the late Roman period, but reaches its high point (literally and programmatically) with the Parthenon Frieze. The visitor's route is therefore a clear, three-dimensional loop. It goes up from the lobby via escalator to the double-height galleries for the Archaic period; upward again by escalator to the Parthenon Gallery; then back down to the Roman Empire galleries and out toward the Acropolis itself. The base hovers over the excavation on more than 100 slender concrete pillars. This level contains the lobby, temporary exhibition spaces, museum store, and support facilities. The top is the rectangular, glass-enclosed, sky-lit Parthenon Gallery, over 7 meters high and with a floor space of over 2,050 square meters. It is shifted 23 degrees from the rest of the building to orient it directly toward the Acropolis. Here the building's concrete core, which penetrates upward through all levels, becomes the surface on which the marble sculptures of the Parthenon Frieze are mounted. The core allows natural light to pass down to the Caryatids on the level below.

To compare museum of Acropolis with other museums of ancient times, I can say that museum discussed has his own modern style with references to antiquity. We can observe it on the facades of building which are fulfilled with rotated in one direction planes. Such kind of methods allows us to see an image of columns which were very common in ancient times. Museum of Acropolis does not change or add exhibitions and their exhibits. The museum's program can introduce special excursions for different educational institutions to help young visitors learn a lot of useful information in a funny and comfortable way.

To conclude, I think that this museum demonstrates a great example of how people have to save and be proud of culture and heritage of the country they live in.

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**Levchenko V. O.**  
**STEEL FIBER REINFORCED CONCRETE**

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It is now well established that one of the important properties of steel fiber reinforced concrete (SFRC) is its superior resistance to cracking and crack propagation. As a result of this ability to arrest cracks, fiber composites possess increased extensibility and tensile strength, both at first crack and at ultimate, particular under flexural loading; and the fibers are able to hold the matrix together even after extensive cracking. The net result of all these is to impart to the fiber composite pronounced post – cracking ductility which is unheard of in ordinary concrete. The transformation from a brittle to a ductile type of material would increase substantially the energy absorption characteristics of the fiber composite and its ability to withstand repeatedly applied, shock or impact loading.

Fiber-reinforced concrete (FRC) may be defined as a composite materials made with Portland cement, aggregate, and incorporating discrete discontinuous fibers. Plain, unreinforced concrete is a brittle material, with a low tensile strength and a low strain capacity. The role of randomly distributes discontinuous fibers is to bridge across the cracks that develop provides some post- cracking “ductility”. If the fibers are sufficiently strong, sufficiently bonded to material, and permit the FRC to carry significant stresses over a relatively large strain capacity in the post-cracking stage.

There are, of course, other (and probably cheaper) ways of increasing the strength of concrete. The real contribution of the fibers is to increase the toughness of the concrete (defined as some function of the area under the load vs. deflection curve), under any type of loading. That is, the fibers tend to increase the strain at peak load, and provide a great deal of energy absorption in post-peak portion of the load vs. deflection curve [4].

When the fiber reinforcement is in the form of short discrete fibers, they act effectively as rigid inclusions in the concrete matrix. Physically, they have thus the same order of magnitude as aggregate inclusions; steel fiber reinforcement can not therefore be regarded as a direct replacement of longitudinal reinforcement in reinforced and prestressed structural members. However, because of the inherent material properties of fiber concrete, the presence of fibers in the body of the concrete or the provision of a tensile skin of fiber concrete can be expected to improve the resistance of conventionally reinforced structural members to cracking, deflection and other serviceability conditions.

The fibre reinforcement may be used in the form of three – dimensionally randomly distributed fibres throughout the structural member when the added advantages of the fiber to shear resistance and crack control can be further utilized. On the other hand, the fibre concrete may also be used

as a tensile skin to cover the steel reinforcement when a more efficient two – dimensional orientation of the fibres could be obtained [2].

As with any other type of concrete, the mix proportions for SFRC depend upon the requirements for a particular job, in terms of strength, workability, and so on. Several procedures for proportioning SFRC mixes are available, which emphasize the work ability of the resulting mix. Commonly, to reduce the quantity of cement, up to 35% of the cement may be replaced with fly ash. In addition, to improve the workability of higher fibre volume mixes, water reducing admixtures and, in particular, superplasticizers are often used, in conjunction with air entrainment. For steel fibre reinforced shotcrete, different considerations apply, with most mix designs being arrived at empirically [1].

SFRC can, in general, be produced using conventional concrete practice, though there are obviously some important differences. The basic problem is to introduce a sufficient volume of uniformly dispersed to achieve the desired improvements in mechanical behaviour, while retaining sufficient workability in the fresh mix to permit proper mixing, placing and finishing. The performance of the hardened concrete is enhanced more by fibres with a higher aspect ratio, since this improves the fibre-matrix bond. On the other hand, a high aspect ratio adversely affects the workability of the fresh mix. In general, the problems of both workability and uniform distribution increase with increasing fibre length and volume. One of the chief difficulties in obtaining a uniform fibre distribution is the tendency for steel fibres to ball or clump together. Clumping may be caused by a number of factors:

- 1 The fibres may already be clumped together before they are added to the mix; normal mixing action will not break down these clumps.

- 2 Fibres may be added too quickly to allow them to disperse in the mixer.

- 3 Too high a volume of fibres may be added.

- 4 The mixer itself may be too worn or inefficient to disperse the fibres.

In view of this, care must be taken in the mixing procedures. [3]

The uses of SFRC over the past thirty years have been so varied and so widespread, that it is difficult to categorize them. The most common applications are pavements, tunnel linings, pavements and slabs, shotcrete and now shotcrete also containing silica fume, airport pavements, bridge deck slab repairs, and so on. There has also been some recent experimental work on roller-compacted concrete (RCC) reinforced with steel fibres. The list is endless, apparently limited only by the ingenuity of the engineers involved. The fibres themselves are, unfortunately, relatively expensive; 1% steel fibre addition will approximately double the material costs of the concrete, and this has tended to limit the use of SFRC to special applications.

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**Litvin J. S.**

## **6 THINGS EOU DIDN'T KNOW ABOUT FRANK GEHRY**

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Architect Frank Gehry has designed some of the most iconic buildings of the past two decades, from the Guggenheim Bilbao to Facebook's new mothership in Silicon Valley. Yet in recent years, he has become something of architecture's bete noire, lambasted for his extravagant, sculptural style in an era of razor-sharp efficiency, sued for alleged design errors, and mocked for butting heads with journalists. Misunderstood genius? A new biography from Paul Goldberger—*Vanity Fair*'s architecture critic and prolific writer—suggests as much, painting a portrait of Gehry as a shy, sensitive man who's grappling with self-doubt and ego in equal measure.

Goldberger has been covering Frank Gehry since the 1970s and is no stranger to his work. *Building Art* (Knopf, 2015) isn't a catalogue raisonné, but a narrative about the pivotal moments in the architect's life: failing at his first marriage, experiencing anti-Semitism, flunking a few college classes, and working as a truck driver. The 450-page book reveals the personal backstory that informed the body of work as a whole and dives deep into the most important commissions of the octogenarian architect's life.

"You always function better as a critic when you can put things into a context, but one can only contextualize so much when you're writing about a single building," Goldberger says. "When you're looking at the whole of a life story, it's all about context. Context is the whole thing."

We spoke with Goldberger about Gehry's motivations, celebrity in the architecture world, the myth of his totalitarianism, and Gehry's cameo on the *Simpsons*. What we learned will surprise you.

1. Gehry is plagued with self-doubt, but has an ego to match "I've always liked him, liked his work, found him an intriguing character as well as a great architect," Goldberger says. "I knew the basic outline to his life, but where did his odd combination of confidence and insecurity come from? This is what marks him — this determination to go his own way and innovate in a powerful way combined with an openness about his own self doubt. That's a rare combination. Where all that came from and how it came to be was what motivated me most of all."

2. His early life was filled with pain and struggle “People will say I want my whole story told, warts and all,” Goldberger says. “But it’s one thing to say that and it’s another to look at it in black and white in front of you.”

The book candidly speaks about Gehry’s poor behavior to his first wife, Anita, and his children from that marriage (he withdrew emotionally from his family and was rarely around, and both he and Anita had an extramarital affair); and his difficult relationship with his father, an itinerant man who struggled to provide for his family. Goldberger let Gehry review the book for factual errors, but the architect couldn’t make any editorial changes.

“He said, ‘I’m having a hard time getting thorough the book not because of anything you said, because reliving some of that stuff is really painful.’ I think for Gehry, reading it reminded him of all that stuff, which is painful. But he absolutely to the letter honored our agreement and basically said, the pain of reading it is his problem, not mine. It’s accurate and there you are.”

3. Gehry’s work is not “autocratic or arbitrary architecture.” Gehry is misunderstood as an architect who only cares about form-making and Goldberger says that this intersection of imagination and problem-solving is the best way to understand his work.

“He’s very, very concerned with function — he cares about where the toilets go,” Goldberger says. “And where you come in, where you go out, and where the closets are. It’s not an autocratic or arbitrary architecture. It’s an architecture that has its own formal language, but within that language he’s interested in solving problems, not just making shapes. His imagination is never in doubt — because everyone sees that when they look at his work — but what’s not often enough understood is that he wants to locate his work where the line of imagination and the line of problem solving cross. First, it’s where all architecture ideally is — but too often it’s not understood as such. It’s too often seen as either or and by both sides too: those who consider problem-solving to be an intrusion to their freedom as creative figures and those who see creativity as a license for indifference to problem-solving. And both are wrong. The fundamental nature of architecture is that it is both of those things together — if it’s going to work — and I think Gehry very much represents that.”

4. He regrets his *Simpsons* cameo, but wields his celebrity for good causes today. In 2005, Gehry guest starred in an episode of the *Simpsons* in which he created a concert hall’s form by crumpling a piece of paper and directly translating that into a structure.

Gehry received public and critical acclaim simultaneously, which made him a pop-culture icon. “Starchitect is on one level a ridiculous term and on another level it’s not so bad because it’s a reminder that the public is interested in and cares about architecture, and it’s become more central to the cultural discourse than it once was,” Goldberger says. “I think the starchitect phrase and persona encourages misreading [of Gehry’s work].”

Gehry initially balked at his celebrity and scrapped his successful Easy Edges chairs — a line of cardboard furniture from the late 1960s and early 1970s that showcased the sculptural qualities of humble material — in fear that he would be labeled as a furniture designer and because (moreover, the prices rose, going against his aim to create affordable pieces). He steadily became more comfortable with fame and guest starred in a Simpsons episode in which he designed a concert hall for Springfield.

“I think he now has some regret about the *Simpsons*,” Goldberger says. “I think he did it at first because he was too flattered to say no. There’s a side of him that’s definitely got a lot of ego, and I think that side was excited like a child with the invitation and was unable to say no. The whole plot line — which is very funny of course — where he crumples up this piece of paper, throws it on the ground, and looks at it and says, ‘Aha! It’s genius! This is it! This is the idea of the building!’ and designs the building around the crumpled paper is one that caused him grief because people ultimately thought this is how it works in reality. He was unintentionally encouraging the very misreading of his work that drives him nuts.”

Today, Gehry is using his celebrity to get worthy projects off the ground, like a children's mental health center in Watts, which he's designing pro bono.

“He knows that his name being attached to it is going to make that project possible whereas if it was done by somebody else, people might not put any money into it,” Goldberger says. “He can leverage his celebrity to some social benefit, he’s become more sophisticated in doing that, and more eager to do so. He’d rather use his celebrity for that than the Simpsons. That sort of evolution that has come relatively late in life to him.”

5. Gehry and his first wife Anita lived down the street from Michael Tilson Thomas and would babysit him when he was a child.

In 2003, conductor and composer Michael Tilson Thomas commissioned Gehry, his erstwhile babysitter and later friend, to design a hall for the New World Symphony, which he had founded. Located in Miami, the building opened in 2011.

6. Gehry isn’t the architect’s original surname

Gehry’s surname at birth was Goldberg, but he changed it at the request of his wife, Anita, much to his chagrin. The letterforms mimic the shape of “Goldberg”—same first letter, peaked in the middle, and letter with a descender at the end. “By making the name change into an exercise in design, Frank made the whole business at least somewhat more palatable,” Goldberger writes in the book.

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**Lysenko D. P.**  
**THE ARCHITECTURE OF ENGLAND**  
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Like any other art form, the architecture of the state is a kind of a calling card, by which the inhabitants of other countries can judge the level of its cultural development and the peculiarities of its citizens' character. England's architecture is aristocratic and conservative.

Speaking about English architecture it is important to say that even in spite of the fact that its development is classified according to accepted scheme, it had its own peculiarities that made it very original through the world. We can speak of different methods of construction beginning with the most ancient times, but let's think of the architecture itself.

Eclecticism or, in other words, historicism, suggests the presence of the main features of the European architecture in the England's architecture of the 15-18th centuries. At the same time, the British eclecticism tends to have its inimitable distinctive traits inherent to different stylistic schools of those times. These styles had been formed and developed sequentially. This continuity can be traced by examining the buildings of the Tudor, Georgian, Victorian and Edwardian periods. Another outstanding feature of England's architectural monuments which survived to our times is a pronounced functionality of the buildings. The thing is that the majority of large-scale structures of the most productive period in the development of the British architecture were defensive and religious buildings — fortresses, churches and monasteries. Of course, the purpose of the building could not but affect its appearance.

The oldest and, accordingly, the fewest in England are the reminders of the Tudor period (16th century). Tudor-style buildings can be recognized by black wooden frames and steep roof arches surmounted by groups of chimneys decorated with ceramic ornaments. Another characteristic feature of this period's buildings is the presence of small windows and narrow tall doors.

Gothic traits borrowed from the French architecture of the same period are manifested by the elongated, aspiring to the sky cathedral buildings with multiple lancet arches and wall-bounds. The most outstanding examples of Tudor architecture are considered to be The royal palace of Hampton Court near London and the buildings of Oxbridge colleges.

The first English architect who brought classical forms to Britain was Inigo Jones. He was the first to base his designs on a study of the exact rules of classical proportion (as interpreted by Palladio). The style was furthered by Sir Christopher Wren, but those who succeeded him had less regard for its strict rules. The term Baroque is applied to classical buildings that trend to robustness of proportion and freedom of formal arrangement. Sir John Vanbrugh and Nicholas Hawksmoor were its chief exponents

Georgian style, which was forming from the early 18th to mid-19th centuries, has witnessed the reign of King George the First, George The Second, George The Third and George The Fourth. The heyday of the British Empire explains the presence of some Georgian-style traits in the architecture of the countries having been the parts of the empire in that period.

The Georgian style buildings are characterized by simple symmetrical layout and minimalistic decor presented by white ornament. The most outstanding examples of the Georgian style buildings are the famous Pushkin House, Hazlitts hotel in Soho and others. Such historic ensembles of central London as The Trafalgar Square, St James and Regent Street which were designed by John Nash, are deserving special attention. Many Georgian buildings, located in the province of the British capital, are perfectly preserved and present popular objects of the real estate market.

The Victorian style falls on the period of the British state's highest degree of flourishing under the leadership of Queen Victoria from 1837 to 1901. This period in architecture can be described as the most motley, including the constructions from the neo-classical to neo-Gothic styles. You can dive into the atmosphere of the Victorian era going to one of such areas as Barnsberry Square, Gibson Square, Cloudsley Square, Lonsdale Square, Milner Square and Thornhill Square. Here you will see buildings with large windows and round "portholes", stained glass windows and moldings, unplastered facades and lancet windows, asymmetrical layout and quaint turrets. This is where the British eclectic was born.

The Edwardian style was developing during the reign of Edward the Seventh, who ascended to the throne after Queen Victoria and ruled for several decades. The buildings of this period carry the traits of baroque, neo-classical and Georgian architecture.

Saxon architecture developed since 700 till 1060 A. D. It is very simple and even crude. Door and window spaces are small with triangular or semi-circular headings and little or no ornamentation. There are very few complete Saxon churches but many with remains of Saxon work. Around 1060 A.D. Saxon architecture was succeeded by forms of Norman or Romanesque style. Its most important peculiarities are massive and ponderous character with great cylindrical pillars, semi-circular arches, immensely thick walls and narrow, deeply splayed windows. The round-headed windows and doorways are sometimes lavishly decorated. Norman architecture is determined by the period of 1060-1190 A.D.

They say, one look is worth a thousand words. Sightseeing tour on London's architectural sights could become a perfect gift for a lover of architecture as well as for every English learner who wishes to learn more about the country and its people.

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**Maslennykova E. A.**

### **MODERN BUILDING MATERIALS**

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One of the most important directions determining the development of all construction sectors is new materials. Changes in the way of life of mankind are connected with the discovery and mastery of the production of new materials. Materials are the steps of our civilization, and new materials are a springboard for leaping into the future, changing the face of our being.

Building materials - materials used for the erection and repair of buildings and structures. In modern construction, many new building materials, technologies, tools for performing various types of construction work began to be used. The types of building materials and technologies for their production have been changed, as well as the development of productive forces and the changing of production relations in human society. The simplest materials and primitive technologies were replaced by more advanced ones, manual work became a substitute for manual production. Accordingly, the requirements for the modern worker have changed. There were a lot of manual electrified tools (electric jigs, hand milling cutters, electric drills, electric drills, screwdrivers, grinding tools).

Classification of building materials is diverse by origin. Materials are divided into: natural and artificial.

Natural (materials obtained from natural raw materials by simple processing without changing their original structure and chemical composition) forest (roundwood, lumber); stone dense and loose rocks (natural stone, gravel, clay).

Artificial (obtained from natural and artificial raw materials, by-products of industry and agriculture using special technologies) binders (cement, lime), artificial stones (bricks, blocks); concrete; solutions; metal, heat and waterproofing materials; ceramic tiles; synthetic paints, varnishes.

Many wooden products are replaced with plastic products or metal-plastic ones. For example - window, door blocks, plinth, casing, window sills, facing rail, wooden Eurowindows, metal doors, wooden frames are replaced with metal profiles. Polyvinyl linoleum is replaced with a carpet; natural parquet was replaced with laminated parquet.

Thus, instead of traditional small-sized heavy materials, mass production of relatively light large-sized construction components and structures from prefabricated reinforced concrete, gypsum, concrete with lightweight aggregates, cellular concrete, concrete concretes without cement silicate was organized.

The production of a variety of thermal and waterproofing materials is widely developed. Rapid development of production and use in the construction of polymer materials was for various purposes. Enterprises were created to produce heat insulation materials and light aggregates.

And although the main materials remain unchanged, still the development of building materials remains a very important process, especially when it comes to the environment.

New lining materials were introduced in production along with such as fiberboard, chipboard and plywood: OSB, MDF, laminated board. Glass wool perfected in mineral materials - Ursa, Basalt mineral plates; also polymer materials of polystyrene, polystyrene, sandwich panels replaced expanded clay, brick; Formwork collapsible-replaceable replaced - non-removable formwork of polystyrene.

Large selection of materials for roofing presents various types of roof tiles - soft - of roofing material; metal tile; sheet materials - ondulin, roofing sheets.

All these materials are made on the basis of polymers. When installing window and door units, they use the mounting foam-sealant instead of - the oakum. When glazing, put silicone instead of putty. So, for example, polyethylene film replaced ruberoid, only. It is used as a waterproofing material. Many technologies are used for facing ceilings: suspended ceilings, stretch ceilings.

In conclusion, it is due to say, in this regard, you need to constantly improve knowledge, skills and skills to teach students new technologies. To do this, the wizard for the annual updates of the program, taking into account the improvement of technology and taking into account the requirements of Euro-repair.

To improve knowledge, new technical and normative literature is required. In recent years, a literary fund has been updated - textbooks, posters, albums. New stands, models, handouts are produced. There are electrified tools, new materials. Students in special technologies learn new technologies, but in practice they are fixed. During the course of industrial practice, they improve the knowledge and skills obtained in school on theoretical and production training.

Today we can say that modern technologies are developing not by a revolutionary, but rather by an evolutionary way. The operational qualities are improving, the price / quality ratio is being worked out, and there is a struggle to reduce energy consumption. At the same time, in each specific case, preference can be given both to fundamentally new and tested old materials.

The main trends in the development of modern housing construction have been the reduction of the cost and operating costs. These factors have become the main criteria for assessing the prospects of modern technologies and materials.

It should be noted that many new building materials are none other than those that have long been used, but recreated on the basis of innovations in the field of production technologies materials. Examples of such materials can be a beam of various types of wood, impregnation of which with modern protective solutions sharply increases its operational properties, reinforced concrete based on alloyed reinforcement, and the like.

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**Maslova A. V.**

### **MUSICAL PROPORTIONS AND STRUCTURAL DESIGN IN ARCHITECTURE**

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Examples of proportional division sacred memorials came under review in this paper. Theoretical considerations of craftsmen on proportions in architectonic art are presented together with examples of their practical implementation. Both fine art experts and just ordinary observers express an opinion on the transparency and clarity of the baroque composition. Famous art historians in their works emphasized such features of the composition as "discipline of rhythm", "perfect division", "balance, majestic serenity", "logical clarity," "superior harmony."

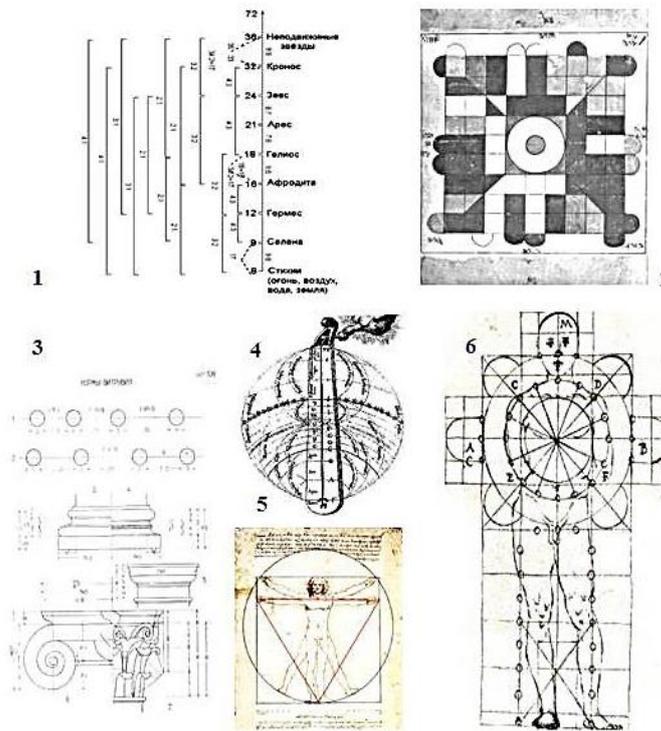
It is known that, having spoken of "heavenly harmony", the ancient Greek philosopher and mathematician Pythagoras meant only the ratios of the octave, quarte, quinte, giving the ability to hear consonance in the planetary rotation only to himself. His ideas of heavenly harmony had been developed by Claudius Ptolemy in subsequent years. Ptolemy reflected his own planetary ideas in his treatise "Harmonics". Proportions were based not only on archetypal figures and music series, but also on cosmology (Fig. 1). The Earth with orbits – the geocentric concept that reached the idea of "heavenly harmony," has the static Earth in the center of the universe and planets

rotating around it in the next sequence: Selena, Helios, Aphrodite, Hermes, Ares, Zeus and Cronos [1]. If we set a value for Selena as 1 and for Helios as 2, then the distance from Helios to Selena will be understood as a ratio of 2:1 - octave, set a value for Aphrodite as 3, respectively, and the distance to Helios will be 3:2 – quinte, the distance between Hermes and Aphrodite is 4:3 – quarte. In total, this "heavenly heptachord", is a ratio of 1:2:3:4:8:9:27. In the summary table of the Ptolemaic system there are interval distances shown between the planets represented only by epimoric (4: 3, 3: 2) and multiple ratios (2:1, 3:1, 4:1) which arise between planetary spheres at more remote distances.

For craftsmen of plastic arts the use of consonant proportions was quite a meaningful step which determined their conscious choice. Roman architect Vitruvius, author of the treatise "Ten Books on Architecture", describes the similarity of musical intervals to the ratio of angles of archetypal figures: he compares the octave with the ratio of the angle of a regular triangle to a regular hexagon ( $60^\circ:120^\circ$ ), [2, p. ~ 39]. the quinte is compared to the ratio of a regular triangle to a square ( $60^\circ:90^\circ$ ), the quarte - the ratio of a square to a regular hexagon ( $90^\circ:120^\circ$ ). Thus, musical tones (Fig. 4) and ratios represent a parallel between architecture and music expressed in the form of mathematical ratios.

Moreover, in the construction of churches, there was a proportionality of the area of a circle and a square used, anthropomorphy. Even the human proportions were determined, according to the ancient canon of Polykleitos, by the golden section and for the humanist from Venice, Francesco Giorgi, they represent an integer ratio of 9:8 ~ (tone) - height with and without the head, 4: 3 ~ (quarte) – height of the body to the feet, 2:1 ~ (octave) - height of the chest to the abdomen [3, p. ~ 136]. The cornerstone of integer ratios is the division of the side of the square to a certain number of parts (Fig. 3). On the basis of such integer ratios there were order structures built as one of the ways of constructing these proportions from the module values. Geometric experiments created harmonic series, which served as a generalized scheme of the Subdicio theoretical concept - the principle of finding a harmonic series [4, p. ~ 19]. One of such implemented geometrical experiments is the geometric proportioning – a gothic window (Fig. 2) based on the harmonization of geometrically similar figures. Even much later, during the Renaissance, the basis of proportioning were still such archetypal forms as a circle, a square and an equilateral triangle. Leonardo da Vinci was also interested in the quadrature of a circle, which can be seen from his famous drawing "Vitruvian Man" (Fig. 5) depicting a man whose outstretched legs and arms are inscribed simultaneously in the square and in the circle. In the Renaissance period the proportions of the human body were studied by architects not only in order to achieve the similarity of the drawing, but also in order to create architectural objects, proportions of different parts of the building corresponded to the proportions of different parts of the human body

(Fig.6). The fact that the architects of the Renaissance and Baroque followed in many cases the medieval principle of similarity of figures is also confirmed by natural measurements and calculations.



*Fig. 1. Ptolemaic system. Fig. 2. Gothic window.*

*Fig. 3. Column base construction table. Fig. 4. Formation of music tones.*

*Fig. 5. Vitruvian man. Fig. 6 Anthropomorphic plan of the cathedral*

The quadrature in its volume and topical coverage is one of the first ideas of rethinking architecture. It means a qualitatively new format in the construction of buildings and gives an opportunity to move on to a new stage – a scientifically sound understanding of the relationships of proportions of the past centuries.

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**Mitrofanow W. M.**  
**ASPHALT DER NEUEN GENERATION**

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Ob Sie wissen, werden wieviel die Autodeckel in einem nur kleines Israel im Laufe von einem Jahr hinausgeworfen? Die genaue Zahl ist unbekannt, aber nach den Schätzungen der Experten, neben drei Million im Jahr.

Wenn sie nach der Oberfläche der Erde in eine Schicht, so sie im Zustand auszulegen, den Löwenanteil des Staatsgebiets abzudecken. Und wenn von ihnen den Turm aufzubauen, so kann dieser Turm... Im übrigen erreichen, nicht so ist es wichtig, wieviel kann die vergeblichen Sachen aus drei Million Deckel schaffen. Es ist viel interessanter, ob man auf den Nutzen der Menschheit dieser "Gummimüll" richten kann [2, 1].

Aus den Gummideckeln kann man das Floß, die Spielschaustellungen, die urbanen Skulpturen auf dem Hofgrundstück errichten. Aber das alles der Tropfen im Meer im Vergleich dazu, was in Israel machen. Und in Israel rollen die Gummideckel in den Asphalt.

Der Gerechtigkeit wegen werden wir berichten: rollen nicht die Deckel, und klein Gummiteilchen, die infolge der Zerkleinerung der die Frist durcharbeitenden Autodeckel erhalten wird. Es wurde möglich dank der neuen Technologie des Unternehmens Tyrec, die sich mit der Überarbeitung der Autodeckel beschäftigt. Der Vorteil doppelt: einerseits, Israel entgeht den Gegenständen, die die Umwelt verschmutzen, und mit anderem, – verbessert sich die Qualität der Reisedeckung. So wird das durchgearbeitete Produkt ein wertvoller Rohstoff für die Bildung des Asphalts der neuen Generation wieder [2, 1].

Die Reisedeckung, in die Gummiteilchen eingeht, viel fester, als den traditionellen Asphalt, dabei es weicher und elastisch, dass zur Verbesserung der Eindrücke von der Fahrt auf dem Auto beiträgt.

Der technologische Prozess der Verwertung der Reifen nimmt die Extraktion aus dem Deckel des metallischen Skelettes (der nacher auf die Überarbeitung auch gehen wird) und die Zerkleinerung der Gummideckung in die Teilchen vom Umfang von 0.5 bis zu 4 mm im Durchmesser auf. Tyrec erzeugt Gummiteilchen drei Hauptstandards, je nach der weiteren Nutzung des Materials. Zum Beispiel, für die Reisedeckung wird Gummiteilchen vom Umfang in zwei Millimeter, und für das Stadion entsprechend den Standards der FIFA – die Millimeterteilchen verwendet. Noch solange, bis die Deckel in gummi Teilchen zermahlen werden, aus dem Zwischenprodukt mit Hilfe des mächtigen Magnets werden die kleinen Teilchen des Metalls herausziehen, und das spezielle Netz wird die Fetzen des Stoffes, der den ursprünglichen Rohstoff bildete absondern [2, 1].

Der ganze technologische Prozess ist automatisiert und kommt vom Computerprogramm zurecht. Die Kontrolle der Produktion verwirklicht sich mit Hilfe des Displays des Computers, auf dem der ganze Prozess vom Anfang bis zum Ende sichtbar ist. Es im vollen Sinn des Wortes die forschungsintensive Produktion: das ganze Personal des Unternehmens, einschließlich die Führung, der Operatoren und des Wächters, bildet nur 25 Menschen. Dieses kleine Unternehmen zieht die Überarbeitung 30 Tausend Tonnen der Autodeckel im Jahr jährlich unter. Aus zwei Tausend Deckel wird ungefähr der Kilometer der Reisedeckung erhalten.

Nicht vom Asphalt einheitlich ist Tyrec lebendig: aus gummi Teilchen kann man die Deckungen für die Spielplätze, für die Bildung der künstlichen Rasen, für die Erledigung der Behausungen mit einem Wort eine Menge der nützlichen und nötigen Gegenstände erzeugen.

Vom Gesichtspunkt des Schutzes der Umwelt ist eine wertlose Erfahrung. Die Produktion tatsächlich abfallfrei, in die Sache geht allen.

Die Überarbeitung der Autodeckel – eine einer Menge der ökologischen Projekte modernen Israels, deren Aufgabe – unser Leben reiner und besser zu machen.

Nicht Asphalt alleiniger ist lebend Tyrec: aus Kleinchen es darf ausarbeiten Deckungen für Kinderspielplätze, für Schöpfung der künstlichen Rasen, für Aufmachung der Behausungen, Wort, große Anzahl der behilflichen und nötiger Gegenstände.

Aus Blickpunkt der Bewachung der Umwelt dieser wertvolle Erfahrung. Betrieb praktisch ohne Abfälle, in Angelegenheit geht absolut all [3, 1].

Das Gummileinen ist genug rentabel in der Produktion und das ökologisch sichere Produkt. Zur Grundlage für seine Herstellung dienen hauptsächlich die Autodeckel, deren Ressource vollständig produziert ist. Dass auch zu sagen, ist solcher Rohstoff überschüssig, wird doch Teilchen aus den Reifen personalkraft-, der Lastkraftwagen, der Busse und anderen Verkehrsträgers erzeugt [4, 1].

Worin der Vorteil des Asphalts, zu dessen Bestand das Gummileinen gehört? Die vorliegende Komponente auf die Ordnung erhöht die Immunität des Asphalts und verlängert die Frist seines Dienstes.

Solche Reisedeckung fordert die Reparatur zweimal seltener, als den gewöhnlichen Asphalt.

Die Bewohner der Hauptstadt entgehen den Reifen oft, sie einfach hinauswerfend. Doch kostet die Sendung der durchgearbeiteten Deckel auf die Verwertung gebührenpflichtig, sie neben 3 Euro für einen Deckel. Aber, wie die Produzenten des Gummileinens, diese bescheidene Zahlung — die wichtige Investition in die Erhaltung der Sauberkeit der Umwelt halten. In den Bestand eines Reifens geht daneben 60% die Gummis ein, aus denen es sich auf dem Ausgang 45-50% rein Gummiteilchen die Leinen ergibt. Entsprechend, aus einem 6-Kilogrammdeckel bekommen neben zwei Kilogrammen des Leinens [4, 1].

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**Molotkova V. G.**

### **THE IMPORTANCE OF PSYCHOLOGY IN ARCHITECTURAL ACTIVITIES**

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People have an undeniable advantage over other forms of life: they are able to communicate. Education, training, work, relationships with friends and family - all this is done through communication. It is considered to be one of the main forms of human social activity. In the process of communication, what one person knew and was able to do before becomes the property of many people. Communication in the scientific sense is the interaction of people (the impact of people on each other and their responses to this effect) and the exchange of information in this interaction. But is it worth it for a modern person to know about the features of communication from a scientific point of view? At this time, the issue is not so relevant, at first glance, in order to really advertise. Nevertheless, if one really approaches rationally the question of education in higher education institutions and further employment, one can still note the professions that initially prepare the psychological ground. One of the most striking examples of teaching methods of communication is the architectural sphere of activity.

There are two groups of ways in which interaction between people can be realized: verbal and non-verbal means of communication. It is believed that verbal communication gives less information about goals, truthfulness of information and other aspects of communication, while with the help of non-

verbal manifestations it becomes possible to establish many points that are not accepted in the conversation.

Depending on the intentions of the individual, a variety of speech texts arise. In any text (written or spoken) the language system is implemented. It allows the verbal method of communication, at first glance, to take more predominant role, in comparison with the non-verbal method.

From an architectural point of view, the language is divided into: the language of architectural science, the language of the architectural project and the language of the architectural form. The latter describes the graphic language of figures and drawings. Under the language of architectural forms is meant the architectural expressiveness of the building, complexes, town-planning creations.

Based on four specific functions of the system of values (orientation, interpretation - difference, signal identification and recognition - recognition), we can draw an analogy between the two methods of communicating one of the main forms of human social activity with the languages of the architectural profession. Consequently, the verbal type corresponds to the semantics section or the language of the architectural project, and the nonverbal type corresponds to the language of architectural forms.

“According to Robert M. Krauss, professor of psychology at Columbia University, signs and symbols are the major signals that make up verbal communication. Words act as symbols, and signs are secondary products of the underlying message and include things like tone of voice, blushing and facial expressions”[3]. This form of communication makes the process of conveying thoughts easier and faster, and so remains the most successful type of conveying information. Yet, this makes up only seven percent of all human communication.

The main function of verbal communication is relaying a message to one or more recipients. Yet, it makes up only 10 % of all human communication, while the nonverbal is about 70 %.

Nonverbal communication is made of tone of voice, body language, gestures, eye contact, facial expression and proximity. These elements give deeper meaning and intention to your words. Conforming to the analyze of David Motsumoto (professor of psychology at San Francisco State University): “...learning to read microexpressions and nonverbal behaviors in general can be very valuable for anyone whose job is to understand other people’s true feelings, their thoughts, their motivations, their personalities or their intentions. So obviously, there’s an application for people who are doing interviews or interrogations. That would be people in the criminal justice system, law enforcement, national security, intelligence – those are the kinds of people that we primarily work with because their job is to try to find out whether a person is concealing facts or concealing knowledge or concealing something or has some information that would be useful for solving a crime or getting some other kinds of information”[2].

“Thus, verbal communication is best suited to convey specific information, and is better suited to communication through technology over long distances. Nonverbal communication is more immediate”[1]. Vladimir Shilin proves this in one of his books: "When modeling the" life cycle "of an architectural space, spatial values are taken into accounts that are understandable to all people who will live in this space"[4, 25]. “But its meaning is typically more ambiguous, notwithstanding the fact that certain forms of nonverbal communication, such as the use of the eyes, can convey emotions more effectively than words can. Some technological means of communication, such as film, can effectively convey many forms of nonverbal communication”[1].

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### LITERATURE IN STONE AND BRONZE

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There is a number of monuments to outstanding poets and writers in Kharkov. The oldest examples of Kharkov city sculpture, preserved to date, is the bust of **Alexander Pushkin** (1904) and **Nikolai Gogol** (1909) which belong to the period of the Russian Empire. The monument to **Taras Shevchenko**, the work of the Soviet sculptor M.G. Manizer, became a real masterpiece of the Soviet monumental art and one of the symbols of Kharkov.

In the 2000s, due to the world trends in the creation of original genre sculptures, monuments to literary characters and movie heroes, in Kharkov appeared a number of very interesting monuments and sculptures. Majority of them is



devoted to famous writers and the characters of their books. But, unfortunately, they are located in places that people rarely visit so many monuments remain unknown to the majority of our citizens. Kharkovites highly appreciate the humor so many sculptures depict the heroes of the novel "Twelve Chairs" by Ilf and Petrov.

The first whom the guests of the city meet on the platform of the South Station is the hero of the novel "Twelve Chairs", **Father Fyodor**, an adventurer, traveling around the country in search of diamonds. It is an exact copy of the character from the film of the same name, embodied by famous comic actor M. Pugovkin. On the monument, you can read the lines from a letter to his wife: "Kharkov is a bustling city, the center of the Ukrainian Republic.



After the province it seems as if I have come abroad."



On Yaroslav the Wise street you can see several sculptures to other characters of the famous novel "Twelve Chairs". The most interesting and original, in my opinion, is the monument to **Kisa Vorobyaninov**, played by the famous actor Sergei Filippov. In this laconic sculpture, the author caught the character of this personage and the very essence of the novel.

There are two monuments to **Grigory Skovoroda**, a great humanist, poet, fabulist and teacher, in Kharkov. The first one was installed in 1992 on the territory of Pokrovsky Square. Entering the square you cannot immediately see the majestic bronze figure hidden in the shadow of the trees. The monument is a lonely ascetic figure with a sad and pensive look which personifies the life of the wandering philosopher.



The second monument to Grigory Skovoroda was installed on the territory of the Kharkov National Pedagogical University named after G.S. Skovoroda. The monument was opened in 2012 on the initiative of the University staff on voluntary donations of students and teachers. You can enter the university territory only by a pass, but you can ask permission from the guards to see the monument.

Walking around Kharkov, you can sometimes find monuments and sculptures, the existence of which

you did not even guess. For example, in our city you can find the only monument in Ukraine to the world-famous American writer, journalist, Nobel Prize laureate in literature **Ernest Hemingway**. A bronze statue appeared in the city in 2012. Although the monument is located in the heart of the city, near the art pub "Old Man Ham", it is difficult to notice, as it is stuffed between the shop windows.



The unusual garden of sculptures "is hidden" in one of the courtyards of Kharkov. The open exhibition area near the restaurant "Hermitage" is located on Maksimilianivska street, 18. Here we can see monuments to famous poets and writers: Fyodor Dostoyevsky, Ivan Bunin, Nikolai Gumilev, Sergey Yesenin, Boris Pasternak, Anna Akhmatova, Vladimir Vysotsky and

others. Here you can also see the monument to **M.A. Bulgakov** with Cat Behemoth sitting on one bench.

And the last example, a monument to the classic of Ukrainian literature Petr Gulak-Artemovsky was opened on November 17, 2017. From 1841-1849, he headed the Kharkov University and was one of the most brilliant university professors. The opening took place in the Shevchenko Garden near the main building of the Kharkov National University named after Karazin.



The origin of word monument comes from the Latin words Moneo or Monere which means "to advise", "to remind", or "to warn". And this reminder, the notable piece of advise and warning is given to the living admirers of those remarkable structures. Monuments are built to remind people of the past, about something people in present consider too important to forget.

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## **LITTLE KNOWN MONUMENTS OF KHARKIV**

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In modern Kharkov, there is a large number of monuments, memorials, commemorative signs, sculptural groups and compositions. In the 2000s, Kharkov did not stay away from the world trends in the creation of original and unusual monuments. There belong monuments to literary characters and movie heroes, representatives of different professions which were embodied in Kharkov.

In this article I would like to talk about unique creations of sculptors that are not known to the majority of Kharkovites, because they cannot be found on busy squares but on quiet streets, in small courtyards, far from the stream of people or rising high above the roofs of the buildings. A number of monuments and sculptures and especially their names characterize Kharkovites as people with a very subtle sense of humor and rich imagination.

**"Violinist on the roof"** is located in the heart of the city. The prototype of "The Violinist" was the famous viola player Y. Bashmet, but the image is considered collective, and the monument is dedicated to all Kharkov people of art - artists, actors and musicians. Unfortunately, this elegant monument is located too high, so you cannot have a good look at it and many simply do not notice it.



The sculptural composition **"Student-programmer"** was installed in 2010 in a small square in front of the entrance to the Kharkiv National University of Radio Electronics. The composition includes a bronze sculpture of a student with an open laptop on his lap sitting on a bench and dreaming about something, a bag

with the KNURE logo lies to his left.

Another original monument located high enough depicts the **"Chimney-sweeper"**. It is installed on the chimney of the Kharkov yeast plant, located on Moskovsky prospect, 135. The author of the bronze sculpture is Alexander Demchenko. The chimney-sweeper welcomes the townspeople with the removed



top hat. Usually it was there that the chimney sweepers stacked small tools. In addition, a high headdress protected the worker from falling bricks. There is a legend: if in the morning a person met a chimney sweeper, then the day promised to be successful.

There are many ridiculous and strange sculptures that inevitably cause a



smile. You can find a monument to eggs, Kharkovites call it "Dinosaur Eggs". One of the monuments that can bring good luck in financial affairs is a monument to **the "Happy coin"**, which appeared in Kharkov in honor of the opening of 3333 branch of "PrivatBank". You can see the "happy coin" near the fourth entrance of the Gosprom.

It is impossible to count all the monuments on our planet erected in honor of famous people and significant dates. But monuments dedicated to animals occupy a special place. There are monuments to monkeys, laboratory mice, cats, seals, crocodiles and even mammoths. But, perhaps, the most popular animal for the monument is the dog.

In many cities of the world there are monuments to dogs and almost all of them are set for special merits of these animals to a man, as a symbol of dog devotion. Monuments to dogs, which saved their owners at the cost of their lives, are in Belarus, in Russia, in Poland. In Paris there is a monument to St. Bernard Barry, who saved the lives of people trapped in an avalanche. The inscription on the pedestal reads: "Barry, who saved forty people and was killed by the forty-first."

Kharkov also supported this humanistic trend. Among the monuments dedicated to animals, there are two that arouse special sentiments. First of all, it is a monument **"Homeless dog - a friend of tennis players"** which is located near the entrance to the building of the tennis club "Unicort" near Karazin University. The monument to a common mongrel named Palma was created by Alexey Demchenko.

The history of the sculpture is rather touching. In the early 1990s, the children found a huge mongrel with her puppies. "We fed her, and ten days later she got used to us and let us move the puppies to our building", recalls "Unicort" director Valery Burko. "So Palma lived there for 12 years. We did not drown any puppies: we handed them out to our children's parents, students and teachers". When Palma died, "Unicort" decided to make



a bronze monument to a stray dog. A prototype was a photograph of Palma. Now everyone who enters this sports complex, strokes the head of a bronze dog.



Another monument is a “**Monument to three monkeys**”, animals that survived during the years of nazi occupation. It is known that during the Great Patriotic War the Kharkiv Zoo was destroyed and the animals either perished or fled. Local residents rescued a family of three monkeys, who found shelter in the Building of the State Industry. In 2008, the monument to three monkeys was opened in the zoo in honor of animals and their rescuers.

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**Ostras V. R.**

### PARAMETRIC ARCHITECTURE

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The term "parametrism" appeared thanks to the suggestion of Patrick Schumacher (born 1961) to designate a new style in architecture, born at the turn of the millennium [1, 119].

The general rapprochement, observed in the avant-garde directions of architecture in recent times, confirms the emergence of a new style: Parametrism. This style originates in methods of digital animation. Its subsequent development is based on advanced systems of parametric design and script methods. Developing the last 15 years, this style now claims to be a leader in avant-garde architecture [2]. Gothic, Baroque, Rococo, Modernism, Constructivism and others - the styles on which every period in architecture is based. Each style depends on the technology of the construction industry of the time. Multifunctionality is one of the most important properties in the development of architecture. The same preference was given to objects not so aesthetic and exclusive, but economical and practical.

There is a desire to push away from existing principles of creating architectural structures and create something unusual and unique. It is understood that these principles are based on certain dogmas, the existence of which in the postmodern era is simply impossible.

Sculpture, mathematics and architecture are concepts that are interrelated in parametric architecture. Parametric design, unlike other styles, has a relationship with mathematics. Digital design should take into account the relationship between the erected building, the environment and human factors [3].

Parametric architecture goes beyond simple forms and constructive solutions. It is of fundamental importance to use the potential of parametrisation in educational design, in particular its technological capabilities in architectural shaping.

This type of architecture has gained popularity only in recent years with the development of advanced parametric design systems. Parametrisation at the moment is the most important and dominant style in avant-garde practice, requiring scale, in all areas, from architecture and interior design, to large-scale urban design [4].

The form appears as a result of the work of connections invented by the architect. This work is also related to constructive, aesthetic, functional things.

At this stage, parametric design cannot reach the level when the computer will be designed based on the tasks assigned, but in the future, the computer will be able to understand the needs of users.

Examples of a building made in the style of parametric architecture are the Office Building Media-ICT. Media-ICT was built in Barcelona by the architect Enrico Ruiz Geli. This building combines environmental friendliness and modern technologies. The outer shell of the building is covered with innovative transparent thermoplastic ETFE (Ethylene Tetra Fluoro Ethylene), which is an alternative to glass. It includes Teflon, film and foil. The Heydar Aliyev Cultural Center, built by the famous architect Zaha Hadid, is also an example of parametric architecture. The structure of the center is very flexible and expressive. The surface of the building is curved and has a viscous shape. The flowing form of the cultural center divides the space into three parts: a conference hall, a museum and a gallery [6].

The UK Pavilion was designed by the architect Thomas Hespurk. This unusual structure was called the "Family Cathedral" and was presented at the Expo in Shanghai. The pavilion was a box of 15 x 10 meters, where from each face there were silvery rods 7.5 meters long from transparent acrylic. At the ends of each of these transparent rods, there were various kinds of seeds from the Chinese Institute of Botany Kunming, a partner of the Royal Botanical Garden in Kew. On the general surface of the pavilion there were 60,000 rods, some of which were attached to the lower part of the structure, which made it easy for the whole building. Civil Engineer Adams Kara Taylor arranged the rods in such a way that from any foreshortening you could see the outline of the Union Jack flag.

In conclusion, we can say that parametric design is still at an early stage of development, but modern research shows that in the near future it will be implemented in real design. The development of new methods becomes a

fundamental condition for future success. A new way of designing is developed not only thanks to technology, but also to new software that will make parametric design accessible to architects.

In parametric design, one of the most important problems is the problem of accounting for the human factor. Digital design should always consider the relationship between the object, the environment and the person. Some argue that the computer is not able to take into account user needs and environmental requirements. However, with good reason, it can be argued that in the future, parametric design will reach a level.

Thanks to parametric technologies, the architect can process large amounts of data and the results of long studies and on this basis determine the shape of the building. Moreover, the received objects are so complicated that it would be impossible to create them by traditional methods.

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**ADOBE CONSTRUCTION**

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You should know that adobe construction is one of the oldest and most versatile building techniques used by humans. You can find it in the simplest of one-room huts and the world's most elaborate mosques. It's everywhere, but what is it - and more importantly, where did it come from?

“Adobe” is the term widely used in the southwestern United States and Spanish speaking countries. Unlike many architecture words, “adobe” does not originate in Greece or Italy. Meaning "the brick," the word derives from

Arabic and Egyptian and has also been seen in ancient hieroglyphics. This material was also used in ancient Egypt and the walls of Troy were built of adobe.

Adobe is an ancient building material, essentially a dried mud brick, baked in the sun. Adobe is one of the most widely used building materials which have gained immense popularity during previous era due to its magnificent energy saving qualities. Because of friendly as well as economic qualities, these houses create a feasible environment for populations living in warm climatic conditions with low humidity.



The walls of mud-houses are capable enough to restrict less intense sun rays and prohibit them to penetrate in to warm their inner side and begin to transfer heat to the living space. Soon after the sun is

set, the temperature tends to drop in these particular areas, and then the warm wall will continue to transfer the heat to inner side for next several hours, having an influence from time lag effect.

To form a brick you should dilute clay with water, mash it in a pit or boxes and then mix it with different additives. Such materials as chopped straw, wood chips, manure increase strength of adobe brick; cement, lime accelerate hardening and increase water resistance; sand, gravel, crushed stone and expanded clay reduce shrinkage upon drying. Formed bricks are kept on building square about 10 days. Then it is ready for building. When constructing buildings, the adobe is laid manually.



These environment friendly houses have a roof made up of a mixture constituting soil/clay, water, sand as well as other available organic materials which is further formed and pressed into wood forms resulting in series of dried mud bricks that would then be laid across a support structure of wood and plastered into place with more adobe.

Adobe brick walls are usually protected by applying a variety of substance. Since adobe is an ancient building method, traditional surface coatings may include substance that seem odd to us today—for example, "fresh animal blood." More common siding includes:

- mud plaster (mixture of "clay, sand, water, and straw or grass");
- lime plaster (mixture of "lime, sand, and water");
- whitewash (consisting of "ground gypsum rock, water, and clay");
- stucco, a relatively "new" form of adobe siding.

Making use of adobe bricks is probably one of the simplest forms of earth building. Adobe walls have a number of advantages and relatively few disadvantages.

As with other forms of earth construction, adobe bricks are fireproof, durable yet biodegradable, non-toxic building material which provides sufficient thermal mass to buildings to ensure excellent thermal performance. Other benefits include low sound transmission levels through walls and a general feeling of solidity and security. One of the biggest advantages of the adobe system is that it allows the individual units or bricks to shrink before they are placed in the wall.

Due to the production process and the nature of clay, adobe bricks have good water resistance. Nevertheless it is very important to provide adequate weather protection of the earth walls, especially in exposed situations.

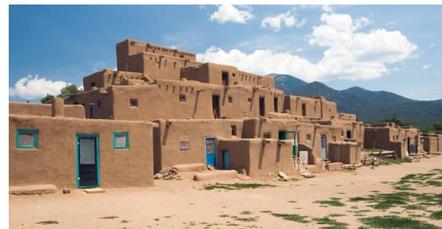
The small adobe units provide great flexibility in the design and construction of earth buildings. Adobe bricks can be easily cut for fitting and can be provided with holes for reinforcing and services.

Problems usually have more than one source, but the most common are these:

- poor building, design, and engineering techniques were used;
- too much rainwater, ground water, or watering of surrounding vegetation;
- wind erosion from windblown sand;
- harboring plants or insects within the adobe walls;
- previous repairs with incompatible building materials.

In conclusion, it can be said that this material is environmentally friendly and does not harm the environment. Many people find the pattern and texture of adobe walls very attractive.

Adobe buildings are most often found in Asian countries, this material is used for the construction of low-rise buildings. Also they can be found in rural areas of Russia, southern regions of Ukraine and Moldova, in the southwest of the USA.



Today adobe brick construction has been partially adapted to economical, social and technical changes. In countries with a big demand, adobe bricks are produced mechanically in commercial brick making yards or there is the option of hiring a brick making machine to make adobes on site.

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**Petrenko V. V.**

## **MINIMALIST TRADITION IN ARCHITECTURE**

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Minimalism is an art and design movement that started in the 20th century. Minimalism is a concept not only in architecture, but in other art and design fields as well. Today minimalism is also popular as a lifestyle.

Minimalism is a long tradition in the Japanese culture that dates back to the Higashiyama culture in the 15<sup>th</sup> century, particularly in the notions of *Wabi* and *Sabi*, which found beauty and depth in minimalism. *Wabi* and *Sabi* were defined as an active aesthetical appreciation of poverty, *Sabi* being elegant simplicity, while *Wabi* was regarded as quiet taste.

The desire to strip architecture to its essential elements, at times for technical reasons but often with religious, spiritual or aesthetic goals in mind, has existed for thousands of years in countless cultures and civilizations. Minimalism has often burst upon the scene as a reaction to the corruption of religious or secular power and is the signal of the return to essential values. A good example is the numerous Cistercian abbeys that were built at the end of the Middle Ages as a response to the corruption of the church.

Minimal art emerged in the early 1960s in America and introduced a new way of producing, looking at, and experiencing artworks. Artists like Carl Andre, Dan Flavin, and Donald Judd were inspired by Cubism and its concept of reducing everything in an artwork to geometric shapes. These artists created minimalist works with a focus on the most essential elements, pure shapes, monochromatic surfaces, repetition, clarity, and simplicity of form.

The origins of minimalist architecture go back to Cubism-derived design movements De Stijl and Bauhaus that ran parallel in the 1920s. De Stijl movement endorsed simplicity and abstraction and reduced an artwork to its essential form/color. De Stijl principles were applied to architecture by Theo Van Doesburg and Gerrit Rietveld. They based their design philosophy on functionalism, rectilinearity of planes, and elimination of surface decoration.

In 1947, after the Bauhaus was relocated in the United States and known as the International Style, its famous architect Ludwig Mies van der Rohe summarized its minimalist philosophy in a trademark phrase: 'Less is more'. *Less-is-more* refers to reduction of form to the bare minimum of elements; and it is still used to define minimalism today.

In addition to the Bauhaus and De Stijl, minimalist architecture was influenced by traditional Japanese architecture. Appreciating simple and plain objects, the traditional Japanese design has always revolved around the idea of minimal and focused on adding only what is needed and removing the rest.

Minimalist architecture uses the fewest and barest essentials to reach the essence of architecture. This means reducing and condensing a design's

content to a minimum of necessary elements, number of parameters, and operating means that define form. Thus, minimalist architecture is a result of elimination of the inessentials where the design is stripped down to its most fundamental features and can no longer be improved by subtraction.

The notion of lessening and reducing elements to its utmost simplicity makes minimalist architecture. Extreme simplicity of form/volume and bareness, plainness, and cleanliness of design vocabulary are the major characteristics of minimalism.

A minimalist interior design scheme doesn't need to be stark and cold. The new look for minimalist interior design is a softer look, more personal and easier to live with.

The materials are a key point of minimalism. The minimalist ornamentation uses wood and rustic materials: polished cement, glass, steel and stone –mainly in its natural state, minimally manipulated. Minimalism always seeks at creating contrast by the alternation of these materials and the use of different textures.

Minimalism gives maximum power to architectural space. Basically, it is a function of space. Space in minimalism is regarded as unlimited space.

Thus, open-plan spatial arrangements are used to create minimalist architecture.

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### **PERFORATED BEAMS**

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Perforated beams are metal products that have been used for several decades in various construction sectors. Metal beams refer to bent elements. They are used to cover the spans of multi-storey industrial and civil buildings.

The most rational in use is the rolling beams of the I-beam and channel sections, since they are easier to manufacture.

Recently in construction, beams with a perforated wall are often used. A small part of the wall section in the central zone is removed (35-40% of the wall material), which for most beams does not present any danger. The consumption of metal in such beams is reduced by 20-30%, and the cost is up to 18%. Additional labor costs for the cutting and welding of metal structures are small, so the use of perforated beams is very beneficial [2, 20].

The beams are made in such a way:

1. The longitudinal dissolution of the wall of the rolled I-beam is carried out.

2. The halves are welded butt to the protruding parts. As a result, a beam is obtained with a series of holes located at the same distance, the cross-section of the I-beam increases up 1.5 times, and the bearing capacity grows to 30-50%. All positive effects are achieved without additional material flow, which is very important.

Depending on the length and the height of the profile, as well as on the shape, it is possible to obtain various holes and different heights of perforated beams. The most optimal profile is obtained with an increase in the height to 1.5 m.

Perforated beams in construction are used as columns and pillars, overlapping elements and trusses, spatial systems and purlins.

The main advantages of perforated metal beams are lightness, increased bearing capacity, ultimate stiffness and high performance characteristics, therefore, they are used for a larger span and greater load. In this case, the effect of shear forces on the stress in the vertical wall is insignificant. Designing perforated beams allows you to achieve steel savings of up to 20-30% [2, 13].

However, due to the high cost of manufacture, their application should be expedient and economically justified.

Cross beams are used as independent structures of bearing elements of span structures of bridges up to 24 m in length. To increase the bearing capacity, the main beams are made in a bestial variant, and also with a variable cross-sectional area. Thus, by increasing the height of the beam, the material of the section is redistributed with a concentration closer to the peripheral fibers (shelves) [1, 27-28].

Modern technology makes it possible to fabricate beams one- and two-slope, with a slope in both the upper and lower belt. To improve the efficiency of structures as a lower belt, a Taurus made of steel of a stronger brand of a constant cross-sectional length is used. The desire to increase the cross section with a moderate weakening of the tails and piers, led to the use of plate inserts between the ridges of joined parts. Holes that reduce the concentration of stresses are obtained with curved inclined cuts. Cutting in this case is performed with a small waste of metal. There are many other variants of wall

cutting with different advantages. The main dimensions of the beam are its design span and its section height.

The perforation provides many additional features, simplifies the processes of painting and installing the diaphragms of the internal space, facilitates accessibility when inspecting the structure. In addition, the useful volume of construction increases, the laying of technological and engineering communications is simplified. A small weight and increased transportability make it possible to effectively use perforated beams for construction work in hard-to-reach areas.

As we see, the use of these beams is expedient and economical, thanks to perforation we save material, improve strength characteristics and bearing capacity, simplify the operation of the structure. Despite the high cost of production and installation, perforated beams pay for their application. It is necessary to increase the use of perforated beams in all cases where the design allows.

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### **MODERN STYLE IN ARCHITECTURE**

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Modern architecture or modernist architecture is a term applied to a group of styles of architecture which emerged in the first half of the 20th century and became dominant after World War II. It was based upon new technologies of construction, particularly the use of glass, steel and reinforced concrete; and upon a rejection of the traditional neoclassical architecture and Beaux-Arts styles that were popular in the 19th century.

Modern architecture continued to be the dominant architectural style for institutional and corporate buildings into 1980s, when it was challenged by postmodernism.

Notable architects important to the history and development of the modernist movement include Frank Lloyd Wright, Ludwig Mies van der Rohe, Le Corbusier, Walter Gropius, Konstantin Melnikov, Erich

Mendelsohn, Richard Neutra, Louis Sullivan, Gerrit Rietveld, Bruno Taut, Gunnar Asplund, Arne Jacobsen, Oscar Niemeyer and Alvar Aalto.

Modern architecture emerged at the end of the 19th century from revolutions in technology, engineering and building materials, and from a desire to break away from historical architectural styles and to invent something that was purely functional and new.

The revolution in materials came first, with the use of cast iron, plate glass, and reinforced concrete, to build structures that were stronger, lighter and taller. The cast plate glass process was invented in 1848, allowing the manufacture of very large windows. The Crystal Palace by Joseph Paxton at the Great Exhibition of 1851 was an early example of iron and plate glass construction, followed in 1864 by the first glass and metal curtain wall. These developments together led to the first steel-framed skyscraper, the ten-story Home Insurance Building in Chicago, built in 1884 by William Le Baron Jenney. The iron frame construction of the Eiffel Tower, then the tallest structure in the world, captured the imagination of millions of visitors to the 1889 Paris Universal Exposition.

French industrialist François Coignet was the first to use iron-reinforced concrete, that is, concrete strengthened with iron bars, as a technique for constructing buildings. In 1853 Coignet built the first iron reinforced concrete structure, a four-story house in the suburbs of Paris. A further important step forward was the invention of the safety elevator by Elisha Otis, first demonstrated at the Crystal Palace exposition in 1852, which made tall office and apartment buildings practical. Another important technology for the new architecture was electric light, which greatly reduced the inherent danger of fires caused by gas in the 19th century.

The debut of new materials and techniques inspired architects to break away from the neoclassical and eclectic models that dominated European and American architecture in the late 19th century, most notably eclecticism, Victorian and Edwardian architecture, and the Beaux-Arts architectural style. This break with the past was particularly urged by the architectural theorist and historian Eugène Viollet-le-Duc. In his 1872 book *Entretiens sur L'Architecture*, he urged: "use the means and knowledge given to us by our times, without the intervening traditions which are no longer viable today, and in that way we can inaugurate a new architecture. For each function its material; for each material its form and its ornament." This book influenced a generation of architects, including Louis Sullivan, Victor Horta, Hector Guimard, and Antoni Gaudí.

At the end of the 19th century, a few architects began to challenge the traditional Beaux Arts and Neoclassical styles that dominated architecture in Europe and the United States. The Glasgow School of Art (1896-99) designed by Charles Rennie MacIntosh, had a facade dominated by large vertical bays of windows. The Art Nouveau style was launched in the 1890s by Victor Horta in Belgium and Hector Guimard in France; it introduced new styles of

decoration, based on vegetal and floral forms. In Barcelona, Antonio Gaudi conceived architecture as a form of sculpture; the facade of the Casa Battlo in Barcelona (1904-1907) had no straight lines; it was encrusted with colorful mosaics of stone and ceramic tiles.

Architects also began to experiment with new materials and techniques, which gave them greater freedom to create new forms. In 1903-1904 in Paris Auguste Perret and Henri Sauvage began to use reinforced concrete, previously only used for industrial structures, to build apartment buildings. Reinforced concrete, which could be molded into any shape, and which could create enormous spaces without the need of supporting pillars, replaced stone and brick as the primary material for modernist architects. The first concrete apartment buildings by Perret and Sauvage were covered with ceramic tiles, but in 1905 Perret built the first concrete parking garage on 51 rue de Ponthieu in Paris; here the concrete was left bare, and the space between the concrete was filled with glass windows. Henri Sauvage added another construction innovation in an apartment building on Rue Vavin in Paris (1912-1914); the reinforced concrete building was in steps, with each floor set back from the floor below, creating a series of terraces. Between 1910 and 1913, Auguste Perret built the Théâtre des Champs-Élysées, a masterpiece of reinforced concrete construction, with Art Deco sculptural bas-reliefs on the facade by Antoine Bourdelle. Because of the concrete construction, no columns blocked the spectator's view of the stage.

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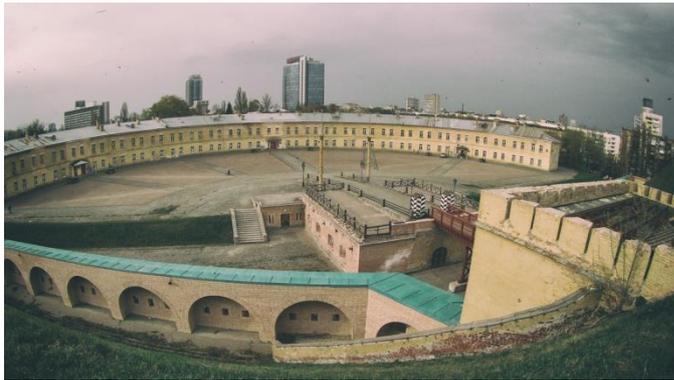
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**Pryz I. O.**

### **THE KYIV FORTRESS, THE WORLD'S LARGEST EARTH FORTIFICATION**

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Today Kyiv fortress is one of the largest European fortifications still preserved. It is a unique structure, which is the largest in Europe and second largest in the world stone and earthen fortifications. The construction of Kyiv fortress began in 1706 by the order of Peter the Great. In that time, the Russian Empire was weakened by the war with Sweden, and there was a danger for Kyiv to be occupied by Turkey or Crimean Khanate. Therefore, the main purpose of the newly built fortress was to enforce Kyiv military positions. It is constantly updated with new objects. The main phase of the construction was carried out in the mid-19th century, during the reign of Nicholas I. The author of the plan of the fortress became a military engineer



Carl Opperman. Kyiv fortress never participated in the fighting, has not made a single shot of combat. Military technology of the late 19th century has changed dramatically, and the castle was used as a warehouse.

Kyiv fortress includes fortifications in Kyiv-Pecherska Lavra, territory of the National museum of the Second World War, Arsenal plant and many other objects mostly located in Pechersk district.

The Kosyi Caponier is a part of a huge Kyiv fortress, located in the very centre of the city, which is a part of the Kyiv fortress and built for nearly 200 years from the 17th to 19th century. It is a defensive construction of Hospital fortification in Kyiv fortress system. It was raised in 1844 and is a semi underground construction with heavy walls made of brick and stone.

This is the only place in Europe with fully restored complicated system of 10-15-meter high earth walls and deep fosses. Earth walls were cut through by patterns – bricked tunnels with length up to 40 meters, closed by lattices from both sides. Above-ground part of the Kosyi Caponier projects to Cherepanova mountain. The Kosyi Caponier building is located at the angle to the fortress earth wall in order to ease the process of artillery crossfire, and that is the reason why it is called “kosyi” (oblique). Multi-level defense system of fortress left no chance for its occupation. The Kosyi Caponier was surrounded by fosse. The only way to enter the building was through the suspended gate. If enemies smashed the first defense level, they were immediately attacked from the other fortification. In such way, the fortress was considered as unassailable.

Gun ports and loopholes for gun and cannon shooting are located in the walls. The complex owes its name to the fact that Caponier (a covered passage across a ditch round a fort) is located angularly to the ground rampart of the fortress and for this reason was called “Cross-eyed”.

First, the Kosyi Caponier was used for weapons and artillery ammunition storage. At the beginning of of 1860s, the fortress was turned into a political prison. Many prisoners, who were mostly revolutionists, were executed here by a firing squad. Participants of Polish Uprising against the Russian Empire (1863-1864) became the first prisoners of the fortress. Participants of the First Russian Revolution (1905-1907), such as



Boris Zhadanovsky, were also imprisoned in the Kosyi Caponier. Some of them were shot right by the fortress.

Later, the fortress became a dungeon for Dmitry Bogrov, the Russian anarchist and the killer of Piotr Stolypin, the famous Russian statesperson. The Kosyi Caponier was called “Kyiv Shlisselburg” for its tough conditions. (Shlisselburg was one of the most important medieval fortresses in the northwest Russia. It is located to the head of the Neva River on Lake Ladoga. During the times of Imperial Russia, the fortress was used as a notorious political prison. Ivan VI of Russia was murdered in the fortress in 1764, and Lenin's brother, Aleksandr Ulyanov, was hanged there as well. )



The Museum in the prison part of Kosyi Caponier was created in Soviet times. Now its exposition has been renewed. Here one can see the famous “Condemned carriage” which took sentenced to death prisoners to the place of execution. The killer of Russian Prime Minister P. Stolypin D. Bogrov was also carried in it. The appearance of prison wards has been reproduced –

prisoner wards for soldiers and officers, punishment cells, prison corridors. Prisoners` personal belongings, judicial documents, military uniform and weapons can be observed in the show windows.

Today the territory of the Kosyi Caponier includes two museums, dedicated to history of this fortification. The first museum is located underground. The room is kept in the same state as it was in prison times. The museum exposition consists of old utensils, weapons, uniform, personal possessions of prisoners. The second museum presents military clothing of different periods and historical documents, related to the history of Kyiv and the Kosyi Caponier.



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Architecture is the art of building in which human requirements and construction materials are related so as to furnish practical use as well as an aesthetic solution, thus differing from the pure utility of engineering construction. As an art, architecture is essentially abstract and nonrepresentational and involves the manipulation of the relationships of spaces, volumes, planes, masses, and voids. Time is also an important factor in architecture, since a building is usually comprehended in a succession of experiences rather than all at once. In most architecture there is no one vantage point from which the whole structure can be understood. The use of light and shadow, as well as surface decoration, can greatly enhance a structure.

The analysis of building types provides an insight into past cultures and eras. Behind each of the greater styles lies not a casual trend nor a vogue, but a period of serious and urgent experimentation directed toward answering the needs of a specific way of life. Climate, methods of labor, available materials, and economy of means all impose their dictates. Each of the greater styles has been aided by the discovery of new construction methods. Once developed, a method survives tenaciously, giving way only when social changes or new building techniques have reduced it. That evolutionary process is exemplified by the history of modern architecture, which developed from the first uses of structural iron and steel in the mid-19th century.

Until the 20th century, there were three great developments in architectural construction—the post-and-lintel, or trabeated, system; the arch system, either the cohesive type, employing plastic materials hardening into a homogeneous mass, or the thrust type, in which the loads are received and counterbalanced at definite points; and the modern steel-skeleton system. In the 20th century, new forms of building have been devised, with the use of reinforced concrete and the development of geodesic and stressed-skin (light material, reinforced) structures.

See also articles under countries, e.g., American architecture; styles, e.g., baroque; periods, e.g., Gothic architecture and art; individual architects, e.g., Andrea Palladio; individual stylistic and structural elements, e.g., tracery, orientation; specific building types, e.g., pagoda, apartment house.

**Architecture of the Ancient World**

In Egyptian architecture, to which belong some of the earliest extant structures to be called architecture (erected by the Egyptians before 3000 BC), the post-and-lintel system was employed exclusively and produced the earliest stone columnar buildings in history. The architecture of W Asia from the same era employed the same system; however, arched construction was also

known and used. The Chaldaeans and Assyrians, dependent upon clay as their chief material, built vaulted roofs of damp mud bricks that adhered to form a solid shell.

After generations of experimentation with buildings of limited variety the Greeks gave to the simple post-and-lintel system the purest, most perfect expression it was to attain (see Parthenon ; orders of architecture). Roman architecture, borrowing and combining the columns of Greece and the arches of Asia, produced a wide variety of monumental buildings throughout the Western world. Their momentous invention of concrete enabled the imperial builders to exploit successfully the vault construction of W Asia and to cover vast unbroken floor spaces with great vaults and domes, as in the rebuilt Pantheon (2d century. AD; see under pantheon).

### **The Evolution of Styles in the Christian Era**

The Romans and the early Christians also used the wooden truss for roofing the wide spans of their basilica halls. Neither Greek, Chinese, nor Japanese architecture used the vault system of construction. However, in the Asian division of the Roman Empire, vault development continued; Byzantine architects experimented with new principles and developed the pendentive, used brilliantly in the 6th century. for the Church of Hagia Sophia in Constantinople.

The Romanesque architecture of the early Middle Ages was notable for strong, simple, massive forms and vaults executed in cut stone. In Lombard Romanesque (11th century.) the Byzantine concentration of vault thrusts was improved by the device of ribs and of piers to support them. The idea of an organic supporting and buttressing skeleton of masonry (see buttress), here appearing in embryo, became the vitalizing aim of the medieval builders. In 13th-century Gothic architecture it emerged in perfected form, as in the Amiens and Chartres cathedrals.

The birth of Renaissance architecture (15th century.) inaugurated a period of several hundred years in Western architecture during which the multiple and complex buildings of the modern world began to emerge, while at the same time no new and compelling structural conceptions appeared. The forms and ornaments of Roman antiquity were resuscitated again and again and were ordered into numberless new combinations, and structure served chiefly as a convenient tool for attaining these effects. The complex, highly decorated baroque style was the chief manifestation of the 17th-century architectural aesthetic. The Georgian style was among architecture's notable 18th-century expressions (see Georgian architecture ). The first half of the 19th century. was given over to the classic revival and the Gothic revival.

### **New World, New Architectures**

The architects of the later 19th century. found themselves in a world being reshaped by science, industry, and speed. A new eclecticism arose, such as the architecture based on the Ecole des Beaux-Arts , and what is commonly called Victorian architecture in Britain and the United States. The needs of a

new society pressed them, while steel, reinforced concrete, and electricity were among the many new technical means at their disposal.

After more than a half-century of assimilation and experimentation, modern architecture, often called the International style, produced an astonishing variety of daring and original buildings, often steel substructures sheathed in glass. The Bauhaus was a strong influence on modern architecture. As the line between architecture and engineering became a shadow, 20th-century architecture often approached engineering, and modern works of engineering—airplane hangars, for example—often aimed at and achieved an undeniable beauty. More recently, postmodern architecture (see postmodernism), which exploits and expands the technical innovations of modernism while often incorporating stylistic elements from other architectural styles or periods, has become an international movement.

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**Radchenko Ye. S.**

#### **PSYCHOPHYSIOLOGICAL PERCEPTION OF OBJECTS OF ROADSIDE INFRASTRUCTURE BY THE DRIVERS**

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Psychophysiological requirements for the drivers are determined by their professional activity or the need for a personal vehicle. When driving a car, it is necessary for a long time to maintain the optimal psychological state, which allows to perceive and process information quickly and qualitatively. The deviation of the psychological state from the norm increases the probability of the driver's erroneous actions.

The driver should take large volumes of information about the participants of the movement, the means of organization and regulation of traffic, the state of the road and the environment, as well as the operation of systems and units of the car. In addition, the road situation needs to be continuously analyzed and the appropriate decisions should be taken, often in the conditions of severe shortage of time.

The processing of the received information is accompanied by a comparison of possible solutions based on the developed skills, driving experience, knowledge and understanding of traffic rules. The perceived information is rated by the driver from the point of view of its danger or safety. It takes some time to assess the situation and make the right decision, depending on the driver's experience and skills.

The driver's reaction to any element of the road environment is aimed at changing the emotional tension caused by the complication of vehicle control, the influence of unexpected maneuvers of other cars, and reduced visibility.

The reaction time depends on the driver's age, his gender, his health, professional qualities and psychological properties.

The process of the reaction can be divided into three stages: assessment of the situation, making a decision and carrying out the appropriate actions. The reaction time of a driver when driving a car is measured by the interval from the moment of perception of a danger to the beginning of concrete actions.

The reaction can be simple and complex. A simple reaction is related to the expectation of a single irritant, known to the driver, in response to which the driver must perform certain actions. It is between 0.2-0.15 sec. An example of a simple reaction is the pressing on a button on the car's panel on the light or sound irritant. Assessment and decision-making on specific actions are a complex reaction, which is 0.4-1.5 sec. depending on the professional experience and individual psychophysiological features of the body of the driver.

In the process of driving a car, the driver constantly moves a view of various objects in the field of view, and on different elements of the road. In the process of moving the look the road signs are detected; the presence of a sign in the field of view is determined. After detecting a road sign, the driver fixes his view at it within 0.2-0.3 sec. During this time the recognition, identification and decoding of the sign is being made. At the stage of recognition, the driver determines the general features: location, brightness and color, size and shape of the sign. At the stage of identification, the driver compares the main features on the sign with the standards stored in his memory. The final stage of perception of the road signs is the decoding, that is, the assessment of a semantic content of the sign.

The distance of detection, recognition and identification is the distance from the driver to a sign on which the driver with a sufficient confidence can respectively detect, recognize and identify the road sign in the real conditions of movement.

The problem of a road safety requires knowledge of the connection between the psychophysiological indicators of the driver's work during the movement, and the road conditions of the movement of a car. Moreover, due to the lack of knowledge of psychophysiological indicators of a person, most of the characteristics of driver's reliability can be determined only empirically.

The dynamics of the course of psychological processes is determined by the temperament of the person, which manifests itself in emotional excitement and general mobility of the person. The temperament is the individual peculiarities of a person that determine the dynamics of the course of his

mental processes and behavior. The temperament determines and provides the speed, strength and balance of the reactions; it manifests itself in the thinking, language, manner of communication.

There are four types of temperament: sanguine, choleric, phlegmatic and melancholic ones, which are reflected in the driver's performance.

Mental properties	Types of temperament			
	Sanguine	Choleric	Phlegmatic	Melancholic
The speed of psychic reactions	Red	Dark Red	Yellow	Orange
The power of psychic reactions	Yellow	Dark Red	Orange	Red
Emotional excitement	Orange	Dark Red	Yellow	Red
The power of emotions	Orange	Dark Red	Yellow	Red
Emotional stability	Red	Orange	Dark Red	Yellow
Sensuality	Red	Orange	Yellow	Dark Red
Reactivity	Red	Dark Red	Orange	Yellow
Activity	Orange	Dark Red	Red	Yellow
The pace of the reaction	Red	Dark Red	Orange	Yellow

Dark Red	- very high nervous activity
Red	- high nervous activity
Orange	- average nervous activity
Yellow	- low nervous activity

*Figure 1 – The degree of impressionability of the properties of higher human nervous activity.*

Sanguine people approve themselves most positively as the drivers; they are cheerful, friendly people with high working capacity. However, they are characterized by a trait to overestimate their capabilities and, as a result, they take belated decisions. Choleric people are characterized by a high level of emotional excitement. An exceptional activity with an insufficient assiduity and endurance destroy his qualities as a driver. At the wheel during the rush hours they show their irritability, unreasonable risk, and lose self-control. The equilibrium, calmness and deliberation of the phlegmatic people have a positive effect on the work, which does not require quick decisions in the

absence of time. Suburban trips and a slight change in the situation suit them best of all. A melancholic person is the least suitable one for professional activity as a driver. He is prone to manifestations of emotional instability and indecision. Any non-favorable changes in the situation can lead him out of the balance, although their external manifestations of feelings are negligible.

To determine the reaction time of the driver on the perception of the road object by him, depending on the type of temperament, it has been established that the reaction time of the driver consists of: movement of the attention of the driver, time of convergence, and time of fixation of the driver's view on the object and its recognition. The time of the driver's reaction to the perception of the road object by him, depending on the type of temperament, is: a melancholic person – 0.68 sec; a phlegmatic person – 0.77 sec; a choleric person – 0.47sec; a sanguine person – 0.58 sec. According to the results of the study, although the melancholic person is less suitable for professional activity than phlegmatic one, for the further calculations we accept the phlegmatic type of temperament, as the most inhibited to promote the road conditions and decision-making in a time-deficit.

According to the study, the data were obtained regarding the frequency of placement of the road signs, depending on the category of the highway, the speed of the vehicle, the time required to identify the object and the number of objects that are fixed by the attention of a phlegmatic driver.

According to the results of the work, the following conclusions can be made: a set of psychophysiological indicators is determined; they influence the perception of means of information security by the driver; according to the analysis of the degrees of the course of psychological processes, manifested in emotional excitement and general mobility of a person, a ranking is established regarding the ability of a person to perform the duties of a driver depending on the temperament; it is established that the most inhibited to promote the road conditions and decision-making in a time-deficit is a phlegmatic person; the periodic distances of placement of the road signs, depending on the category of highway, speed of the vehicle, and time needed to recognize the object and its quantity are recommended.

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**ZAHA HADID BIOGRAPHY**

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The designs of Iraqi-born British architect Zaha Hadid (born 1950) are daring and visionary experiments with space and with the relationships of buildings to their urban surroundings.

Often named as the most prominent contemporary female architect, or singled out for notice because of her Iraqi Arab background, Hadid is significant beyond these accidents of birth for her intellectual toughness, her refusal to compromise on her ideas even when very few of them were being realized in concrete and steel. For many years, her designs filled the pages of architecture periodicals but were dismissed as impractical or as too radical, and Hadid even thought about giving up architecture after she suffered a major rejection in her adopted homeland of Britain in 1995. Her star began to rise internationally when her design for Cincinnati, Ohio's new Center for Contemporary Art was selected and built, earning worldwide acclaim. By the mid-2000s Hadid employed nearly 150 people in her London office and was working hard to keep up with new commissions that were coming in, offering her a chance to help reshape the world architectural landscape.

Born in Baghdad, Iraq, on October 31, 1950, Zaha M. Hadid grew up in a well-educated Islamic family oriented toward Western multiculturalism. Her father was an executive and, for a time, the leader of a liberal Iraqi political party. The drawing ability that would later attract attention in art museums was first absorbed from her mother. Hadid's interest in architecture had roots in a trip her family took to the ancient Sumer region in southern Iraq, the site of one of the world's oldest civilizations, when she was a teenager. "My father took us to see the Sumerian cities," she told Jonathan Glancey of London's Guardian newspaper. "Then we went by boat, and then on a smaller one made of reeds, to visit villages in the marshes. The beauty of the landscape—where sand, water, reeds, birds, buildings, and people all somehow flowed together—has never left me. I'm trying to discover—invent, I suppose—an architecture, and forms of urban planning, that do something of the same thing in a contemporary way."

In 1972 Hadid moved to London (later becoming a British citizen) and enrolled at the Architectural Association School of Architecture. She has never married nor had children. "If [architecture] doesn't kill you, then you're no good," she explained to Glancey. "I mean, really—you have to go at it full time. You can't afford to dip in and out." By 1977 Hadid had received her degree, along with a special Diploma Prize, and she began working for a London firm, the Office of Metropolitan Architecture, founded by one of her key teachers, the similarly daring Dutch architect Rem Koolhaas. One of her

student projects was a design for a hotel built atop the span of London's Hungerford Bridge.

Hadid opened an office of her own in 1980, but at first her ideas were more in demand than her actual designs. Hadid taught courses at the Architectural Association and filled notebooks with one-of-a-kind ideas, some of which were published in architecture magazines or exhibited in galleries. Hadid began to enter design competitions, some of them research-oriented and others for buildings intended for construction. Her design for The Peak, a sports club jutting out horizontally from one of the mountain slopes that surround the city of Hong Kong, won the top prize in the institution's competition, but the building was never constructed. Hadid's competition entries in the 1980s and early 1990s were little known to the public at large but stirred up interest among her fellow architects, and even after she became famous, her website continued to list her competition prizes before focusing on her actual building projects.

At the same time, Hadid began to amass a solid core of admirers among her staff, among architecture experts, and among ordinary observers. At the same time the Cardiff project was going down in flames, Hadid designed a temporary pavilion to house an exhibit for the architecture magazine *Blueprint* at a builders' convention. She had to present the structure, described by Moore as "a thing of flying steel," to a gathering of the magazine's advertisers, most of whom greeted it initially with silence. But an executive from a firm that made portable toilets stood up and said "I think it's bloody marvelous" (according to Moore), and began applauding. The other advertisers joined in, and Hadid gained a moment in the building-trade spotlight.

As clients became more and more fascinated with Hadid's plans, some of the plans advanced from theory to reality. She designed the unique Bergisel Ski Jump on a mountain near Innsbruck, Austria, and a parking garage and transit station in suburban Strasbourg, France, that later won the Mies van der Rohe Award from the European Union. In 1998 came the biggest commission yet: the Lois and Richard Rosenthal Center for Contemporary Art in Cincinnati, popularly known as the Contemporary Arts Center.

The new building had to fit the confines of a narrow street corner lot in downtown Cincinnati, but Hadid made a virtue of necessity by linking the museum's internal and external environments: the outdoor sidewalk continued into the building, where it propelled visitors toward a sleek black central staircase that melded dramatically into the structure's back wall. As viewers ascended the staircase they looked into galleries that completely overturned the usual neutral conception of museum display spaces—the galleries had different shapes and sizes, and each one seemed to present something new to those approaching. "Not many people voluntarily walk up six stories anywhere," noted Joseph Giovannini of *Art in America*, "but Hadid's space so intrigues visitors that few think of bypassing the experience by hitching a ride on the elevator: they sense they would miss chapters." A bonus in Hadid's

design was its economy: the building used only common materials, and construction costs came in at a reasonable \$230 per square foot.

Hadid's creative fulfillment of a plum commission raised her international profile considerably. Where Hadid had sometimes been considered abrasive and difficult to work with, now she was hailed as a pioneer who had stuck to her vision even while facing difficult obstacles. At times, Hadid ascribed the resistance her ideas encountered to her gender and ethnicity. She also conceded that her work and personality were challenging. "I am eccentric, I admit it," she told Moore, "but I am not a nutcase."

In 2004 Hadid was awarded the Pritzker Architecture Prize, considered the profession's highest honor. She was the first woman to receive the award. In the mid-2000s she finally received a full-scale commission in the British Isles, for a cancer-care building called Maggie's Centre in Fife, Scotland. Highly visible Hadid buildings planned or underway included a bridge in the Persian Gulf state of Abu Dhabi, a movie theater complex in Barcelona, Spain, and several new museums. Greater international exposure seemed assured in a project waiting further down the line: the aquatics building for the 2012 Summer Olympics to be held in London. And she seemed to be outdoing herself with each successive design. "Co-curator Monica Montagut quotes Hadid's statement that 'I still believe in the impossible,'" noted Raymund Ryan in his *Architectural Review* commentary of Hadid's Guggenheim exhibition. "Judging from this display in New York City, there are few limits to what Hadid might do next."

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**Ryabchyns'kyi Ye. A.**

### **EUROPE'S FIRST UNDERWATER RESTAURANT TO OPEN IN NORWAY IN 2018**

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Food and Beverage Industry is a delightful part of the hospitality industry. There are amazing restaurants and food service outlets to mesmerize us.



*The Real Poseidon* which has recently opened in Ahmadabad is India's first underwater restaurant, but it is not the world's first. There have been many before it and in the recent years the concept of an underwater restaurant is picking up steadily. There have been a number of underwater restaurants which have opened.

*Ithaa Undersea Restaurant in Maldives* is located 16 feet below the surface and is in Hilton's Conrad Maldives Rangali Island Resort in Maldives.

*The Poseidon Sea Resort Fiji* is one of the most popular places among those who seek a different kind of experience. It is surrounded by water lagoons.

*Al Mahara* is the underwater hotel in Dubai. If you are here, you have to try their sea bass which is brilliant.

There are four aquarium restaurants in the US. Not only are they a great place to eat, but they are also educative as there is a 20-minute tour which gives you a decent understanding of the aquatic life.

Europe will soon see its first underwater restaurant, according to the project's Norwegian architects. The planned concrete structure features a 36-foot wide panoramic window and is designed to become part of the marine environment. It's expected to be completed by early 2019, with construction work starting in February 2018, at the southernmost point of Norway's coastline.

The restaurant has been designed by Norwegian architectural firm Snøhetta, known for its work on the Norwegian National Opera & Ballet and the Bibliotheca Alexandrina in Egypt. Called "Under", the restaurant will stand on the sea bed five meters below the surface, its thick walls designed to withstand the most variable sea conditions.

Environmental considerations have guided the design, which is housed in a coarse concrete shell to invite mussels to cling on. Outside of opening hours, the unit will double as a marine biology research center, with planned experiments to study the behavior of marine life through shifting seasons.

Described by the Oslo- and New York-based firm as "Europe's first underwater restaurant", the building will comprise a rugged concrete box with half of its body on the coastline, and the other half sunken underwater. Its primary use will be as a restaurant for up to 100 people, but it will also function as a marine research center and as an artificial mussel reef. Once inside, visitors will be able to look through a huge panoramic window to observe sea life at first hand.



The building's concrete walls will be a meter thick, helping to withstand its inhospitable environment. Externally, this concrete will have a coarse texture, to encourage mussels to attach themselves to the structure. Meanwhile, the marine research centre inside will facilitate studies into fish behavior – specifically whether it is possible to train wild fish with sound signals, and also whether fish act differently in different seasons. A huge frame-like oak wall will provide the building's entrance, which will lead through to a wood-lined restaurant space.

The restaurant is named “Under” as the Norwegian word for ‘under’ can also be translated into ‘wonder’. Half-sunken into the sea, the building’s monolithic form breaks the water surface to lie against the craggy shoreline. More than an aquarium, the structure will become a part of its marine environment, coming to rest directly on the sea bed five meters below the water’s surface. With meter-thick concrete walls, the structure is built to withstand pressure and shock from the rugged sea conditions. Like a sunken periscope, the restaurant’s massive acrylic windows offer a view of the seabed as it changes throughout the seasons and varying weather conditions.



The dining room will be painted in deep blue and green hues "inspired by the seabed, seaweed and rough sea". The large panoramic window, measuring 11 meters wide, spans the entire end wall of the space.

The designers hope that the building’s aesthetic among the rocky surroundings means it will become part of the environment. “Under” has been designed with sensitive consideration for its geographic context and aquatic neighbors. The sleek, streamlined form of the building is encapsulated in a concrete shell with a coarse surface that invites mussels to cling on. Over time, as the mollusk community densifies, the submerged monolith will become an artificial mussel reef that functions dually to rinse the sea and naturally attract more marine life to its purified waters.



The building comfortably accommodates 80-100 guests. Muted lighting from the inside of the restaurant and installed on the seabed will help stage the wildlife flourishing on the sandbank outside the 11 x 4-meter panoramic acrylic window.

The building will also function as a research centre for marine biology outside of restaurant opening hours, and researchers will help to optimize conditions for fish and shellfish in proximity to the structure.

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### **CLAY AS A RAW MATERIAL FOR HOUSE BUILDING**

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The ground underfoot is the main source of materials for construction. You can find sand and clay almost everywhere.

Many people think that clay is suitable only for making pots, dishes and hand-made articles. But this is not so. Clay is very suitable for building houses, and such houses are characterized by strength, reliability and comfort, they are very warm, frost-resistant, heat-resistant and hypoallergenic.

This article will tell you about the chemical composition and properties of clay. And also some variants of the use of clay in construction have been introduced.

When considering the chemical and physical structure of clays, the kaolinite (clay) formula is known:  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$

This formula represents the sum of the elements of which the clay consists, but does not give an idea of the physical nature of this conglomerate. Since 1900, V.I. Vernadsky conducted work on establishing the structure of clay and related minerals based on silicon and aluminum and in 1930 published a model, giving it the name "kaolin core":  $\text{Al}_2\text{Si}_2\text{O}_7$

At the same time, he came to the conclusion that aluminum and silicon oxides are acid residues, i.e. under certain conditions, silicon can form the following acids:

- metasilicon  $\text{H}_2\text{SiO}_3$
- orthosilicium  $\text{H}_4\text{SiO}_4$
- dicumeric  $\text{H}_2\text{SiO}_5$
- pyroxreternium  $\text{H}_6\text{Si}_2\text{O}_7$

In addition, it is possible to rearrange the atoms in the acid molecule, resulting in  $\text{H}_2\text{SiO}_2$ . It is customary to designate silicic acid as:  $\text{H}_2\text{SiO}_3$

All these acids are slightly soluble in water and form colloidal solutions. Depending on the metal whose alkali is in contact with the acid, the calcium silicates of magnesium and others are well known. The nearest metal to the silicic acid is aluminum, on the basis of which the salt-aluminosilicate was formed.

Kaolinic acid is represented by the following formula:  $\text{H}_2\text{Al}_2\text{Si}_2\text{O}$ . Of kaolinic nucleus, this acid is formed by the addition of  $\text{H}_2\text{O}$ . The structural

characteristics of the kaolin core gave Vernadsky a reason to conclude: "Silicon and aluminum are chemically and crystallochemically very closely related."

The kaolin core is like a ridge of most rocks, which contain feldspars (garnets, syenites, diorites, gabbros, basalts, etc.) in the form of frozen magma. Disintegrating with time, feldspars turn into clays. However, there are rocks, for example, Cambrian clay, which do not contain aluminosilic hydrates. Therefore, now the word "clay" is understood as a sedimentary fines that possesses plasticity, a property provided by the high dispersity of the constituent particles. Hardness of clay is a fairly loose formations, characterized by hardness on the Mohs scale – 2.

Before the First World War in France, near the town of "Box" was discovered a mineral called "bauxite". A characteristic feature of this mineral was that in it, with the same structure, the silicon atoms were mostly replaced by aluminum, that is, the salts turned out to be salts of aluminum acid. And although Vernadsky noted the identity of silicon and aluminum, it turns out that this is not the case. The properties of aluminum are significantly different from silicon. Aluminum and its compounds in the composition of aluminum acid have an amphoteric property. The generally accepted formula for aluminates is  $R[Al_2O_4]$ , where R is the metals of Ca, Mg, Zn, and others [1].

It is possible to allocate 3 directions of use of materials on the basis of unburnt clay in construction:

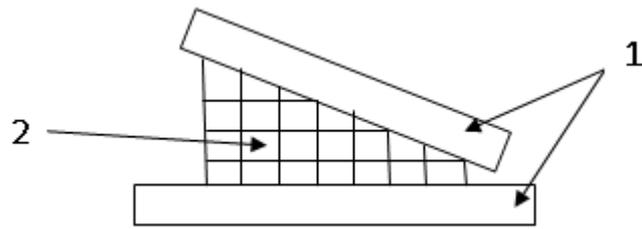
1. Solid monolithic construction. On the top of the foundation is set the formwork in the thickness of the future wall. Inside the formwork a reinforcing frame is built in. The formwork is densely pressed with a mixture of viscous thick clay and the addition of reinforcing fibers. As the formwork is filled, the formwork is raised higher and so the walls are erected to the desired height.

2. Construction of adobe blocks. From a heavy adobe in special forms from boards, form adobe blocks. Then they are taken out of the molds and dried to full hardening - as a result, very strong adobe blocks are obtained that are able to compete in strength with a brick.

3. Frame construction with frame filling with light airbrick. A double frame is built. The gaps between the beams of the frame are clogged with a light airbrick (lots of straw, little clay-water mixture). The outer surface of the walls is covered with clay.

In the future, by extracting Al from the clay and converting it into  $Al_2O_3$ , it is possible to obtain a material of a hardness close to diamond.

Model of the phase structure of a water-resistant clay material:



1. Hard clay particles with a conventional kaolin core.
2. Zone of contact between particles in the form of aluminates and calcium hydroaluminates [2].

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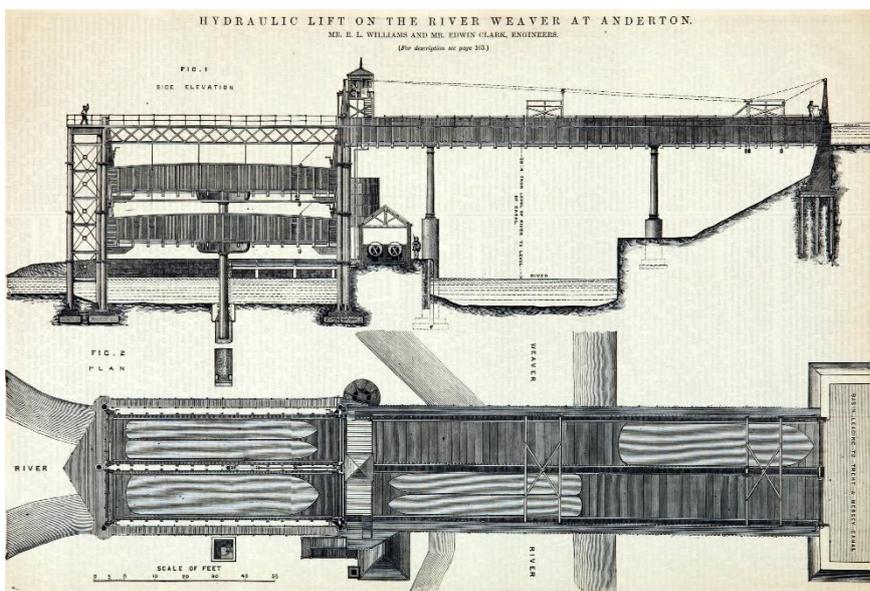
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## Serdyuk A. M. EDWIN CLARK'S BEST KNOWN ACHIEVEMENT IN THE UK, THE ANDERTON BOAT LIFT

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The Anderton Boat Lift is a two caisson lift lock near the village of Anderton, Cheshire, in North West England. It provides a 50-foot (15.2 m) vertical link between two navigable waterways: the River Weaver and the Trent and Mersey Canal. The structure is designated as a scheduled monument, and is included in the National Heritage List for England.

By 1870 the Anderton Basin was a major interchange for trans-shipping goods in both directions, with extensive warehousing, three double inclined



planes and four salt chutes. Trans-shipment was time-consuming and expensive, and the Trustees of the Weaver Navigation decided a link between the waterways was needed to allow boats to pass directly from one to the other. A flight of locks was

considered but discarded, mainly because of the lack of a suitable site and the loss of water that would have resulted from using them. In 1870 the Trustees proposed a boat lift between the waterways at the Anderton Basin. The Trustees approached the North Staffordshire Railway Company, owners of the Trent and Mersey Canal, to ask for a contribution towards the cost. When this approach was unsuccessful the Trustees decided to fund the project themselves.

The Trustees asked their Chief Engineer, Edward Leader Williams, to draw up plans for a boat lift. He settled on a design involving a pair of water-filled caissons that would counterbalance one another and require relatively little power to lift boats up and down. A similar boat lift on the Grand Western Canal, completed in 1835, used chains to connect the caissons via an overhead balance wheel. It had a solid masonry superstructure to support the weight of the loaded caissons. Leader Williams realised that if he used water-filled hydraulic rams to support the caissons their weight would be borne by the rams and their cylinders, buried underground and a much lighter superstructure could be used. He may have been inspired by inspecting a hydraulic ship lift and graving dock at the Royal Victoria Dock in London, designed by experienced hydraulic engineer Edwin Clark.

Having decided on a hydraulic ram design, Leader Williams appointed Edwin Clark as principal designer. At that time the Anderton Basin consisted of a cut on the north bank of the Weaver surrounding a small central island. Clark decided to build the boat lift on this island. The wrought iron caissons were 75 ft (22.9 m) long by 15 ft 6 in (4.72 m) wide by 9 ft 6 in (2.90 m) deep, and could each accommodate two 72 ft (21.9 m) narrowboats or a barge with a beam of up to 13 feet (4.0 m). Each caisson weighed 90 long tons (91 tonnes; 100 short tons) when empty and 252 long tons (256 t; 282 short tons) when full of water (because of displacement, the weight is the same with or without boats). Each caisson was supported by a single hydraulic ram consisting of a hollow 50 ft (15.2 m) long cast iron vertical piston with a diameter of 3 ft (0.9 m), in a buried 50 ft (15.2 m) long cast iron vertical cylinder with a diameter of 5 feet 6 inches (1.68 m). At river level the caissons sat in a water-filled sandstone lined chamber. Above ground the superstructure consisted of seven hollow cast iron columns which provided guide rails for the caissons and supported an upper working platform, walkways and access staircase. At the upper level the boat lift was connected to the Trent and Mersey canal via a 165 ft (50.3 m) long wrought iron aqueduct, with vertical wrought iron gates at either end.

In normal operation the cylinders of the hydraulic rams were connected by a 5 in (130 mm) diameter pipe that allowed water to pass between them, thus lowering the heavier caisson and raising the lighter one. To make adjustments at the start and end of a lift either cylinder could be operated independently, powered by an accumulator or pressure vessel at the top of the lift structure, which was kept primed by a 10 horsepower (7.5 kW) steam

engine. If necessary, the steam engine and accumulator could operate either hydraulic ram independently to raise the caissons, although in this mode it took about 30 minutes to raise a caisson, as opposed to three minutes in normal operation.

During the 1990s British Waterways carried out preliminary investigations before launching a restoration bid. It was originally intended to restore the lift to electrical operation but after consultation with English Heritage, in 1997 it was decided to restore the lift to hydraulic operation using hydraulic oil.

To raise the £7 million restoration cost, a partnership was forged between the Waterways Trust, the Inland Waterways Association, the Anderton Boat Lift Trust, the Friends of Anderton Boat Lift, the Association of Waterways Cruising Clubs, British Waterways and the Trent and Mersey Canal Society. Heritage Lottery Funding contributed £3.3 million, and more than 2,000 individuals contributed to the scheme, raising a further £430,000 [12].

Restoration commenced in 2000 and the lift was re-opened to boat traffic in March 2002. The site now includes a two-storey visitor centre and exhibition building with a coffee shop and information and films about the history of the lift. The visitor centre incorporates the new lift control centre. Although a modified version of the original hydraulic system was reinstated, the 1906–08 external frame and pulleys have been retained in a non-operational role. The weights that used to counterbalance the caissons were not rehung, but have been used to build a maze in the grounds of the visitor centre.

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### **Shardakov Ye. I.** **JOINT PERFORMANCE OF RECTANGULAR TUNNEL LINING** **AND SOIL GROUND**

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Currently rectangular tunnel lining is widely used in the construction of underground tunnels and subway tunnels. Even insignificant saving of concrete and reinforcement in the manufacture of tunnel lining leads to a significant economic effect, and taking into account the joint operation of the

tunnel lining and the soil, internal efforts in it are reduced which means that we can save about 8-12% of the reinforcement and reduce wall thickness of 1-2 cm.

When solving problems on the joint operation of tunnel lining and the soil, it is necessary to assign a design model of a soil massif. Dozens of soil models were proposed. The simplest is the Winkler model, later other soil models were developed: an elastic half-plane, an elastic half-space, a model in the form of a finite layer, a model with a deformed modulus of deformation, combined models, and recently models that take into account the nonlinear relationship between stress and strain, taking into account the plastic and geological properties of the soil and the model, considering the random processes occurring in the ground.

For each soil model, the area of its application is established. When calculating a rectangular tunnel lining, Winkler's model is often used for all of its elements. More accurate solution considers different models in different elements of the tunnel lining. For example, for a tray element, the elastic half-plane model is used, and for the calculation of the side walls, an elastic quarter plane is used. Recently, in a number of named models, the word "elastic" is replaced by a linearly deformable word [1-3].

When introducing the problem using these models, it is often necessary to solve fourth-order integral and differential equations in partial derivatives, which presents an extraordinary difficulty in the mathematical sense. Therefore, some authors introduce simplifications in these solutions. For example, B.N. Zhemochkin proposed the solution of the problems of the theory of elasticity to be replaced by a simpler solution by the method of construction mechanics, which reduced the solution of algebraic equations. This simplified the solution of problems on the joint work of the structure and the soil for the most complicated in the constructive sense elements loaded with any external forces, and also allowed to take into account the influence of various loads on the stress-strain state of the system [3-4].

With the use of modern computer technology, the problems of determining internal forces in a tunnel lining are simplified since very powerful program complexes have been created to take into account the influence on the stress-strain state of the lining of virtually all factors. In this respect, the finite element method offers great possibilities. Now programs are implemented on the basis of the finite element method, which take into account several thousand elements (up to 200-300 thousand).

For example, in the Lira software complex, two soil models are involved in calculating the foundations: the Winkler model and the two-parameter Pasternak model. Thus, with the introduction of other soil models, this program will not work, i.e. this program has a limited scope. Other complexes consider other soil models. This suggests that there is still a wide field in the study of the joint work of construction and soil (especially for tunnel lining). These studies should be aimed at developing software packages that would take into account all types of soil models.

The question of the influence of the following factors on the stress-strain state of the “structure-soil” system is still open: the moisture and the soil density, the soil filtration capacity, the plasticity and creep phenomena, the stress relaxation capabilities, the construction technologies and others.

This approach, taking into consideration many unknowns, allows us to evaluate not only the processes occurring in the tunnel lining, but also those processes that may occur in structures located nearby.

Thus, the calculation of tunnel lining, considering the joint work of the ground, allows studying the processes occurring both in the tunnel lining itself and outside it, this leads to more reliable economical tunnel design [5].

For example, calculations show that when taking into account a rectangular tunnel lining of joint work, only a tray results in saving the reinforcement from 80 to 200 kg per meter linear.

In these calculations if the thickness of the tray was changed, then a required solution could be obtained resulting in savings and hardness in the manufacture of tunnel lining. This once again confirms the factor that the joint design work with the ground is a promising direction of study.

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**Shmatova A. Y.**

### **INCREDIBLE CONSTRUCTION OF WOOD**

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«Concrete jungles» of the future can again become wooden. Modern building technologies allow engineers and architects to design high-rise buildings and even skyscrapers of composite materials based on wood [1].

Wood almost entirely consists of a "skeleton" of dead cells of a plant, more precisely - from the spongy structure that their cell walls form. This design can show tremendous durability. Specific strength of some types of wood is comparable to aluminum alloys and even alloyed steel. It can be easily processed, comfortable, humanity has used it for tens of thousands of years in construction. And at the same time, we still can not fully use all the advantages of wood [1].

Sequoia goes to the height of a 35- or 40-story tower, but reliably connects individual wooden parts and is suitable for building a house of size that until now no other kind of timber has succeeded [1]. Record buildings - such as the famous 13-storey wooden log house of Nikolai Sutyagin, burnt in 2012, or the house of his American Horace Burgess, reaching a height of 30 m - from the engineering point of view look oddities [2]. It is built without a definite plan, so that everyone who has been inside remembers the walking floors with trembling, not without trepidation. However, several cardinal innovations that the architects have mastered in recent decades make the impossible possible, not only possible, but also quite probable. "I would compare it to something like the beginning of the" steel revolution "that happened 120 years ago," explains Canadian engineer and architect Michael Green, one of the main preachers of the use of wood in the construction of high-rise buildings. In his opinion, modern composite materials based on it have become quite durable, reliable and fireproof [1]. In the autumn of 2016 in Vancouver, on the campus of the University of British Columbia, the Green Project was erected an 18-storey (53 m) wooden building of the student dormitory. And it seems that this is really only the beginning: high-rise houses made of wood are being built at full speed around the world, and some projects reach 80 floors [1]. This material allows you to build high-rise modern buildings without fear of mistakes and dangers of the past. Roof-laminated wood is made of two or four sheets, which are combined together with special fire-resistant glue. The fibers of each layer are rotated 90 degrees, which allows the strength of the material to not yield to steel [1]. The main advantage of the construction of wood, namely from the roofing-laminated wood is the sustainability of the future building [2]. Up to 39 percent of all carbon emissions in large countries are related to construction, directly or indirectly. The tree is much lighter than steel, which will facilitate its transportation to the construction site, and will reduce the depth of the necessary foundation. Both creature factors will reduce greenhouse gas emissions. Of course, there are some disadvantages in the construction of houses of wood. Despite the fact that wood is a renewable resource, it is critically important not to use it irresponsibly and excessively [1]. In addition, people are afraid to live in wooden buildings because of possible fires, not trusting the builders' assurances that the wood is treated with special compounds that are not afraid of fire.

Technologies for the production of multi-layer glued wood panels (CrossLaminated Timber, CLT) were developed in the 1990s in Austria, Germany and Switzerland [3]. A strong impetus to development they received in the early 2000's, when the fashion included the "green" construction technology. In fact, steel and concrete production are serious consumers of energy and cause significant emissions of greenhouse gases into the atmosphere [3]. In contrast, growing wood does not emit, but binds atmospheric carbon dioxide, accumulating mass: it turns out that the production of building materials will not increase, but reduce its content in the air. CLT-board is formed from dried boards with thickness from 16 to 50 mm and more. They are connected with spikes in flat panels and folded with a "sandwich" of three to seven layers, the fibers of which are oriented perpendicular to each other. In this case, usually the direction of the outer layers is chosen so that their fibers go vertically, increasing the rigidity of the entire structure. The wooden layers are pressed with polyurethane, phenolic or melamine adhesives - and, finally, polished. Of these panels, in 2009, a 9-storey Murray Grove residential building was erected in London by the Waugh Thistleton Architects project [2]. And the 18-story hostel in Canada is just another step in the quest for wooden buildings up. Already next year in Amsterdam, will build a 21-storey residential building of the CLT-panels, and in 2023 in Stockholm, under the project DinellJohnasson will be built a house in 34 floors. Tower River Beach in Chicago (the construction of which will still be reinforced with diagonal steel beams) will rise up as much as 80 floors; it will be a full-fledged skyscraper [3].

But not all the calculations say that immediately switching to mass replacement is wood [1]. The volume of wood necessary for this is enormous: according to the same Chad Oliver, they reach 40% of the annual increase in the mass of trees of the whole planet and about three times higher than the current level of its consumption. In order not to stay on a completely "bald" Earth, new technologies of mass growing trees, new large-scale farming projects are needed. Another problem is construction legislation, which still prohibits the erection of wooden buildings above a certain level - why it suffered.

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**Shovkoplyas D. E.**

## **TYPES OF VENTILATION, ITS DEVICE**

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### **Types of ventilation, its device.**

Installation of ventilation. Each building should be equipped with an effective ventilation system, because constant air exchange is also important as well as a good heating system or high-quality water. Scientists have long established a connection between the development of a number of negative phenomena in buildings and improper ventilation. Thus, good air exchange of premises is necessary not only for extending the life of the building, but also for maintaining our health.

### **Why do we need ventilation?**

The main purpose of ventilation is an organized supply of fresh air and the subsequent replacement (or removal) of contaminated air. Air exchange should be carried out with a certain frequency. In buildings with poor ventilation system a lot of dust, microscopic chemicals accumulates (regular use of household chemicals). High humidity contributes to the formation of mold, and in the air a high concentration of fungal spores is observed. A person working or living in such a building may complain of burning in the eyes, headaches, problems with concentration and fatigue. Increased humidity in buildings and poor ventilation of the premises leads to condensation and the formation of droplets of moisture on the ceilings and walls. Such conditions are ideal for the development of fungi, that affects human health adversely and leads to the gradual destruction of the building. Also, these factors are very often the cause of most respiratory diseases, and for people who are prone to allergies, poses a serious threat to their health.

### **Classification of ventilation systems.**

Ventilation systems are classified in four main ways:

1. By way of creation for circulation of air flow: artificial ventilation; with a natural drive.
2. By appointment: exhaust systems; tidal.
3. By the service area: common exchange systems; local.
4. For constructive execution: non-channel systems; channel.

### **The main types of ventilation.**

There are the following main types of ventilation systems:

1. Natural.
2. Mechanical.

3. Exhaust.
4. Tidal.
5. Tidal-exhaust.
6. Local.
7. General exchange.

### **Natural ventilation.**

As you can guess, such ventilation is created naturally, without the use of ventilation units, but only through natural air exchange, wind currents and the difference in the temperature on the street and in the room, as well as at the expense of atmospheric pressure fluctuations. These types of ventilation are relatively inexpensive in value, and most importantly, they are easy to mount. However, such systems are directly dependent on climatic conditions, and therefore can not cope with all the problems.

### **Mechanical.**

When forced replacement of the exhaust air to the fresh flow occurs - this is mechanical ventilation. In this case, special equipment is used that allows the air to flow and bring the air flow into the premises to the required extent, regardless of changing climatic conditions. In such systems, air is subject to various treatments (humidification, dehumidification, cooling, heating, cleaning, etc.) if necessary, that is virtually impossible to organize in natural ventilation systems. In practice, mixed types of ventilation are often used, which simultaneously combine mechanical and natural systems. For each particular case, the most optimal way of ventilation in sanitary and hygienic terms is selected, and also that it is technically and economically rational. The mechanical system can be installed both for the entire room (commonplace) and at a specific workplace (local ventilation).

### **Tidal.**

With the help of the tidal systems, the supply of clean air flow to the ventilated room that changes the contaminated air, is carried out. If necessary, the inflow air is subjected to special treatment (humidification, heating, purification, etc.).

### **Exhaust.**

Such a system is designed to remove contaminated air from the premises. In most cases, the exhaust and tidal types of ventilation are supposed simultaneously in the premises. It is important that their performance is balanced, taking into account the possibility of air flow from adjacent premises or adjacent premises. Also, only an inflow or only an exhaust system can be installed in the premises. In this case, the air enters the room from adjacent rooms or externally through special openings, or flows into adjacent premises, or is removed from the room outside.

### **Local ventilation.**

This is a system in which the air flow goes to a certain place (local tributary system), and polluted air is removed from the places of accumulation of harmful emissions - a local exhaust (ventilation).

### **Local tidal system.**

Air showers (concentrated high-speed air flow) relate to local inflow ventilation systems. Their main task is to supply clean air to permanent workplaces, to reduce the temperature of air in their area, to blow the workers that are exposed to intense thermal irradiation. Air curtains (near stoves, gates, etc.) also refer to local ventilation systems, they change the direction of air flow or create air barriers. Such a ventilation system, in contrast to general-exchange, requires lower costs. In the premises of industrial use in the allocation of harmful things (heat, moisture, gases, etc.) a mixed scheme of ventilation is usually used: local (tributary and local suction) - for the maintenance of workplaces, and general - to eliminate the entire volume of harmful premises air.

### **Local exhaust system.**

When harmfulness (dust, gas, smoke) and heat are secreted locally, for example, from a cooker in a kitchen or a machine tool in production, they apply a local exhaust ventilation system. It captures and removes harmful emissions, preventing their further spread throughout the space of the room.

### **Ventilation of premises.**

These systems include local and on-board suction, exhaust hangers, and much more things. Also, local exhaust ventilation includes air curtains - air barriers that prevent airflow from entering the room or from one room to another.

### **General-exchange ventilation.**

Such a system is intended for ventilation of a premise in general or its considerable part. The common exhaust ventilation scheme involves the removal of air from the entire service space evenly, and the general exchange tidal system provides an air flow and distributes it throughout the space of the room.

So, heating, ventilation and air conditioning systems are an integral part of a modern office, home or any other property. These systems consist of the most innovative and modern aggregates, designed depending on the structural features of the building, allowing you to save greatly on heating. It is important to remember that a properly designed and installed ventilation system is the key to creating an optimal microclimate in the premises.

**Skorikova A. G.**

## **INNOVATIVE WAYS OF GREENING THE ENVIRONMENT**

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With the growth of the city, the development of its industry, an increasingly complex problem is the lack of vegetation and creating

comfortable conditions for human life. This problem is relevant for most modern cities, where every year the number of new buildings is increasing.

Construction of buildings leaves less space for gardens, parks, squares. Today, this problem is solved by using different methods of landscaping.

Traditional gardening techniques include the creation of parks, gardens and green lawns. They contribute to an increase in the flow of oxygen, the purification of urban air from impurities and providing recreation for residents. However, it is not always possible to create this in the city limits, where each meter is allocated for a new house or shop, park or square.



In this case, non-traditional methods of gardening of urban areas are used: vertical and roofing landscaping, the construction of ecological parks, lawn lattices or gardens in cities (urban agriculture) that combine both aesthetic and practical function .

A green wall is a wall partially or completely covered with greenery that includes a growing medium, such as soil or a substrate. Most green walls also feature an integrated water delivery system. A green wall is also known as a living wall or vertical garden. It provides insulation to keep the building's inside temperature consistent.

It is useful to distinguish green walls from green facades. Green walls have growing media supported on the face of the wall, while green facades have soil only at the base of the wall (in a container or in ground) and support climbing plants on the face of the wall to create the green, or vegetated, facade.

Green walls may be indoors or outside, freestanding or attached to an existing wall, and come in a great variety of sizes.



Patrick Blanc, a botanist specialized in tropical forest undergrowth, worked with architect Adrien Fainsilber and engineer Peter Rice implementing the first successful large indoors green wall in 1986 at the Cité des Sciences et de l'Industrie in Paris. In 2005, he created the landmark vegetal exterior wall of the administrative building of the Musée du quai Branly with architect Jean Nouvel.

Green walls subsequently saw a rapid surge in popularity. Of the 61 large-scale outdoor green walls listed in an online database provided by greenroof.com, 80% were constructed in or after 2009 and 93% in or after 2007. Many iconic green walls have been constructed by institutions and in public places such as airports and are now becoming common.

A green roof or living roof is a roof of a building that is partially or completely covered with vegetation and a growing medium, planted over a waterproofing membrane. It may also include additional layers such as a root barrier and drainage and irrigation systems. Container gardens on roofs, where plants are maintained in pots, are not generally considered to be true green roofs, although this is debated. Vegetation, soil, drainage layer, roof barrier and irrigation system constitute green roof.



Green roofs serve several purposes for a building, such as absorbing rainwater, providing insulation, creating a habitat for wildlife and decreasing stress of the people around the roof by providing a more aesthetically pleasing landscape, and helping to lower urban air temperatures. Green roofs are suitable for retrofit or redevelopment projects as well as new buildings and can be installed on small garages or larger industrial, commercial and municipal buildings. They effectively utilize the natural functions of plants to filter water and treat air in urban and suburban landscapes.

Alternative methods of gardening the territory provide compromise solutions to the problem of lack of landscaping in large cities that grow rapidly.

I think it is necessary to spread the idea and practice of building green areas on the roofs, because, despite the complication, the garden on the roof - an urgent need of modernity, which seeks for maximum ecological compatibility. Today, in many European cities, greening the roof has become a mandatory measure.

The analyzed tendencies of development of modern innovative greening systems allow to predict the wide-scale future of vertical landscaping. Properly designed and installed vertical wall predictably replaces the traditional system of ventilation and air conditioning of the building.

The sooner each person realizes his responsibility to nature, the sooner the potential threat of the death of all mankind disappears and the opportunity of full life in harmony with the world will emerge.

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**Smirnov V. Y.**

### **GENERAL PRINCIPLES OF THE FUNCTIONAL AND PLANNING ORGANIZATION OF THE FOREST BELT AGGLOMERATIONS**

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The current state of the forest parks in most cities with a million inhabitants is characterized by a chaotic use of territories and a high degree of anthropogenic pressure on landscapes. Forest territories, including forest parks outside the boundaries of populated areas assume spontaneous deployment of capital construction projects for residential, industrial and public utilities, as well as aggressive anthropogenic load and household waste pollution. The most acute problems of unbalanced development are manifested in the territories of the first and second agglomeration belts. All of this was the result of inconsistency of the existing territorial planning instruments in the built-up areas, which has led to violation of the territorial, functional, ecological balances of the largest and small cities as well as adjacent territories. In this connection, a new conceptual approach to the formation of a forest-park belt of agglomerations and the application of settlement systems on the basis of theoretically formulated principles of its functional and planning organization is considered to be the solution of this problem. In international practice, methods for the functional and spatial organization of the forest park zone agglomerations and settlement systems have been developed. These methods allow to formulate an appropriate methodological base aimed at the preservation and development of cultural and natural landscapes.

In 1994, the "green plan" was implemented in the General Layout Plan for the Ile-de-France region, which included the "Green Network" agglomeration, "Green Belt", "Rural Crown". The green network of agglomeration covered Paris and its adjacent zone, where it was planned to preserve and improve the state of forests and the natural landscape by increasing the area of public green territories. The green belt included natural and green areas around Paris. The components of the Green Belt were large and small forests, urban parks, green areas, public institutions, recreation centers, which were considered as "specially protected areas". The rural crown occupied three quarters of the territory of the Ile-de-France region. Here,

along with agricultural and forestry activities, natural regional parks have been created to preserve zones of "natural balance" [1].

In 2008, a new General Scheme of the Ile-de-France region was developed. The Scheme underscored the traditional priority areas in the strategic planning of the development of the world's largest urbanized regions, namely conservation and maintenance of natural and green areas, agricultural and forest lands as opposed to continuous built-up area.

In Great Britain, according to the plan of Greater London in 1944, a scheme for the functional division of the territory of Greater London was introduced, in which it was proposed to divide the entire territory into four rings. The first ring covered the urban areas of London, characterized by high population density and a lack of open spaces. The second ring covered the nearest suburbs within a radius of 20 km from the city center. The third ring was the "green belt" of London. The essential difference between the third and the second rings was that the built-up areas had a more isolated character. The green belt was given an important role, since it was intended to fill the lack of free and rest places in the inner city districts. The fourth ring, extending to the outer borders of Greater London, was rural. These were separate settlements, freely located in open areas, mainly among agricultural lands. It was the territory which was supposed to assume the main wave of migration from the overcrowded inner city areas. However, taking into account the special value of certain areas of the rural ring with regard to landscape and agriculture, the part of the territory was protected [2].

Among the numerous experiences of European countries in forming forest-park belt, universal German experience is of great importance in terms of methodology. There are two belts in the suburban area of Berlin. The first belt is directly adjacent to urban development. On the outer border of the first belt there are small settlements which are regarded as local administrative centers. A characteristic feature of the planning structure is the placement of industrial enterprises, municipal institutions and residential buildings along transport lines. At the same time, it is intended to fulfill the functions of the green zone. The second belt is primarily the location of suburban agriculture. The territory of the second belt is largely used for recreation of the population. Unlike the Ukrainian practice and experience of English urban planners, Berlin experience does not provide for the application of the principle of organizing a stable and continuous green belt around the city; it is replaced by the principle of green wedges [1].

The analysis of world experience allows us to consider the forest park in the structure of agglomerations and settlement systems as an interconnected system of specially protected and recreational areas that are governed by the principles of territorial organization that promote ecological balance and development. The formulated principles and the theoretical model of the forest park make it possible to give recommendations on the complex transformation of the territories of forest parks in order to achieve the required

parameters of the quality of the environment, including changes in functional and planning characteristics, transformation of territories and the formation of comfortable social and environmental conditions.

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### **ANALYSIS OF SOIL ANCHOR OPERATION**

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The excavating and fixing of the construction pit is a responsible step in the construction of an underground structure. The choice of a type of anchorage depends on the geological and hydrogeological conditions of a construction site, the size of the construction pit in the plan and profile, the approved deformations, the availability of the necessary equipment, the economic feasibility and other factors. At the present time in Ukraine construction pits with separate piles and reinforced concrete walls in the ground are the most commonly used ones.

The "wall in the ground" method is one of the most progressive and universal for the construction of underground structures with open construction pits. But this method often requires additional mounting. In the conditions of urban development two types of additional mounting are used: internal (disjoint) and external (anchor). The application of anchoring fastening of constructions pits instead of disjoint fastening has a number of technical and economic advantages [1, 7-15].

The biggest advantage of anchoring is that the constructions pit is completely free from all sorts of temporary structures and the most convenient for the development of soil and construction design. High rates of construction and the possibility of using the simplest technologies of soil and concrete provide the relatively high cost of anchoring devices.

The analysis of anchoring devices efficiency compared to disjoint one conducted on the basis of national data and subway construction firms specialized in US [2] (Table 1) shows that the productivity increases in earthworks up to 42.5%, backfilling – 32.8%, while assembling structures by 15%. In general, the construction of underground single-vaulted stations the

anchors' construction pits increases productivity by 11% and reduces its construction time.

*Table 1 Work input of the construction pit of a subway station by excavation and anchoring methods*

№	Types of work	Labor costs		Saving	
		Executions	Anchors	%	people d.
		people /d.	people /d.		
1	Development of soil excavation	176.6	101.5	42.5	75.1
2	Mounting of a construction pit	164	169.1	-3	-5.1
3	Anchorage of a construction pit	78	-	-	78
4	Structural design	3952	37201	6	232
5	Modular interior design	92	80	15	12
6	Backfilling	382	357	32.8	125
	Total	4844	4327	10.7	517

The set anchors do not form obstacles in the further development of underground structure; they should be designed to be removable.

In the design of ground anchors the following conditions must be provided: reaching the bearing capacity of the anchors for the perception of effort on existing structures; placing an anchor location area outside the prism of possible collapse of the soil; anchor thorough protection from corrosion; reliable contact between the anchor structure and the surrounding soil [3, 26-29].

Structural strength calculation performed by the formula of Blum Lomeyra and Jacobi scheme [2, 298]. Blum-Lomeyra formula is used for large plunged and hamstranged wall in the soil mass and the Jacobi's scheme excludes fixing wall, using only the conditions of static balance against bulging at the highest possible resistance to ground. The selection of the depth of the construction pit in the ground made by an elastic line, which is based on solving the problem of marginal balance.

The comparative analysis of ground anchors conducted on the example of construction pit method "wall in the ground" with the use of ground anchors in the construction of "Social and shopping center" on the corner of Moskovskiy Avenue and Cooperative Street in Kharkov. Under the building a

two floor underground car park was supposed to build. The depth of the parking pits was 7.5 - 8.7 m.

*Table 2. The calculation results of anchoring construction pit*

Calculation	The results			
	The maximum displacement in the wall $U_{\max}$ , cm	The maximum bending moment $M_{\max}$ in the wall, kNm	The maximum lateral force in the wall $Q_{\max}$ , kN	Calculated by the anchor load bearing capacity of foundation, kN
PC Wall-3	1.887	698.43	330.26	2,356
PC Lira	5.480	658.82	304.32	–
Krantz method	–	–	–	1,440
WPC 506-88	–	–	–	1,887

After studying the geological, hydrogeological and urban areas the prior geometric parameters of the construction pit and anchoring walls have been identified. The finite-element model joining with soil mass and the fences of deep construction pit was formed, made on the technology "wall in soil" with one reinforcement anchor system and the calculation on the basis of physical nonlinearity in Lira-software complex CAD has been made. There was also the calculation of the same vertical construction pit in highly specialized program to calculate the pits of Wall-3. To test the adequacy of the results obtained in the calculation of ground anchors the manual calculation of anchor protections under existing regulations and using the classical method of calculation by Krantz formula was conducted.

Thus, it was defined that both modern software systems give similar results. Program complex WALL-3 is more convenient for a user, but where it is necessary to calculate the construction pit in more difficult conditions, with more stress, Lira PC for this purpose has better features.

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**Strumskas O. V.**

**VERTICAL CITIES: MODERN GLIMPSE**

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Nowadays many people think that skyscrapers are prototypes of future vertical cities.

Edward Glaeser is the Professor of Economics in the Faculty of Arts and Sciences at Harvard University who has focused on the determinants of city growth and the role of cities as centers of idea transmission. In his book *Triumph of the City* he wrote that high population density is a necessary condition for the prosperity of cities. He believes that human communication is the main resource of economic growth. The smaller the distance between people, the more inevitable and easier their interaction becomes. Therefore, the best architectural form is a skyscraper.

There is also an ecological argument in favor of a skyscraper. The apartment in a skyscraper comparing to a private cottage occupies as less space on the Earth's surface as the trace from a ladies' heel-stud comparing to a print of a men's boot.

Glazer says that we should be more tolerant to demolition of low buildings for the sake of construction of high buildings, and be less tolerant to activists who resist growth of the cities which reduces pollution of the environment

Skyscraper as a village. At first skyscrapers were just built because it had become technically feasible and the justification for their construction was the high prices of the land. Then the phenomenon was tried to be comprehended by Rem Koolhaas. The skyscraper at his understanding bears the capacity of the autonomous settlement, as "a city in the city" in itself. For example, there are separately lodges on each of floors of a skyscraper. He states that each of these artificial levels is treated as a virgin site, as if the others did not exist, to establish a strictly private realm around a single country house and its attendant facilities, stables, servants' cottages, etc. Villas on the 84 platforms display a range of social aspiration from the rustic to the palatial; ... emphatic permutations of their architectural styles, variations in gardens, gazebos and so on, create at each elevator stop a different lifestyle and thus an implied ideology, all supported with complete neutrality by the rack.

The 'life' inside the building is correspondingly fractured: on level 82 a donkey shrinks back from the void, on 81 a cosmopolitan couple hails an airplane. Incidents on the floors are so brutally disjointed that they cannot conceivably be part of the same scenario. The disconnectedness of the aerial plots seemingly contradicts the fact that, together, they add up to a single building. The diagram strongly suggests even that the structure is a whole exactly to the extent that the individuality of the platforms is preserved and exploited, that its success should be measured by the degree to which the structure frames their coexistence without interfering with their destinies. The building becomes a stack of individual privacies.

The skyscraper was for the first time described here as the vertical city which parts are more tolerant to each other, than in the habitual horizontal city.

In January of the 2013th year, the famous team of engineers and designers of ARUP has published the project of a skyscraper of the 2050th year under the name "It's alive!". According to ARUP, the skyscraper will be able to feed and heat its inhabitants, and even to reconstruct itself.

Parts of building have different degrees of durability. The steadiest part is horizontal levels and their bearing construction. Meanwhile, walls of a skyscraper are designed on operation only within 20-30 years. Then they can be updated or replaced. The most interesting is that the robot which is a part of the building will be engaged in it.

Thanks to solar batteries and wind power plants, the skyscraper will make more energy, than to consume. He won't release carbon dioxide into the atmosphere, because it will be held by a special membrane, and then it will be processed into oxygen. Several floors will be busy by livestock farms and kitchen gardens, that is why food shouldn't be brought from the far village. There is the funicular in the building. In addition, the walking paths conducting from a skyscraper to a skyscraper are not only on the earth, but also at the level of some floors. So, transition from the floor to the floor will become equivalent to movement in the city and will give not less wide range of possibilities, for example visiting an administrative office, the park, shops and other. The special system will regulate power supply and communications of all the city. Naturally, there is an underground platform for transport.

Technologically the world is capable to embody any of the described concepts already today. But probably there is the psychological barrier of we accustom to move horizontally. Therefore, to develop our world and especially its infrastructure we should step outside of old habits towards to new modern construction.

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**Suvorova V. I.**

## **MODERN ARCHITECTURE IN HISTORICAL DEVELOPMENT**

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The need for a harmonious combination of modern and historical architecture is one of the most important problems facing a modern architect.

Each period of history imposes a certain imprint on the external appearance of cities. Buildings that arise in different historical times and under different conditions have their unique appearance, which is determined by the shape, rhythm, constructions, facing materials. This makes buildings of different historical times so unlike each other. Therefore, at present, with increasing density of development, it is necessary not only to design buildings, but to enter them correctly into the existing exterior of the city.

Under conditions of reconstruction of the existing buildings, architects should not only preserve the old development, adapting it to the needs of people, their modes and rhythms of life, but also harmoniously inscribe modern architecture into it. The architect should attempt to establish the possibility of a harmonious synthesis of the old and the new, taking into account the preservation of the integrity of historical development, and at the same time realizing all the requirements imposed on the structure.

The connection of a new building with historical development is formed according to the following types:

1. Symbiosis of "the old and the new." The modern building due to common compositional methods, materials and forms complements and creates a united architectural ensemble with historical development.

2. The principle of subordination. Historical buildings are dominant in relation to the modern building. This concept is achieved due to simplicity of the shape and color of the new building, which "dissolves" in space, giving priority to the historic building.

3. "Inscription" in the historical development. In this case, architectural integrity is achieved through the complement of historical buildings by rhythm and masses.

4. Contrast. The new building is contrasted with historical buildings, using modern materials and choosing an architectural form, contrasting with the surrounding buildings.

The main tool for forming the interaction of a new building with historical environment and the classification feature are the methods of environmental adaptation to its historical environment, as well as the role of the building in the structure of a specific historical environment.

1. Method of compositional environment adaptation. The new building is designed taking into account the basic means of the architectural composition: horizontal and vertical divisions, rhythmic, metric, scale and other characteristics of the environment.

2. Method of stylistic environment adaptation. The new building is subordinated to the historical environment compositionally. At the same time, the architect uses the method of stylization, trying to combine history and modernity.

3. Method of decorative environment adaptation. The unity of a new building with historical buildings is achieved through the use of non-stylistically modernized architectural details: bas-reliefs, corbels, ornaments.

4. Method of associative and figurative-symbolic environment adaptation. The new building fits into historical development by revealing a certain image typical for a particular place, its history or its "spirit".

5. Method of coloristic environmental adaptation. A new building in a historical environment is built into the existing typological series with the help of methods of scaling, proportioning and modularity.

The search for the optimal combination of newly designed buildings with a historically developed environment is an interesting and at the same time creatively difficult task.

Depending on the role of the newly constructed building in the existing development, the main techniques can be used - opposition to the historical environment, or subordination to the surrounding buildings and their stylistic characteristics. The modern architect should carefully treat historical buildings, erecting new buildings so as to ensure the harmonious coexistence of the old and the new in the city's architectural and developmental environment.

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**Timoha A. D.**

### **DRAINAGE ON ROAD BRIDGE STRUCTURES**

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The water drainage from the roadway of bridge structures is a difficult task, which has not been completely solved yet. The need to remove water as quickly as possible from the roadway is based on the necessity to ensure the

safety of vehicles and pedestrians, as well as to prevent water penetration to bearing structures according to the regulatory documentation the roadway is given some transverse and longitudinal gradients for receiving and discharging surface water.

In addition to the removal of surface water by the device of drainage pipes, it is also planned to remove water that has reached the level of waterproofing. In the open end of drainage pipes there are holes through which the water should leave the waterproofing level, which is fed into the drainage pipe.

Studies of functioning drainage pipes show that even if there was no rain for a long period, water drips from the pipes. This confirms its presence inside the pavement. However, the withdrawal of internal water through the slots in the tubes is very small.

During the last century in the design of bridge structures there has been a tendency to combine the drainage pipes with the outlet through the edges of the plate. The surface water from the roadway was dumped unorganized to the both sides. The waterproofing was taken to the vertical surfaces of fences.

As a result of such a technical solution many defects began to appear in the construction of bridge structures. When the water flows through the edges of the slabs of the roadway, their surfaces undergo soaking, defrosting and destruction, which leads to some emergency conditions of sidewalks.

It is known that when a car is moving under saturated water, the road clothing experiences a hydraulic shock. A large amount of water penetrates under the cover and it must be removed before the torn off waterproofing will literally float.

To clarify the reasons for this phenomenon, the Department of Bridge Construction in KHNADU has made a layered opening of the pavement. Under the asphalt-concrete coating a protective layer was found which was destroyed into small pieces according to the size of a grid cell. [1]

Under the protective layer the slab of the waterproofing roadway was found it was swollen from 2 to 8 mm and torn to pieces. [1]

It is obvious that the destruction of clothing designs was because of its working conditions as an elastic-supple (water) cushion, and the formation of open cuttings "attracted" the water from the rest of the bridge area. It should be noted that when designing waterproofing it is necessary to pay attention to its dynamic susceptibility.

The above data led to the conclusion about the need to develop a technical solution that ensures the removal of water from the pavement and the preservation of waterproofing. [2]

The problem of the construction of drainage systems in the design of pavement bridges also was studied by foreign experts in the 1970-80s. But the problem was considered by them in a different aspect. Overseas in most cases cast asphalt concrete laying with a temperature of 200 - 220°C is used on the bridge structures in road clothes.

When laying cast asphalt concrete with such a temperature the moisture trapped in the capillaries and pores of concrete layer becomes vapor and leads to the detachment of waterproofing, coating and swelling. Therefore, the search for technical solutions by foreign experts leads to the creation of steam-air drainage.

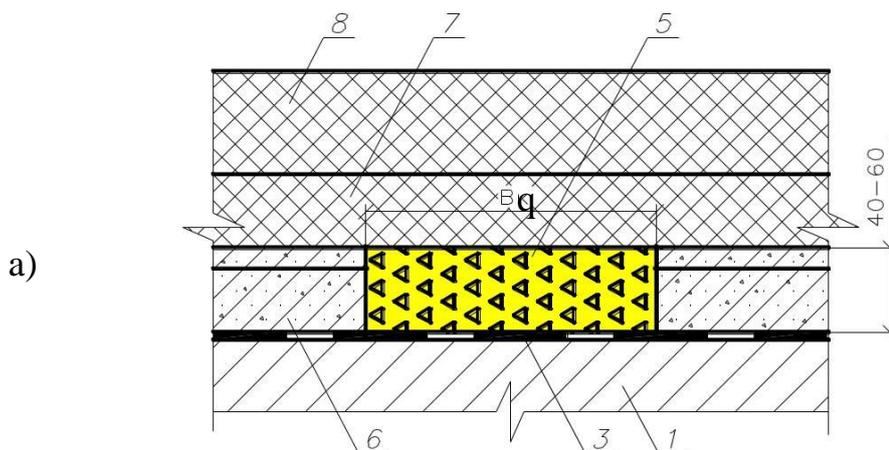
In most foreign countries the drainage is performed in the form of separately installed tubes (USA, Sweden). In Germany the drainage system contains drainage pipes and drainage canals.

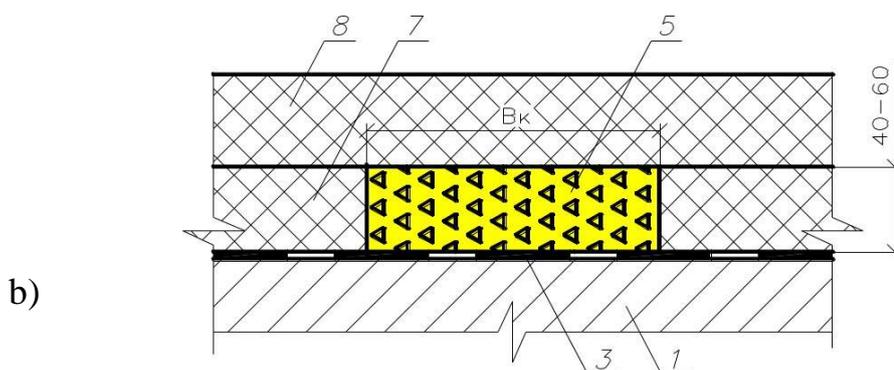
In our country a significant amount of water gets to the level of waterproofing through road clothes which must be somehow removed. This can be done with the help of drainage systems.

In all projects of bridge structures the design of the drainage system is almost identical. The differences are only in the width and height of a canal. The height is determined by the thickness of the protective layer about 40 or 60 mm. The width is from 120 to 400 mm. The diameter of tubes is not less than 30 mm (as a rule, 40 mm). In most cases, the tubes are made of polypropylene. [2, 3]

Fig. 1 shows the position of the drainage canal in the thickness of the pavement depending on its design and the type of span structure. On the span structures with a reinforced concrete slab of the carriageway, a drainage canal of width  $B_q$  is placed in the thickness of the protective layer (Figure 1a) or in the thickness of the lower layer of the coating (Figure 1b) in the absence of a protective layer. Similarly, in the thickness of the lower coating layer a drainage canal is provided on bridges with an orthotropic slab of the roadway [3].

On the majority of bridge structures with the introduction of drainage systems in the conditions of freezing and melting it is required some further constructive refinement and the technologies of performing the work.





*Figure 1(a, b) Positioning the drainage canal in the pavement thickness:*

- 1 - reinforced concrete slab of the roadway (or leveling layer);*
- 2 - orthotropic plate;*
- 3 - waterproofing;*
- 4 - protective-adhering layer;*
- 5 - drainage canal;*
- 6 - protective concrete layer of waterproofing;*
- 7 - the bottom layer of asphalt-concrete coating;*
- 8 - the upper layer of asphalt-concrete coating.*

The practice has shown that the usage of drainage pipes when concreting the slab of the roadway is difficult enough because of the need to fix their exact position, the complexity of the tearing off a structure, the impossibility to install the tube in such a way that its top exactly joins with the top of the waterproofing and, most importantly, the required watertight contact of a tube and concrete is not ensured. These circumstances demand the sealing of tubes and the processing of their technologies.

The following circumstance is connected with the features of the drainage canal. The execution of a canal with good draining properties requires careful compliance with the technology of its operation.

The drainage canal is made of a range consisting of crushed stone and epoxy compound, combining individual grains of gravel to each other. In this case the canal materials must have certain strength and water proofing.

The experience of operating some bridge structures with drainage systems shows that the overwhelming majority of them function successfully, there are no defects in the form of leaks on the contacts of the drainage pipes.

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## **STAINED GLASS AS AN ARCHITECTURAL DETAIL**

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The art of stained glass is often used to create modern interior solutions. The main material for making stained glass is glass. Its small pieces are painted in different colors or selected from the finished palette of material, painted in a factory way, according to a pre-prepared sketch. Then, the picture is assembled and inserted into the frame or mounted, decorating a piece of furniture or an interior.

Modern stained glass windows can be seen not only on windows and doors but they decorate suspended ceilings, decorative partitions, lamps, clearstory and domes. With sunlight or lighting, the colored glass fits very nicely into any interior and gives any room at home or office a unique look.

The first stained-glass windows appeared in the Middle Ages. Later colored glass was most often used to decorate temples and cathedrals. The antique stained-glass windows were made from the plates of alabaster and selenite. Now samples of V-VI centuries, are stored in the monastery of St. Paul in England and in German Alsace.

Stained glass in this era had a very rapid development, but its real rise occurred in XII century. Manufacturing technology of those times is very well described in the treatise of Theophilus. It should be noted that it is not much different from the technique modern stained glass use. The main difference is the tools and materials that have become more sophisticated.

To enhance the color effects and add extra texture to the stained glass windows, medieval masters used various imperfections of glass – tuberosity, roughness, air bubbles, undissolved grains of sand.

As for the art of stained glass in the 20th century, it is characterized as transition from monumental painting to decorative and applied art. Stained glass windows has become more refined. National and religious traditions faded into insignificance. Talented artists became arbiters of fashion for this or that stained glass. They began to use stained glass to decorate various details of the interior - ceilings, domes, doors, various partitions.

At the turn of the 19th and 20th centuries, new technologies for glass processing were invented, which made it possible to create stained glass products of various shapes and sizes. A great contribution to the development of stained glass art was made by the American jeweler and artist Luis Comfort Tiffany, who invented a new technique for manufacturing stained glass. It is due to this invention it became possible to arrange ornaments, landscapes, images of plants and animals, them from tiny pieces of colored glass without painting the material. Previous techniques did not allow detailed elaboration due to the small flexibility of the profile connecting the elements, and replacing it with a thin folio not only improved the toolkit of the master, but also made it possible to produce three-dimensional stained glass products

This technique was called "Tiffany" by the name of the creator and is widely used until now. It allows creating real artwork from colored glass. This American artist was able to restore the popularity of stained glass in wide applications, which was inherent in Gothic glass products.

Today, after centuries, stained glass art is still relevant. Each epoch brought in it certain innovations, making it more perfect, and enriching with new stained glass techniques. A lot of talented artists and architects used colored glass in their works. Famous users of stained-glass windows are Frank Lloyd Wright, Alphonse Mucha, Marc Chagall. They isolated glass from other materials and used it to create color-changing color effects that change under the influence of sunlight.

For example, the ingenious Spanish architect Antonio Gaudi, when creating his incredible buildings, very often fell back on the use of stained glass. With the help of glass, he stressed the non-standard lines and fantastic forms of ceilings, the plastic shapes of windows and domes of his architectural masterpieces

Today, there are a huge number of types of stained glass, as well as ways to produce elements of it, but the main ones can be identified as follows:

Classic – one of the first and simplest types of stained glass, which involves collecting a plot of simple elements, welded together lead, brass or copper. In modern versions cooper are often used instead of radioactive lead. Stained glass windows from Tiffany's salon are an example for safety kind of classic stained glass. Such products are produced by baking at a certain temperature, or by simply soldering the elements;

Cast – a special kind of stained glass, the most spectacular and colorful. It involves the separate production of each element, which is blown or cast by hand. Forms and volumes that can be created in this way can help to achieve an incredible effect, thanks to repeated refraction of light;

Etched – stained glass is akin to the cast, only the volumes and texture in this case is achieved by using a special acid. To achieve a pronounced relief, multi-layer etching is used;

Combined – the direction of stained glass art, which includes the use of different types and methods of production.

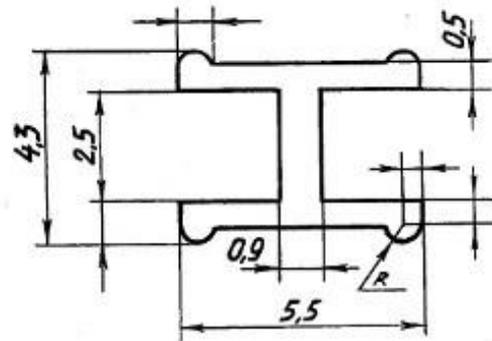
In addition to these, it is possible to note such types of stained glass as sandblasting, sintering, color (thin glass on thick), cabochon (a relief glass insert) and a frost pattern imitating on windows.

Some technologies used in contemporary stained-glass art are known from ancient times. But thanks to scientific progress new possibilities for making glass products and stained-glass windows appeared today.

I think the unique color refractions and saturation of stained-glass window for a long time will be attractive for people by its mystery and majestic view. People will return to this kind of monumental painting again and again to add unforgettable impression to some place.



*Stained-glass from middle ages*



*H-shaped lead profile*

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**Tseselska K. A.**

## **SUSTAINABLE DESIGN IN ARCHITECTURE**

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The contemporary environment today has been undergoing many changes. Particularly the interference of the human activities with the natural environment ends up with universal changes, and thus, these changes add new dimensions to the ecological equilibrium of the world. The developments created by humankind for his comfort are threatening his own life. Never before in history have human beings had such an impact on the Earth. The

resulting problems are a product of the size and growth of population, quantity of consumption and quality of technology. A general acceptance, regarding environmental crisis is reflected on both local and global levels that, the present form and degree of resource exploitation and associated consumption practices are unsustainable.

The understanding of the 20th century architecture, has a big responsibility in achieving this unsustainable result. Architecture in the 20th century, began as a celebration of the Age of Industry and Technology; but this is rapidly changing in response to a new Age of Information and Ecology.

Most conventional practitioners of modern design and construction find it easier to make buildings as if nature and place did not exist [1].

Sustainable architecture is architecture that seeks to minimize the negative environmental impact of buildings by efficiency and moderation in the use of materials, energy, and development space and the ecosystem at large. Sustainable architecture uses a conscious approach to energy and ecological conservation in the design of the built environment.

The idea of sustainability, or ecological design, is to ensure that our actions and decisions today do not inhibit the opportunities of future generations [8].

Over the past two decades, sustainable design has been in the process of being defined world-wide. Sustainable architectural design, is the kind of design which respects natural resources, and embraces, human, cultural, and historical distinctions.

Architecture is an intervention upon Nature. It protects human beings from the intensities of solar exposure, climate and other humans [3]. Besides, architecture is a reflection of the contemporary society in attitude, customs, desires, needs and technology; and in present society, the natural coherence and sustainability become important priorities in the process of design.

Sustainability in architecture, requires efficient and healthful interior solar and climatic space planning. Besides, the relationships of the interior spaces with the exterior spaces have to be strong and the coherence of nature has to be provided.

Modern technology and methods of construction have sadly degraded natural resources- agricultural land, forests, air, and water. There has been a loss of energy on the Earth because of misuse [4].

Sustainable design assumes that this misuse can no longer be sustained, because the world's population is expected to be more than double in the next fifty years. One of the defining features of the machine-age twentieth century, has been how separated and sealed off from the environment people have become. Whether in air-conditioned buildings, the shopping centers or the theme park, technology has been used to construct a world that removes people from nature. So sustainable design, focuses on optimizing and using the environment. It requires a fundamental change in mind set and a change in values towards less consumption and environmental awareness.

In the context of sustainability, architecture seems to act as a container of changing circumstances, where individuals and groups play an important role in the creation of their habitats, and at the same time it provides opportunities for long term flexibility and adaptability. So, architecture must be capable of sustaining changes and be based on long user needs. Architecture does not end with its foundation and outer walls. But the complete design infrastructure of urban planning, interior, landscape, product and systems design are part of the sustainable architecture [3].

Many factors account for the shift toward a more human and contextual design approach. These factors can be grouped under the heading of “criteria for sustainable architecture”.

Energy is the precondition of any civilization. First wave societies drew their energies from human and animal muscle power; or from the sun, wind and water. Second wave industrial societies began to draw their energy from irreplaceable fossil fuels-oil, coal and natural gas. This revolutionary shift meant that for the first time a civilization was eating into nature’s capital rather than merely living off the interest it provided. Third wave civilization must and will draw on an amazing variety of energy sources-hydrogen, solar, geothermal, perhaps advanced fusion power, as well as other energy sources not yet imagined [5].

After World War II, the architects explored the potential of air-conditioning and they developed a new form for high-rise, mid-rise and long-span spaces, also for residences, that reflected the moving away from passive strategies. These buildings featured an entirely new language of smooth-skinned glass-and-steel boxes without operable windows, ventilators or external sunshades. And with the development of low-wattage fluorescent lights that didn’t emit much heat, the floor area of these structures widened to the point where natural illumination was replaced completely with artificial.

The affordability of these new buildings and the fossil fuels used to drive the generators that powered them explains, in large part, why passive environmental control was phased out. The consumption of fossil fuels is one of the biggest environmental problems. Drilling in ecologically sensitive areas, oil [6].

Architecturally, the sustainability is about conserving energy and material resources, safeguarding the health of occupants, and protecting and enhancing the natural environment. Sustainability in architecture means minimizing not only the waste and pollution generated by buildings, but also that attributable to their construction.

Eco-housing, green development, sustainable design – environmentally sound housing has as many names as it has definitions. This new kind of architecture is described as "taking less from the Earth and giving more to people." In practice, "green" housing varies widely. It can range from being energy efficient and using nontoxic interior finishes to being constructed of recycled materials and completely powered by the sun.

Green building practices offer an opportunity to create environmentally sound and resource-efficient buildings by using an integrated approach to design. Green buildings promote resource conservation, including energy efficiency, renewable energy, and water conservation features; consider environmental impacts and waste minimization; create a healthy and comfortable environment; reduce operation and maintenance costs; and address issues such as historical preservation, access to public transportation and other community infrastructure systems. The entire life cycle of the building and its components is considered, as well as the economic and environmental impact and performance.

While we live according to the principles of environmental compatibility, civil architecture, including residential buildings, continues to allow very high energy waste. The 21st century brought international recognition to the assumption of climate change is accurate. Many governments established standards for energy-saving buildings, which individual home owners will have to comply with in coming years.

Alongside the goal of saving energy is that of sustainability. Recycled building materials provide new esthetic possibilities. Wood occupies the leading position among eco-friendly materials. It stores large amounts of the greenhouse gas CO<sub>2</sub> – even in a finished state – and is a warm building material that works well for insulation, especially in the form of fiber products made of wood waste, i.e. recycled materials.

Ancient Greek and Roman builders, Renaissance and Enlightenment architects, and architects of the Modern movement understood these moves long before energy was an issue and long before anyone used the word "sustainability." Sustainable design merely continues an ageless architectural tradition, based on the idea that "necessity is the mother of invention". Thus pursuing sustainable architecture is not only the ethical and, in the long run, the most economical thing to do, but also the smart thing to do to make buildings look and perform better [7].

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## **REINFORCED CONCRETE**

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Modern construction is unthinkable without reinforced concrete structures. Although patented in 1867 they were used much earlier.

A combination of concrete and steel reinforcement allows to join them into one piece and work together in a structure. The term “reinforced concrete” is frequently used as a collective name for reinforced-concrete structural members and products. The idea of combining in reinforced concrete two materials that are extremely different in properties is based on the fact that the tensile strength of concrete is significantly lower (by a factor of 10–20) than its compressive strength. Therefore, the concrete in a reinforced-concrete structure is intended to take compressive stresses, and the steel, which has high ultimate tensile strength and is introduced into the concrete as reinforcement rods, is used principally to take tensile stresses. The interaction of such different materials is extremely effective: when the concrete hardens, it adheres firmly to the steel reinforcement and protects it from corrosion, since an alkaline medium is produced during the process of hydration of the cement. The monolithic nature of the concrete and reinforcement also results from the relative closeness of their coefficients of linear expansion ( $7.5 \times 10^{-6}$  to  $12 \times 10^{-6}$  for concrete and  $12 \times 10^{-6}$  for steel reinforcement). The basic physical and mechanical properties of the concrete and steel reinforcement are virtually unchanged during temperature variations within a range of  $-40^{\circ}$  to  $60^{\circ}\text{C}$ , which makes possible the use of reinforced concrete in all climatic zones.

The basis of the interaction between concrete and steel reinforcement is the presence of adhesion between them. The magnitude of adhesion or resistance to displacement of the reinforcement in concrete depends on the mechanical engagement in the concrete of special protuberances or uneven areas of the reinforcement, the frictional forces from compression of the reinforcement by the concrete as a result of its shrinkage (reduction in volume upon hardening in air), and the forces of molecular interaction (agglutination) of the reinforcement with the concrete. The factor of mechanical engagement is decisive. The use of indented bar reinforcement and welded frames and nets, as well as the arrangement of hooks and anchors, increases the adhesion of the reinforcement to the concrete and improves their joint operation.

Structural damage and noticeable reduction of the strength of concrete occur at temperatures above 60°C. Short-term exposure to temperatures of 200°C reduces the strength of concrete by 30 percent, and long-term exposure reduces it by 40 percent. A temperature of 500°-600°C is the critical temperature for ordinary concrete, at which the concrete breaks. Therefore, the use of ordinary reinforced concrete at temperatures exceeding 200°C is not recommended. Heat-resistant concrete is used in thermal units operating at temperatures up to 1700°C. A protective layer of concrete 10–30 mm thick is provided in reinforced-concrete structures to protect the reinforcement from corrosion and rapid heating (for example, during a fire), as well as to ensure its reliable adhesion to the concrete. In an aggressive environment the thickness of the protective layer is increased.

The shrinkage and creep of concrete are of great importance in reinforced concrete. As a result of adhesion, the reinforcement impedes the free shrinkage of concrete, leading to the emergence of initial tensile stresses in the concrete and compressive stresses in the reinforcement. Creep in concrete causes the redistribution of stresses in statically indeterminate systems, an increase in sags in components that are being bent, and the redistribution of stresses between concrete and reinforcement in compressed components. These properties of concrete are taken into account in designing reinforced-concrete structures. The shrinkage and low limiting extensibility of concrete (0.15 mm/m) cause the inevitable appearance of cracks in the expanded area of structures under service loads. Experience shows that under normal operating conditions cracks up to 0.3 mm wide do not reduce the supporting capacity and durability of reinforced concrete. However, low cracking resistance limits the possibility of further improvement of reinforced concrete and, particularly, the use of more economical high-strength steels as reinforcement. The formation of cracks in reinforced concrete may be avoided through the method of prestressing, by means of which concrete in expanded areas of the structure undergoes artificial compression through mechanical or electro-thermal prestressing of the reinforcement. Self-stressed reinforced-concrete structures, in which compression of the concrete and expansion of the reinforcement are achieved as a result of the expansion of the concrete (manufactured with so-called stretching cement) during specific temperature-moisture treatment, is a further development of prestressed reinforced concrete. Because of its high technical and economic indexes (profitable use of high-strength materials, absence of cracks, and reduction of reinforcement expenditures), prestressed reinforced concrete is successfully used in supporting structures of buildings and engineering structures. A basic shortcoming of reinforced concrete, high weight per volume, is eliminated to a considerable extent by the use of lightweight concrete (with artificial and natural porous fillers) and cellular concrete.

The extensive use of reinforced concrete in modern construction has resulted from its technical and economic advantages as compared to other

materials. Reinforced-concrete structures are fireproof and durable and do not require special protective measures against destructive atmospheric influences. The strength of concrete increases with time; and the reinforcement is not subject to corrosion, because it is protected by the surrounding concrete. Reinforced concrete has a high supporting capacity and bears static and dynamic loads, including seismic loads, well. Structures and structural members with extremely diverse forms and great architectural expressiveness are relatively easy to create with reinforced concrete. The basic content of reinforced concrete consists of common materials—crushed stone, gravel, and sand. The use of precast reinforced concrete makes possible a significant rise in the level of the industrialization of construction. Structural members are manufactured in advance at well-equipped plants, and only the assembly of finished components with mechanized equipment is carried out at the construction sites. Thus, high rates of construction of buildings and structures as well as savings in monetary and labor expenditures are ensured.

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**VERNACULAR ARCHITECTURE**

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Despite of the development of technologies, there are a lot of problems that humanity cannot solve. One of the main ones is the protection of human health and the protection of the environment. The climate is significantly affected by construction - the main sources of chemical air pollution are concrete building materials or their distant transportation. Architects of many countries recommend now to return to the sources and use environmentally friendly materials. For example, a tree is a vegetable; limestone material and shell rock are materials of sedimentary origin. In addition, there was a request

for folk architecture - vernacular. This is the construction of houses by people who do not have basic knowledge of architecture and construction. The taught history of architecture covers only great buildings, and this is about five percent of all built by mankind. [1, 125] Vernacular architecture does not have designs or drawings, unlike professionally constructed buildings. Such structures are called samostroy (house with own hands) and are improvisation. The unprofessional builder himself becomes both an architect and a customer at the same time. The value of self-construction is in its originality and authenticity. Once upon a time, all historical cities were formed in such a vernacular way, characteristic of this natural and ecological region. Do not confuse vernacular architecture with traditional architecture, which has been formed for centuries. Vernacular architecture depends on the environment and external factors. This architecture is dictated by the need and, most importantly, by functionality. Private residential buildings are built with the help of improvised tools and materials available in the region. Priority use of local materials has not only economic significance, but also practical. So, the use of wood as the main building material is often due not only to closely growing forests, but also to a humid climate, where the metal parts simply rust and break down. In a climate where it gets hot and humid in the summer, wood that changes its condition with temperature and humidity has become an ideal material. So, in Japan wooden buildings are used very actively - they are adapted to heat and cold. Load-bearing constructions absorb most of the force of lateral tremors during earthquakes and typhoons. [2, 179] Local climate has a great influence on the formation of aesthetic principles in the construction of houses. So, strongly acting hinged cornices not only protect the walls from permanent showers, but also add an unusual decor to the entire structure. The famous architect-innovator (by the way, having no architectural education) Frank Lloyd Wright said: "People's building grows in response to actual needs, fits into the environment by people who have more than knowledge - they have a sense of a native". [3, 96] The most vivid manifestations of "homemade" architecture can be country cottages. A special power of fancy is required for an amateur builder when there is no money for professional architecture. Natural materials are used - wood, bamboo, linen rope, mud and clay. For example, in the north of Denmark in seaside villages the roofs of the houses are covered with algae. And in some villages of the Caucasus Mountains, houses are built of local stone and are located on the slopes of terraces. And, sometimes the house from the top terrace is built right on the roof of the house of the lower terrace. Houses which are built by unprofessional architects have strange shapes and distinctive designs. The lack of free territories makes the architects-amateurs make up unusual volumetric-spatial compositions and calculate construction options on tiny plots of land. Often these are asymmetric buildings with a bold design. In one house you can see a blockhouse with a pitched roof (from a Russian hut) and the use of moveable bulkheads (from a Japanese house). A large number of

drain pipes used by an unprofessional builder can give the house an element of industrial aesthetics. The size and shape of the house and lifestyle of the amateur architect affects what size of the family, how people interact, how to cook food and spend leisure time. It happens that at first the house was planned to be of the same size and shape, and in the course of time it was expanded by all extensions. Thus, a handmade house often turns out to be block or modular. Vernacular architecture can be used professionally. So, for example, modular blocks were used by Kisho Kurokawa in his famous capsule tower Nakagin. Each of the apartment modules can be removed and replaced as needed. [2, 113] In the course of the works on this article, I chose vernacular architecture, because the relevance of this topic is conditioned by the need to develop the construction of ecologically clean houses in our country. Borrowing the experience of amateur construction is future-oriented - vernacular architecture, having its own regional features and aesthetic images, can be used in professional construction. And maybe, vernacular architecture simply makes our everyday routine more colorful and interesting.

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### **TECHNIQUES DE PURIFICATION DE L'EAU**

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#### Production d'eau potable

La production d'eau potable correspond à l'action permettant de produire de l'eau consommable à partir d'une eau naturelle. Le traitement nécessaire dépend fortement de la qualité de la ressource en eau. Il varie aussi avec le niveau d'exigence et les normes appliquées, différents suivant les pays. Il est pris en charge par la collectivité ("en régie", par la commune ou un groupement de commune en général) ou délégué à une entreprise privée (délégation de service public), avec des coûts variant beaucoup selon les contextes.

Certains micropolluants (pesticides, nitrates, résidus de médicaments), dont certains sont des perturbateurs endocriniens à faible dose, restent parfois difficiles à éliminer. Dans les régions arides, il s'agit aussi d'une «gestion de la rareté» .

## Filtration

L'eau est passée à travers un filtre qui intercepte les petites particules. Plus petites sont les mailles du filtre, plus petite doit être une particule pour passer. La filtration peut être accomplie comme traitement tertiaire d'une eau brute, comme traitement secondaire d'une eau usée ou comme unique traitement si on parle d'une filtration transmembranaire. Les filtres les plus communs dans les stations de traitement d'eau sont les filtres au sable et à l'antracite. Les filtres s'assurent que l'eau qui en sort respecte les normes en vigueur (ou mieux) en ce qui concerne la turbidité (la couleur ayant été enlevée par l'étape précédente).

### Filtration sur charbon actif

Le charbon actif, un composé à haute teneur en carbone, adsorbe beaucoup d'autres composés dont certains toxiques. Le chlore est éliminé par catalyse et les organites sont éliminés par adsorption. Le charbon actif est utilisé sous forme de grain ou de poudre. Dans le cas du grain, l'eau percole à travers un lit de charbon actif, issu de la noix de coco ou du charbon minéral, pour la purifier de ces composés. Lorsque le charbon actif est utilisé sous forme de poudre, il est ajouté à l'eau sous forme de suspension puis décanté ou filtré. Cette méthode est également utilisée pour filtrer l'eau des ménages et l'eau des aquariums.

### Désinfection

Afin d'éliminer les bactéries et les virus, certaines usines de production d'eau potable utilisent l'ozone (O<sub>3</sub>). La faible liaison des trois atomes d'oxygène de la molécule d'ozone confère à ce gaz une grande capacité oxydante: en oxydant toutes les substances organiques, l'ozone inactive les pesticides et les micro-organismes pathogènes. La désinfection est le plus souvent effectuée au moyen de chlore. Selon l'OMS, 2 à 3 mg/L de chlore devraient être ajoutés à l'eau, le maximum étant de 5 mg/L.

### Ebullition

L'eau est maintenue à ébullition un temps suffisamment long pour inactiver ou tuer les microorganismes qui vivent dans l'eau à température ambiante. L'ébullition n'élimine pas les solutés qui ont une température d'ébullition supérieure à celle de l'eau, au contraire leur concentration peut augmenter si de l'eau s'évapore. L'autoclave ou l'autocuiseur raffine et améliore le procédé en y ajoutant une pression élevée, qui évite la fuite de l'eau et augmente sa température d'ébullition.

### Distillation

On fait bouillir l'eau de façon à produire de la vapeur, qui s'élève, et est mise en contact avec une surface refroidie où la vapeur se condense à nouveau en eau liquide qui peut être recueillie. Les solutés ne se vaporisent normalement pas et restent ainsi dans la solution mise à bouillir. Cela dit, même la distillation ne purifie pas complètement l'eau, du fait de contaminants ayant à peu près la même température d'ébullition que l'eau, et de gouttelettes d'eau non vaporisée transportées avec la vapeur.

### Osmose inverse

Une forte pression mécanique est appliquée à une solution impure pour forcer l'eau à passer à travers une membrane semi-perméable. On appelle cela l'osmose inverse parce que l'osmose normale verrait l'eau pure se déplacer dans l'autre sens pour diluer les impuretés. L'osmose inverse est en théorie la meilleure méthode pour la purification à grande échelle de l'eau, mais il est difficile de créer de bonnes membranes semi-perméables. Le procédé d'osmose inverse utilise une membrane semi-perméable afin de séparer les solides dissous, la matière organique, les virus et les bactéries de l'eau. En fonctionnement, l'eau est pressée sur le module. Elle pénètre au travers des couches de la membrane, et est recueillie dans le support poreux. Les sels retenus sont directement évacués au rejet.

### Electrodialyse

Dans l'électrodialyse, on utilise des membranes échangeuses d'ions. La force motrice est le courant électrique qui permet l'élimination des ions de la solution devant par exemple être dessalée: plus l'eau est salée, plus la consommation électrique est importante.

### Photo-oxydation

L'eau subit un rayonnement ultraviolet de haute intensité. Cela permet de cliver et d'ioniser les composés organiques, qui peuvent ensuite être éliminés dans les colonnes échangeuses d'ions. Cela provoque en outre l'apparition de composés oxydants, capables de détruire les micro-organismes et certaines molécules.

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### **TYPES OF DEFECTS AND INJURIES, THEIR CAUSES**

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In concrete structures there may occur defects and damage arising on fabrication stages, transportation and installation:

a) processing a crack: shrinkage formed in the unhardened concrete shrinkage deformation due to poor concrete with the care of its surface, and sedimentary arising from uneven precipitation of the concrete mixture during

its densification or deformation formwork; these cracks have indented edges, dramatically changing the length of the disclosure;

b) the temperature-shrinkage damage arising in the hardened concrete due to its poor heat and humidity treatment, and usually manifested in the form of cracks with openings up to 0.2 mm;

c) concreting defect: cracks and caverns spaces with leaked laitance, stripping of reinforcement or insufficient thickness of the protective layer;

d) other damage: concrete chips, power cracks due to unforeseen effects (usually occur in underreinforced sections)

2. During the action on the concrete structures of loads and impacts the following types of cracks may occur:

a) Strength cracks in concrete: transverse stretched elements in the and stretched zones of bent elements; longitudinal ones in compressed elements and in compressed zones of bent elements; oblique (inclined) - in the walls of the beams;

b) cracks caused by topical load: in the areas of installation of prestressed steel of anchors in areas of supporting, and other similar places.

The formation and development of these cracks is limited to calculations based on the fracture toughness, and in a compressed zone of concrete - by calculations and according to strength [1, 17].

3. Temperature-shrinkage cracks, which result from non-uniform deformation over the cross section from the action of the ambient temperature and the shrinkage of concrete. These phenomena can independently give rise to cracks or surface grid, summed with the strain caused by the loading exacerbate the formation of cracks. The development of the latter in this case (for example, in the walls of the beams) may occur within 5-7 years.

4. The longitudinal cracks along the prestressed steel arising due to the constrained shrinkage of concrete caused by reinforcement, freezing of crude injection solution in the channels or due to corrosion of reinforcement in concrete. These factors may accelerate the appearance of longitudinal fissures due to concrete compression.

5. The causes of insufficient thickness of the protective layer of concrete can be corrosion of reinforcement, low density of the concrete protective layer and, consequently, loss of passivating concrete properties (e.g., as a result of carbonization), particularly dangerous conditions in aggressive environments (most frequently chloride salts).

The values of cracking in these cases are approximately twice the thickness of corrosion product (rust) on the reinforcing rod or bundled bars. In turn the thickness of corrosion products exceeds the thickness of corroded metal by 2.5-3 times. The structures may have corrosion damage associated with alternating freezing and thawing of concrete in a wet environment (defrost). Such damage is manifested in the form of cracking the concrete surface, loosening and subsequent failure of external layers. If water

penetrates into the internal cavity, chipped concrete caused by the expansion of freezing water can be observed in it.

In structures due to the defect of water drainage and waterproofing water leaking can be observed, which in turn is accompanied by efflorescence, that is the appearance of leachate on the concrete surface of the element. This phenomenon is associated with the removal of water soluble salts therein (leaching). Efflorescence can also occur on at the construction stage before laying, the waterproofing, grouting of joints and sealing various technological holes [1, 18-20].

### **Defects of superstructures**

The main defects of reinforced concrete bridge structures are identified as a result of visual inspection. Typical defects in the span structures can be grouped into the following three groups.

I. Defects associated with manufacturing and installation inaccuracies: misalignment semidiafragm, height deviations of adjacent beams, in the retreat size and location of support parts, etc. Defects in this group, as a rule, can not be "treated" during the operation. Their danger is that they do not only reduce the load capacity of the bridge itself, but also can cause intense accumulation of defects at the time of "power" cracks, waterproofing damage due to the joint work of span structure plates buildings, etc. [2, 42-43].

II. Defects associated with the disorder or poor implementation of the structural elements of the roadway, pavements and joints. As a result, of malfunction of waterproofing, drainage devices, expansion joints, unpressurized conjugation pavement structures with the main beams there occurs humidification of significant amounts of concrete, dissolution and removal of cementitious concrete components ( "leaching of stone-element " ), intensive reinforcement corrosion. At freezing of water there can occur a concrete gap. As a result the strength and frost resistance their service life of structures, as well as. These defects tend to develop over time, if one does not eliminated their causes. Initially, they appear in the form of wet spots, on the following - stages traces of leaching and reinforcement corrosion, with age there occurs peeling of the protective layer, stripping of valves, gradual reduction in the density and strength of the entire array, formation of cavities of significant size.

Defects in this group, as a rule, can and should be eliminated immediately upon detection [3, 15-16].

III. Defects such as cracks in concrete, caverns, chips, etc. Proper design of superstructures made of conventional concrete provides cracks disclosure provides no more than by 0.2 mm, wherein the reinforcement corrosion does not practically occur. Crack openings greater than 0.2 mm in the areas of location of the wire bundles of the prestressed reinforcement. It is necessary to establish the reasons for their occurrence to properly assess the danger of cracks that tends to develop and analyze the impact on the structure performance [2, 32].

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### **ROMANTIC ARCHITECTURE**

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Romantic architecture takes its cue from the movement called Romanticism, which first developed in England during the late 18th century and the Industrial Revolution of the 19th century. It was motivated by a reaction against the rational, classical ideals of the 18th century and introduced a more nuanced understanding of aesthetics, emotions, the deeper sensibilities that motivate people, and of course, the sublime, which draws upon the image of a vast, untamed, and powerful nature for its inspiration. Romanticism spread from Europe to the United States, and is best known in literature, seen in the writings of François-René Chateaubriand and Jean-Jacques Rousseau in France, William Blake and William Wordsworth in England, Johann Wolfgang von Goethe and J. C. Friedrich von Schiller in Germany, and Ralph Waldo Emerson and Edgar Allan Poe in the United States.

In architecture, Romanticism often evokes past styles, such as the Gothic style, seen in the mid-19th-century Gothic Revival. Other types of Romantic architecture are illustrated in a variety of styles considered "exotic" due to their displacement into a "foreign" setting in a more fanciful, less accurate format. Examples of exotic architectural styles include Egyptian-influenced homes, Asian-styled homes, and even Swiss chalets. These homes contain such "exotic" elements as Egyptian columns and small sphinx sculptures, or Japanese-inspired rooflines, or a Swiss chalet A-frame as a decorative overlay to the traditional European building type. Inspired by Napoleon's military campaign to Egypt, which initiated the first modern, sustained research on Ancient Egyptian culture, Egyptian-influenced architecture was very popular in France and England from the 1790s through the first decades of the 19th century.

The Oriental Revival of the early 1800s can be attributed to increased trade with India and China in the later years of the 18th century.

The most famous example of this fanciful, Indian inspired style is seen in the Royal Pavilion in Brighton, England, built by John Nash in 1815-1822



as a seaside home for King George IV when he was the prince regent. The building features a series of onion domes along the roof, with minarets flanking the central dome while the roofline features exotic-styled pointed crenellations capped by balls. The front porch is partially covered with a latticework screen with Moorish horseshoe arches

and pseudo-Gothic bifurcated windows.

The interior of the pavilion is done in a Chinese style, with richly decorated rooms suited to a vacation home. Neo-Classicism also enjoyed a continued popularity in the form of the mid-19th-century Greek Revival style, which can be considered a Romantic style. Romanticism is also seen in the introduction of the Italian country villa style during this period, called the Italianate style.



However, what makes the Italianate style different from the nearly continuous classical revival that characterizes architecture from antiquity onward is the motivation for its use. In this case, it specifically refers to the more Romantic notion of a nostalgic longing for this Italian Renaissance building type rather than to the more noble philosophical and sometimes political issues that are traditionally pinned to the various classical revivals.

In America, these ideas can be seen in the most ornate Italianate style house in the United States, which is the famous "Breakers House" built overlooking the ocean in Newport, Rhode Island. Designed by Richard Morris Hunt in the 1890s for Cornelius Vanderbilt, this 70-room mansion features a three-part stone façade where porticoes open at both the ground level and the upper story to allow views of the surrounding countryside. The central porticoes are flanked by wings on either side. While many more modest Italianate homes are made of wood and feature modified Victorian woodwork, this stone house represents the more monumental form of the Italianate style. Clearly a vacation home for the wealthy, The Breakers takes its cue from the Italian Renaissance villa type to create a visual reference between the Vanderbilt family and the established aristocratic families of Europe, who

were widely viewed at this time as more culturally refined than their American counterparts.

The Swiss chalet-style home, also considered a vacation home, became popular in both Europe and the United States after it was introduced in a pattern book published in 1850 by Andrew Jackson Downing. This type of home, originating in the Alps, was more economically amenable to the middle-class than the more "exotic" Indian style, and therefore it found favor during the first several decades of the 20th century, primarily in the mountain regions of the United States.

Most Swiss chalets in the United States appeared between 1885 and 1915, with the style being more popular in some regions, such as Cincinnati.

The true site for a Swiss cottage is in a bold and mountainous country, on the side, or at the bottom of a wooded hill, or in a wild and picturesque valley. In such positions the architecture will have a spirit and meaning which will inspire every beholder with interest, while the same cottage built in a level country, amid smooth green field, would only appear affected and ridiculous.

Finally, the Octagon House, with its eight-sided shape, was introduced during this era as well, and several hundred of them, built on the East Coast and in the Midwest during the 1850s and 1860s, survive today. Introduced in a pattern book published by Orson S. Fowler in 1849, the octagonal house was considered to be very economical, efficient in floor plan, and better lighted than a traditional square building. Fowler's ideas on indoor plumbing and central heating were very forward-looking for his day, and although the Octagon House did not ultimately become widely successful, its economical design and practical features paved the way for subsequent designs created to accommodate the influx of middle-class homeowners in the 20th century.



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**Zhyliakova O. Y.**

**TOTALITARIAN EPOCH AND BUDYNOK SLOVO**

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Art always reflects current events, ideas and moods, especially, architecture, because this kind of art can proclaim manifestos of generations and at the same time be as close as possible to everyday life. Kharkiv constructivism is a unique business card of the city - simple and rational forms still seem natural to the inhabitants of the industrial center.

The stormy twentieth century has many faces, every decade has unique features. The thirties are probably the most interesting moment in Kharkiv history. City becomes the capital of the UkrSSR and the center of cultural life as a consequence: here works Les Kurbas - Ukrainian Meyerhold, Mike Johansen plays pool with Mayakovsky. Shocks of the beginning of the century and the atmosphere of pluralism create a fertile ground for artists. "The double fires of war and revolution have devastated our souls and our cities. Scorched skeletons are palaces of yesterday's luxury. Crushed cities are waiting for new builders", says V. Mayakovsky in his "*Open letter to workmen*".

The revolution turned both society and art 180 degrees: elite modernism remained in the past, the proletariat entered in the center of attention. Constructivism grew from such ideas as "consumerism" and production art. The theory of constructivism in many of its positions coincided with the theory of productive art. But it was impossible to identify them completely. Theorists of productive art in the years of the greatest development advancement of this concept (1921-1924) considered early constructivism (1920-1921) as a certain stage of the overgrowth of the concept of "consumerism" in industrial art. Mayakovsky formulated the basic principles of productive art: the denial of the "creative" profession notion (there is no difference between an artist and a steel maker) and reduction the form-making of "things" to reflection, justification of its purpose. Aleksei Han, one of the leading Soviet theorists of constructivism, proclaimed "the incompatibility of artistic activity with the functionality of intellectual production." Only practice makes sense: constructivists call on artists to leave their workshops and work in production" [1].

Constructivism broke with the past, it put a full stop and tried to create architecture from the beginning, but the conditions in which these ideas originated were not unique. These ideas echo with the French architecture of the second half of the eighteenth century, namely the *architecture parlante*. Agony of the monarchy - this particular condition is the basis of currents with a difference of two centuries. Ledoux's and Boullée's projects lie beyond the plane of condition and reaction on the condition. When France searches for

rationality, expediency, simplicity, and appeals to ancient culture, Ledoux denies the whole system of ancient orders, colonnades, porticoes, and opposes to them "the forms that are created by the simple movement of the compass." His credo is short and concrete: "Circle, square is an alphabet, which authors should use in their best works."

Boulle professed exaggeration of geometry forms scales and rejection of any décor. He was persuaded that building appearance must reflect its purpose. The brightest example of this idea is the project of Isaac Newton cenotaph. This building is a sphere on the round base, it is 150 meters high. Such form is a symbol of the universe, perforated surface means stars in the sky. This project was not realized, but it had strong influence on the development of the Bulle's coevals' ideas. In XX century Bulle's conceptions were discovered again [2].

Thus, the architecture of the beginning of the century is the architecture of the world destroyed to the foundation, where the profit and strength are beauty itself.

There is no doubt that, we used to consider majestic Derzhprom as the main monument of Kharkiv constructivism. The first skyscraper of the Soviet Union proudly heaves above the city, envelops the Dzerzhinsky square. Derzhprom is a project from bright communist future, greatness of the new empire is absolute and indisputable.

It was constructed between 1925 and 1928 by Leningrad architects S. Serafimov, S. Kravets and M. Felger. The grand building of the Derzhprom became the beginning of such a town-planning formation, which included the square-forum and the residential area surrounding it. Thus, Derzhprom became the starting point for further development; its pulse was still felt in the radial structure of the web of streets [3].

Derzhprom is iconic because of its scale, variety of points of view and architect's skill; it is heavy enough to influence the whole housing area behind it. Derzhprom is a manifesto. *Budynok Slovo* means as much for understanding the epoch as Derzhprom does, but in a different way. *Budynok Slovo* is everyday life crude materialism for "builders of a new society". It is important not only because it's accordance to the ideas of constructivism, but because of its history. In literature and historiography, the thirties are called the years of *executed revival* or *red renaissance*. *Budynok Slovo* becomes the symbol of terror.

The project of *Budynok Slovo* belongs to Mykhailo Dashkevych. Building was started in 1928 and finished in 1930. In thirties that part of the city was a suburb, streets were not paved. The building is very different from neighbor houses. The architect's idea is simple and rectilinear – the building has Cyrillic letter "C" as a plan, i.e. the first letter in the Russian word "слово" [4].

In the moment of the housing crisis *Budynok Slovo* was a miracle. It was not only a shelter. The conditions that were not available to ordinary

people were created for creative people. Among them were writers, artists, actors, etc. The building had central heating, every flat had a lavatory, a kitchen with a small stove, and there was even a solarium on the roof. But the most important were telephones that before had been available only for government institutions but in this house the residents had them. Soon all their conversations were repeated on intercoms [5].

*Executed revival* started from the Khvylovyi's shot. News about Skrypnyk's discharge from the post of the people's commissar of education and promotion of their main enemy, Andrii Khvyliia, to the post of Chief of Ukraine Arts department, caught Khvylovyi as soon as he returned with A. Liubchenko to Kharkiv from Poltava [6]. Lyubchenko wrote: "Hunger spreads all over the villages and districts

People try to run away ... But where? In general, - hopelessness, despair, terror, disorder, government bewilderment..." Myhailo Yalovyi's arrest became the last straw. On the 13<sup>th</sup> of April Hvylovyi shot himself. It was 1933. Greatness and power of the new empire was absolute and indisputable.

Nowadays *Budynok Slovo* is forgotten. It looks like an ordinary block of flats that is just a little bit older, than neighbor high-rise buildings. The only thing that reminds of the past is a memorial tablet.

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## ECONOMICS

**Andrianova A. A.**

### **INCREASE OF UKRAINE EXPORT TO THE WORLD MARKET AND THE EU COUNTRIES**

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The article is dedicated to the informational support the increase of export of Ukraine to the world market and the EU. First let us remind what

export means. The definition says: exports are the goods and services produced in one country and purchased by citizens of another country [2]. It does not matter what goods or services are. It does not matter how they are sent. They can be shipped, sent by email, or carried in personal luggage on a plane. If they are produced domestically and sold to someone from a foreign country, it is export. International agreements limit trade in and transfer of certain types of goods and information, e.g. goods associated with weapons of mass destruction, advanced telecommunications, arms and torture, and also some pieces of art and archaeological artefacts. Examples include Nuclear Suppliers Group - limiting trade of nuclear weapons and associated goods (currently only 45 countries participate), the Australia Group – limiting trade in chemical and biological weapons and associated goods (currently only 39 countries), Missile Technology Control Regime – limiting trade in the means of delivering weapons of mass destruction (currently only 36 countries) and the Wassenaar Arrangement – limiting trade in conventional arms and technological developments (currently only 40 countries) [1, 43-44].

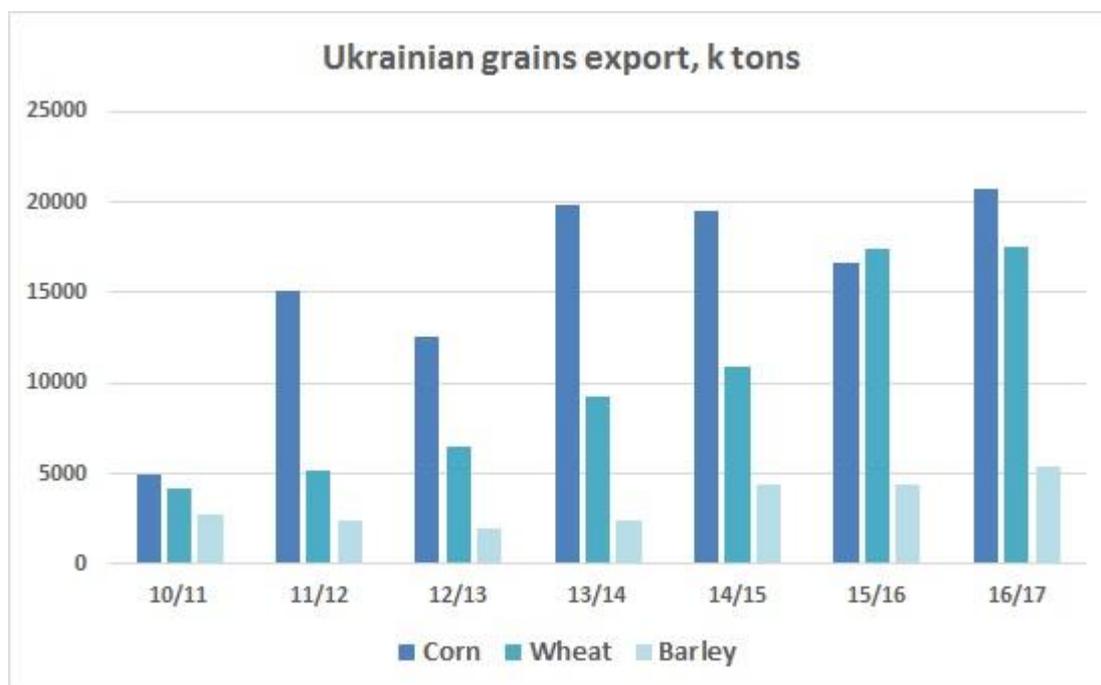
Most countries want to increase their exports. Their companies want to sell more. If they've sold all they can to their own country's population, then they want to sell overseas as well. The more they export, the greater their competitive advantage is. That is because they gain expertise in producing the goods and services. They also gain knowledge about how to sell to foreign markets. Governments encourage exports. That's because it increases jobs, brings in higher wages and raises the standard of living for residents. They become happier and more likely to support their national leaders. Exports also increase the foreign exchange reserves held in the nation's central bank. That is because foreigners pay for exports either in their own currency or the U.S. dollar. A country with large reserves can use it to manage their own currency's value. They have enough foreign currency to flood the market with their own currency. That lowers the cost of their exports in other countries. Countries also use currency reserves to liquidity. That means they can better control inflation, or too much money chasing too few goods. To control inflation, they use the foreign currency to purchase their own currency [2].

Ukraine is in need of sustainable economic growth and improving the welfare of the people, and to achieve this aim, it counts on the European integration path. But it turns out that European success is not so significant that due to the EU a number of problems involving integration.

In order to enter the world market for export, we need to develop the export of agricultural products. This year Ukraine is rapidly beginning to increase exports of agricultural products to the world market and the EU.

Grains export from Ukraine in MY 2016/17 made record-high 43.8M tons, which has been significantly higher vs. previous record of 39M tons set in previous season. During last years, Ukraine became one of the most important players on the global market. As it was noted above, total export in MY2016/17 made close to 43.8M tons, thereof 17.5M tons was wheat export,

20.7M tons – corn and 5.4M tons – barley export. Ukrainian accounted for 17% of total world barley export (3rd place), 12% of total corn export (4th place) and 10% of wheat export (6th place).



*Pic. 1. Ukrainian grains export statistics for several latest season*

We additionally note that corn and soybeans prices in Ukrainian port are significantly dependent on global prices, correlation is quite high (premiums can vary, though their variation is much lower than underlying prices variation). On the other side wheat and barley prices in Ukrainian ports are less dependent on CBOT wheat prices, they more depend on factual sales prices by which international traders sell Ukrainian grains at destination. It means that correlation between Ukrainian export prices for wheat and CBOT wheat quotations is much lower than for corn and soybeans [4].

Ukraine's exports to the EU are not a determining factor for European integration, and its effectiveness is quite low and unbalanced. The inadequacy of the Agreement on free trade zone between the EU and Ukraine could lead to even greater imbalance in foreign trade and the growth of the negative balance for Ukraine and the rest of the world [5].

In spite of some difficulties faced by Ukrainian farmers during sowing campaign in autumn 2017 (drought in some regions in August-September with subsequent heavy rains), because of favourable weather conditions in the winter (good snow), early spring condition of winter crops as a whole was assessed as good (and better than last year). However, after the frosts in April and early May, and low rainfall in Central Ukraine in May-early June, the winter condition worsened. Also let us note that at the moment, because of

these reasons; there is significantly lag behind in development and spring crops (primarily corn).

After analyzing all the data, we can conclude that Ukraine needs to pay more attention to agricultural production; a large part of the budget should go for development of export of agricultural products to the world market and the EU.

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**CAR INDUSTRY IN UKRAINE**

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After the separation of Ukraine from the USSR in 1991, more than 50 big automotive plants remained on the territory of the country, and the country was on the leading roles in the European automobile industry. In 1988, only Lviv Bus Plant produced more than 14.6 thousand buses a year. Currently, the car industry is on the brink of the collapse, many factories were closed due to the lack of financing and large interests on loans that have been going on for decades. The government decided not to sponsor this direction and leave this opportunity for the sponsors. But after problems on the political stage, many investors were afraid to invest money and went to Asia. Those, who built such plants or decided to invest in existing ones, were unpleasantly disappointed by the excessively large taxes and a small amount of manufactured equipment for the quarter. This in turn was reflected in revenues.

We would like to note that a very little attention is paid to this problem in the national literature. Therefore it is very difficult to find any information and it is necessary to refer mainly to the government sources in the Internet, in particular, to the Association of Ukrainian Automobile Manufacturers ‘Ukraudoprom’.

Also we want to mention the scientists who studied the car industry in Ukraine. A lot of efforts were made to study the car market by O. Karpov, V. Kishun, M. Kolbasin, P. Makarenko, O. Marushchak, Y. Pirozhkova, G. Prochnitska, M. Rahman.

I was spurred to write this article by the crisis in the car market. It was a collapse of the action of the LAZ plant (Lviv Bus Plant) not so long ago. The LAZ plant was the leader in the production of buses at our market for many years. It worked since 1945 and for one year it has been completely ruined and destroyed. Its equipment was sold from auctions by banks, the rest of the property was arrested, and the plant ceased operations.

Currently, the leaders at the car's market are the Kremenchug Automobile Plant, whose employees have already met twice a year to picket due to the arrears of wages, the Dniprovsky Bus Plant, as well as the Bogdan Corporation, and many other factories were exported, or sold out for debts. According to Ukrautoprom, it is possible to learn that in the second half of 2017, Ukraine sharply increased production of cars by 17 percent. But what is the reason for this recovery? It is difficult to explain, because before that, for 12 years, we have seen only a fall. Also it should be noted that there were some small outbreaks of growth, but they could not stand the long term. The AvtoKrAZ plant accounted for 90 percent of the entire truck production segment in the country, and the Bogdan's Lutsk plant reduced the production of buses by a factor of 2. And it is not very clear how the general level has grown in these conditions. Many world manufacturers, seeing the trends of our market still decided to take a chance and invest in the production of cars in our country. For example, companies Chery and Chevrolet didn't only purchase the land and adjust production capacities, but also began to cooperate with our producers. As an example of a recent novelty of our brand ZAZ that was developed with the direct participation of Chevrolet. We also want to note that these are not the only representatives of foreign manufacturers at our market. We want to note that national companies cannot compete in design or interior with foreign manufacturers, but they still have their advantages. Our manufacturers lure buyers by low value and high strength, but still for most of our population the car is more as a luxury than a means of transportation.

The state does not want to pay attention to this branch of the economy, and one could take an example from the same Japan or Germany, whose cars are already leading for a long time, they are sponsored by the state, and they are also given subsidies and loans at scanty percentages. The process of dying of one of the leading industries of yesterday, is connected with one more related problem, because people who worked at these plants remain unemployed, the unemployment rate only grows. In turn, we do not see any response from the government, the factories are only being closed, and nothing is known about the new ones. Euroassociation of our country also has a direct impact on the decline in the production of national cars, because they have to adjust to the Euro-5 standards. This, in turn, scared off a few big investors and automakers.

Detailed studies were carried out and in the result we came to the conclusion that only the correct state assistance, in particular, lending or

complete restructuring of the industry, can help the auto industry. We need to try to attract more foreign investors who will be ready to invest in this industry. Also the government needs to negotiate with major automakers in order to hear their opinion and possibly offer their vision of a solution to this problem.

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### **PROBLEM OF DEFAULT AND BUSINESS FAILURES IN THE ECONOMY OF UKRAINE**

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Financial solvency is a capacity to pay debts in time, it is estimated by the liquidity ratio. They demonstrate how well short-run duties are covered by the available assets. To define the financial insolvency, the assessment of the financial condition should be made. An assessment of the financial condition is in the interests of the enterprise holder names, its administration, investors, creditors.

As for today, Ukrainian enterprises have more or less similar problems: changes of operating environment, a loss of traditional marketing outlets of their own output; changes of system planning and as a result - a break of steady production as well as unsteadiness of legal boundaries.

Bankruptcy is one of the elements of market system and the institute of an extensive network of civil law or trade law; this is a mechanism which gives an opportunity to avoid a crash and a dispose of funds profitably.

From the point of view of economics bankruptcy is a person's disability to continue his business activities by the reason of economic unsteadiness and

unprofitability .According to the law the entities of bankruptcy are only law persons of one category - business entities unable to pay debts to creditors or the budget.

As a whole, the factors being an imputation of enterprise bankruptcy can be classified into external factors of an enterprise (economical, political, demographical, improvement of international competition, customs offense, debtor's bankruptcy) as well as internal ones( rise in debit loans, scarcity of working capital, inefficiency of financial investments, lack of delivery discipline).

The specific features of a financial crisis lie in diminution in demand for its production due to an unfavourable volume variance; debt growth to suppliers, to the state budget and banks; and wage payments arrears to officials.

There are the following types of business failures that mark down the main kinds of business failures in legislative and financial practice: an evidence bankruptcy, a technical bankruptcy ,a deliberate bankruptcy and a fiction bankruptcy.

The bankruptcy act must perform the main three functions:

1.To perform a mechanism for avoiding a nonbeneficial usage of enterprise assets.

2.To be an instrument of enterprise rehabilitation that is on the verge of bankruptcy and possesses considerable reserves for successful financial and economic activity in the future.

To be considered a bankrupt at all stages of proceedings in case of bankruptcy after the Arbitration court adopts the resolution on recognition the debtor to be a bankrupt. The number of such proceedings steadily increases in the Ukrainian economy.

The arbitration court can apply the following types of procedures to the debtor: reorganization (remedial) liquidation; and settlement agreement.

Unfortunately, the world financial crisis has led to an increase in the number of financially insolvent enterprises in each branch of the Ukrainian economy, it can be explained, first of all, by objective macroeconomic instability, and secondly, by a number of subjective factors: inability of the administration to reveal problems timely and to take necessary measures.

In fact the institute of bankruptcies is one of the ways of business entities selection. In conditions of market economy, bankruptcy of enterprises is a normal phenomenon. From 20 to 30 of each100 new enterprises remain on the market.

The liquidation commission (the agency that deals with liquidation) estimates the cash property of the liquidated enterprise, it carries out the work of collecting indebtedness and pays off with creditors, makes up the liquidating balance and presents it to the owner or the agency who has appointed the liquidating commission.

In order to make the processes of bankruptcy of business entities avoid affecting the economics, the state has to carry out an actively regulating role regarding the property relations, it is necessary to have the corresponding legislative base.

Sanation is a system of financial, economical, technological, legal and social actions directed to restoration of the solvency, liquidity, profitability of the corporate debtor within a long-run period.

The main stages of financial improvement of an enterprise are as follows: definition of feasibility and possibility of conducting sanation, a conceptual sanation baseline, to know the trends of implementation, a choice of sanation activity, the development of the sanation plan, sanation procedure, sanation activities determined by the legislation; sanation activities directed to refinancing and restructuring.

It is a well-known fact that there are a lot of ways to prevent bankruptcy. They are conditionally divided into unproved ones by the taxpayer before the issue of proceedings about bankruptcy and judicial settlement.

Steady monitoring of a financial position and system of bankruptcy diagnostics for identification of the crisis phenomena at an early stage and carrying out the actions of crisis management by the enterprise play the main role in a system of activities for prevention of bankruptcy.

Studying of development practice of anti-recessionary measures has shown that today the enterprises prefer a development of protective strategy which is characterized by operations rollback. And forward strategy of enterprises activity (development strategy) are at an expectation stage, it is characterized by deep studying of opportunities of cuts in expenditures and a search of innovative approaches to the organization of production technologies and product sales. It is only due to production which foresees the modern demands that enables an the enterprise can to remain "afloat" and even to trends develop in crisis conditions.

The strategic trends of the bankruptcy problem solution are the following: reengineering, economic security, controlling, using an early warning system and appropriate reactions, crisis administration, sanation and restructuring.

The strategic mechanism of an existing state of bankruptcy is a system of measures which is based on the use of the model of sustained economic enterprise growth provided by key parameters of its financial strategy. The essence of a model consists in calculations of the possible rate of volume product sales which doesn't disturb the financial balance of an enterprise.

The main contest of the operating mechanism of an existing state of bankruptcy at Automobile Transport Enterprises is ensuring the balance of monetary assets and short-term financial obligations of an enterprise. In especially complicated cases it is necessary to carry out the reengineering

process of business, which is a root to revising the production program, it is material - technical supply, etc.

One of the ways to prevent the bankruptcy of joint-stock enterprises is reduction or full refusal of dividend payments of shares in case if it is necessary to convince the shareholders.

The existing the state of bankruptcy can be as follows:

Increasing the cash flow (maximizing)

Reduction of the working capital requirements (economy of MTS (fuel, spareparts, labour forces ).

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### REVIEW OF CRYPTOCURRENCIES

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A cryptocurrency is a medium of exchange like normal currencies such as USD, but designed for the purpose of exchanging digital information through a process made possible by certain principles of cryptography. Cryptography is used to secure the transactions and to control the creation of new coins. The first cryptocurrency to be created was Bitcoin back in 2009. Today there are hundreds of other cryptocurrencies, often referred to as Altcoins.

Put another way, cryptocurrency is electricity converted into lines of code with monetary value. In the simplest of forms, cryptocurrency is digital currency.

Unlike centralized banking, like the Federal Reserve System, where governments control the value of a currency like USD through the process of printing fiat money, government has no control over cryptocurrencies as they are fully decentralized [1, 56-57].

Most cryptocurrencies are designed to decrease in production over time like Bitcoin, which creates a market cap on them. That's different from fiat currencies where financial institutions can always create more, hence inflation. Bitcoin will never have more than 21 million coins in circulation. The technical system on which all cryptocurrencies are based on was created by Satoshi Nakamoto.

While hundreds of different cryptocurrency specifications exist, most are derived from one of two protocols; Proof-of-work or Proof-of-stake. All cryptocurrencies are maintained by a community of cryptocurrency miners who are members of the general public that have set up their computers or ASIC machines to participate in the validation and processing of transactions [2, 244].

The first cryptocurrency was Bitcoin. Bitcoin was created in 2009 by a pseudonymous developer named Satoshi Nakamoto. Bitcoin uses SHA-256, which is a set of cryptographic hash functions designed by the U.S National Security Agency. Bitcoin is a cryptocurrency that is based on the proof-of-work system.

In April 2011, Namecoin, the first altcoin, was created to form a decentralized DNS to make internet censorship more difficult. In October 2011, Litecoin was released and became the first successful cryptocurrency to use scrypt as its hash function rather than SHA-256. This gave the general public the ability to mine for litecoins without the purchase of specific hardware such as the ASIC machines used to mine Bitcoin.

Litecoin began receiving media attention in late 2013 – reaching a market cap of \$1 billion. Ripplecoin, created in 2011, was built on the same protocol as Bitcoin but services as a payment system – think of it like a Paypal for cryptocurrencies that supports any fiat currency, cryptocurrency, commodity or even frequent flier miles [3, 176].

Bitcoin is the largest cryptocurrency in market capitalization, volume, acceptance and notoriety, but it's not the most valuable coin. NEMstake, while only having a market cap of \$1,116,720, trades at \$1,117 a coin. Looking at the market cap, Litecoin takes second place after Bitcoin with Ripple close behind.

One coin that you are more than likely familiar with is Dogecoin. Dogecoin ranks, on average, thirds in trading volume, but has a relatively low market cap – ranking number six in the largest cryptocurrency[4, 132-134].

Cryptocurrency mining power is rated on a scale of hashes per seconds. A rig with a computing power of 1kH/s is mining at a rate of 1,000 hashes a second, 1MH/s is a million hashes per second and a GH/s is one billion hashes per second. Every time a miner successfully solves a block, a new hash is created. A hash algorithm turns this large amount of data into a fixed-length hash. Like a code if you know the algorithm you can solve a hash and get the original data out, but to the ordinary eye it's just a bunch of numbers crammed together and remains practically impossible to get the original data out of.

While Bitcoin and a several other coins are mined using SHA-256, Litecoin and many other coins, use Scrypt. These are the two major hashing functions, but several different kinds exists and are used by other cryptocurrencies such as scrypt-N and x11. The different hashing functions were adopted to answer concerns with the SHA-256. Before, individuals were able to mine Bitcoin with their GPU's, which require a large amount of

energy. But as Bitcoin grew in popularity, ASIC SHA-256 machines were built which made GPU mining obsolete.

To give you an idea of just how powerful these machines are, a mining rig running 4 GPU's would get a hash rate of around 3.4 MH/s and consume 3600kW/h while an ASIC machine can mine 6 TH/s and consume 2200kW/h. This effectively killed GPU mining and left many individuals worried about the security of the network. With less individuals being able to profitably mine from their home computer, the network became less decentralized. Script mining was implemented with the promise of being ASIC resistant due to the memory problem it introduced.

Script hashes require lots of memory, which GPU's are already designed to handle and ASIC machines were not. However, Script mining requires a lot of energy and eventually script-ASIC machines were designed to address this problem. At this point Litecoin considered changing their proof-of-work function to avoid ASIC mining. Script also means that their proof-of-work is much more energy efficient than SHA-256. Bitcoin blocks are solved at a rate of 1 per 10 minutes while Litecoin blocks are solved at a rate of 1 per 2.5 minutes.[5, 210]

The security of cryptocurrencies has two parts. The first part comes from the difficulty in finding hash set intersections, a task done by miners. The second and more likely of the two cases is a "51%" attack. In this scenario, a miner who has the mining power of more than 51% of the network, can take control of the global blockchain ledger and generate an alternative block-chain. Even at this point the attacker is limited to what he can do. The attacker could reverse his own transactions or block other transactions.

Cryptocurrencies are also less susceptible to seizure by law enforcement or having transaction holds placed on them from acquirers such as Paypal. All cryptocurrencies are pseudo-anonymous, and some coins have added features to create true anonymity.

While cryptocurrencies are legal in most countries, Iceland and Vietnam being an exception – Iceland mainly due to their freeze on foreign exchange, they are not free from regulations and restrictions. China has banned financial institutions from handling bitcoins and Russia, while saying cryptocurrency is legal, has made it illegal to purchase goods with any currency other than Russian rubles.

In the U.S., the IRS has ruled that Bitcoin is to be treated as property for tax purposes, making Bitcoin subject to capital gains tax. The Financial Crimes Enforcement Network (FinCEN) has issued guidelines for cryptocurrencies. The issued guidelines contain an important caveat for Bitcoin miners: it warns that anyone creating bitcoins and exchanging them for fiat currency are not necessarily beyond the reach of the law.

Miners seem to fall into this category, which could theoretically make them liable for MTB classification. This is a bone of contention for bitcoin

miners, who have asked for clarification. This issue has not been publicly addressed in a court of law to date [6, 165-166].

There are a host of services offering information and monitoring of cryptocurrencies. CoinMarketCap is an excellent way check on the market cap, price, available supply and volume of crypto currencies. Reddit is a great way to stay in touch with the community and follow trends and CryptoCoinCharts is full of information ranging from a list of cryptocurrencies, exchanges, information on arbitrage opportunities and more. Our very own site offers a list of crypto currencies and their change in value in the last 24hrs, week or month.

Liteshack allows visitors to view the network hash rate of many different coins across six different hashing algorithms. They even provided a graph of the networks hash rate so you can detect trends or signs that the general public is either gaining or losing interest in a particular coin.

A hand website for miner is CoinWarz. This site can help miners determine which coin is most profitable to mine given their hash rate, power consumption, and the going rate of the coins when sold for bitcoins. You can even view each coins current and past difficulty.

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**Bilous K. D., Gerdt I. Yu.**

### **INFLUENCE OF PAYMENT'S SYSTEM CHANGE UNIFIED SOCIAL TAX**

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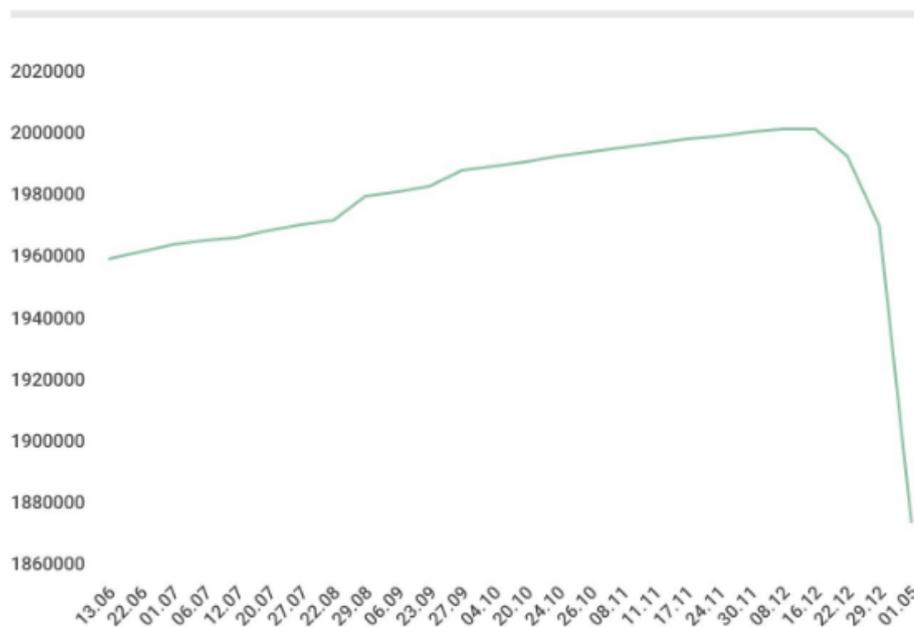
Small and medium-sized businesses today are the socio-economic foundation, without which it is impossible to develop any innovation-oriented European country. Small business largely determines the pace of economic growth, structure and quality of the gross domestic product of the country, moreover, it expends jobs. Data of the State Statistics Service of Ukraine show that in recent years from 75% to 78% of Ukrainians work for small

companies. So, small and medium business not only provides a great share of budget revenues, but also creates jobs, what is especially important during the crisis [2].

Small business implements important social functions, including:

- creation of additional jobs, reduction of unemployment, solving poverty problems;
- formation of the middle class;
- maintaining a competitive environment and limiting the monopoly of large enterprises, rapid saturation of the market with goods and services;
- development of the local economy and markets oriented on national interests;
- general improvement of the economy and society providing the education of entrepreneurs in economic and business culture.

At the moment, the situation is volatile, and the queues for closing their business are longer. Every year, small business projects occur less and less often. Compared to the year 2000, in 2017, the rate of registration of new individuals decreased by almost five times, while legal entities more than tripled. In Ukraine, in 2016, 1524 companies went bankrupt and another 2073 enterprises were in procedure of bankruptcy. The mass closure of PE is carried out in each region of Ukraine. Mostly in: Kiev (17176), Kharkiv (12390) and Dnipro (11196) regions. Most closed are entrepreneurs of retail (43275) and wholesale (8931) trade, warehousing (10798) and transport services (7040). The trend for a decline in the number of registered entrepreneurs is shown in Picture 1.1.



*Pic. 1.1. Number of registered PE in 2016-2017*

Increase in the minimum wage from January 2017 not only raised the amount of money to pay, but also the size of the flat tax, which is currently 704 hryvnias. On the one hand, a large number of registered businesses left the shadow side, on the other hand, it has led to a cardinal and rapid closure of business, for example, who worked seasonally. If earlier businesses had at least a normal profit, then at present, even without having a profit, they have to pay a unified social tax in size, not lower than the minimum, anyway.

It turns out that entrepreneurs who do not get profit from their activities, from January 1, 2017, are required to pay a contribution to the Pension Fund on the basis that they are registered by entrepreneurs. Lawyers have already named these changes as "tax on the status of entrepreneur," analogous to medieval England, in which the "tax on life" was introduced in the 14th century.

So, the consequences of changing the system of payment for unified social tax for small and medium businesses can be:

- reducing the time of work or dismissing the staff and, as a consequence, increasing unemployment in Ukraine;
- closing business and getting into the shadow, as a consequence, reducing taxes to the budget of Ukraine;
- some of the business enterprises' employees will be closed in order to work on another BE, and thus save on a single social contribution.

An analysis of the state of entrepreneurship in Ukraine shows that this sector of the economy needs immediate changes. Accordingly, unfavorable economic and legal environment for doing business helps to create barriers for the full development of entrepreneurship.

Thus, the urgent tasks in the sphere of development of small and medium enterprises include:

- simplification of registration procedures, state control, obtaining documents of permissive character;
- improvement of the order of tax and statistical accounting and reporting, reduction of tax pressure on the economy;
- reduction of pressure from the controlling bodies, counteraction to corruption;
- introduction of regional policy promoting small business development;
- creation of favorable financial conditions for the establishment and implementation of entrepreneurial activity, availability of financial resources for entrepreneurs;

Consequently, in Ukraine today there are many problems hindering the development of business, the solution of which will increase the efficiency of entrepreneurial activity, ensure the expansion of the business sector reducing the shadow sector. The main role in overcoming these problems should be played by the state, whose main goal is to create favorable conditions for the further stimulation of enterprises.

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### **KEY CONCEPTS OF THE GENERAL DEFINITION "MARKETING STRATEGY OF A PARTICULAR BUSINESS"**

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**Formulation of the problem.** In our time, in the Ukrainian economy, enterprises are trying to maximize their profits through effective marketing activities and optimal strategic management. There is a need to investigate market opportunities, select the target markets, develop an effective marketing mix and successfully manage its implementation. In the marketing strategic management of the enterprise, the formation of a marketing strategy for business takes an important place. Consideration of this aspect is not a spontaneous phenomenon, each stage of its formation requires attention, time and trouble-free analysis. That is why, the generalization of the essence of the concepts under consideration will help in more detail consider the definition of the marketing strategy of business.

**Analysis of recent research and publications.** The theoretical and methodological basis of the question concerning the essence of determining the process of forming a marketing strategy, in general, is reflected in the works of many foreign and domestic scientists, such as: N. Strekalova, O. Kibik, K. Belous, L. Balabanova, F. Kotler, N. Kudenko, Zh.-Zh. Lamben, M. McDonald, M. Porter, D. Saunders, J. R. Evans and B. Berman, V. Solovyov, T. Primak, U. Feinberg, I. Ansoff, A. Thompson, M. Mintzberg, A. Chandler, M. Meskon, M. Albert, F. Hedouri, P. Doyle, O. Kukushkin and others.

**The purpose of the article.** The purpose of the study is to deepen the theoretical foundations for the definition of the essence of the concepts of

"strategy", "marketing", "business" to generalize the content of the general concept of forming a marketing strategy for a particular business.

**Presenting main material.** An extremely important place in the marketing strategic management of the company is taken by the marketing strategy of business. Methodical provision of strategic business planning requires the adaptation of classical models to new conditions, and a completely different approach to decision making. The development of this approach requires a different, new look at the essence of strategic planning at the business level [3, 19]. The variety of approaches to determining the marketing strategy of a business is due to the depth of the terms "marketing", "strategy", "business" and the extent of their use.

The first thing that needs a detailed review is the general concept of marketing. In general, the term "marketing" comes from the English "market", which is translated as activity in the market of sales. There are more than 2000 different definitions that comprehensively reveal the content of the concept of marketing with all its features and specifics, treated in the analyzed literature. Summarizing the sources discussed, we can give a fairly complete definition: marketing is a type of human activity that involves the organization and management of a system of measures to meet the needs of consumers and obtain the desired result through an exchange from the manufacturer to the end user.

Then, there is a need to analyze the concept of "strategy". It is believed that the term "strategy" appeared in the military lexicon. It comes from ancient Greece – the title of strategist, the word "strategia", which means art or science to be a military leader [4, 177]. In the economic literature there is a large number of definitions of the term, which testify to the different views of scientists on the content of the "strategy". The concept evolved with the change in time and the external environment, which is reflected in the investigated literature. Despite the differences in the interpretation of the concept of "strategy" by the authors, some their views can be general: the strategy is a clearly formed plan for future actions aimed at achieving the desired results; realization of the strategy according to clearly defined directions taking into account the available resources; when formulating a strategy, it is necessary to pay attention to external opportunities and threats and internal strengths and weaknesses; the strategy has to be constantly rectified in the context of the constant change in the environment.

It is impossible not to mention such key characteristics of the strategy as: the long-term focus; general rather than specific nature of certainty and priorities; the abstract level (strategy) involves specification when it is transmitted to the middle and grass-roots level of the firm's management; taking into account external and internal factors; the focus on ensuring the competitiveness of the firm; display of sequence of actions and intermediate states (step by step achievement of the goal).

On the basis of the analysis of the term by foreign and domestic scientists, we can see that it is necessary to consider the strategy as a complex of measures determined on the basis of the choice of optimal ways of activity, taking into account the available resources, implementation of which will ensure achievement of the set goal. There is no strategy for all companies. Each company is unique in its own way, therefore the type of strategy and strategy development process are unique for it, as it depends on the position of the company on the market, the dynamics of its development, the cultural environment and many other factors.

The last thing to consider when exploring the essence of a business marketing strategy is the general notion of business. In society, the combination of different types of activities, the result of which is the creation of material goods and their movement towards the consumer, forms the economy. This activity is realized on the basis of the interaction of productive forces and industrial relations characterized by interpenetration and mutual expression. That is, business is the activity that arose in the development of society. V. Efremov wrote that the business strategy is an act of action that determines a well-defined and relatively stable line of behavior of a production-commercial organization over a sufficiently long historical interval. Such an action is made within the framework of a certain system of principles, rules and priorities that determine the circumstances of the place (where), time (when), the causes (why), the method (as) and the purpose (for what) of action [3, 21].

**Conclusions.** This material allows us to comprehend the broad concept of forming a marketing strategy for a particular type of business. The data serves as a basis for further consideration of the issue of defining the general concept of "marketing strategy for a particular business." That is, we can say that the variety of approaches to determining a marketing strategy is due to the depth of the term "strategy" and the extent of its use. Marketing strategy is one of the types of functional strategies of the enterprise, which in their totality ensure the achievement of the overall conceptual strategy of the enterprise. The analysis made it possible to determine that the general concept should be viewed from the standpoint of consumers and competitors; to represent means of realization of marketing objectives of the enterprise; based on the results of strategic analysis; determine the direction of activity of the enterprise.

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**Buhay D.**

## **MANAGEMENT OF DEVELOPMENT OF SPORT FACILITIES IN THE MARKET CONDITIONS**

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Nowadays Ukraine forms a program of social and economic development, goes through the reform of the economy, creates effective mechanisms of management, and appropriate fiscal policy is implemented. The radical changes, that take place in the state, objectively affect both the sectoral management systems and the conditions of management and they lead to changes in the principles, approaches, methods of activity of various sectors of the economy, including the socio-cultural sector, which is an integral part of physical culture and sport. The new functions of branch ministries and departments, rethinking of their role in the field of management, cause need in appropriate changes in regulatory policies that promote the development of sports facilities and the provision of high-quality sports and sports services, ensure the interaction of state bodies with private business entities, etc.

The network of existing sports facilities provides more than 160 sports. Sports facilities are the most difficult of all constructions used by modern people. Sports and sports facilities are used by all segments of the population: from preschoolers to the elderly, both healthy and disabled. The network of sports facilities in our country, unfortunately, is outdated and does not meet modern needs. To involve more people in physical activity, it is necessary to reconstruct existing and build new modern sports facilities [1, 2, 3].

Sports facilities are constructions for physical education and sports. Sports facilities are quite diverse, have a direct and specific purpose (stadiums are used as a place for playing football, competitions in athletics, entertainment events, swimming pools - for swimming, gyms - for gymnastics, running slalom trails - for skiing etc.), vary in size and cost. Each sports facility has its own specific equipment, necessary for a particular sport (racks, nets, simulators, gymnastic equipment, etc.). Sports facilities create the appropriate conditions for classes, regardless of natural and weather

conditions, and exclude factors of negative natural impact (precipitation, wind, heat, cold).

In our time, there is an increase in the number of closed structures (swimming pools, stadiums, courts) instead of open ones. This is due to the fact that closed buildings can be used throughout the year, and open - only seasonally. On the other hand, the development of specialized sports centers is actively developing: skiing centers, sailing centers, carting centers, etc. It is clear that at the same time, the popularity of sports, the level of interest of the population in visiting sports facilities and complexes depends on the level of comfort of structures, services provided, and architectural attractiveness. Although in our time the most important is the construction of indoor sports facilities, but open-type objects, namely, specialized playgrounds, football fields and stadiums, designed for a spectator size of less than 1500 people, continue to exist, old buildings are properly restored, and new ones are built [1, 3, 4].

In addition to its direct purpose, sports facilities (especially of spectacular nature) are often used for public gatherings, concert performances, exhibitions. Some sports facilities are of architectural value [1, 4].

The status of physical culture and sports movement, the complex interaction of state bodies with public organizations of physical culture and sports orientation are important. This requires the purposeful coordinated work of state institutions, territorial communities, industrial structures, private organizations, public associations and specialists in the field of providing sports and sports services to the population.

Physical culture and sports as a social institution and a specific kind of activity are aimed at recreating the main productive power of a society - a person who undergoes profound qualitative, quantitative and structural transformations. The decline in the development of physical culture movement requires an increase in the number of sports facilities, the use of sports bases by appointment, and the effective work of leading specialists and scientists in the field of physical culture and sports.

The management of the development of sports facilities is aimed at increasing efficiency in market conditions and creation of the possibility of providing quality sports and sports services. Therefore, the strategic goal of state reformation of provision of sports and sports services is determined by an increase in the level of health of the population; support of high capacity of people; prevention of various social phenomena; the implementation of the provision of a constitutional guarantee of the right of citizens to equal access to physical education and sports, and the development of sports infrastructure positively affects the state's economy – additional jobs are being created, contribution to increasing the competitiveness of the sports industry and the implementation of an effective social policy is being made.

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### **LANDWIRTSCHAFT DER UKRAINE**

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Gegenwärtig entwickeln sich die Prozesse der wirtschaftlichen Integration in der Welt in einem zunehmenden Tempo, enge Interaktion der Wirtschaftssysteme, die Schaffung von Einzelmärkten und die Marktinfrastruktur von Gruppen von Staaten, infolgedessen die Zahl der Integration von Wirtschaftsgewerkschaften und einheitlichen Zollzonen kontinuierlich wächst.

Der Agrarsektor der Ukraine ist einer der größten unter den GUS-Staaten und zeichnet sich durch eher hohe Produktionsindikatoren und Exportorientierung aus. Gleichzeitig hat die Durchführung von Reformen im Agrarsektor, die oft nach Szenarien durchgeführt wurden, die weitgehend nicht den nationalen Interessen entsprechen, zu schwerwiegenden Folgen geführt, die sich in einem Rückgang der Produktion und der Verschlechterung der materiellen und technischen Basis niedergeschlagen haben.

Unter modernen Bedingungen ist die Integration der wichtigste Faktor und die Richtung der Entwicklung des Weltwirtschaftskomplexes, während die Rolle der regionalen integrierten Formationen bei der Gewährleistung der nachhaltigen sozialen und wirtschaftlichen Entwicklung der Länder wesentlich zunimmt.

Regionale Integration entsteht durch intensive Handels- und Wirtschaftsbeziehungen zwischen bestimmten Ländern, deren Dynamik viel

schneller ist als die Entwicklung der Interaktion mit anderen Staaten. Diese Tendenz trägt objektiv zur gleichzeitigen Erweiterung der Kanäle der politischen Kommunikation zwischen den Subjekten des Vereins bei und forciert Integrationsinitiativen im politischen Bereich. Auf der anderen Seite entsteht die regionale Integration als Ergebnis politischer Beziehungen, die nicht immer auf dem angemessenen Niveau der wirtschaftlichen Interaktion beruhen und geografische und historische Merkmale berücksichtigen können. Diese beiden Trends sind eng miteinander verknüpft [1].

Auf der zwischenstaatlichen Ebene erfolgt die Integration durch die Bildung regionaler Wirtschaftsverbände und die Harmonisierung ihrer in- und ausländischen Wirtschaftspolitik. Interaktion und gegenseitige Anpassung der Volkswirtschaften manifestiert sich vor allem in der schrittweisen Schaffung eines "gemeinsamen Marktes" - in der Liberalisierung der Bedingungen des Warenaustausches und der Übertragung von produktiven Ressourcen (Kapital, Arbeit, Information) zwischen den Ländern.

Viele Länder verzichten freiwillig auf die volle nationale Souveränität und bilden Integrationsverbände mit anderen Staaten. Der Hauptgrund für diesen Prozess ist der Wunsch, die Wirtschaftlichkeit der Produktion zu erhöhen, und die Integration selbst ist in erster Linie wirtschaftlich.

Das schnelle Wachstum der wirtschaftlichen Integrationsblöcke spiegelt die Entwicklung der internationalen Arbeitsteilung und der internationalen Produktionskooperation wider.

Die Integration in den Agrarsektor ist der wichtigste Faktor für die Gewährleistung einer nachhaltigen Entwicklung der landwirtschaftlichen Produktion und die Gewährleistung der Ernährungssicherheit der GUS-Länder.

Die Bedeutung der Integration im Agrarbereich wird durch die Möglichkeit bestimmt, in diesem Fall erhebliche Vorteile zu erzielen. Welche umfassen:

- Erzielung eines synergistischen Effekts, wenn das Endergebnis die Menge der anfänglichen Ablagerungen übersteigt;
- rationale Nutzung natürlicher, personeller und finanzieller Ressourcen, die zur Verbesserung der sozioökonomischen Situation jedes Landes und des Commonwealth insgesamt beitragen;
- Umsetzung des Übergangs zu einem innovativen Entwicklungspfad durch Einbeziehung des wissenschaftlichen Potenzials der Commonwealth-Länder, von denen jedes seine eigenen Errungenschaften in diesem Bereich hat, diese jedoch nicht immer vollständig umsetzen können;
- Schaffung von Voraussetzungen und Möglichkeiten, um erhebliche Verluste durch ungerechtfertigten Wettbewerb auf ausländischen Märkten zu vermeiden;
- Wahrung der nationalen Besonderheiten der Integrationsländer und ihrer Souveränität [2].

Landwirtschaft der Ukraine betreibt unter den Bedingungen der globalen Nahrungsmittel- und Finanzkrise zu erhöhen, durch die wirtschaftliche und organisatorische Umstrukturierung der Branche verschärft.

Wichtige Komponenten des Systems der Reformen der Agrarpolitik sind: die Schaffung eines offenen und transparenten Marktumfeldes, die Bildung einer effektiven Marketing-Infrastruktur des Agrarmarkts, die Optimierung der landwirtschaftlichen Vertriebskanäle, die Werkzeuge der staatlichen Regulierung der Entwicklung der Agrar- und Ernährungswirtschaft zu verbessern, mit einem Fokus auf der Gewährleistung der Ernährungssicherheit des Landes und erhöhen ihre Präsenz auf den internationalen Agrarmärkten.

Die Formen der Organisation der Produktion in der Ukraine haben ein wichtiges Merkmal des Wunsches, die Großproduktion in der Pflanze zu erhalten, als Hauptlieferant von Commodity-Produkten, vor allem Getreide.

Allerdings ist eine der grundlegenden Vorschriften des vorgeschlagenen IWF für die Länder der ehemaligen Sowjetunion - der Rückzug des Staates aus der Wirtschaft und die tatsächlichen Beendigung der staatlichen Unterstützung für das Dorf - mit allen negativen Konsequenzen durchgeführt.

Eine radikale Transformation in ländlichen Gebieten, die Disparität der Preise als Folge der Marktliberalisierung, die Zerstörung der alten Versorgung und Handelsinfrastruktur, der starke Rückgang bei der Verwendung von Düngemitteln und die tatsächliche Beendigung der Lieferung von Ausrüstung, sowie der Mangel an Wirtschaftszuverlässiger finanzieller Ressourcen - alles führte dies zu einem starken Rückgang der Produktion, vor allem im öffentlichen Sektor, der massive Abzug von Arbeitskräften aus.

Dörfer und die Bauernschaft - der Wunsch zu überleben durch die Organisation von persönlichen Nebenfarmen. Diese Situation eine Überarbeitung erforderlich, wenn auch nicht in Form von Rundfunkprogrammen, Agrarpolitik, die Rückkehr des Staates in der Landwirtschaft, als eine wichtige Kraft für die finanzielle Sanierung der landwirtschaftlichen Betriebe und Produktion. Im Wesentlichen war diese Revision zu einem großen Teil der Ideologie der Agrarpolitik. die Schaffung eines Vorzugskredit System der direkten Unterstützung der Regierung durch verschiedene Programme, gefolgt von all das noch durch die steuerlichen Vorzugsmaßnahmen. Diese Faktoren hätte sich nur positiv auf die landwirtschaftliche Produktion auswirken können. Wir müssen auch einige fruchtbare Jahre in Betracht ziehen. Die Produktion hat jedoch noch nicht das Niveau vor der Reform erreicht, und auch der Nahrungsmittelverbrauch ist erheblich zurückgegangen. Ist ein sehr schmerzhaftes Problem der Mechanisierung der Landwirtschaft aufgrund der extremen Verschlechterung des Parks und drastisch die Versorgung Dorf zu reduzieren.

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### **ORGANIZATION OF ACCOUNTING CAPITAL INVESTMENTS IN CREATION OF INTANGIBLE ASSETS**

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The main purpose of each company's activity is to generate profits. Nowadays, businesses are using great amount of resources and tools. If earlier it was enough to use available tangible assets, now such policy does not provide any guarantees that the organization will be successful and profitable. That is why intangible assets have become a vital element of any enterprise.

Tangible and intangible assets are usually formed by industrial enterprises through their purchase from suppliers or by using services of outside organizations including construction, design, research and other works. Such activity requires an adequate system of accounting organization.

First of all, we will appeal to the International Standard of Accounting 38 "Intangible Assets", which defines the concept of intangible assets. Paragraph 8 states that they include the development of new technologies, the acquisition of scientific knowledge, the development and introduction of new systems, licenses, intellectual property, certain market research and trademarks (including product marks and the title of publications). The examples of such objects include computer software, patents, copyrights, customer lists, mortgage rights, import quotas, privileges, customer / supplier relationships, customer loyalty, market share, marketing rights and so on [1].

If we consider FP (b) O 8 "Intangible assets" [2], then we can see the definition of an intangible asset: a nonmonetary asset that is not material and can be identified and held by the entity during more than one year (or one operating cycle, if it exceeds one year) for production, trade, administrative purposes or leasing to other individuals.

In the intangible assets' chart of accounts a separate account is allocated. At the debit of the account 12 "Intangible assets" we display purchase or obtaining of intangible assets as a result of development that are accounted at the original cost, and the amount of the revaluation of such assets. For credits - the release due to sale, free disposal or the inability of

enterprise to receive further economic benefits from its usage and the amount of intangible assets.

Investment activity of industrial enterprises is associated with considerable expenses. They are considered to be accounted in the account 15 "Capital investment". For analytical accounting of expenses for certain areas of investment and ensuring the final formation of the initial value of each acquired and independently created assets, the plan of accounting of assets, capital, liabilities and business operations of enterprises and organizations, approved by the order of the Ministry of Finance of Ukraine from 30. 11 1999 No. 291 provides the use of the following sub-accounts:

1. Sub-account 151 "Capital construction" - to reflect the use of funds for construction, carrying out both subcontracting and business methods for the own needs of an enterprise.

2. Sub-account 152 "Acquisition (production) of fixed assets", which is designed to account the cost of the acquisition or production of own assets of tangible assets, which is recorded in the account 10 "Property, plant and equipment" (except for construction and biological assets).

3. Sub-account 153 "Acquisition (production) of other non-current tangible assets" - to reflect enterprise's investments in the acquisition or production of own assets of tangible assets, which account is taken into consideration 11 "Other non-current tangible assets".

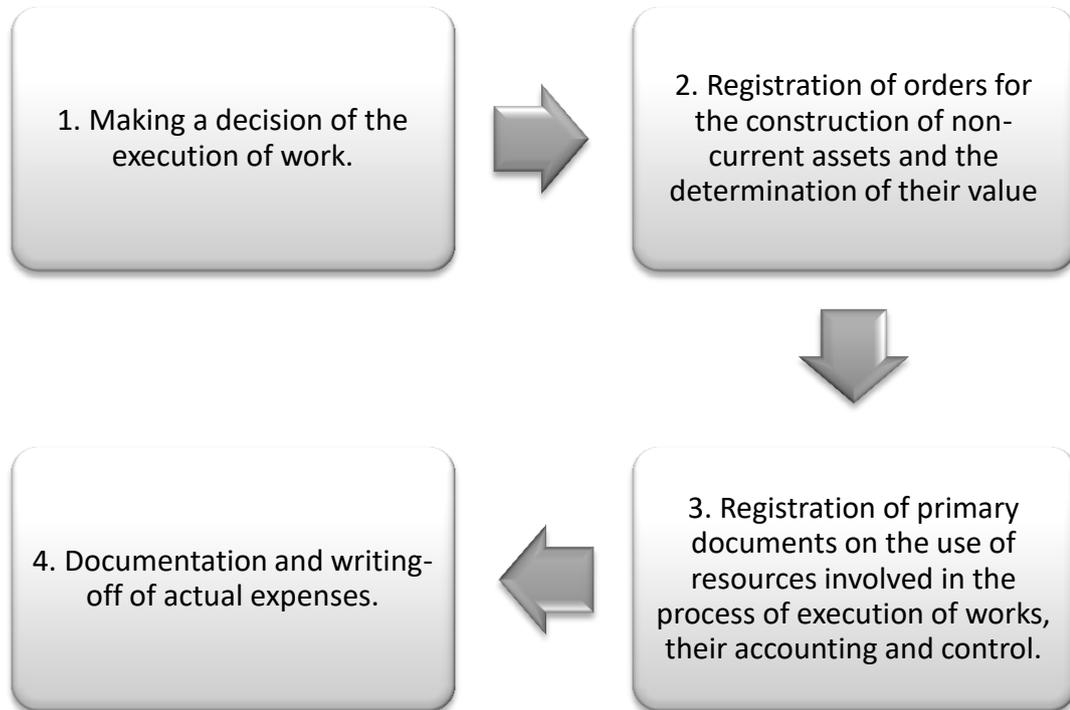
4. Sub-account 154 "Acquisition (creation) of intangible assets", where it is necessary to calculate expenses of an enterprise for the acquisition or creation of own assets, accounting of which is carried out in the account 12 "Intangible assets".

By the debit of the subaccount 154, the accounting of the company accrues expenses that, based on the relevant documents on completion of the work will be written off on other sub-accounts of capital investment.

Working on the creation or improvement of intangible assets at enterprises is usually performed by employees of specialized units and requires special funding and proper control of the use of all types of the resources involved. So, it is necessary to introduce an understandable system of reporting, accounting and control of work execution, which would include the order shown in Figure 1.

The written order for the execution of works is issued by the head of an enterprise or his deputies on the basis of the decision of the owners, protocols of production and technical meetings, the application of the heads of shops or other units, etc. In accordance with the written order of the company's service, the departments responsible for capital investment in intangible assets, such as the IT department, are obliged to place orders for the execution of works and register them in special journals. After registration of the order, it is transferred to the executing unit for the establishment of the nomenclature and determination of direct and indirect costs. These particular data are necessary for the calculation and determination of estimated cost of

works for the implementation of the capital investment project in the creation of intangible assets by the order which should contain only direct and total production costs.



*Figure 1 System of documenting, accounting and control of capital investment in intangible assets*

After the proper execution of documents for capital investment work, they are transferred to the accounting department of an enterprise and will be served as the basis for opening an analytical account (card) for accounting and control of actual costs by order.

Transmissions into operation of the created intangible assets are formalized by acts of the model form NA-1 "Act of introduction into the economic circulation of the object of intellectual property rights." These documents will be the basis for the write-off of actual capital expenditures from the credit under the subaccount 154 "Acquisition (creation) of intangible assets" and their inclusion in the debit account for the accounting of intangible non-current assets.

Consequently, to make it short, the investment activity of the company in the irreversible, and especially in intangible assets, requires considerable attention. A well-structured accounting system for capital investment will help to facilitate the creation of intangible assets.

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**Goncharova A. S.**

## **INTERESTING FACTS ABOUT MANAGEMENT, MYTHS**

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Management is a special kind of activity that turns an unorganized crowd into an effective, purposeful and productive group.

Considering some facts about managers and management, it is necessary to mention the following moments: when a manager is hired, the most important quality is considered talent, then - work experience, dedication and professionalism; during the setting of the goal, the expected result is indicated, and not the expected strategies for achieving it; when the manager motivates the subordinate, the emphasis is on the strengths of the employee, not the weak ones; management supports a particular employee by translating him or her into a suitable position, not just the next one. during the setting of the goal, the expected result is indicated, and not the expected strategies for achieving it; when the manager motivates the subordinate, the emphasis is on the strengths of the employee, not the weak ones; management supports a particular employee by transferring him or her into a suitable position, not just the next one.

As for the myths about management, they can be found enough, but we will consider the main five ones.

The first myth is a formula for success, which says that there is a definite management formula, the application of which guarantees successful functioning and productivity growth. In fact, there is no definite formula. Each organization includes unique parameters, which must be processed in a special order.

In the second myth, it is indicated that it is worth following the strategy. A certain set of steps or a predefined strategy must necessarily be followed for successful management of the process. In fact, improvisation is an hour affair. If a particular strategy worked well for one organization, this does not necessarily mean that the same strategy will correct the problems of other organizations. It is necessary to understand that while different individuals are involved in the process, the methods of action will change. In addition, management is a multi-level activity and it must change in accordance with

each scenario, each dispute, each employee and with each problem of other levels.

The third myth tells about getting into the goal - the achievement of goals.

It is believed that if the daily, weekly, monthly and annual tasks for one employee, as well as at the managerial level are performed, the company achieves its ultimate goals and ambitions.

And in fact there is a possibility that the main goal can be missed in the pursuit of numbers.

Measurement of the organization's activities only against the achieved goals is a scarce management. The most revealing way to measure the success of any organization is to track the fact of meeting the crucial and significant criteria for achieving the main goals. If the performance of tasks promotes the organization on a one step closer to the main goal, then everything is good and excellent. But, if it does not give anything in terms of improving the company, the best way is to check the insufficiency of "sufficient" numbers.

Equal treatment of all is the fourth myth of management. Equal treatment of each employee is the only correct way of management. In fact, the key is a "fair" attitude, and not "the same."

Obviously, excellent performers will be rewarded with incentives, and they deserve it. On the other hand, lagging employees and employees of mid-level productivity should also be motivated to improve. And again, justice should not overlap with the allocation of pets (favoritism). Favoritism in the workplace interferes with effective management, which can raise undesirable moral and ethical problems.

Your contacts - your knowledge - the seventh myth, which states that the only way to achieve your goal is not using and applying your knowledge and understanding, but to develop contacts and social ties. In fact, without knowledge and effectiveness in a certain process, your contacts and connections go into oblivion.

The organization hires a certain person depending on its potential and understanding of this issue. Such important resources as time and money will not be wasted on those who are not competent in a specific role, just because he or she was appointed by someone at the highest level of the organization. Management trusts its organization by attaching someone to their project, and this is their right to expect from a hired employee the promised 100% effort. On the other hand, it is unfair and impractical to think that promotions are determined by ties.

All the above points of view are the top five management myths that have existed since immemorial time.

Management is not just a job, it's an art. Efficiency, potential and diligence are of little value if they are appropriately and artistically not managed.

G.S. Alag once said: "Anything plus management is equal to success." Thus, if there is nothing more desirable than success, then there is nothing more useful than management.

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### **TAX SYSTEM OF UKRAINE**

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The main source of state existence and fulfillment of its functions are taxes. The totality of taxes and taxes in force in the state forms the tax system. The combination of forms and methods of collecting part of the income of legal entities and individuals in the budget revenue forms a system of taxation.

The basic principles of functioning of the tax system should be the one-time taxation of one and the same object; the equality of the amount of the tax paid on the value of the benefits and services received from the state; the purpose of each type of tax, that is, its focus on covering specific types of budget expenditures; the application of new taxes should only take place to cover new government expenditures, rather than a budget deficit; they should be simple and understandable for taxpayers, tax conditions; tax collection in a convenient time for the payer and understandable to him by the method of taxation. In general, the existing taxation system in Ukraine is rather complicated, difficult to access and little understood by taxpayers. This applies primarily to the calculation of income tax. Accepted for this law is fuzzy, vague, stated in it, the procedure for calculating taxable income contradicts the existing practice of calculating profits in accounting.

Direct taxes are taxes that are imposed directly on the income and property of taxpayers and paid by them from their own proceeds of money. These include taxes on income, vehicles, land, income tax on incomes of citizens, etc. These taxes are established directly on the income or property of the payer and their size depends on the volume of the object of taxation.

Indirect taxes are imposed on goods and services and are paid by the buyer in their prices or tariffs, and the budget is paid by sellers of goods and services providers. In this case, the buyer pays these taxes to the seller in the prices for the goods and services that he buys, and the seller subsequently transfers them to the state. In this case, the link between the taxpayer (the consumer of the goods) and the state is mediated through the object of taxation. Indirect taxes include VAT, excise duty, customs duties. The size of these taxes at constant rates (tariffs) depends on the number and value of purchased goods (services). The economic content of the object of taxation distinguishes between taxes on income, consumption and property. These include income tax and personal income tax. The consumption tax is levied on purchasers in the prices of goods and services purchased. These taxes include VAT, excise and customs duties. An application for property is established on the concrete property of legal entities and individuals. Depending on the level of state structures that impose taxes, they are divided into national and local [1].

Local taxes are set by the local authorities and are mandatory for payment in a certain area. Local taxes include municipal taxes, advertising taxes, and fees: hotel, market, resort, for issuing an order for an apartment, etc. Common are taxes that do not have a specific purpose and are used by the state for nationwide measures (maintenance of government bodies, defense of the country, etc.). These include income tax, VAT, personal income tax, excise duty, etc. [3].

Each type of tax must have a corresponding source of payment. The sources of tax and tax payments are the income of their payer, from which the corresponding taxes and payments are paid, that is, the one from which taxes are paid. The source may be directly related to the object of taxation (for example, when the income is taxed directly - profit, then the object of taxation and the source coincide), or may not be related to the object of taxation (for example, the tax on vehicles is charged from volume of cylinders of the engine of the car, and is paid from income). Formation of sources of payment of taxes is related to the pr Percent is the income on invested capital or invested resources (means of production, etc.). This revenue can be received both by legal entities and individuals. Thus, it can be a source of both direct and indirect taxes.

Wages - is the income paid to employees for the use of their labor (workforce). It is the proportion of national income that comes in personal consumption. This revenue can be a source of both direct taxes (profitable) and indirect (VAT, excise) [2].

Entrepreneur is the income received as a result of entrepreneurial activity. It is a source of payment of direct taxes to entrepreneurs (income tax, etc.). When analyzing the sources of payments for the income of legal entities and individuals and directly to taxpayers, it should be noted that the source of payment of direct taxes (income tax, etc.) for legal entities is their direct income. For indirect taxes (VAT, excise duty, etc.), the source, in the end, is

also profit (since attributing them to an increase in the cost of sales of products and services reduces the amount of profit), ie they are paid budget revenue directly. As for individuals, direct taxes (income, etc.) deducted from their income (as sources of taxes) are paid to the budget from the proceeds of business entities. Indirect taxes (VAT, excise duty) are levied on individuals through the prices of goods sold and services provided, and transferred to the budget by sellers of goods and services from the proceeds. Thus, if the sources of tax payment for legal entities and individuals are different, they are paid to the budget by economic entities from the proceeds [3].

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### **DAS MINIMALE GEHALT: DIE PROBLEME UND DIE WEGE IHRER LÖSUNG**

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Die Kennziffer, die von der Effektivität der Produktion abhängt, der Arbeitsproduktivität und der Konkurrenzfähigkeit der Produktion ist ein Gehalt. Das Gehalt ist ein Indikator, von dem die allgemeine Lebensqualität der Arbeiter und ihrer Familien abhängt. Von ihrem Zustand und den Formen der Realisierung, des Anteiles im nationalen Bruttoprodukt in vieler Hinsicht hängt die Entwicklung der Wirtschaft insgesamt auch ab. Das Gehalt gewährleistet die Bildung der vereinten Nachfrage der Arbeitskraft, wird ein immer mehr wichtiger Faktor der öffentlichen Produktion unter den Bedingungen des modernen Marktmechanismus.

Als einer der Hauptregler des Arbeitsmarktes tritt das Gehalt auf. Jedoch wird der Frage der Analyse und der Einschätzung der Einwirkung der Gehälter auf den Arbeitsmarkt und vor allem auf die Beschäftigung in der Ukraine, die gehörige Aufmerksamkeit, was zu den negativen Folgen – der beschleunigten Größe der Arbeitslosigkeit bringt, der Zerstörung der Motive und der Stimuli zum Werk, der Verarmung der Mehrheit der Bevölkerung nicht gewidmet. Deshalb, nach unserer Meinung, ist die Analyse des Niveaus des Gehaltes bei der modernen Entwicklung der Wirtschaft aktuell.

Das minimale Gehalt ist ein gesetzgebend bestimmter Umfang des Gehaltes nach dem einfachen, unqualifizierten Werk, es ist der niedriger es kann sich die Bezahlung für erfüllt vom Arbeiter monatlich, sowie die Stundennorm des Werkes nicht verwirklichen. Das minimale Gehalt ist eine staatliche soziale Garantie, die auf dem ganzen Territorium der Ukraine für die Unternehmen aller Eigentumsformen und die Wirtschaftsführung und auch die natürlichen Personen obligatorisch ist, der gemieteten das Werk verwendenden Arbeiter [1].

Entsprechend den internationalen Akten das minimale Gehalt sollen, einerseits, unter Berücksichtigung der Interessen der Arbeiter, sowie der Mitglieder ihrer Familien, und mit anderem - unter Berücksichtigung der wirtschaftlichen Entwicklung feststellen. Gerade hängt von der sozial-ökonomischen Lage des Landes die Bestimmung der Kriterien der Errichtung des minimalen Niveaus der Hauptlebensnotwendigkeiten der gemieteten Arbeiter ab. Das Verzeichnis der Bedürfnisse für die Aufrechterhaltung des würdigen Lebensstandards bestimmt "die Allgemeine Deklaration der Menschenrechte", entsprechend deren Art. 25 jeder Mensch auf solche Lebensqualität, einschließlich die Nahrung, die Kleidung, die Behausung, den medizinischen Abgang und die soziale Bedienung berechtigt ist, der für die Aufrechterhaltung der Gesundheit und seines Wohlstands am meisten und der Familie [2] notwendig ist. Entsprechend den internationalen Standards wird das Niveau des minimalen Gehaltes wie die untere Grenze betrachtet, die die Befriedigung der Hauptlebensnotwendigkeiten des Arbeiters und der Mitglieder seiner Familie garantieren soll. Jedoch hängt die Bestimmung der Kriterien des minimalen Niveaus der Lebensnotwendigkeiten von der Wirtschaftssituation im Land, der Arbeitsproduktivität und der Fähigkeit der Arbeiter aktiv in vieler Hinsicht ab, die Rechte zu behaupten. In diesem Plan die Situation in der Ukraine nicht allzu tröstlich. Doch der Umfang des minimalen Gehaltes (3200 hrv. In Dezember 2017 nicht zu), die als Lebenshaltungskosten auf die arbeitsfähige Person fast ist doppelt so viel, lässt die Hauptbedürfnisse des Menschen zu befriedigen und gewährleistet nur die Möglichkeit des physiologischen Überlebens [3].

Wir werden bemerken, dass die sozialen Garantien auf einem Niveau im Laufe des Jahres blieben, doch blieb das minimale Gehalt nach dem Gesetz der Ukraine "Über das Budget der Ukraine unveränderlich am 2017". Die folgende Erhöhung des minimalen Gehaltes wird schon im folgenden Jahr stattfinden: ab dem 1. Januar 2018 bis zu 3723 hrv. Und der Lebenshaltungskosten bis zu 1700 hrv. [4].

Also, heute soll eine der Prioritätsaufgaben des Staates die Stimulierung des inneren Konsums und die Erhöhung der Kaufkraft der Bevölkerung werden. Dazu, nur die rechtmäßige Verteilung der Einkünfte im realen Sektor der Wirtschaft wird helfen, die Armut in der Ukraine zu überwinden. In der Wirtschaftssituation, ausgeprägt auf heute im Land, muss man die Politik der Regulierung des Systems der Bezahlung des Werkes und die besondere

Aufmerksamkeit revidieren, der Verstärkung der kontrollierenden Funktionen des Staates hinter dem Prozess der Bildung und der Verteilung der Aufwände von national bis zu lokal der Niveaus der Wirtschaft, vorsehend die Entwicklung der Methodologie und der Grundlagen der begründeten Erhöhung der Kosten auf die Bezahlung des Werkes in der Ukraine zuzuteilen. Die Erhöhung des Umfanges des Gehaltes - der mächtige Stimulus für die allseitige Entwicklung der einheimischen Wirtschaft, dank der man auf die Größe der inneren Nachfrage, die Erhöhung der nationalen Produktion, die Bildung der neuen Arbeitsplätze, die allgemeine Verbesserung des Lebens der Bevölkerung und der Bildung bei der Gesellschaft das Gefühl der Geborgenheit und der Überzeugung in der Zukunft rechnen kann.

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### **Kamynin O. K.**

#### **BEDEUTUNG DER ENTWICKLUNG DES MENSCHLICHEN KAPITALS IN DER BILDUNG DER NATIONALEN WIRTSCHAFT**

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Unter den heutigen Bedingungen der Entwicklung der Volkswirtschaft ist es wichtig, die besondere Rolle des Humankapitals bei der Bewältigung von Krisensituationen zu verstehen. Dies ist die einzige Ressource, deren Einsatzmöglichkeiten praktisch unbegrenzt sind.

In den letzten Jahren eine gemeinsame Ansicht geworden, dass die Wirksamkeit der modernen Staaten Volkswirtschaften stark davon abhängen, wie viel es in seine Menschen investiert. Zum Beispiel in den USA, nach einigen Schätzungen ist der Anteil der Investitionen in das Humankapital

mehr als 15% des BIP, mehr als die „reine“ Privatkapital Bruttoinvestitionen in Maschinen, Anlagen und Lagerhallen. [1].

Humankapital - gebildet wird, und als Folge der Investitionen entwickelt und gewann einen Mann stock Gesundheit, Wissen, Fertigkeiten, Fähigkeiten, Motivationen, die speziell in den besonderen Bereich der wirtschaftlichen Tätigkeit verwendet wird, steigert die Produktivität und damit das Umsatzwachstum seines Besitzers beeinflussen, Unternehmensgewinne und Volkseinkommen. [2, p. 280]

Humankapital entsteht vor allem durch Investitionen in die Verbesserung des Lebensstandards der Bevölkerung. Einschließlich - in der Ausbildung, Bildung, Gesundheit, Wissen (Wissenschaft), Geschäftsfähigkeit und Klimainformationen Bereitstellung in der Arbeit, die Bildung von wirksamen Eliten, die Sicherheit der Bürger und die Wirtschaft und die wirtschaftlichen Freiheit, sowie Kultur, Kunst und andere Bestandteile.

Es gibt drei Arten von Investitionen in Humankapital: Investitionen in Bildung, Gesundheitsausgaben und Mobilitätskosten. Investitionen in Gesundheit und Bildung sind die wichtigsten. Allgemeine und spezielle Bildung verbessern die Qualität, erhöhen das Niveau und den Bestand an menschlichem Wissen und erhöhen dadurch das Volumen und die Qualität des Humankapitals. Investitionen in die Hochschulbildung tragen zur Bildung hochqualifizierter Fachkräfte bei, deren hochqualifizierte Arbeitskräfte den größten Einfluss auf das Tempo des Wirtschaftswachstums haben [3].

Die Ukraine ist dem Entwicklungsstand des Humankapitals gegenüber den Industrieländern deutlich unterlegen. Dies ist zurückzuführen auf:

- ein niedriger Lebensstandard (gemäß dem Index für die Lebensqualität 2016 erreicht die Ukraine Platz 63 von 133);
- unzureichende Finanzierung der menschlichen Entwicklung (Ukraine auf dem Index der menschlichen Entwicklung, bis 2016, nimmt Platz 81)
- Verlust der Position in der Entwicklung des menschlichen Potenzials des Landes.

Die Existenz dieser Faktoren niedriger menschlicher Entwicklung führt zu negativen sozialen und wirtschaftlichen Folgen, unter denen die folgenden hervorzuheben:

- massive Entvölkerung der Bevölkerung mit einer Verschlechterung der qualitativen Merkmale des Humankapitals;
- irrationale Bevölkerungsstruktur der Bevölkerung;
- Verringerung der Geburtenzahl und Erhöhung der Sterblichkeitsrate der Bevölkerung;
- Abwertung des Humankapitals;

Unter den Bedingungen der wissenschaftlichen und technologischen Revolution ist das Humankapital der Haupttreiber des BIP und des nationalen Reichtums des Landes. Das Wissen und die Fähigkeiten, die in Bezug auf die Transformation der wirtschaftlichen und sozialen Bereich werden der dominierende Faktor bei der Erreichung wirtschaftlicher Erfolg für

Privatpersonen und Unternehmen und für das Land als Ganzes Humankapital definieren.

Daher sollte die Ukraine ihre Prioritäten für die Investitionspolitik überprüfen und die Schlüsselrolle des Humankapitals anerkennen. Gleichzeitig erkennen Sie nicht nur die Person als ein führendes Element im Wirtschaftssystem, sondern verstehen auch die Notwendigkeit, in eine Person zu investieren, da Kapitalerhöhungen auf Kosten von Investitionen und in der Zukunft eine lange wirtschaftliche Wirkung bringen.

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#### DIE EUROPÄISCHE INTEGRATION – EINE SCHLÜSSELPRIORITÄT DER UKRAINISCHEN AUßENPOLITIK

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Die europäische Integration ist eine Schlüsselpriorität der ukrainischen Außenpolitik, die in Übereinstimmung mit den Normen und Standards der EU systemische Reformen in allen Bereichen des Lebens vorsieht. Das ultimative Ziel der europäischen Integration ist der Erwerb der Mitgliedschaft in der Europäischen Union durch die Ukraine. Die Hauptaufgabe für heute ist der Abschluss der Verhandlungen über den Abschluss des Assoziierungsabkommens, dessen integraler Bestandteil die Freihandelszone ist. Separate wichtige Richtung der Zusammenarbeit unseres Landes mit der EU ist visumfreien Dialog, dessen Ziel in dieser Phase dem die Durchführung der ersten Phase des Aktionsplans zur Liberalisierung der Visabestimmungen, deren Umsetzung wird die Ukraine in der Zukunft ermöglichen visumfreien EU-Mitgliedstaaten für die Reisen der Bürger zu erreichen, einschließlich "Schengen-Zone".

Das Assoziierungsabkommen ist von historischer Bedeutung für die strategische Entwicklung des ukrainischen Staates, da es nach der Unterzeichnung eine Änderung der Spielregeln auf regionaler Ebene erfordert.

Die Erfüllung dieser Kriterien ist keine Frage von einem Tag. In einigen Ländern arbeitet die ukrainische Gesellschaft seit ihrer Unabhängigkeit. Insbesondere handelt es sich um eine Reform der Staatsanwaltschaft, der Gerichtsverfahren, des öffentlichen Finanzmanagements, des Geschäfts- und Investitionsklimas.

All diese Kriterien sind eine sorgfältige und systematische Arbeit: die Ausarbeitung von Gesetzesvorlagen, ein Dialog mit europäischen Institutionen und öffentlichen Organisationen, die Umsetzung der bereits verabschiedeten Gesetze. Diese Pläne spiegeln sich in den Entscheidungen des Präsidenten, der Regierung und des Nationalen Sicherheits- und Verteidigungsrats wider.

Die ukrainische Seite hat bereits einige Fortschritte gemacht, und dies wird sowohl in Brüssel als auch in einigen europäischen Hauptstädten anerkannt.

#### *Kriterien für die Unterzeichnung der Vereinbarung*

Im Rahmen der Wahlkriterien der drängenden Fragen bleiben das Datum der Wahlen für das Problem der Einzelwahlkreise und die Notwendigkeit, dass die Empfehlungen zur Verbesserung der Rechtsvorschriften über die Parlamentswahlen gemacht von der Venedig-Kommission / des Europarates und der OSZE zu bestimmen, wurden berücksichtigt.

Der endgültige Entwurf zur Änderung des Gesetzes über die Wahl der Volksvertreter wurde der Venedig-Kommission und der OSZE für zusätzliches Fachwissen zur Verfügung gestellt. Im Falle einer positiven Beurteilung wird das Gesetz unverzüglich im Parlament verabschiedet.

Wie für die Reform des Justizsystems, ist die zentrale Frage betrachtet das Know-how der Venedig-Kommission und die Verabschiedung der ersten Lesung des Gesetzes über die Reform der Staatsanwaltschaft zu übertragen, die dramatisch die Rolle dieser Institution in der ukrainischen Justiz ändern sollten, es näher an den besten europäischen demokratischen Standards zu bringen. Bei der Ausarbeitung von Gesetzentwürfen in Bezug auf die Strafverfolgungsbehörden und den Obersten Justizrat werden Fortschritte erwartet. Nach Erhalt der letzten positiven Schlussfolgerungen der Venedig-Kommission muss die Einführung von Änderungen der Verfassung der Ukraine in Bezug auf die Reform des Gerichtsverfahrens sichergestellt werden [1].

Besondere Aufmerksamkeit im Zusammenhang mit der Erfüllung der Kriterien sollte Exit-Strategie zu finden, aus der Situation mit dem ehemaligen Premierministerin Julia Timoschenko eine politische und rechtliche gegeben werden. Dies sollte in Verbindung mit der Beobachtermission des

Europäischen Parlaments unter der Leitung von P. Cox und A. Kwasniewski geschehen.

Ich möchte darauf hinweisen, dass eine der Prioritäten der ukrainischen Regierung in der Wirtschaft für die Anziehung ausländischer Investitionen die Schaffung günstiger Bedingungen ist [2].

Das Hauptziel und das Programm des Gipfels in Vilnius sollten die Einführung einer strategischen Politik und der Anstoß sein. Die Unterzeichnung des Assoziierungsabkommens mit der Ukraine und der Abschluss des Verhandlungsprozesses für solche Abkommen mit anderen Partnerländern werden die Grundlage für die Fortsetzung der strategischen Diskussion über die Annäherung der Partnerländer an die EU im Sinne von "mehr für mehr" bilden.

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### **WHAT IS BLOCKCHAIN AND HOW IT WORKS**

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Many of the technologies we now take for granted were quiet revolutions in their time. Just think about how much smartphones have changed the way we live and work. It used to be that when people were out of the office, they were gone, because a telephone was tied to a place, not to a person. Now we have global nomads building new businesses straight from their phones. And to think: smartphones have been around for merely a decade. We're now in the midst of another quiet revolution: blockchain, a distributed database that maintains a continuously growing list of ordered records, called "blocks". Consider what's happened in just the past 10 years:

- The first major blockchain innovation was bitcoin, a digital currency experiment. The market cap of bitcoin now hovers between \$250–\$300 hundred billion dollars, and is used by millions of people for payments, including a large and growing remittances market.

- The second innovation was called blockchain, which was essentially the realization that the underlying technology that operated bitcoin could be

separated from the currency and used for all kinds of other interorganizational cooperation. Almost every major financial institution in the world is doing blockchain research at the moment, and 15% of banks are expected to be using blockchain in 2017.

- The third innovation was called the “smart contracts” embodied in a second-generation blockchain system called ethereum, which built little computer programs directly into blockchain that allowed financial instruments, like loans or bonds, to be represented, rather than only the cash-like tokens of the bitcoin. The ethereum smart contract platform now has a market cap of around a hundred billion dollars, with hundreds of projects headed toward the market on the ethereum platform.

- The fourth major innovation, the current cutting edge of blockchain thinking, is called “proof of stake.” Current generation blockchains are secured by “proof of work,” in which the group with the largest total computing power makes the decisions. These groups are called “miners” and operate vast data centers to provide this security, in exchange for cryptocurrency payments. The new systems do away with these data centers, replacing them with complex financial instruments, for a similar or even higher degree of security. Proof-of-stake systems are expected to go live later this year.

- The fifth major innovation on the horizon is called blockchain scaling. Right now, in the blockchain world, every computer in the network processes every transaction. This is slow. A scaled blockchain accelerates the process, without sacrificing security, by figuring out how many computers are necessary to validate each transaction and dividing up the work efficiently. To manage this without compromising the legendary security and robustness of blockchain is a difficult problem, but not an intractable one. A scaled blockchain is expected to be fast enough to power the internet of things and go head-to-head with the major payment middlemen (VISA and SWIFT) of the banking world, which means performing about or more than 7-8 thousand transactions per second.

This innovation landscape represents just 10 years of work by an elite group of computer scientists, cryptographers, and mathematicians. As the full potential of these breakthroughs hits society, things are sure to get a little weird. Self-driving cars and drones will use blockchains to pay for services like charging stations and landing pads. International currency transfers will go from taking days to an hour, and then to a few minutes, with a higher degree of reliability than the current system has been able to manage. These changes, and others, represent a pervasive lowering of transaction costs. When transaction costs drop past invisible thresholds, there will be sudden, dramatic, hard-to-predict aggregations and disaggregations of existing business models. For example, auctions used to be narrow and local, rather than universal and global, as they are now on sites like eBay. As the costs of reaching people

dropped, there was a sudden change in the system. Blockchain is reasonably expected to trigger as many of these cascades as e-commerce has done since it was invented, in the late 1990s. Predicting what direction it will all take is hard. Predictors usually overestimate how fast things will happen and underestimate the long-term impacts. But the sense of scale inside the blockchain industry is that the changes coming will be “as large as the original invention of the internet,” and this may not be overstated. What we can predict is that as blockchain matures and more people catch on to this new mode of collaboration, it will extend into everything from supply chains to provably fair internet dating (eliminating the possibility of fake profiles and other underhanded techniques). And given how far blockchain come in 10 years, perhaps the future could indeed arrive sooner than any of us think.

Until the late 1990s it was impossible to process a credit card securely on the internet — e-commerce simply did not exist. How fast could blockchain bring about another revolutionary change? That is the question the time will ask, but turning back to the revolution of the Internet suggests promising and intensively growing opportunities.

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### **UNABHÄNGIGKEIT DER ZENTRALBANKEN ALS MAKROÖKONOMISCHER FAKTOR**

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Die unabhängige Geldpolitik ist ein Thema, das im 18. Jahrhundert auf dem Spiel steht. und bis heute. Verschiedene Wirtschaftsschulen betrachten dieses Thema aus verschiedenen Richtungen. So haben Vertreter der klassischen Wirtschaftstheorie gesagt, dass die Wirtschaft in der Lage ist, sich selbst zu regulieren und ihre Ressourcen vollständig zu nutzen. Und Vertreter der keynesianischen Schule haben über die staatliche Regulierung von

Wirtschaftsbeziehungen gesprochen. Aber wir glauben, dass die Wahrheit immer noch zwischen ihnen ist. Man kann nicht sagen, dass die Zentralbanken in diesem Staat unabhängig werden und sich der Lebensstandard im Land anpassen wird. All dies hängt von einer Vielzahl von Faktoren ab. Daher ist es notwendig, die Frage zu untersuchen, wie es für die Ukraine am besten sein wird, wenn die Zentralbank unabhängig sein wird oder wenn ihre Unabhängigkeit unter den gegenwärtigen Bedingungen begrenzt sein wird.

Lassen Sie uns die Geschichte der Entwicklung der Idee der Unabhängigkeit der Zentralbank analysieren und entscheiden, welches Maß an Unabhängigkeit in unserem Land benötigt wird.

Vertreter der ersten Richtung sagen, dass die Zentralbank unabhängig sein sollte. Zu diesem Trend gehören W. Kozyuk dass die Unabhängigkeit der Zentralbanken befürworten die Hypothese schlägt, die sagt, dass je niedriger die Höhe der Unabhängigkeit der Zentralbanken in Länder ausgesetzt, wo Exportstruktur von ressourcenintensiven Gütern dominiert. Genau das ist unser Land. Wenn eine Exporte des Landes verringerte sich öffentliche Einrichtungen machen Entscheidungen, die die Wirtschaft des Landes stabilisieren wird und hier auf die Hilfe einer Zentralbank, die Gegenstand der Entwicklung und Umsetzung der Geldpolitik ist. Schließlich, wenn es eine Krise im Land gibt, gibt es keine Investitionen in seine Wirtschaft, niemand will Geld mit langfristigen Schulden geben. Und hier benutzt es die Zentralbank, mit deren Hilfe einen Benchmark durchführen. Die marktbeherrschende Stellung ist dominierend. In Fällen, in denen die Zentralbank aufgrund von Inflation und finanzieller Instabilität als Instrument zur "Beschränkung der nächsten Regierung" eingesetzt wird, ist keine Gruppe daran interessiert, ihre Unabhängigkeit zu erhöhen. Gleiches gilt für den Zugang zur Lodge [1].

Der zweite Grund, der für die Wirtschaft negativ ist, wenn die Zentralbank auf V.Kozyuka Meinung abhängig ist, dass die Zentralbank abhängig Ungleichgewichtsretentionsrate gibt, wenn das schwache Bilanz des Landes Zahlungen infolge der rückläufigen Reserven und wachsende Ungleichgewicht. Was tatsächlich in der Ukraine für eine lange Zeit stattfindet. Kürzungen von Rückstellungen können auch aufgrund des direkten oder indirekten Zugangs zu einem begrenzten Angebot von Währung für bestimmte Mitglieder des öffentlichen Dienstes auftreten. Die Geldpolitik wird zu einem Umverteilungsinstrument, das den einzelnen Menschen Währungszugang ermöglicht, der sie dann für ihre eigenen Zwecke nutzt [1].

Vertreter der zweiten Richtung glauben, dass in einigen Fällen die Unabhängigkeit der Zentralbank begrenzt werden muss. Zum Beispiel, wenn die Zentralbank völlig außer Kontrolle ist und niemand Einfluss darauf hat. Um eine solche Situation in dem Land zu vermeiden, sollten spezielle Kreditinstitute geschaffen werden. Es ist mit ihrer Hilfe und Kontrolle über die Zentralbank. Ein solches System wird derzeit in den Niederlanden betrieben. Das Gesetz des Landes Zentralbank vorgeschlagen, regelmäßige

Konsultationen mit den Vertretern der Finanzinstitute halten die wichtigsten Bereiche der Zentralbankpolitik zu erklären und zu gemeinsamen Anstrengungen der Stabilisierung, anti-inflationäre Maßnahmen zu entwickeln. Diese Art von Übung hilft, gute Kontakte und gegenseitiges Verständnis zwischen den beiden Ebenen des Kreditsystems herzustellen [2].

Vertreter der dritten Richtung glauben, dass die hohe Unabhängigkeit der Zentralbank negativ ist. So sagte Frederick S. Mishkin, dass undemokratische eine Geldpolitik zu haben, die das Wohlbefinden aller in der Wirtschaft betrifft, sondern bestimmt und von der Zentralbank kontrolliert, die niemanden verantwortlich [3].

Nach der Analyse dieser drei Ideen, neigen wir zu der ersten und glauben, dass für unsere wirtschaftliche Situation in dem Land noch mehr Unabhängigkeit der Zentralbank benötigt.

Der Grund für die geringe Unabhängigkeit der Zentralbank könnte sein, dass sie sich für einige der Machthaber interessiert, die wir in unserem Land sehen können. Die Folgen einer solchen Politik können sehr ernst sein, sowohl wegen der Krise des Landes als auch vor dem völligen Zusammenbruch seiner Wirtschaft. Eine andere Sache - diejenigen, die über die wirkliche Unabhängigkeit der Zentralbank entscheiden können, interessiert das vielleicht nicht.

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**Kozyrkov R. V.**

### **LEAN PRODUCTION MECHANISMS IMPLEMENTATION IN THE HIGHER EDUCATIONAL ESTABLISHMENT MANAGEMENT SYSTEM**

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Modern economics situation for higher educational establishments is the following: for successful performance at the educational services regional market and realization of state police in the sphere of higher education in conditions of strict resources deficit it is necessary to understand the problem of improvement of internal management mechanisms. Higher educational establishments in the results of their activity need to follow

sometimes not corresponding interests of two market subjects – a private customer and the state – the only customers of regional HEE services and the sources of their resource base.

Formation of motivating conditions to increasing of effective work of HEE, providing educational services in Russian regions, is carried out by the influence of external environment, primarily stated by the actions of government and implemented in the form of measures of state support of effective higher education and conversely removing from the market ineffective higher educational establishments. So the state regulator – the Ministry of education and science of Russian Federation plans to create at the basis of 60 HEE their centers of innovative-technical and social development.

While creating a list of prospective universities in this regard, the Ministry of Education and Science takes as a basis the results of monitoring of their effectiveness: the university must have a technopark, engineering center or business incubator in its infrastructure. As it was noted in the department, "half of the universities have such infrastructures, and therefore, they have some management models, teams that can be shared with, more global tasks for the territory" [1]. All selected universities should be related to regional clusters, to some special economic zones. For example, at the Primorsky Territory, eight universities have good monitoring indicators results. They are, for example, Vladivostok State University of Economics and Service, Pacific State Medical University. At the Krasnodar Territory, 18 universities were stated to be effective in monitoring. Among them there are the Kuban State University, the Kuban Medical and Technological State Universities. At the Sverdlovsk region, 22 universities are among the most effective. Thus, the market of educational services, formed and regulated by the actions and decisions of the state authorities - the Ministry of Education encourages universities to look for some proactive mechanisms for the formation of effective models of self-government in the struggle to preserve the situation at this market [2].

One of the most promising proactive mechanisms for the formation of effective governance models (and of self-government) in the struggle to maintain a competitive position at any economic system is a comprehensive approach to improving the management of the higher education establishment on the basis of the lean production system in the frame of an organization.

The principles of Lean Manufacturing are methods for simple solutions systematically finding to eliminate hidden losses in the production of goods and services in order to quickly and qualitatively meet the needs of the customer. These simple principles should be implemented by the staff in the workshops and offices, their goal is to help workers get rid of everyday problems routine.

As the practical experience of some universities has shown, "lean production" as a concept can also be used to improve the quality of work of a regional HEE. In particular, the Elabuga branch of KNRTU (Kazan National Research Technical University named after AN Tupolev) has a successful experience in this technology implementing. As noted in the work of V.L. Vasilieva and others, the experience of introducing the Lean-principles in the educational activity of this educational establishment allows us to describe the following actual directions and the results of their implementation:

A) Optimization of the current activity of the organization by the "5S" method (the so-called "five steps" principle). The main processes of the university were chosen as the object of optimization - the activities of the head and the education department. In future it is planned to ensure standardization, sorting, order, discipline and control the departments activities. However, the one-time application of the "5S" itself did not significantly reduce the existing losses and even led to inconveniences due to the existing order change. But if the use of "5S" insured systematically and ubiquitously in any work and undertakings of the units of the university, this can significantly increase the work efficiency.

B) Arrangement of career guidance work according to the "pulling approach" ("pulling" is the production or services rendering only at the request of the customer, internal or external, and at strictly product or service necessary quantity). The next stage is the value creation flow analysis in the educational process, the material and technical base improvement, outside investments attraction, graduated specialties expansion. At the Elabuga branch of the KNRTU, it was implemented in organization of preparatory courses for school leavers, constant cooperation with the residents of the SEZ "Alabuga" and other enterprises of the district, holding traditional conferences on the basis of OJSC "PO ELAZ", opening a new subsidiary building, updating computer equipment, thesis defense by the subsidiary employees.

C) Pre-diploma practice carrying out, including the problems solving of local enterprises using the principles of "lean manufacturing". Students from the Elabuga branch of the KNRTU made mapping of production processes at JSC ELAZ, MUP Yelabuga-Vodokanal, KamAZ OJSC, Yelabuga Uchkurplast LLC. The results of enterprises mapping showed the presence of losses in the product final cost.

According to the cited work authors, while implementing the LP methodology at the university, the following problems were identified: the difficulty of production and training process interests combining; overcoming the organization's routine and production technology complexity; the need to increase the educational and methodological support relevance for education; low managers, students and teachers motivation, due to low awareness of the concept of "lean manufacturing"; the difficulty of introducing the results of the thesis design [4].

At Astrakhan State University, the implementation of lean manufacturing technology was focused on the educational process. As noted in the publication of A.M. Treshchev et al., the educational process at ASU was built on the CDIO Global Initiative standards basis (CDIO is the major international project on engineering education reformation, which was launched in 2000). The vision of the project is to provide students with an education that emphasizes the engineering foundations laid out in the context of the real systems, processes and products life cycle "Think - Project - Implement - Manage". According to our opinion, implementing lean manufacturing policy peculiarity at ASU is that this concept has become a successful educational product for students and listeners, but has not yet emerged as a mechanism for intra-organizational optimization of the HE establishment.

"Lean manufacturing" mechanisms implementation into the management system of higher education establishment is an urgent task and it has real prospects for regional universities. In Western countries, its implementation began somewhat earlier than in Russia - in the last decade middle. Thus, the work of P.Haines and S.Lietbridge considers the practice of lean manufacturing tools implementation in some US universities and the effects achieved. The specialized office was created at the University of Wisconsin-Madison, which task included the Lean technologies integration into the organization's management system; as a result, administrative expenses were reduced by 38%, administrative expenses decreased by 39%, the delay in admission of entrants was eliminated.

The "lean manufacturing" mechanisms implementation at the universities that act directly in Russian regions can become a very effective internal tool for strategic development at the educational services market (that is, in the external environment), but the only condition is that the Lean tools introduced into the production process will be implemented in the form of specific instructions and schemes.

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**CORRUPTION AS A DRIVER OF MIGRATION ASPIRATIONS**  
**IN UKRAINE**

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Corruption is widely regarded as one of the biggest challenges of the 21st century. It is a complex social, political and economic phenomenon that affects all countries. The common conception of corruption is that it hampers economic growth, brings about political instability, disproportionately burdens the poor and undermines the effectiveness of foreign investments and human capital. In fact, most economists view corruption as a major obstacle to economic growth. It is seen as one of the causes of low income and is believed to play a critical role in generating poverty traps. Corruption continues to pervade all levels of Ukraine's political, social and economic systems. Apart from the traditional migration driver – income differentials between source and destination countries – corruption is also a driver of migration aspirations. Ukraine does not only suffer from a broad variety of negative externalities, diverse institutional inefficiencies and structural problems, but may also lose - as a consequence of the negative socioeconomic and political effects of corruption – the human capital necessary for sustainable economic development. The phenomenon of corruption has now assumed global proportions.

It is an issue that resonates with people all over the world and therefore has become a popular topic in academic and political discourse. So pervasive has corruption been that there is no country in the world that has, in one way or the other, been spared of the „corruption virus“ though to different extent. In Ukraine uncontrolled systematic corruption has emerged after the collapse

of the Soviet Union. For the last 20 years, the topic of corruption has entered the agendas of all major political actors in Ukraine. Researchers are paying increasing attention to this problem as today Ukraine presents all forms of corruption that may be found throughout the world. Corruption has had a devastating impact on the people of Ukraine and its economy. It has spread to almost every segment of society – health care, education, police force, business, juridical system and politics. Corruption in Ukraine remains one of the top problems threatening economic growth and democratic development. The research object of the article is corruption as a driver of migration aspirations in Ukraine. The findings support the theoretical suggestions that individuals respond to a deterioration of socio-economic and politico-institutional conditions – induced by corruption – by, among other options, leaving the country and migrating to a better place, where corruption is less rampant.

The quantitative and qualitative research findings demonstrate that corruption in Ukraine is omnipresent. In general, Ukrainians are rather critical of conditions in their own country and simultaneously have rather positive images of Europe. However, although they are against being forced to give bribes, they are not necessarily against voluntarily giving them to somebody if this might help them solve their problems faster. Another corruption justification is low salaries and the gratitude/gift tradition. Researchers find that (a) those people, who believe that there is a lot of corruption in Ukraine are 1.5 times more likely to have a positive migration aspiration to Europe than to those who think the opposite; (b) people, who believe that there is little corruption in Europe are twice as likely to have a positive migration aspiration as those, who think that there is a lot of corruption in Europe[1]. Individuals respond to deterioration in socio-economic and politico-institutional conditions - caused by corruption - by, among other options, aspiring to leave the country and migrate to a place where corruption is perceived as being less rampant.

Corruption in Ukraine undermines the rule of law and has political and economic reasons. Thus to tackle the issue of high migration aspiration in Ukraine it is necessary for the government to implement target-aimed anti-corruption measures and of course to improve the overall social, economic and political situation in Ukraine, otherwise Ukraine will lose more human capital, which is needed for sustainable economic development.

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## **WHAT YOU NEED TO KNOW ABOUT CRYPTOCURRENCY**

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The importance of money as a form of judging the ownership of a person's assets is known since late stone age. It started with stone nuggets, then iron tablets followed by gold and silver coins and now paper money and electronic money. One notable fact is that throughout the timeline, the number of money people possessed increased and the value of each unit decreased. This happened till a stage when the banking system had to finally digitalize their currency, and it is all stored in reserve banks in a digitalized form.



A cryptocurrency is an online version of money, a **digital asset** to be precise. The name is derived from the **cryptography**, which is used to encrypt transactions and control the production of the currency. Cryptography is a technique that uses elements of mathematical theory and computer science and was evolved during the World War II to securely transfer data and information. Currently, it is used to secure communications, information and money online.

We can use cryptocurrency as the real currency and it's another medium of exchanging things, but the real money is printed on paper and we can keep them in our pocket physically. Cryptocurrency is created and stored electronically which we can save only on our computers or websites. With cryptocurrency, we cannot just shop online and purchase virtual things like domain, hosting, or some internet service, but we can use to buy physical goods and services too. Cryptocurrencies allow users to make secure payments, without having to go through banks. While the actual list of cryptocurrencies is huge – there are over 800 cryptocurrencies as of date, and so we can only discuss the most prominent few here.

**Bitcoin:** **Bitcoins** are the most popular and the highest rated cryptocurrency. Valued somewhere near \$600 per Bitcoin by mid-2017, it became the reason for interest in the cryptocurrency market when its rate surged suddenly.

**Ethereum:** this currency launched in 2015 might be the cryptocurrency of the future. It is a decentralized, secure and could be used to trade almost anything.

**Litecoin:** they say that if Bitcoin is gold, Litecoin is silver. Litecoin is based upon the fundamentals of how the peer-to-peer system works on Bitcoin, but with improvements on the technical front.

**Ripple:** Ripple's distributed financial technology allows for banks around the world to directly transact with each other.

**Dash:** Dash, or DarkCoin, as they call it, is a highly secretive cryptocurrency. It is almost impossible for anyone to trace where it has been routed.

Advantages of cryptocurrencies.

**Easy and Fast Payment:** Make payment without using your credit card or sign any document. You just need to know the wallet address of person or organization to whom you want to transfer money, payment transfer processing is very fast and can affect in a matter of seconds.

**Secure:** The use of military grade cryptography ensures that transactions remain secure. No person except the owner of a wallet can make transfers or payments from a wallet.

**Low or No Fees:** Banks and Payment Processing companies charge fees to conduct payment and fund transfer but with crypto currencies, these fees can be eliminated and are very low.

**No Fraud:** There is no way someone can charge back like they do if payment is made with a Credit card. Once payment is sent, it can never be reversed.

Disadvantages of cryptocurrencies.

**Irreversible Payment:** There's no center point in payment processing so if you transfer someone by mistake and want to get a refund for services there's no option to dispute that person only way to get your money back is to ask the person to refund payment and if he refused then forget about it.

**Not Widely Accepted :** There are not many companies or websites who accept it, if you have cryptocurrencies and wanted to purchase something then you have to search first that which service provider accept it even if you don't like their services and have only cryptocurrencies then you have to use it even if you don't like that provider also in physical stores you have to use real money instead of digital money.

**Losing Your Wallet:** If you stored your digital currencies in your system or mobile and if you lose it then there's no way to get your money back you can't complain to police or even some other person can't get it, it's like burning your money. However, there are still ways to keep safe, like keeping it offline.

To mine cryptocurrencies you need a powerful hardware as well as software combination. Since the value of a currency depends on the number of units of the currency available in the market, it should be a carefully monitored and a very reliable process. Cryptocurrency mining is simply the process of generating new units of the cryptocurrency. It includes two functions, namely: adding transactions to the blockchain (securing and verifying) and also releasing new currency.

Bitcoin, world's first decentralized digital person-to-person crypto currency, is considered to be a revolution in present currency market. This virtual currency is gaining huge popularity worldwide and mass adoption.

Advantages of Bitcoin.

Bitcoin transactions are completely anonymous and private. Unlike in payments through bank, where the transactions can be tracked and identified, bitcoin transactions cannot be identified.

Payment Freedom. Bitcoins can be sent to any person in any part of the world. No intermediaries in between. No bank holidays/strikes. No boundaries or borders. No payment limit.

Low/Minimal Fees. Paying through Bitcoin has very low and sometimes no transaction fees at all. It all depends on the priority of the person.

Fewer risks for merchants. Bitcoin transactions are secure, irreversible, and do not contain any customers' sensitive or personal information. This protects merchants from losses caused by fraud or fraudulent chargebacks.

It's fast. Bitcoin transactions are very fast if compared to banking channels. A bitcoin transaction is as fast as an e-mail and can be processed in 10 minutes.

Disadvantages of Bitcoins.

Degree of acceptance. Many people are still unaware of Bitcoin. Every day, more businesses accept bitcoins because they want the advantages of doing so, but the list remains small and still needs to grow in order to benefit from network effects.

Volatility. Bitcoin prices are very volatile and increases/decreases at a very high pace.

Ongoing development. Bitcoin software is still in beta with many incomplete features in active development. New tools, features, and services are being developed to make Bitcoin more secure and accessible to the masses. Some of these are still not ready for everyone. Most Bitcoin businesses are new and still offer no insurance.

The price of a cryptocurrency, like almost every other product and service, depends on demand and supply. If more people demand a specific cryptocurrency and it is short in supply, its value increases. Then more units are mined to maintain the flow. Many however have chosen to restrict the number that can be mined. For instance, the number of Bitcoins is currently restricted to a maximum of 21 million.

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**Kulyk T. U.**  
**INSURANCE OF LOANS**

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Banks are called to embody reliability and security. Since bankers work mostly with someone else's money, they should try to reduce the risk of their activities even more than other entrepreneurs.

Credit risk. The present or potential risk for revenues and capital arising from the failure of the obliged party to comply with the terms of any financial agreement with the bank (its subdivision) or otherwise to fulfill its obligations. Credit risk exists in all types of activities, where the outcome depends on the activities of the counterparty, issuer or borrower.

It occurs whenever the bank provides funds, undertakes to provide them, invests in funds, or otherwise risks them in accordance with the conditions of real or conditional transactions, regardless of where the transaction is shown, whether on the balance sheet or outside the balance sheet.

We can say with certainty that such a type of banking operations, as lending to the acquisition of property, is accompanied by high risks of non-repayment of borrowed funds. To avoid this situation, a system has been created that minimizes bank credit risks.

Credit insurance is one of the main options that allows you to provide additional guarantees both to the lender and the borrower. Insurance of bank loans plays a very important role in the functioning of the financial and credit system. Today, there are many different types and insurance programs on the market that provide for the insurer to recover funds if the borrower fails to fulfill the required debt obligations on a loan or does not repay interest.

Directed credit insurance is to protect banking institutions from possible problems with borrowers, but this protection is provided at the expense of the borrower himself. Credit risks are minimized or eliminated altogether, and thus, the financial security of the creditor is ensured in the event of insolvency of the borrower, deterioration of his financial condition or non-repayment of credit funds for other reasons.

The subject of insurance can be the risks that are inherent in the entire field of lending. Subjects of credit insurance are, on the one hand, insurers, but from other subjects of the lending sector, which should be divided into the main subjects - creditors and borrowers, and auxiliary, serving and facilitating the credit process - notaries, realtors, etc [2].

There are two types of insurance:

1. Insurance directly the outstanding amount of the loan.

2. Insurance of liability of the borrower for failure to fulfill his obligations[1].

A separate role in this matter is mortgage insurance. In accordance with the mortgage "Mortgage", the mortgagee must insure the mortgage object at its full cost from the various risks of accidental destruction or damage. In addition to mortgage insurance, banks require life insurance for the borrower. This gives them the confidence that in the event of death or illness of the debtor, they will still receive their money. The comprehensive insurance program includes: insurance of residential and immovable property from all kinds of risk situations, life insurance, as well as health, title insurance and civil liability insurance in the use of mortgaged property.

At the moment, the main problem of insurance of bank loans is that the banking system is more advanced, unlike the insurance system. But since lending operations are ones of the main ways to generate profit for a bank, the services provided by insurance companies are becoming more and more relevant.

Reinsurance According to the contracts of reinsurance of risks as of June 30, 2017, Ukrainian insurers (donors, reinsurers) paid shares of insurance premiums of UAH 9 771.0 million. (as of June 30, 2016 - UAH 5 729.8 million), including: reinsurers-non-residents - UAH 2,057.7 million. (as of June 30, 2016 - UAH 2,384.8 million), to reinsurers-residents - UAH 7,713.3 million. (as of June 30, 2016 - UAH 3 345.0 million). The total sum of insurance premiums, compensated by reinsurers, amounted to UAH 566.3 million. (as of June 30, 2016 - UAH 494.4 million). Insurance premiums paid for reinsurance as of June 30, 2017 compared to the corresponding period of the last year increased by 70.5% or UAH 4 041.2 million[3].

The lack of clear criteria and the freedom to choose insurance companies leads to a reduction in competition and may further adversely affect the financial position and the interests of borrowers.

Nevertheless, it should be noted that loan insurance is a necessary and generally accepted measure of protection of interests of both banks and borrowers. And for more effective development of credit and insurance relations, a closer interaction between banking and insurance systems, as well as the development of a competitor.

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**Kvasnytsia I. M.**

**ANTICRISIS MANAGEMENT OF ENTERPRISE FINANCIAL SITUATION OF BREWING INDUSTRY IN UKRAINE**

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The management of enterprise financial condition varies considerably when it is in a state of crisis. Today, in Ukraine, in the face of economic and political instability, businesses are experiencing difficult times, therefore, there is the issue of diagnosing and protecting enterprises from crises and bankruptcy. This problem can be solved, in particular, due to the use of anti-crisis financial management system.

The prevention of the financial crisis of an enterprise, its effective overcoming and the elimination of its negative consequences are provided by the subsystems of financial management, dubbed "anticrisis financial management of the enterprise" and aimed at neutralizing the risk of its bankruptcy [1].

The financial crisis is not always threatened with bankruptcy. It can create a threat to lower profitability, loss incurred, and reduce the market value of enterprises. Thus, the prevention of bankruptcy can only be considered as one of the tasks of the crisis financial management.

In any case, the main objective of the crisis management of the financial state of the enterprise is to ensure the recovery of the life of the subject of entrepreneurial activity, prevent the emergence of its bankruptcy and prevent the crisis situation in the future.

Today, brewing enterprises are characterized by negative trends of development, the presence of crisis phenomena, the lack of growth in the generation of net cash flow, which confirms the dynamics of production and sales of beer in Ukraine, so there is an urgent need for the use of anti-crisis management tools at these enterprises.

Positive trends in the beer market were characterized only before the 2008 crisis. In 2008, the peak of beer production in Ukraine was registered, when domestic enterprises produced a record 330 million decal its of output. Since 2009, the recession begins, and in 2016 the volume of production has already been less than 200 million dal [3].

The main directions of crisis management at the enterprises of the brewing industry in modern conditions of management should be directed against external and internal threats. In particular, the following external factors have a significant negative impact on the development of enterprises in this sector:

- constant increase of the excise tax rate, as well as the prohibition of advertising beer;
- increase of tariffs for electric power;
- Rising raw material prices.

Thus, the growth of the excise tax for the past year has doubled to UAH 2.48. From January 1, 2017, the excise tax rate increased by another 12% and amounted to 2.78 UAH. [4]. An increase in the excise tax will lead to an increase in the price of beer, and with low purchasing power of the population we can predict a drop in demand, which will lead to a reduction in the supply of this product on the market. Since beer is not a necessity product, manufacturers should first of all search for cost savings reserves. Reducing costs is possible, for example, by reducing the cost of raw materials. Companies that have their own meat production are offered the use of innovative technologies based on reducing energy consumption for meat production and reducing the period of reproduction of the grain. For enterprises that do not have their own raw materials production, it is necessary to search for suppliers using these technologies.

Also, companies in the brewing industry need to introduce the use of boilers for alternative fuels (solid and liquid), which will enable to reduce the energy content in the cost of production. It is also advisable to constantly update the production infrastructure. Such a permanent balancing of income and expenditure will reduce the risk of insolvency and the emergence of crisis phenomena.

There is the negative influence on the sales of products and the formation of incomes of these enterprises from the attribution of brine to alcoholic beverages, as well as, as a consequence, the extension of all restrictions provided for in the Law of Ukraine "On Advertising" (the prohibition of advertising beer) [2]. Such an initiative is aimed at counteracting alcoholism, but the introduction of any additional prohibitions and restrictions can not solve this problem. Worldwide practice shows that beer advertising does not affect the growth of consumption, it only increases the benefits of choosing certain brands within the varieties.

In the beer market, which is characterized by a downturn, the "Karlsberg Ukraine" PJSC, which is constantly increasing its market share, looks like atypical: from 29.1% in 2014 to 29.9% in 2016. The management of Karlsberg Ukraine also understands that, that under the crisis, kraft brewing is a successful project, therefore, since 2014, it produces a series of "Robert Doms". Thus, in times of crisis, kraft brewing is an effective way to stay in

the market, as the consumer becomes more economical, but more demanding in quality [4]

Summarizing mentioned above, we can propose the following measures of crisis management of the financial situation at the enterprises of the brewing industry:

- optimization of expenses at the expense of reduction of raw material cost and reduction of energy consumption;
- Balancing income and expenditure growth;
- renovation of production infrastructure;
- sponsorship, organization of media projects and participation in them;
- increase in the depth of sorting beer due to unique varieties;
- the restructuring of non-current assets, that is, the sale of those assets that are not used or improving the use of available non-current assets;
- ensuring more efficient use of attracted long-term financing sources;
- active implementation of the policy aimed at increasing own capital, in particular due to the direct increase of the volume of capitalized profits due to increased revenues and implementation of cost optimization reserves;
- Permanent debt control of each counterparty, as debtor lending leads to the fact that enterprises have to increase their own payables;
- restructuring of debt capital, reducing the share of short-term financing sources and, consequently, increasing the long-term;
- avoidance of overdue accounts payable.

Summing up, it can be argued that the introduction of crisis management is extremely important today. The essential part in formation of an enterprise crisis management system there should be not only measures to overcome and overcome the crisis, but also measures aimed at preventing the emergence of crisis situations in the enterprise. Due to the difficult economic and political situation, the decline in solvency, the constant increase in tax burden, and the negative phenomena in the market of raw materials by domestic breweries, it is necessary to improve the quality of managerial decisions regarding the positioning of beer as a product that has its value, search for cost optimization reserves and all business processes.

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**Leonov M. Ya.**  
**INFORMATION AS A SOURCE OF COMPETITIVE ADVANTAGE  
OF THE ORGANIZATION IN THE PROCESS OF STRATEGIC  
CHANGES**

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In the context of the trends in the financial and economic field, the regulatory and legal framework, innovation and investment technological and socio-cultural factors, organizations can not develop without an actual strategy, the introduction of different approaches, principles, models, methods and instruments that are oriented to the adaptation of the organization in the conditions of cyclical strategic changes. In such circumstances it becomes obvious that for the successful functioning and development of an organization it is necessary not only to use standard economics model, but also cybernetic approaches to foresee a rapid change in the socio-economic systems.

Different schools of strategic management highlight the most important aspects in describing the processes of strategic change. For example, according to the school of strategic positioning, "strategic change" means a frequent, sometimes single, large-scale change [3]. In the work of I. Ansoff, the founder of the school of strategic management, the term strategic change was not used, but the term "novelty of change" was introduced - it is a measure that determines the inapplicability of the organization's capabilities to solve problems under conditions of change [1]. Thus each school emphasizes certain characteristics, but an important element is a qualitative change. In this regard, we use the term "strategic change" to mean the process of transforming the organization from the current state into a qualitatively new one.

In a highly competitive environment, both on the external and internal markets, the choice of the organization's competitive strategy is influenced by strategic changes in the external environment of indirect and direct influence (political, economic, technical and conjuncture factors, suppliers, competitors, consumers, etc.) . To develop an adequate organizational strategy, it is important to divide strategic changes into continuous (associated with minor impact) and random (associated with a radical change in the organization). It should be noted that strategic changes should be classified not by the response of the organization after the full impact of the change, but by the level of uncertainty or prediction of this change.

Let's single out two groups of strategic changes: 1) the most predicted ones are those that are directly related to direct factors of influence on the organization (competitors, suppliers, strategic partners, competitors in substitute markets, etc.). A distinctive feature of this group is frequently

occurring or uninterrupted changes with a high probability of a predicted event, but with negligible impact and as a result with the organization's rapid response; 2) the least predicted strategic changes (according to the current definition, which was offered by N. Taleb) [4]. These changes are called "Black Swan", because the manifested strategic changes lead to the destruction of the existing organization and its further transformation to a qualitatively new level. Strategic changes similar to the "Black Swan" are rare, but they lead to catastrophic consequences (for example, the financial and economic crisis of 2008).

All changes require constant monitoring of the overall state of the external environment from business entities, otherwise they are in danger of losing competitive advantages. The estimation of the least predicted strategic changes occurs with the use of information technologies of management "on weak signals", which the external environment sends changing goals, tasks and strategy, which significantly affects the activities of the organization. When predicting the "Black Swan", the qualitative information flow plays a fundamental role. In this regard, the distinguishing of information into "noise" and "signals" is considered the most effective tool. By "noise" is meant not essential information, which will subsequently have a minor effect on the functioning of the organization. While the "signal" is so-called valuable information that is allocated from the total population and allows you to assess the probability of a predicted strategic change, and therefore, to develop possible response scenarios. According to the experts the ratio between "noise" and "signal" is quite large, for example, on average for an hour of information there will be 99.5% of "noise", and only half a percent of a "signal", during the day 95% of information will refer to "noise" and only 5% to the "signal" [4]. Thus it can be noted that the rate of change of information tends to exponential growth, in connection with this it becomes vital for any organization to filter the information received in accordance with the technology "noise" - "signal".

Strategic changes in the conditions of a turbulent economic environment can be classified as opportunities for further development or threats. Economic actors that regard strategic changes as threats are vulnerable and more prone to bankruptcy. In the conditions of rapid changes, the most successful will be those entities that will take a proactive position in the market, introducing cybernetic approaches, models, methods for evaluating relevant "signals" into practice and forming on their basis adequate organizational and economic mechanisms for developing and creating a competitive advantage in the market.

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## **6 FACTORS THAT INFLUENCE EXCHANGE RATES**

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Aside from factors such as interest rates and inflation, the exchange rate is one of the most important determinants of a country's relative level of economic health. Exchange rates play a vital role in a country's level of trade, which is critical to most every free market economy in the world. For this reason, exchange rates are among the most watched, analyzed and governmentally manipulated economic measures. But exchange rates matter on a smaller scale as well: they impact the real return of an investor's portfolio. Here we look at some of the major forces behind exchange rate movements.

Numerous factors determine exchange rates, and all are related to the trading relationship between two countries. Remember, exchange rates are relative, and are expressed as a comparison of the currencies of two countries. The following are some of the principal determinants of the exchange rate between two countries. Note that these factors are in no particular order; like many aspects of economics, the relative importance of these factors is subject to much debate.

### **1. Differentials in Inflation**

As a general rule, a country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies. During the last half of the 20th century, the countries with low inflation included Japan, Germany and Switzerland, while the U.S. and Canada achieved low inflation only later. Those countries with higher inflation typically see depreciation in their currency in relation to the currencies of their trading partners. This is also usually accompanied by higher interest rates.

### **2. Differentials in Interest Rates**

Interest rates, inflation and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. Higher interest rates offer lenders in an economy a higher return

relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. The opposite relationship exists for decreasing interest rates – that is, lower interest rates tend to decrease exchange rates.

### 3. Current-Account Deficits

The current account is the balance of trade between a country and its trading partners, reflecting all payments between countries for goods, services, interest and dividends. A deficit in the current account shows the country is spending more on foreign trade than it is earning, and that it is borrowing capital from foreign sources to make up the deficit. In other words, the country requires more foreign currency than it receives through sales of exports, and it supplies more of its own currency than foreigners demand for its products. The excess demand for foreign currency lowers the country's exchange rate until domestic goods and services are cheap enough for foreigners, and foreign assets are too expensive to generate sales for domestic interests.

### 4. Public Debt

Countries will engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, nations with large public deficits and debts are less attractive to foreign investors. The reason? A large debt encourages inflation, and if inflation is high, the debt will be serviced and ultimately paid off with cheaper real dollars in the future. In the worst case scenario, a government may print money to pay part of a large debt, but increasing the money supply inevitably causes inflation. Moreover, if a government is not able to service its deficit through domestic means, then it must increase the supply of securities for sale to foreigners, thereby lowering their prices. Finally, a large debt may prove worrisome to foreigners if they believe the country risks defaulting on its obligations.

### 5. Terms of Trade

A ratio comparing export prices to import prices, the terms of trade is related to current accounts and the balance of payments. If the price of a country's exports rises by a greater rate than that of its imports, its terms of trade have favorably improved. Increasing terms of trade shows greater demand for the country's exports. This, in turn, results in rising revenues from exports, which provides increased demand for the country's currency. If the price of exports rises by a smaller rate than that of its imports, the currency's value will decrease in relation to its trading partners.

### 6. Political Stability and Economic Performance

Foreign investors inevitably seek out stable countries with strong economic performance in which to invest their capital. A country with such positive attributes will draw investment funds away from other countries

perceived to have more political and economic risk. Political turmoil, for example, can cause a loss of confidence in a currency and a movement of capital to the currencies of more stable countries.

The exchange rate of the currency in which a portfolio holds the bulk of its investments determines that portfolio's real return. A declining exchange rate obviously decreases the purchasing power of income and capital gains derived from any returns. Moreover, the exchange rate influences other income factors such as interest rates, inflation and even capital gains from domestic securities.

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**Moroz O. K.**

### **PROSPECTS FOR ATTRACTING FOREIGN DIRECT INVESTMENTS TO UKRAINE**

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**Introduction.** In the modern world, while strengthening the global economy, the ability of countries to participate in the development of economic activity is an important indicator of success and competitiveness. Increased intensity of relationships in trade and finance, the development of transport and communications are important indicators of the economy. To preserve the ability of the country to economic growth, its current business relations go far beyond traditional international exchange of goods and services, as evidenced by a significant increase in the number of joint ventures, mergers, licensing agreements and other forms of business cooperation between enterprises of the country and foreign partners. Foreign direct investment (FDI) can be regarded as an economic strategy, taking the company to new investment activity. Also FDI can be an alternative to purchase existing assets of a foreign company. Most companies are trying to add, expand or replace international trade, producing goods and services in countries where the company was first established.

**Analysis of recent researches and publications.** The issue of the impact of investment on enterprises was studied by many modern scholars of the world such as S. Djankov – a Bulgarian economist (professor) and former statesman, Tim Hanzer – an employee of McKinsey & Company, Kerala

Maklysh – a board member of the Economic Society of Australia, Rita Ramalho – an economist of the World Bank and Andrei Schleifer – an American economist.

**The aim of the article** is to reveal the investment opportunities in Ukraine and underpin the need to create conditions for attracting foreign investments into the economy.

**The main material.** There are two kinds of FDI: the creation of productive assets or the acquisition of existing assets by foreigners, for example, through the merger of enterprises takeover or acquisition. Normal international trade is less important for the provision of services than selling goods. The increase in FDI flows in Ukraine in recent years has slowed. This is due, first and foremost, to the general economic downturn and the severe economic crisis in the country. In the economic downturn, inefficient and corrupt system, complexity of legislation and regulation, poor contract enforcement and poor governance are severe obstacles for investment. And that's not considering the fact that the country has a large domestic market, agricultural potential, energy and mineral resources and has a strategic geographical position that makes it the transit center of Europe.

The main investors in Ukraine are Germany, Netherlands, United Kingdom, Austria, the USA and Russia. In the first half of 2015, the share of FDI from EU countries to Ukraine was \$ 42,820,000,000 that is 72.4% of total FDI. The largest part of FDI was Germany (11.1%), the Netherlands (9.7%), Russia (6.9%), Austria (5.8%), the UK (4.9%), Virgin Islands (4, 4%), France (3.3%), Switzerland (2.1%) and Italy (2%) [3].

FDI in Ukraine in the form of equity effective on April 1, 2016 was \$ 52,18bln, which is \$ 6,21bln, or 10.6% less than at the beginning of the year.

According to the State Statistics Service, residents in January-March this year invested \$ 570.2 million, but at the same time seized \$ 468.4 million, but the negative exchange difference amounted to \$ 6.28 billion. In the first quarter of 2015 foreign investors invested \$ 1.56 billion, but withdrew only \$ 562 million, and a negative exchange difference amounted to \$ 209 million. According to the specified data Gosstata, foreign direct investment into Ukraine at the beginning of April 2016 amounted to \$ 1.152 thousand per capita compared with \$ 1.284 thousand at the beginning of the year, hence a decrease of \$ 132.

In 2015, FDI into Ukraine increased by \$ 2.86 billion, and a year earlier - to \$ 4.13 billion. Foreigners invested in 2015 in the Ukrainian economy \$ 5.677 billion (previous year - \$ 6.013 billion), while seized \$ 2.845 billion (previous year - \$ 1.256 billion).

In 2016 investments came from 134 countries. The top ten investor countries, accounting for more than 83% of total direct investment, are: Germany - \$ 6.033 billion, the Netherlands - \$ 5.523 billion, Russia \$ 3.538 billion, Austria - \$ 2.891 billion, UK - \$ 2.401 billion, Virgin Islands - \$ 2.225

billion, France - \$1.783 billion, Switzerland - \$ 1.320 billion and \$ 1.101 billion Italy.

The main advantage of Ukraine to invest in is the fact that Ukraine is one of the largest markets in Europe with 47 million customers and has the fastest GDP growth in Europe. In addition, Ukraine is fourth in the world in terms of high-tech professionals in the sector and has a high level of education and a successful education system. Its strategic geographical location at the entrance to Europe, Russia and Asia, also testifies to the potential investors. The presence of such investors as Kraft Foods, Coca-Cola, Hewlett Packard, Cargill, Knauf, Raiffeisen Bank Aval, Credit Agricole and many others, as well as strengthening and reforming the banking sector can no doubt be attributed to the benefits of Ukraine.

However, despite the existing advantages in Ukraine there are some weaknesses. This, above all, a small amount of support provided by the law to foreign investors, the weakness of the national oil company, the financial situation of the country and the constant risk of failing to pay the gas bill. They also include political instability and armed internal conflict, high inflation and corruption, low level of investor protection. Ukraine takes only the 128<sup>th</sup> place among 189 countries in the world in terms of the level of investor protection in 2016, and it has lost one position compared to the 127<sup>th</sup> one in 2015 [4].

This level is based on the indicators listed below. It covers three aspects of the security of investor interests: transparency of transactions (field index of openness), a tendency to leverage the situation (field director liability index), the opportunity of shareholders to sue officials and directors for official misconduct (index of ease of filing claims by shareholders). Indices are measured on a scale of 0 to 10, with higher values indicate greater openness, greater liability of directors, greater influence by the shareholders to the transaction and committed by better protection of the investor interests.

Let us consider these aspects in minutiae. The first aspect is the index of disclosure agreement and includes five components:

1. Can a corporate body provide resolution that is legally binding for the transaction? Grade 0 is assigned if the decision is taken by the Director-General or the Executive Director, 1 – if the board of directors, supervisory board or shareholders must vote, 2 - if the board of directors or supervisory board and the shareholders are not allowed to vote, 3 - if you have Shareholders vote.

2. Is it necessary to immediately disclose the public deal, regulators or shareholders? Grade 0 is assigned if disclosure is not required, 1 - if it is required to disclose the terms of the agreement, 2 - if it is required to disclose the terms of the transaction as well as there is conflict of shareholder interest.

3. Do I need to publish information about the deal in the annual report? Grade 0 is assigned if the company is not obliged to publish information about the deal.

4. Should a shareholder be informed of the transaction details between buyer and seller? Grade 0 is assigned if the disclosure of the agreement is required, 1 - if the board of directors should be informed of general terms about the conflict of interest without disclosing any details, 2 - if the board should be fully informed of all material facts connected to the interests of shareholders in the transaction between buyer and seller.

1. Is it necessary to involve an external body such as an external auditor to verify the transaction before its implementation. Grade 0 is assigned if no, 1 - if so.

According to Doing Business Rules, we find that the disclosure of the index operation for Ukraine rates 5. The next code by which to assess investor's protection in the country is a director liability index, which in turn includes 7 components:

1. Can a shareholder bring the director to account for damage to the company, which entails an agreement between buyer and seller? Grade 0 is assigned if the director can not be held liable or can only be fraud or dishonesty, 1 - the director can be held responsible only if he influenced the approval of the transaction or negligence found, 2 - the director can be held responsible when the transaction is unfair or detrimental to other shareholders.

2. Can a shareholder bring to justice the CEO, board members or supervisory board members for damage to the company, which entails agreement? Grade 0 is assigned if the director can not be held liable or can only be fraud or dishonesty, 1 - if the director can be prosecuted for negligence, 2 - if the director can be held responsible when the transaction is unfair or detrimental to other shareholders.

3. Can the court declare the agreement invalid subject to the claim of a shareholder? Grade 0 is assigned if the operation can not cancel or possible only in case of fraud or bad faith; 1 - cancel the transaction if possible when it infringes the interests or harms the other shareholders; 2 - cancel the transaction if possible when it is unfair or related to conflict of interest.

4. Is the director of the company obliged to compensate the damage done to the company, the shareholder's claim? Grade 0 is assigned if no; 1 - if so.

5. Shall the director return the profits earned as a result of the transaction, the shareholder's claim? Grade 0 is assigned if no; 1 - if so.

6. Can a director be fined (the two preceding paragraphs at a time) and jailed. Grade 0 is assigned if no; 1 - if so.

7. Can the shareholders present direct or indirect claims for compensation company, which entails agreement. Grade 0 is assigned if the presentation of claims is impossible or only possible for shareholders who own more than 10% of shares 1 - if direct or direction may bring lawsuits shareholders who own 10% or less fate in the stake.

According to the Doing Business index of director liability for Ukraine is at level 2.

Another aspect that affects the level of protection of investors - is the index of ease of prosecution of the shareholders, which includes six components:

1. The documents are available to the shareholder plaintiff filed by the defendant and witnesses during trial. Grade 1 is assigned for each of these papers available to the claimant;

2. Can the plaintiff during the trial conduct the initial interrogation of the accused and witnesses? Grade 0 is assigned if no; 1 - if so, but with the prior approval of a judge; 2 - if yes, without prior approval.

3. Can the claimant receive the category of documents relating to the case, the defendant, without specifying any particular document? Grade 0 is assigned if no, 1 – if so.

4. Can the shareholders who own 10% or smaller share of the company, without giving a claim to court demand the agreement between the buyer and seller to be reviewed by Inspector. Grade 0 is assigned if no; 1 – if so.

5. Do the shareholders who own 10% or lower share of equity in a company have the right to study the transaction documents before filing suit in court? Grade 0 is assigned if no; 1 - if so.

6. Is there an evidence standard on civil cases lower than the criminal? Grade 0 is assigned if no; 1 - if so.

The index rate according to Doing Business in Ukraine is 6. The index of investor protection is an average of the index of disclosure agreement, director liability index and the index of ease of prosecution CEOs shareholders. The index is in the range of 0 to 10, with higher values indicating a higher degree of investor protection. For Ukraine in 2016 level of this index was 4.3 [2]. This methodology was developed in the Dencheva by Simon Djankov and others. (Djankov, La Porta, Lopez-de-Silanes, Schleifer (2008)) and used in the report of the World Bank Doing Business with minor changes. Data is collected by means of a survey of lawyers specializing in corporate law and securities transactions, and based on the analysis of regulations on securities, company law and court rules regarding evidence.

Overall, Ukraine unfortunately does not have a stable policy towards foreign investment aid. The unpredictability of decisions sometimes surprises some investors.

**Conclusion.** All in all we see that Ukraine has created the conditions for attracting foreign investments. But the financial crisis means that the investment climate in the country has deteriorated. These findings were confirmed by expert opinions. It is substantiated by falling investment rating of our country and reduction of investor protection index. Ukraine has to eliminate its weaknesses in order to attract foreign direct investment and currently has investment attractiveness, even in comparison with the closest countries. All this once again underlines the need to create conditions for attracting foreign investments into the economy.

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### **GRAVITY MODEL OF TRADE**

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Gravity model was first discovered in physics, when Newton found out, that the gravity between two objects is correlated with the masses of these objects and the distance between the objects. The same principle was first found to work also in international economics by Jan Tinbergen in 1962.

Tinbergen based his research on the earlier empirical studies, which concluded that the most significant determinants of optimum trade were the size of GNP of trading countries and the geographical distance of these countries. The size of GNP affects trade in two ways: firstly, it shows the general volume of demand in that country and secondly, it's a good proxy for the diversity of production in that country. A country with more diversified industry will need to import proportionally less than a country with less diversified one. On the other hand, a country with diversified production has capability to export a wide range of goods. The distance between countries is obviously expected to be negatively correlated with the exports, since longer distance should mean higher trading costs. For his study, Tinbergen used the distance between commercial centres of the trading countries [1].

Tinbergen began his analyses using only three explanatory variables: GNP of exporting country, GNP of importing country and the geographical distance between countries. The basic form of Tinbergen's Gravity Model ended up being:

$$\text{Log}E_{ij} = \alpha_0 + \alpha_1 \text{Log}Y_i + \alpha_2 \text{Log}Y_j + \alpha_3 \text{Log}D_{ij}$$

$E_{ij}$  = Exports from country i to country j

$Y_i$  = GNP in country i

$Y_j$  = GNP in country j

$D_{ij}$  = Distance between countries i and j

During the last 60 years, several researchers have come up with a large amount of studies which give more theoretical justification to the Gravity Model of Trade than Tinbergen's model did. According to Evenett and Keller (2002) the theoretical foundations of Gravity Model of Trade can be derived from models such as Ricardian models, Heckscher-Ohlin models and increasing returns to scale models. These three models differ in the way the economies have specialized: in the Ricardian model the technologies differ among countries, so that each country specializes in producing the goods it has comparative advantage in. In Heckscher-Ohlin model countries have variable factor proportions, so that developed countries have a high ratio of capital to labour in relation to developing countries and vice versa. This is just a different way of describing the comparative advantage of a nation. In increasing returns to scale models the product specialization happens on a firm level [2].

Gravity Model has been used in hundreds of studies to find out the driving forces of a country's trade. The main findings in these studies have been surprisingly consistent, even though the data and methods used have varied significantly between the studies. Disdier and Head (2008) gathered together a sample of 103 Gravity Model studies in which a coefficient for distance was estimated. In these studies altogether 1467 estimates were made. Of these estimates only one yielded a positive effect of distance on bilateral trade. All the others found a negative relation between distance and trade. Some researches show that the effect of distance has decreased over time (Yotov, 2012) whereas others claim that Country A exports intermediate goods Country B imports intermediate goods depending on how much it exports final goods Country C imports final goods and indirectly sets country B demand for intermediate goods the importance of distance has actually increased during the last decades (Disdier, Head, 2008) [1].

Several researchers have also tried to identify the mechanics through which the distance actually affects trade. The traditional point of view is that distance is a good approximation for transportation costs and time, which have a negative effect on trade. The problem is, that in the modern world a lot of goods are produced, which can be delivered either for free or at a very low cost (digital products etc.) and in which the high transportation costs don't

explain the small amount of trade. In these cases the lack of trade is often caused by different technologies, cultures and legal and economic institutions (van Bergeijk, Brakman, 2010), which can be also somewhat correlated with geographical distance. This is why distance is not irrelevant in the trade of intangible products either.

The size of exporting country's GDP has been proven in many studies to be positively correlated with the amount of total exports from that country. This is quite logical, since usually countries with large GDP's have a larger total amount of companies as well as larger amount of exporting companies, which was shown by Lawless (2010). In several studies the coefficient for exporting country's GDP has been found to be around one. Nguyen (2009) found coefficients slightly over 1 for AFTA countries, the study of Lawless yielded a GDP coefficient of slightly below one for the exports of United States and Stack (2009) found coefficients between one and two for trade between several EU and OECD countries [3].

Lately researchers have criticized existing gravity models also for other reasons. They have pointed out, that GDP might not always be the most appropriate mass-variable for explaining bilateral trade flows. Baldwin and Taglioni (2011) showed that the structure of a trade flow plays a key role in determining a suitable mass-variable. If country's exports constitute mainly of final products, then the GDP of importing country is a good proxy for the import demand. Also, if the proportion of final and intermediate goods in country's exports remains stable, the GDP remains as a reasonable proxy. However, if a country's export structure changes into exporting more intermediate goods than before, then the GDP of importing country becomes less accurate in estimating the import demand. This is because the demand of these intermediate goods depends on the demand of the final products which are made of them, which might be consumed in a third country.

Therefore, depending on a country, the more appropriate import demand proxy could be not the GDP of the country where intermediate goods are exported, but the GDP's of countries where the final goods are exported from the intermediate good importing country.

It's easy to understand the logic behind Gravity Model, but still none of the models previously mentioned is undisputedly correct. Instead they can be applied and further modified depending on the research question. Often when empiric studies are conducted using the Gravity Model of Trade, some variables are added to make the model fit better with the empiric results. Such variables can for example be real exchange rate changes between countries, whether countries are neighbouring countries, if people speak same language in them, they belong to the same trade union and many other variables that could potentially affect the amount of trade between them. Including such variables usually yields good results, but don't necessarily give theoretic justification to the methods used [1].

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### **TIME FOR REFORM?**

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The worldwide financial system has undergone great changes, a process of reorientational restructuring. The banking sector has been at the center of the process based on Internet activities.

Cryptocurrencies merge Internet product and Banking services through globalization and internationalization. The process of cryptocurrency appearance in banking system is the extremely innovative for everyone.

Those who developed the new system of blockchain really did have a dream. They wanted to live in a world where they would not depend on politics, crises or the exchange rates of natural resources. Several people, no one knows their names, combined their efforts and unite the desires to invent and be successful. They developed something really new and totally unpredictable.

They used extremely complex code systems to secure their units of exchange. These clever people called this code system “cryptographic protocols”. Have you already guessed we mean cryptocurrency? Never mind

Let’s return to our issue. Cryptocurrency developers built these protocols on advanced mathematics and computer engineering principles. Nobody can break them. So, nobody can duplicate or counterfeit the protected currencies. These protocols also mask the identities of cryptocurrency users,

make transactions and fund flows difficult to attribute to specific individuals or groups.

Cryptocurrencies are also marked by decentralized control. Cryptocurrencies' supply and value are controlled by the activities of their users. They do it by confident highly complex protocols built into their governing codes.

Besides, cryptocurrencies can be exchanged for fiat currencies in special online markets, meaning each has a variable exchange rate with major world currencies (such as the U.S. dollar, British pound, European euro, and Japanese yen).

Most cryptocurrencies are also characterized by finite supply. Their source codes contain instructions outlining the precise number of units that can and will ever exist. Over time, it becomes more difficult for miners to produce cryptocurrency units, until the upper limit is reached.

Due to their political independence and impenetrable data security, cryptocurrency users enjoy benefits not available to users of traditional fiat currencies and the financial systems that those currencies support. For instance, government can easily freeze or even seize a bank account located in its jurisdiction, but it's very difficult for it to do the same with funds held in cryptocurrency – even if the holder is a citizen or legal resident.

On the other hand, cryptocurrencies come with a host of risks and drawbacks, such as illiquidity and value volatility, that don't affect many fiat currencies. Additionally, cryptocurrencies are frequently used to facilitate gray and black market transactions. Many countries view them with distrust.

The very first widely used cryptocurrency is Bitcoin. Just like others it has its value, security and integrity. Let's speak about the principles of its work. All prior transactions and activity of all units of the currency at any given point of time are recorded and stored by a blockchain. A blockchain has a finite length. It contains a finite number of transactions, increasing over time. Computer-savvy individuals or groups of individuals are so-called miners. They record and authenticate cryptocurrency transactions.

A cryptocurrency transaction isn't finalized until it's added to the block chain. It occurs within minutes. Once the transaction is finalized, it's usually irreversible – unlike traditional payment processors, such as PayPal and credit cards.

Cryptocurrencies don't treat international transactions any differently than domestic transactions. Transactions are either free or come with a nominal transaction fee, no matter where the sender and recipient are located. This is a huge advantage relative to international transactions involving fiat currency, which almost always have some special fees that don't apply to domestic transactions – such as international credit card or ATM fees.

During the time between the transaction's initiation and finalization, the units aren't available for use. The block chain thus prevents double-spending, or the manipulation of cryptocurrency code.

Every cryptocurrency holder has a private key for identification. This allows them to exchange units. Users can make up their own private keys, which are formatted as whole numbers between 1 and 78. Once they have a key, they can obtain and spend cryptocurrency.

Cryptocurrency reduces theft and unauthorized use. But there are some draconian rules. Losing your private key is the digital equivalent of throwing cash into a trash incinerator. While you can create another private key and start accumulating cryptocurrency again, you can't recover the holdings protected by your old, lost key.

Although cryptocurrency miners serve as quasi-intermediaries for cryptocurrency transactions, they're not responsible for arbitrating disputes between transacting parties. In fact, the concept of such an arbitrator violates the decentralizing impulse at the heart of modern cryptocurrency philosophy. This means that you have no one to appeal to if you're cheated in a cryptocurrency transaction – for instance, paying upfront for an item you never receive. Though some newer cryptocurrencies attempt to address the chargeback/refund issue, solutions remain incomplete and largely unproven.

By contrast, traditional payment processors such as Visa, MasterCard, and PayPal often step in to resolve buyer-seller disputes. Their refund, or chargeback, policies are specifically designed to prevent seller fraud.

Cryptocurrency proponents believe that, digital alternative currencies is a support for a decisive shift away from physical cash. Which viewed is imperfect and risky.

However, cryptocurrency users take proper precautions to avoid data loss. For instance, users who store their private keys on single physical storage devices suffer financial harm when the device is lost or stolen.

Cryptocurrency is an exciting concept with the power to fundamentally alter global finance for the better. In the meantime, cryptocurrency users (and nonusers intrigued by cryptocurrency's promise) need to remain ever-mindful of the concept's practical limitations. Any claims that a particular cryptocurrency confers total anonymity or immunity from legal accountability are worthy of deep skepticism, as are claims that individual cryptocurrencies represent foolproof investment opportunities or inflation hedges.

The market of cryptocurrencies is fast and wild. Nearly every day new cryptocurrencies emerge, old die, early adopters get wealthy and investors lose money. Everything is as always. Someone gets and another one loses. But the world is changing and developing and now with the help of cryptocurrency.

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## **WAYS OF IMPROVING THE ECONOMIC DYNAMICS OF UKRAINE**

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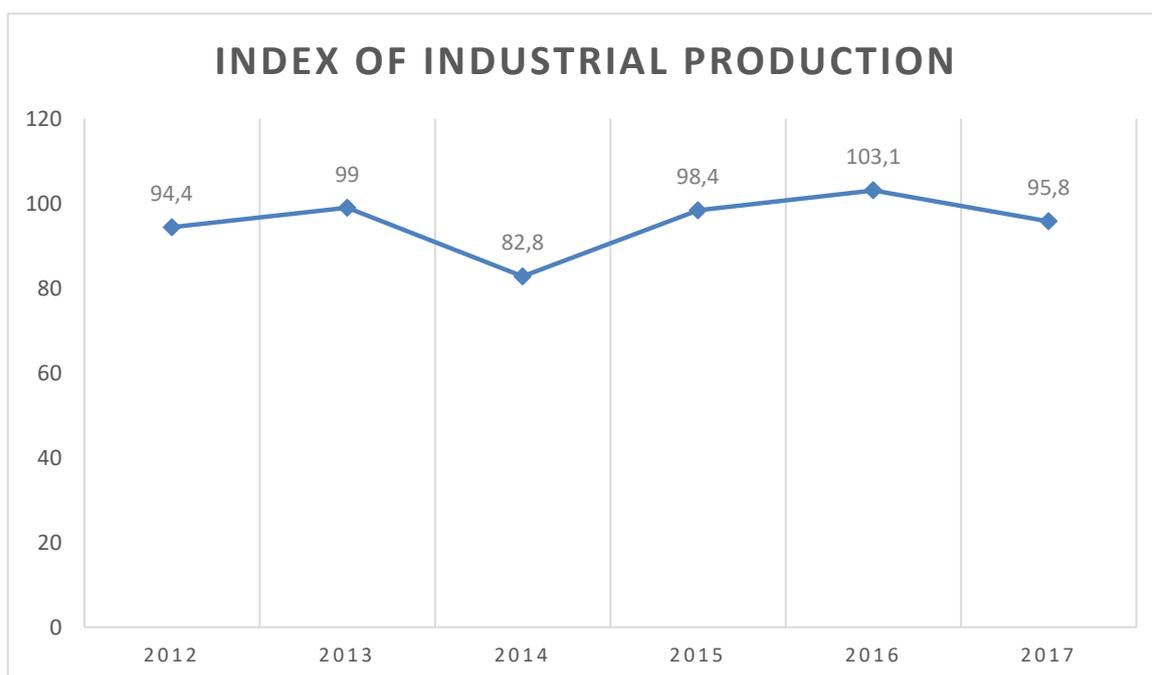
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The aggravation of social, economic and financial problems in Ukraine and in the world is accompanied by the emerging problem of ensuring high-quality economic growth. Indeed, it is in the dynamics of economic growth that we can draw conclusions about the development of the national economy, its place on the world stage, the standard of living of the population, how the problems of resource constraints are solved. Stimulating economic growth, maintaining its pace at a stable and optimal level are the most important long-term goals of the economic policy of the government of any country over the past decades [1].

The analysis of the dynamics of production in Ukraine during 2015-2017 showed that the decline of industrial production in the first half of 2016 gradually changed to its stagnation, and in the second half of 2016, industrial production in Ukraine gradually began to increase (Graph 1). According to experts from the Ministry of Economic Development and Trade, the reduction of Ukraine's GDP by more than half is due to the actual exclusion of Donetsk and Luhansk regions from the economic life of our state. The rest of the GDP reduction is due to other factors, including the world market situation. According to preliminary calculations in 2018, Ukraine managed to overcome the recession and demonstrate insignificant economic recovery rates. The annual growth rate of GDP for the nine months was 1.2%. The gradual withdrawal of the economy from the recession is indicated by the reduction of the negative GDP gap, which lasts from the second half of 2016. Such a reduction is the evidence of a decline in production in the industrial sector, as a consequence of its increase in the agro-industrial sector, since a significant part of this sphere of production (grain, oil) is exported [3,103-104].

Despite the insignificant dynamics in Ukraine, a number of unresolved issues concerning the technological level of Ukrainian industry development remain. Namely, more than 95% of products in Ukraine are produced at enterprises with obsolete equipment (metallurgy, chemical industry, fuel and electric complex), and only 5% due to the introduction of scientific and technological progress (electronics, information services, telecommunications,

biotechnology) . There is a need for the active introduction of modern scientific and technological progress in all branches of production [1, 21-25].



*Graph 1. Index of industrial production.*

In general, at the current stage of the world economic development, the steady growth of high-tech production is considered to be a key factor in raising the level of national economies. The financial and economic crisis has reaffirmed this thesis, since it is precisely the economies with powerful high-tech manufacturing that have proved more stable in times of crisis. Developed countries of the world have been successfully modernizing national economies, which primarily involves the transition to energy, material and labor-saving technologies, that is, to maximize the efficient use of all types of economic resources.

So, in order to ensure the qualitative economic dynamics in our country, it is necessary to implement a strategy of non-overcoming modernization, and ahead of development on the innovative-investment basis. This requires:

- the formation of conditions and mechanisms that will ensure qualitative changes in the structure of the economy with a priority for the creation and development of the fifth and sixth technological processes (alternative energy, biopharmaceuticals, nanosciences and biotechnologies);
- the creation of a powerful system of financing investment activity;
- the stimulation of innovative activity and social business initiatives;
- promoting effective, competitive and sustainable social and economic development of both regions and the country as a whole;
- reduction of monopoly sectors of the economy, control and reduction of corruption and, consequently, openness of the economy and transition to a new model of economic growth;

- ensuring the development of human capital through the implementation of effective national projects in the field of health care, education, housing provision, etc.

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### **THE CONDITION OF LOGISTIC ACTIVITY ON THE TRANSPORT ENTERPRISE**

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**Formulation of the problem.** The role of logistics is increasing every year under the influence of global trends, such as the constant growth of consumer demand, which leads to an increase in the range of products and the complexity of logistics infrastructure. Nowadays, trade enterprises that successfully manage logistics processes are very rapidly beginning to develop, thus taking advantage of favorable market positions in comparison with large and international companies, as they are able to satisfy the demand of consumers due to a well-designed logistics process.

One of the main functional areas of logistics is the transportation of products. The consumer needs a quality product in the right amount, in the right place, at the right time and delivered with minimal expenses. That is why there is a need to ensure the quality of logistics processes on the transport enterprise.

**Analysis of recent research and publications.** Special attention is paid to the theory and practice of logistics in the works of such scholars as B. Anikina, D. Bowersox, A. Hajinsky, M. Grigorak, T. Dudar, A. Kalchenko, Y. Kricavsky, L. Myrotyna, T. Skorobogatova, K. Tankov, N. Tyurin, N. Chukhrai and others.

However, in the dynamic development of the automotive industry, it is necessary to analyze and generalize the notion “logistics of the transport enterprise”.

**The purpose of the article.** The purpose of this paper is to further develop theoretical and methodological provisions and develop practical recommendations for ensuring the quality of logistics activities of the transport enterprise.

**Presenting main material.** In today's market conditions, the role of logistics is of high importance, because its main goal is to look for opportunities to reduce costs for profit. Logistics allows you to link the economic interests of the manufacturer of the product and its consumer. Under market conditions, as the emergence and development of new organizational forms, implementing the processes of movement of goods, the acquisition of logistical processes of interaction between enterprises-manufacturers, consumers, intermediaries, warehouses and transport becomes of increasing importance. Logistics is not only a tool for achieving the final economic result, but also a means that allows to develop economic and technological interrelationships, improve the quality of the result.

When considering the issues of logistic activity of the transport enterprise it is necessary to consider the concepts of "logistics", "logistic process", "logistic operation", "logistic service", "logistic service", "transport service", "logistic approach".

Logistics is the planning, management, control and regulation of the movement of material and related information flows in space and time from their primary source to the place of final consumption [1, 11].

Most researchers consider logistics through the implementation of logistic functions, which in turn are divided into logistics processes and logistics operations. Logistic process is organized in time, this is the sequence of logistics operations, which allows you to achieve the goals. Logistic processes include processes that are associated with changing the parameters of space (placement), time, form, properties of logistic flows [2, 8].

Logistic operation is a part of a logistic process performed in one workplace or using one technical means. This is a set of actions aimed at the transformation of logistic flows, which is not subject to decomposition [2, 9].

Logistics service is the totality of intangible logistics operations that provide the maximum satisfaction of consumers' demand in the process of managing material, financial and information flows by the most optimal way, in terms of costs [3]. This is the assumption of various combinations of logistics services to consumers of equipment in accordance with existing methods of its use during the entire period of operation" [4, 68]. At the same time logistic service of consumer services can be carried out by the manufacturer, trade and intermediary structure, as well as specialized forwarding companies. This depends on the type of the logistics system, the level of the customer's requirements and the provider of the strategy.

The basis of logistics services for consumers is the combination of management of all material flows, which allows you to supply the necessary

products in the required quantity and the required quality in the right place at the appointed time for a given number of consumers with minimal costs.

Consequently, in the definition of the concept of logistic service, attention is focused on the purposes of customer service, the achievement of which is associated with the implementation of logistics approaches.

The logistic approach to the object of management, the tools and methods of logistics are used in a variety of areas of management. The presence of the logistics unit in the company is no longer something unusual, but is considered as an obligatory component of the organizational structure of a successful enterprise. The area of competence of specialists in the field of logistics covers the management of a variety of objects related to document circulation, human flows, information, financial and material ones. It is the management of commodity-material flows, their optimization that are considered the most common tasks of management in the environment of commercial enterprises [5, 10].

The sphere of practical implementation of the logistic approach is logistic activity of the enterprise. The logistical activity of business entities is regarded by some as a practical implementation of complex logistic functions and elementary logistics operations [6, 56].

Complex logistic functions are divided into: *basic* (supply, production, sales); *key* (maintenance of consumer service standards, procurement management, transportation, inventory management, order management, production process management, pricing, physical distribution); *supporting* (warehousing, cargo processing, protective packing, ensuring return of goods, provision of spare parts and service, collection of back waste, information computer support).

**Conclusions.** Consequently, the purpose of logistics is to unite the interests of producers, suppliers and consumers, by its main areas: improving the parameters of incoming flows of resources, based on improved communication with suppliers; improvement of internal flows, that is, results and coherence of actions of the enterprise's divisions; improvement of relations with consumers, ensuring the most accurate correspondence of output flows of goods and services to their requirements.

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## **NEUROMARKETING: TO THE QUESTION OF THE STANDARDS OF ETHICS**

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The last decade was marked by the rapid development of methods of neuroimaging. This is due to the accumulation of a significant amount of knowledge and the huge potential of new research tools. Therefore, the most significant goals of modern neuromarketing research have been set [2].

1. Search for the neurobiological basis of consciousness formation, designed to clarify such issues as: "Who are we?", "What makes us to be ourselves?", "What for are we here?"

2. The study of brain structures responsible for the emergence of trust, which can open additional opportunities for conscious management of communications, both at the personal level, and in the media and channels of information distribution.

3. Studying of the basic reactions of the nervous system arising in the process of selecting and consuming the product.

4. A reliable and complete description of the universal mechanisms of decision making by a person, due to which some of the economic approaches have to be revised, but, at least, substantially update them.

From the point of ethics, modern issues of neuromarketing can be conditionally divided into two blocks [3]:

The first block is directly related to the applied aspects of implementation of the marketing research process and consequences of applying the results obtained in its course. He has a generalized moral and ethical orientation, based on a humanistic forward movement with respect to methods:

- neuroimaging,
- psychopharmacology,
- methods of application of brain machine interfaces.

The second set of questions is devoted to the ethics of using data from neuroscience in solving specific business problems, developing of promotional strategies (for products, brands or even individual persons), testing of advertising materials, etc.

Block 1. Moral and ethical problems of neuroimaging can be conditionally divided into: bioethical, professional ethical and humanistic. All of them mainly come from one consolidating message: "Don't harm".

Bioethical problems are determined by the ratio of the health risk to the respondent and the expected benefits. In modern reality, this is perhaps the most protected area of application of neuroscience. This is due both to the existence of a more or less formed legislative base, and to the vector of development of methods that seek to reduce the potentially negative impact on the body.

The next risk zone is the professional and ethical sphere, where the risk is in the fact of participation of specialists in neuroscanning in the process of obtaining the necessary marketing information. The difficulty in processing of results by statistical analysis and interpretation of local reactionary exertion of brain activity gives a reason to think about the periodically arising potential ambiguity of the conclusions and the role of the "human factor" in these studies. Therefore, we have the probability of an error in the implementation of the diagnostic process. The conclusion, obtained by means of research, can cause serious harm to a person if for any reason does not correspond to reality.

As for humanistic problems, there is a wide field for discussions, which are designed to determine the exact limits of the application of social ethics standards during the application of neuromarketing methods.

Block 2. When discussing issues related to the study of neuropsychological, neurophysiological and neurobiological interdependencies, the public believes that such research discredits the very essence of the notion of freedom of the human will. This is especially true when considering studies on the implementation of choice and decision-making.

Many assessments about the use of knowledge from the field of neuroscience suppose a comprehensive understanding of the processes occurring inside the organism as a whole and the nervous system, in particular, are justified. However, these statements often hide a global misconception that "... all of this leads to a certain kind of manipulation associated with a frank influence on consumer thinking, displacing the concept of personal responsibility for decisions making ..." [1].

Correct, the definition of correlates of brain activity and their correlation with the condition and behavior of the respondent require an immediate resolution of the issue of ensuring confidentiality of the received information in a legal aspect. Employers, marketing specialists, state and judicial bodies are interested in obtaining reliable information about certain inclinations of a person, his personal characteristics, and so on. At the same time, it can not be asserted that these studies, if properly used, harm the whole society or even a single individual, since they have a basis in the form of very correctly formulated goals and objectives.

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**Rokhman A. V.**

### **THE NATURE AND SCOPE OF CRYPTOCURRENCIES**

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The emergence of cryptocurrencies is one of the consequences of a global social and political revolution or, using less radical terms, a set of reforms. The level of citizens' trust to the state is decreasing every year around the world, and the rate of insecurity and mistrust varies from region to region. One may ask, "What is cryptocurrency and how does it differ from ordinary money?" Cryptocurrency is electronic money that is created by separate computers, while the central banks of the countries do not participate in the process at all. Special encryption algorithms are used to create digital "coins".

Features [1]:

- Easy usage. You need to spend about 5 minutes to create a digital wallet of bitcoins. Sometimes it may take even more than one day to open an account in the bank.
- Decentralized system. The system does not have a central control body; it is distributed to all participants. It means that every computer that produces bitcoins is a member of the system. Nobody makes rules for bitcoin owners.
- Privatness. You can create and buy cryptocurrency without specifying your name, while the system is completely transparent.
- Minimum fee. Commission in the bank sometimes simply amazes, for international money transfer you can easily pay \$50. For the purchase or exchange of cryptocurrency, you will pay trifles (although the bitcoin poorly fits for transfers of very small amounts).
- Transparency. The system stores information about absolutely all transactions, and it is called as operation history – "block-chain". Any person

can refer to the address of the bitcoins and see how much is in your account. However, the information is still anonymous.

- Fast transfer. Cryptocurrency can be sent anywhere in the world, with the transfer taking a few minutes after processing the payment.

Ukraine is in the TOP-10 countries of the world by the number of Bitcoin users. In Ukraine, the largest post-soviet bitcoin-agency is Kuna, one of the projects of which is a crypto-exchange market. There are also large development and research companies, for example, Distributed Lab.

The use of decentralized technologies is planned and partially implemented at the state level: e-Auction 3.0 – a system of decentralized online auctions in public institutions at municipal and regional levels; the first example in the world of governmental using a decentralized horizontal system for privatization and leasing state property, creating licenses. E-Vox is a system that allows voting for any purpose, including the election of deputies to local councils, parliament; also due to the system it is possible to conduct electronic referenda, plebiscites and other things. E-Ukraine – the concept of the e-government portal [2].

Ukraine has a very developed crypto-currency community, but at the same time, the legal status of the crypto-currencies and the relations arising from their use are not defined.

The National Bank of Ukraine is actively studying the experience of other countries to adjust these relations in the relation of Europe and globally. The issue of taxation of cryptocurrency transactions remains unresolved. Ukrainian government applies to them standard rules of taxation. So, the income of an individual, received in the form of a digital currency, is taxed at the standard rate of 18%, and the profit of legal entities – depending on the taxation system [4]. The question of value added tax is quite controversial, since the cryptocurrency is not defined as a commodity at the legislative level.

Therefore, before investing in bitcoin, it is worth considering all the advantages and disadvantages of cryptocurrency [1].

Advantages: thanks to the open code of the algorithm, anyone who wants can obtain and use cryptocurrency in any country in the world; all transactions are anonymous, only information about the wallet number is available; cryptocurrency is issued only in a limited amount, which excludes inflation (although there are many cryptocurrencies and there are exceptions to this rule); transactions and payments are not monitored, since the system is decentralized; cryptocurrency can not be copied, it is protected.

Among disadvantages we can highlight the following: there is no guarantee of wallet safety, as there are no regulatory mechanisms; the cryptocurrency is adversely affected by state decisions (for example, the prohibition of operations with bitcoins in Russia or China); the price of cryptocurrency is very variable; if you forget the password to the wallet, it will be impossible to recover it; the higher the level of complexity, the more

difficult it is to create crypto-currencies on conventional computers, accordingly, the mining of new coins will cost more and more.

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### **MOTIVATION OF EMPLOYEES OF THE PUBLIC SECTOR**

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Today the problem of employees motivation in the public sector is one of the most important in Ukraine. People don't want to achieve more than they have.

The imperfection of the motivation system of employees of the public sector needs special attention, because ignoring it can result in a number of negative consequences, among which:

1. Staff turnover is increasing every year due to small wages.
2. The majority of budgetary organizations make an unchanged bureaucratic system [1].
3. The career growth becomes practically impossible.

The most attractive thing an employee of a public institution can be offered is a constant practice as well as a fixed salary and official employment.

Staff motivation is an extremely important problem, as it determines the success of the organization, the level of people's well-being and the quality of education in Ukraine. Effective human resources management is not possible without a clear understanding of the motives and needs of people, as well as the ability use incentives for work in a right way.

Unfortunately, the possibilities of public organizations in labor stimulation are limited in comparison with private ones (especially in terms of material incentives), but they still exist.

Problems of updating motivational systems in public institutions to ensure high productivity growth, improving the quality and competitiveness of the organization to a certain extent were considered by such scientists as L. Artemenko, T. Bazarov, V. Bondar, O. Volnukhina, V. Voronkova, N. Goncharuk, A. Yegorshina, B. Ereminina, S. Zaniuka, A. Kolota, A. Krushelnytska, O. Mashkova, O. Melnikova, D. Melnychuk, S. Mosova, N. Nyzhnik, M. Olekhnovich, V. Oliuiko, N. Protasova, T. Remizova, O. Sliusarenko, O. Turchinova, R. Shevelina and others.

However, the situation remains unsolved and requires a re-diagnosis of the problem and identifying ways to overcome it.

It is necessary for human resource management to determine the problem of employees motivation; conduct qualitative analysis of employees' motivational processes, identify of the causes of workers' passivity, implement foreign methods of motivation and formulate recommendations for management how to improve staff motivation. Using the method of questioning human resource management can analyze the state of employees satisfaction with their positions in an organization.

Both the personnel department and payroll specialists from the accounting department and planning and economic services of an institution must participate in the development of a staff motivation system [2].

A more detailed consideration deserves measures and levers of moral stimulation of employees. It means the efforts of a management team to unite all members of the team, build positive relationships and friendly environment, corporate culture etc. Most people feel motivated when they know they are making a contribution, and doing something useful. It's important for managers to support their staff, listen to their problems and help them feel more confident. Human resource management should be based on the mutual satisfaction. On the one side the employees have to achieve company's objectives in an efficient and productive way, and on the other side the employees expect a compensation for their work in mind of benefits, wages, promotion and so on.

Thus, motivation is the inner driver that influences the person's behavior toward goal achievement. Motivated employees contribute to the long-term success of the organization through creativity, innovation and their orientation towards customers, which is of utmost importance in the public sector.

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**DIE FORSCHUNG DER FUNKTIONEN UND OPERATIONEN DER ZENTRALBANK**

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Die Entwicklung des Systems von den vollwertigen Marktbeziehungen in der Ukraine verändert die Rolle des Staates bei der Regulierung des Wirtschaftsablaufs. Das Ziel des Staates besteht in der Sicherstellung eines beständigen Wachstums des Betriebes, die Unterstützung des hohen Niveaus der Beschäftigung, der Stabilität der Kaufkraft und der Gleichgewicht in dem Außenhandel.

Heute wird die Tätigkeit der Zentralbank besonders aktuell, die eine wichtige Wirkung auf die Stabilität der Landeswährung, die Zuverlässigkeit der Bankenanstalten, die Effizienz des Zahlungs- und Verrechnungssystems, die Aktivierung der Marktkonjunktur, das Alignement der Zahlungsbilanz hat.

Durch die effektive Wirtschaft werden materielle Güter geschafft. Dadurch kann die Gesellschaft eine lange Zeit existieren. Eine große Bedeutung in der modernen Wirtschaft hat die Unterstützung der Geldeinheitsstabilität, genügende Menge vom Kapital sowie der Schutz des Bankensystems gegen die Krise. Für diese Zielerreichung üben die Staaten die strenge allseitige Regulierung und Kontrolle aus. Dies wird von den Verfassungen und Gesetzgebungsakten vorgeschrieben.

In der vollentwickelten Wirtschaft nimmt die Zentralbank eine besondere Stelle ein. Sie ist das Zentrum des Geld- und Kreditsystems der Staatswirtschaft. Die Hauptfunktion des Bankensystems ist die Kontrolle und Regulierung der Finanzen. Die Staatsbank verwirklicht die Operationen für die Sicherstellung der Erfüllung ihrer Funktionen, die in der Tabelle 1 dargestellt werden [1, 3].

*Tabelle 1 Funktionen und Operationen der Zentralbank*

Funktionen der Zentralbank	Operationen der Zentralbank
1	2
In Übereinstimmung zu Hauptprinzipien der Geldpolitik bestimmt die Nationalbank der Ukraine die Geldpolitik.	Die Zentralbank weist Kredite an die Banken für die Unterstützung der bilanzmäßigen Liquidität.

Die Zentralbank verwirklicht die exklusive Emission der Landeswährung der Ukraine und organisiert den Bargeldumlauf.	Die Zentralbank weist Kredite für den Delkrederefonds physischer Personen unter den Bedingungen von Rechtsvorschriften.
Die Zentralbank wirkt als Kreditor der letzten Behörde für die Banken und organisiert das Refinanzierungssystem.	Die Zentralbank verwirklicht Diskontverfahren mit den Wechseln und Checken nach der Ordnung der Nationalbank.
Die Zentralbank verwirklicht die Bankenregulierung und die Überwachung auf einer individuellen und fundierten Grundlage.	Die Zentralbank kauft und verkauft die Valutawerte mit dem Ziel der monetäre diskretionäre.
Die Zentralbank bestimmt für die Banken die Regeln für die Durchführung von Bankoperationen, dem Abrechnungsverfahren und der Rechnungslegung.	Die Zentralbank kauft und verkauft Papierwerte in der vorgeschriebenen Ordnung.
Die Zentralbank organisiert die Schaffung und sichert methodologisch das Geld- und Kreditsystem und die Statistik der Zahlungsbilanz.	Die Zentralbank eröffnet das Bankkonto in den Banken im Ausland und führt das Bankkonto der Korrespondenz-Banken.
Die Zentralbank verwirklicht die Abstimmung des Bankstatuts und deren Veränderungen, die Genehmigungserteilung des Bankbetriebes und der Operationen in den von dem Gesetz vorausgesehenen Fällen, handelt das Öffentliche Bankenregister, das Register der Buchprüfungsfirmen, die die Buchprüfung der Banken beauftragt sind.	Die Zentralbank arrangiert die Gold- und Währungsreserve selbständig oder durch die Banken, erfüllt die Verfahren mit den Gold- und Währungsreserven.
Die Zentralbank bestimmt die Richtung der Entwicklung von modernen elektronischen Bankentechnologien, schafft und sichert ein ununterbrochenes, zuverlässiges und effizientes Funktionieren der von ihm geschaffenen Zahlungs- und Diskontvorgänge.	Die Zentralbank bewahrt das Barrengold auf sowie kauft und verkauft das Barrangold, Edelsteine und sonstige Kostbarkeiten.

Die Zentralbank reguliert die Tätigkeit des Zahlungssystems und der Systemen für die Kalkulationen in der Ukraine, bestimmt die Ordnung und Zahlungsform inklusiv zwischen den Banken.	Die Zentralbank gibt die Gewährleistungen und Bürgschaft aus.
Die Zentralbank führt die offiziellen Register von den Bankenidentifizierungsnummern von Emittenten der Zahlungskarten.	Die Zentralbank bestätigt Verordnungen und Vorschriften.

Die Hauptaufgabe der Zentralbank ist also die Gewährleistung der Stabilität von der nationalen Geldeinheit, d.h. Hrywnja. Die Nationale Bank verwirklicht die Handlung von Bankenbuchen, Börsen, Devisenbörsen und sonstigen Finanz- und Kreditbehörden, die Vorweisung der Interessen der Ukraine in den Beziehungen mit den Zentralbanken anderer Staaten, mit den transnationalen Banken und Finanz- und Kreditbehörden.

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#### **THE MAIN TENDENCIES OF LENDING TO LEGAL ENTITIES**

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The financial and economic instability in Ukrainian economy has led to significant shocks in the banking system resulted in the minimization of bank lending. This is linked to the fact that banks can't compensate for their own expenses on lending with income received, owing to lower public confidence in the banking system, the volatility of the legislative framework, the counterterrorist operation in eastern Ukraine, and many other factors.

According to the results of the research of the international rating agency Standard & Poor's, as of early 2017, the share of problem loans of

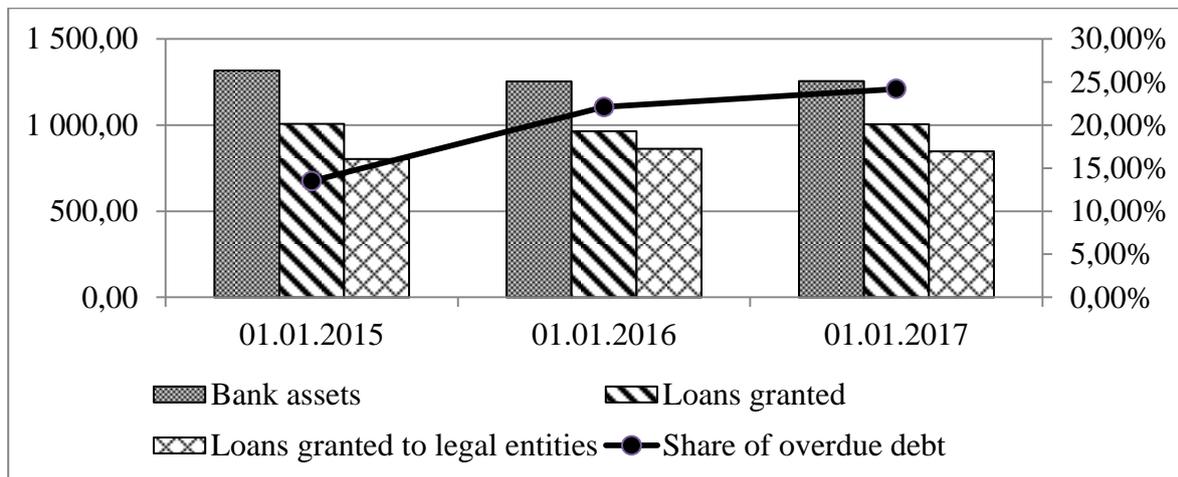
Ukrainian banks is 40%. However, according to many experts, long-term lending is a major accelerator of economic development and one of the indicators reflecting the population's attitude to the banking system [2, 96].

In figure 1 we can trace changes in absolute indicators of lending activities of Ukrainian banks during 2015-2017 [3].

During 2016, the volume of the client loan portfolio shrank by 0.4% (UAH 3845 million) and as of January 1, 2017 it amounted to UAH 1,005,923 million against UAH 1,009,768 million at the beginning of the year.

The reduction in the total volume of the loan portfolio was due to a decrease in the amount of loans granted to legal entities during the year. By the end of 2016, their volume decreased by 10.43% to UAH 847.092 million.

The graph below shows the changes in the amount of outstanding debt in the total amount of loans granted. As we can see, this indicator has a tendency to increase. As of 01.01.2015, it amounted to 13.5%, and as of 01.01.2017 - 24.2%. Consequently, we can say that during this period, it has grown almost twice (by 10.7%).



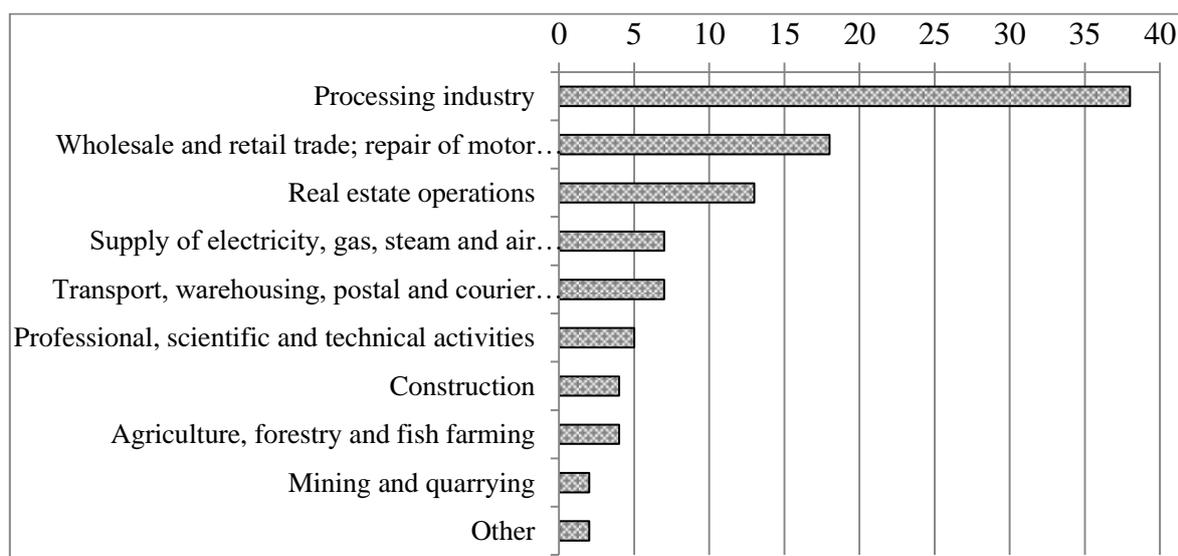
*Fig. 1. Absolute indicators of lending activities of banks for 2015-2017 years, billion UAH.*

The corporate client loan portfolio for the end of 2016 is mainly represented by short- and medium-term loans in national currency to non-financial corporations.

Client loan portfolio by types of economic activity is presented in figure 2 [1].

The figure shows that the largest share of loans is provided to enterprises in the processing industry (38%), followed by wholesale and retail (18%) and the next is real estate business (13%). The smallest share holds: extractive industry and the development of quarries (2%); agriculture (4%); construction (4%).

According to the results of 2016, the average interest rate on loans granted by business entities was 17.5% in national currency and 8.0% in foreign currency. This demonstrates a decrease in the interest rates on loans in national currency they amounted to 20.6% since at the beginning of January 2016, and the growth rates on loans in foreign currencies, they made 6.9% since at the beginning of January 2016. It can be argued that this was one of the reasons for reducing the volume of loans granted by business entities by UAH 16 billion, as most of these loans are provided in foreign currency. As of 01.01.2017, the number of loans in foreign currency amounted to 436 851 million UAH. (52%), and in the national currency, UAH 410 241 million. (48%).



*Fig. 2. Corporate client's portfolio by types of economic activity, %*

Therefore, the development of bank lending in our country is currently declining. The number of financial institutions is reduced, the amount of loans granted is partially reduced, interest rates on loans increase. All this is due to the fact that banks now operate in conditions of uncertainty and high risks.

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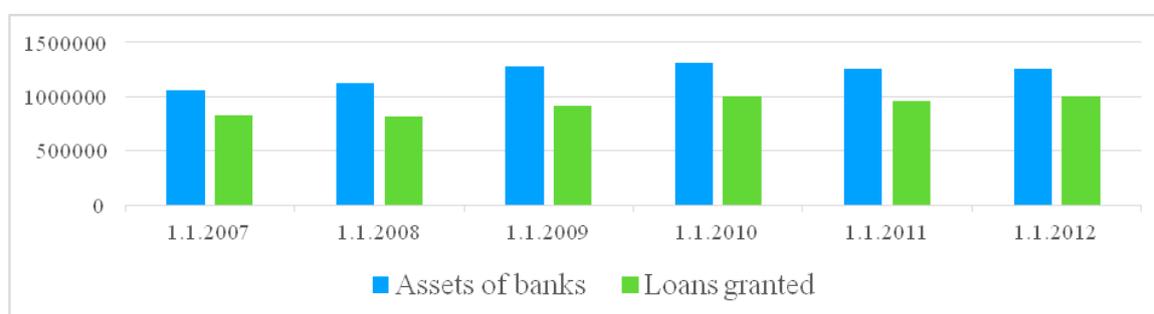
**Shkola O. K.**  
**ANALYSIS OF THE MODERN CREDIT ACTIVITY OF BANKS IN  
UKRAINE**

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At the present stage of economic development, the development of an effective banking system and the further improvement of the credit relations of banking institutions with borrowers are important in the search for ways out of Ukraine from the crisis.

Since 2014, the NBU has launched a large-scale clearing of the banking sector. According to official data of the National Bank of Ukraine, as of 01.11.2017 in Ukraine 88 banks were registered, on 01.01.2014 180 banks were registered. Thus, the banking sector got rid of "pocket" banks. But the problems of bank lending continue to affect the overall financial condition of the banking system of Ukraine.

As of 01.01.2017, the assets of the banking system, net of formed reserves, increased by 18.98% (or by 200.105 million UAH) compared to the figures for early 2012 (Fig. 1) [1]. The loan portfolio of Ukrainian banks tends to increase, but given the depreciation of the national currency by more than 3 times, we conclude that the general trend is towards a decrease.



*Figure 1. Absolute indicators of credit activity of banks in 2012-2017, mln. UAH [1]*

Relative indicators of credit activity of banks at the macro level are the profitability of assets and capital.

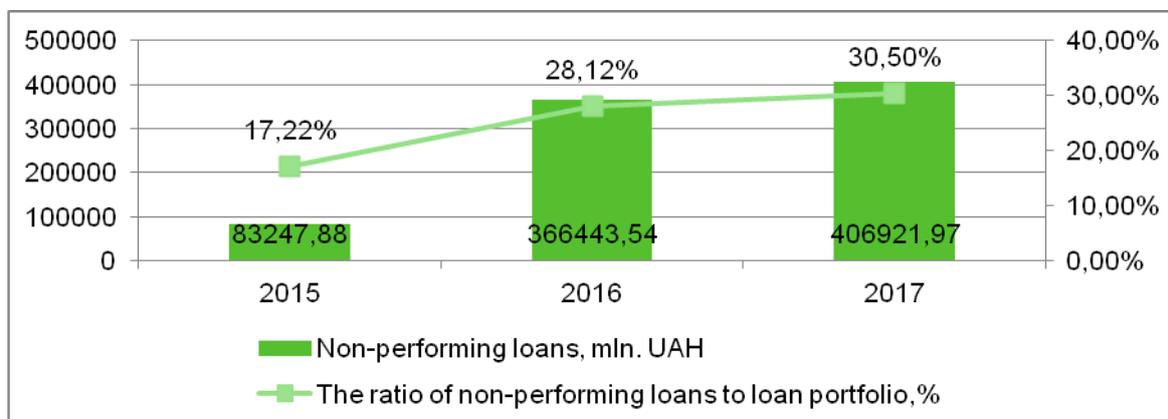
The optimum ROA value is 1% or higher [2].

The decline in profitability indicators always indicates a general deterioration in the financial condition of the banking system, which in turn leads to an increase in credit risks and a decrease in the quality of the loan portfolio.

*Table 1. Relative indicators of credit activity of banks at the beginning 2012-2017 [3]*

Indicators	Return on assets (ROA), %	Return on equity (ROE), %
01.01.2014	-0,12	-0,81
01.01.2015	-4,07	-30,46
01.01.2016	-5,46	-51,91
01.01.2017	-12,6	-116,74

It is advisable to analyse the quality of the total loan portfolio by examining the presence of invalid credits in the credit portfolio of banks. (Fig.2)



*Figure 2. Dynamics of volumes of non-performing loans of the banks of Ukraine for 2015-2017 [4]*

The significant size of non-performing loans indicates the total risk for all credit operations and liabilities of banks lending and is manifested in the decrease in the value of assets.

Investigated the size of aggregate reserves on credit operations relative to the size of banks' loan portfolios.

*Table 2. Dynamics of reservation of loans of Ukrainian banks for 2015 – 2017 [4]*

Year	Loans of Ukrainian banks, mln. UAH	The reservation of credits of banks of Ukraine, %
2015	873 611	9,9
2016	713 974	12,4
2017	554 637	9

Observed a small downward trend in the total reserve relative to the total loan portfolio of banks.

As a result of researches it is established that the activities of banks in lending over the last three years is not successful. The volume of credit portfolio of banks relative to assets increases, but its real value is declining due to the decline in the quality of the loan portfolio. This in turn leads to decrease of profitability of credit operations of banks and rising credit risk.

To solve this problem, banks need to pay more attention to improve the quality and effectiveness of credit portfolio management.

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### **BUDGET SYSTEM OF UKRAINE**

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The legal framework of the budget system is the Constitution of Ukraine, issued on its basis by the Budget Code of Ukraine, other legislative acts. The economic basis of the budgetary system of Ukraine is the national economic complex. The structure of the budget system is its structure, principles of construction and organization of functioning. The structure of the budget system is determined by the budget system, which is based on the administrative and state system of Ukraine.

The budget system of Ukraine is a system of budgets of Ukraine defined by legal norms, a distinction between incomes and expenditures between them, and the powers of legislative and executive bodies in the sphere of the budget. Since Ukraine is a unitary state in which according to Art. 7 of the Constitution is recognized and guaranteed by local self-government, the budget system of the country is two-tier and consists of the State Budget of Ukraine and local budgets. It should be noted that the Law of Ukraine "On the Budget System of Ukraine", which was in force until 2001,

included in the budget system of Ukraine the State Budget of Ukraine, the republican budget of the Autonomous Republic of Crimea and local budgets, thus creating a conflict as to the inconsistency of the unitary state structure and competence local authorities. Consequently, the budgetary system is an organization and principles of budget system construction, its structure, interrelation between separate parts of the budget system. At the same time, the Budget Code of Ukraine does not contain a definition of budget structure. The budgetary system of Ukraine is a set of the state budget and local budgets, which is based on the economic relations, state and administrative-territorial structure.

Budget information should be made public. Within the limits of the established competence, the Ministry of Finance of Ukraine provides access to publications: 1) the draft Law on the State Budget; 2) the Law on the State Budget of Ukraine for the relevant period with the annexes, which is an integral part thereof; 3) information on the implementation of the State Budget of Ukraine for the results of the quarter and year; 4) information on the performance indicators of the consolidated budget of Ukraine; 5) other information on the implementation of the State Budget of Ukraine. The Draft Law on the State Budget is subject to obligatory publication in the *Uriadovy Kuryer* newspaper no later than seven days after its submission to the Verkhovna Rada of Ukraine. The principle of responsibility of participants in the budget process - each participant in the budget process is responsible for their actions or inactivity at each stage of the budget process. The Budget Code establishes that persons guilty of violating the budget laws are civil, disciplinary, administrative or criminal liability in accordance with the laws of Ukraine. One of the measures ensuring the unity of the budget system of the country is the budget classification. In general, the budget classification exists to achieve three objectives: control, regulation and planning, as well as to provide three types of information: cost, effectiveness and efficiency.

The Ministry of Finance of Ukraine submits a draft law on the State Budget of Ukraine to the Cabinet of Ministers of Ukraine for consideration, as well as makes suggestions as to the timing and procedure for consideration of this project in the Cabinet of Ministers of Ukraine. The Cabinet of Ministers of Ukraine shall adopt a resolution approving the draft law on the State Budget of Ukraine and submit it, together with relevant materials, to the Verkhovna Rada of Ukraine no later than September 15 of the year preceding the scheduled. This ends the first stage of the budget process. After approval by the Cabinet of Ministers of the draft law on the state budget, the Ministry of Finance has brought the Council of Ministers of the ARC, local state administrations and executive bodies of the relevant councils: calculations of projected amounts of intergovernmental transfers; the method of their determination; other indicators necessary for drafting local budgets; proposals on the form of the draft decision on the local budget (typical form of the decision). The budget law of Ukraine is a set of financial and legal norms

regulating internal relations that arise in connection with the formation, distribution and use of the state, republican, regional, district, city and local budgets. Great theoretical and practical significance is the definition of the subject of budgetary law, that is, those relations governed by the norms of this section of financial law. Such relations are internal, because they relate to the distribution of financial resources within the state and non-state entities do not participate in them.

Definitive place at the stage of drafting the budget belongs to the Budget Resolution. A budget resolution can be an effective tool for establishing a general level of public expenditure on the economy, as well as for defining general budgetary constraints. The most important disadvantage of the budget process in many countries is that there is a lack of vision of the "panorama" of state expenditures on the economy (state intervention), as well as effective restrictions on spending decisions. In the absence of general local spending constraints, state leaders do not see the need for strictly balanced spending on different programs when making decisions. In addition, the Budget Resolution can be an effective mechanism for long-term budget planning, since the short-term focus of the budget, taking into account only the next budget year, could lead to such expenditure decisions that would not be in line with future policies.

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**Smolnikova A. V.**

### **WHAT SHOULD WE DO FOR THE STABILITY OF THE NATIONAL CURRENCY? – «UNBIND» THE RUBLE EXCHANGE RATE ON OIL PRICES**

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Everybody knows that national currency rate depends on prices for hydrocarbons, but not everyone can explain why. The cost of the currency is determined by supply and demand like everything. The ruble does not claim to be the world's reserve currency and it is almost completely used within Russia and the CIS countries, resp. domestic supply and demand are connected with ruble. Export of raw materials is growing up fast and is nominated in dollars, that's why there is a supposed inflow of foreign

currency in our country. The excess of its supply in the domestic foreign exchange market leads to lower its cost and increase the relative price of the national currency. The same rule acts reverse, so the national currency weakens when exports decrease like it was in 2015 when in spite of the absolute increase in production and exports, which in monetary terms strongly decreased due to the fall of the value of hydrocarbons whereas the ruble responded a fall. That is not the only factor, but perhaps the most significant one.

For many years the authorities at all levels and the expert community are talking about the necessity to get rid of oil-dependency and diversification of the economy [3]. But the situation is greatly complicated by the record low oil prices. It is high time to recognize that Russia is sick. And even this disease has been already sonorously named by **Dutch disease**.

*A brief excursion into history.* In 1959 abundant gas deposits have been found in the north of Holland (the name is Groningen gas field), consequently there was no limit of Dutch`s joy because discovery promised a good return of the national treasury therefore Dutch cheerfully rubbing his hands waiting for the rapid growth of well-being. Most expectations had come true because of incomes has been grown-up and the national currency began to be stronger. A bright carefree future loomed ahead.

But let`s continue to prosperous Holland. The course of the national currency has been raised rapidly. Personal income increased significantly too. And after that the first problems came. Certainly few people think about it that time, because all of this can be seen only in the retrospective analysis, but the structure of the economy beginning to deform. The manufacturing industry could not keep up growth of the extractive industry; it also began to decline [6]. The reason is simple: products have ceased to be competitive on price with foreign counter parts, the changed exchange rate helped to make foreign-made products more accessible now in compare with those another were more expensive in dollars earlier. The situation of exports also became more difficult. Even if the cost of production in the national currency has not changed-Dutch food prices increased in dollars. Why would anyone need manufacturing industries if mining segments promise super profits? In such conditions service sector also feels well, which one clings to the resource rents as a leech.

Let`s see analogies between Russia of the 2000s with the crazy paces of economic growth especially due to the mining industry which has revenues redistributed on the service sector. Oil revenues have been filled the economy, but it did it unevenly. Despite the fact that with an increase in the price of oil incomes of the population grew, the country is becoming more and more dependent on commodity exports. But in our country everything was a bit wrong as in the Dutch canon: the national currency rose in price really limited but yet purchasing power parity was undervalued. This happened due to a number of fundamental reasons which were associated with the outflow of capital and although relatively weak ruble was as supporting factor, because

export of domestic goods is more expensive [5]. The ruble influence on the structure of the domestic economy was not enough for its recovery. Now oil prices fell to multi-year historical lows, these problems manifested them in full force. The Federation hardly can find the funds to balance the budget that is exacerbating by the fact that many credit lines were closed and the others are too expensive to get it. The main reasons are sanctions and low sovereign credit rating [2].

And what eventually happened to the Netherlands? The high inflation has appeared in this country. The personal disposable income began to fall. The economic boom changed on creeping recession. The labor productivity fell. The real manufacturing sector turned out to be under the threat of a critical reduction [4]. As a result Dutch goods were not in demand on the foreign and domestic market. Does it remind something?

There is the term in the economy to describe this phenomenon – a resource damnation. As a rule well-resourced countries are less successful in international competition than unsecured.

Our country has a chance to get rid of this damnation, because hydrocarbon era is over and it will never be worth as expensive as before. All that is needed for market-that is give him more freedom. Economy is freedom-loving fury: it cannot be thoughtlessly to influence it and to intervene in a stable order of things. It is self-regulated and always tends to equilibrium and artificial deviation of one parameter, generally leads to disruption of the entire system. There is antitrust, monetary, fiscal (tax) policy in economy as control elements. Economy characterized by critical conditions and every action should be regulated and predictable.

By the way Russia defends the "traditional values» instead the world is entering to new areas of technological progress such as: electricity storage or effective use of shale fields. Time plays against of Russia today. Economy has become hostage to oil prices; perhaps we need a real shock which will break the full system. The main fundamental factor of devaluation of the ruble is oil prices continue to "look forward the bottom" without finding a fulcrum [1]. The Bank of Russia accompanied for ruble to look for balance because of devastated by sanctions and deceived in their expectations on the market.

We hope that the Central Bank could delete something from its postulates and will ruin by itself «the ruble formula » that consists of the balance between one barrel costs in rubles. Rejection of the prospects for an increase in international reserves and the partial failure of the free navigation to reduce market volatility would be the fewest of two evils.

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## **DIGITALER WÄHRUNGSMARKT IN DER UKRAINE**

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Kryptowährung - aus der englischen "cryptocurrency", also der durch Kryptographie geschützten virtuellen Währung. Als erste Kryptowährung - ein schneller und zuverlässiger Zahlungssystem und Geldtransfer basierend auf der neueste Technologie und von einer Regierung kontrolliert. Die Welt ist viel Kryptowährung (Bitcoin, Litecoin, Astraleum, Peercoin), aber die bekannteste ist die rasante Entwicklung - Bitcoin (bitkoin). Im Jahr 2015 hat der Europäische Gerichtshof Bitcoin von der Besteuerung befreit, die es tatsächlich als vollständige Währungseinheit anerkennt.

Über Bitcoin und Blockchain-Technologie hörten sie sogar diejenigen, die nie kryptographische Literatur benutzt haben und nicht verstehen, was Bergbau ist. Das rasante Wachstum der Popularität und der Kurs des virtuellen Geldes, und besonders seit Anfang 2017, machte sie zu einem trendigen Thema.

Allerdings kann nicht jeder klar vorstellen, was die wichtigsten Vorteile der digitalen Währung, wie es funktioniert und was die Aussichten in den neuen Kettendatenspeichersystemen und Überweisungen sind.

Bitcoin Kryptowährung ist die beliebteste in der Welt, von April 2017 sein Kurs gegenüber dem Dollar um das Vierfache erhöht, „Farm“ mit „Produktion“ eine riesige Menge an Strom bitcoiniv zu verwenden und die Vornamen seines Schöpfers (oder Schöpfer) noch versteckt durch Pseudonym.

Bitcoin ist Ihre eigene Währung im Internet. Es kann bezahlt und sogar als Ersparnisse gespeichert werden. Obwohl Operationen mit Bitcoins eher spekulativ als kumulativ sind. Auch das Interesse am Weinen wird durch Investitionsmöglichkeiten verstärkt. Zum Beispiel fiel die Bitcoin Crypto Currency 2017 nicht unter 18% pro 1 Bitcoin Coin in der täglichen Wachstumsrate vom 6.-7. Dezember, und das Handelsvolumen erreichte unglaubliche Höhen. Der Verlauf dieses Schreies ist sehr volatil, so der Marktpreis von 1 Bitcoin = 15.000 Dollar. USA (Stand: 7. Dezember 2017) [1].

Emissions- und kryptographische Accounting basieren auf verschiedenen kryptographischen Methoden. Und das Funktionieren ist dezentralisiert, in einem verteilten Computernetzwerk.

Der neue Bitcoin oder jede andere kryptische Währung wird mithilfe eines Prozesses namens Mining erstellt. Mining ist eine Lösung für eine komplexe Crypt-Aufgabe, die mit der Methode des Full-Flighting gelöst wird. Ein normaler Computer funktioniert nicht für diese Aufgaben. Daher Bitcoin mit superproduktiven Computern oder leistungsstarken Servern zu bekommen. Jedes Jahr ist der Algorithmus Bitcoin zu bekommen kompliziert, um die jährlichen Emissionen der Kryptographie zu begrenzen und Inflation zu verhindern [2].

In vielen Ländern der Welt gibt es keinen Rechtsstatus für Kryptographie, und die meisten Erklärungen im Open Access sind mit technischen Informationen überladen. In der Ukraine gab es auch 2017 eine Situation mit einer lähmenden Währung, aber in diesem Jahr hat sich alles verändert.

Im Mai dieses Jahres wurde die erste Bitcoin-Maschine in der Ukraine eröffnet.

Automatische digitale Währung ist eines der Einkaufszentren in Odessa und unterstützt Operationen in beiden Richtungen bitcoin für die Griwna gekauft werden kann, und Sie können Ihre Hände auf der Griwna verkaufen und erhalten.

Ukrainische Beamte erwägen bereits die Kryptologie als Anlagegut. Zum Beispiel kann ein MP aus dem MFP Urbanskiy Alexander und sein Bruder - der Leiter des Rates Anatoly Urbanskiy Odessa regional - erworben bitcoinv 73 Millionen, wie in ihren Erklärungen angegeben.

Werchowna Rada der Ukraine Rechtsbeziehungen zu regeln bezüglich der Behandlung, Lagerung, Besitz, Nutzung und Transaktionen über Kryptowährung in der Ukraine 6. Oktober 2017 in der Werchowna Rada registriert einen Gesetzentwurf Nummer 7183 „Auf Circulation Kryptowährung in der Ukraine.“

Heute Kryptowährung hat einen ziemlich zweideutig rechtlichen Status und Experten NBU hat wiederholt erklärt, dass, weil es schwierig ist, über die Möglichkeit der reibungslosen Durchführung ihrer Berechnungen zu sprechen. Diese Situation ist ein fruchtbares Feld für Kriminelle mit Kriminellen. In diesem Zusammenhang beschloss der Gesetzgeber schließlich, eine Rechtsgrundlage für den Einsatz der Kryptologie zu schaffen [3].

Der Zweck des Gesetzes ist offizielle Status Kryptowährung, gesetzliche Regelung für die Verbreitung, Speicherung, den Besitz und die Verwendung von kryptovalyutnyh Operationen in der Ukraine zu gewähren.

Insbesondere definiert die Rechnung den rechtlichen Status Kryptowährung und rechtliche Grundsätze der Organisation und die Tätigkeit der kryptovalyutnyh Transaktionen.

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### **THE CONCEPT OF FINANCIAL RISK**

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Financial risk management is one of the most important functional tasks of financial management. In practice, this area of financial management is mostly distinguished in the specific direction of financial management - risk management.

Risk management should be understood as a system of risk management at the enterprise, which involves the use of methods and tools

aimed at identifying, identifying risks, calculating the probability of their occurrence, their assessment (determining the possible size of financial losses) and neutralization (internal and external insurance).

In general, the risk is a subjective-objective category, connected with overcoming uncertainty, chance, conflict in situations of inevitable choice, and reproduces a degree of achievement by the subject of risk of the result we need.

In domestic and foreign literature there are different approaches to the interpretation of the concept of economic risk.

V. Vitlinsky and P. Verchenko consider economic risk as an economic category in the activity of business entities, connected with overcoming of uncertainty in situations of evaluation, management, inevitable choice.

According to G. Polyak, economic risk is a potential, numerically measurable loss of opportunity, which is characterized by uncertainty associated with the possibility of occurrence of unfavorable situations and consequences during the project implementation.

In the manual of V. Lukyanova and T. Holovach, economic risk is an aspect of the activity of economic life entities that is related to overcoming the uncertainty in an emergency situation, in which process it is possible to estimate the probability of obtaining the desired result, failure and deviation from the goal.

Summarizing the above, one can conclude that economic risk arises under certain conditions. Such as:

- decisions are made in conditions of uncertainty;
- there is a need for choice with a large number of alternative solutions;
- the results obtained as a result of the adoption of each of the alternative solutions, it is possible to evaluate.

The increase in the financial activities of business entities is accompanied by a large number of risks. Their degree of impact on results and the level of financial security is greatly enhanced in a market economy. Risks that closely follow along with economic activity and generate various financial threats are identified as a group of financial risks that play the most important role in the overall risk portfolio of business entities.

In his monograph I. Blank distinguishes the main characteristics of financial risk as an object of financial management and conducts a detailed analysis of them. He refers to them:

- economic nature. Financial risk is manifested in the field of economic activity of the enterprise, directly related to the formation of its profit and is characterized by possible economic losses in the process of financial activity. Taking into account the listed economic forms of its manifestation, financial risk is characterized as an economic category that occupies a prominent place in the system of economic categories related to the implementation of economic activity;

- Objectivity of manifestation. Financial risk is an objective phenomenon in the operation of any entity; he accompanies almost all types of financial transactions and all areas of his financial activities;

- action in the conditions of choice. This action is used in a risk situation or a situation of uncertainty, when the financial risk manifests itself both at the stage of selection (decision) and at the stage of its implementation, and is an instrument for the practical elimination of contradictions in the development of possible conditions for the implementation of financial activities;

- alternative to choice. In any type of risk or uncertainty situation, there are at least two alternatives to choosing: to assume or refuse financial risk;

- Focussing action. Financial risk is always considered in relation to the specific purpose to which it is directed and which is the receipt of a certain amount as a result of the implementation of a particular financial transaction or financial activity in general;

- the probability of achieving the goal. It is manifested in the fact that a risk event may either occur or not occur in the process of financial activity of the entity;

- uncertainty of consequences. Financial risk may be accompanied by significant financial losses for the entity and the formation of additional revenue. A number of adverse financial risks determine the loss of not only income but also the capital of the entity, which leads to bankruptcy;

- anticipated adverse effects. The consequences of a financial risk can be both positive and negative, but the level of financial risk is estimated by the size of possible losses;

- Dynamic level. The level of financial risk in a particular financial transaction or certain type of financial activity of an entity depends on their duration;

- Subjective evaluation. The assessment of the level of financial risk is subjective. This subjectivity, that is, the unequal evaluation of this phenomenon, is determined by the level of completeness and reliability of the information base, qualifications of financial managers, their experience in the field of risk management and other factors.

Since financial risk has an economic nature and manifests itself in the process of financial activity and, moreover, arises on the lower strata of civilization, it can be considered as an economic category, and a historical category.

Financial risk is an objective phenomenon in the operation of any entity and accompanies all types of financial transactions and all areas of its financial activities. It is inherent in every financial decision related to the expectations of income, regardless of how the financial manager perceives this situation.

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### **LOGISTICS AS A TOOL FOR THE DEVELOPMENT OF A MARKET ECONOMY**

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Until recently none of the branches of management did not deal with the detailed study of the process of controlling the movement of goods and materials. It was believed that the study of these processes within the framework of a separate discipline is not appropriate, since some areas of the movement of commodity-material values were studied in the overall management or management of organizations – for example, inventory and warehouse management.

However, in the 60-70-th years of the XX century in the economically developed countries the science of logistics was widely used, the main subject of which is just the management of material and related information flows in order to reduce the cost of production and circulation. In modern economic literature, logistics is often combined with the term 'management', and as a result, logistics management is allocated to a separate discipline.

Today, four consecutive stages of the development of logistics systems are distinguished:

– The first stage. The enterprises work on the basis of the implementation of variable-daily scheduled tasks. The form of logistics management is the least advanced. Scope of the logistics system is connected

only with the organization of preservation of finished products and its transportation.

- The second stage of the development of logistics is characterized by the flow of goods, which the enterprise provides from the last point of the production line to the end user. The control of the logistics system extends to the following functions: customer service, order processing, storage finished products at the enterprise, inventory control of finished products, perspective planning of the logistics system.

- Logistic systems of the third level control the logistics operations from the procurement of raw materials to the service of end-user products. Additional functions of such systems are: delivery of raw materials to the enterprise, forecasting of sales, production planning, extraction or procurement of raw materials, management of raw materials or work in progress, designing logistic systems. The only field that at this stage is not controlled by the logistics manager is the day-to-day business management.

- The scope of action in logistics systems of the fourth stage is similar to the third, except that the processes of planning and controlling logistics operations with marketing, sales, production and finance operations are integrated here.

We list the factors that determine the main trends of logistics development:

- an increase in the number of multinational corporations that position themselves in the international market as global companies and increase competition between them;

- the arrival of global companies in national markets;

- strengthening the role of the political factor in making decisions on the formation and development of transport corridors (parallel or in addition to the current ones). States are included in the competition for the attraction of transit cargoes;

- increasing the role of ports in attracting cargo flows and intensifying competition between ports of certain regions;

- penetration into the national transport services markets of large foreign companies;

- extension of the list and increase of requirements to the quality of the provided logistics services.

All this directly concerns the formation and development of logistics in Ukraine. If the development of logistics in foreign countries evolved under the influence of certain economic and technological factors, which was caused by the search for new competitive advantages in the intensified competition, then Ukrainian firms had to adopt modern logistic principles from the very beginning of the establishment of market relations. The complexity of the current moment in the development of logistics in Ukraine lies in the fact that

at each specific enterprise logistics is at its development stage. We should talk about the uneven development of Ukrainian logistics.

In modern conditions it is especially important to highlight the most valuable in existing practice and on this basis to propose a mechanism for selecting such methods and methods of logistics that would allow to achieve competitive advantages and strengthen the competitive position of the firm in the market.

Perspective directions of development in logistics are:

- global logistics;
- integration of national enterprises into the global logistics network;
- the logistics of ‘smooth’ production.

The essence of globalization is the rapid expansion and complication of interrelationships and interdependencies between both people and states that manifests itself in the processes of forming the planetary information space, the world capital market, goods and labor, the internationalization of the problems of man-made influence on the natural environment, interethnic and interconfessional conflicts and security.

The factors influencing the development of global logistics systems in Ukraine include restructuring and deepening of specialization in the economy, namely:

- the balance of structural policy;
- participation in the international division of labor under the condition of protection of national producers from the intervention of imported goods;
- strengthening the indicative management of foreign economic activity;
- rationality of customs, tariff and tax policy;
- licensing and certification activities, etc.

An important role in global logistics is played by the factor of regionalization. The regional features of global logistics are most pronounced for countries that are not far from each other and have common borders.

The essence of international logistics is that logistics becomes international when the supply chain crosses the national boundaries. According to Porter, the success of the company in the international arena is determined by ‘the ability of the nation to enhance the existing benefits and move to the next level in technology and productivity’.

Issues of generating ideas, sharing experiences and developing scientific and practical approaches to the strategy and tactics of logistics in developed countries are dealt with by national and international specialized societies and associations that unite industrial firms and scientific organizations. Now in Europe there are more than 20 national associations that are members of the European Logistics Association. The development of logistics systems is carried out in conjunction with the evolution of the

concept of logistics and its principles, which have been formed in countries with a market economy for a long time.

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**Sychova K. E.**

### **MAIN ASPECTS OF THE CONCEPT OF MERCHANDISING ORGANIZATION AT THE ENTERPRISE**

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For the first time, merchandising techniques began to be used by such well-known corporations as Coca-Cola and Pepsi. Despite the fact that initially these two companies were competitors in the market of soft drinks, practically at the same time they conducted marketing research, which showed that about 30% of customers entering the store did not know what exactly they would eventually buy [2, 14]. And, of course, knowing that their goods are classified as impulsive purchases, marketers of those companies realized that to increase profits by at least 13-20 %, it was necessary to create a concept of laying out products that was suitable for their goods.

Merchandising in retail involves an increase in the efficiency of retailers. This is not only due to the improvement of staff working, using new communication technologies and financial incentives to encourage buyers and staff, but also mainly by ensuring harmony between the visitor and the situation in the sales area, which predetermines his or her behaviour and influences the decision to purchase goods.

The main goal of merchandising is to attract customer attention to the products being offered, taking into account the specifics of the goods offered. Particular attention in the organization of merchandising in retail trade should be paid to the stimulation of so-called impulsive purchases, which, according

to research, are four times larger than planned ones [5, 67]. Principles of merchandising should be aimed at attracting the attention of buyers to a specific product or group of goods with the help of certain methods.

Main objectives of merchandising in trade can be formulated in the following theses:

- to increase direct sales by means of an effective merchandising of sales area;
- to improve of quality of customer service by creating the most comfortable conditions for the choice of products interesting for customers;
- to emphasise customer's attention on new groups of goods and brands for speedy popularisation of the promoted products among wide audience;
- to optimize the pricing policy, directing it to additional stimulation of consumer demand;
- to identify consumer priorities depending on various factors: geography of business, season, cultural and national preferences. Analytical merchandising in trade is the instrument of strategic planning of purchases.

Having main objectives of merchandising formulated, we can think of tasks and solution of these tasks. One of the main objectives of a manufacturing company when carrying out the program of merchandising is to achieve the maximum laying out of own products on shelves in the sales area. As main shelf space is limited, it is necessary to develop and place some additional branded equipment in sales points by all means for the solution of this task.

Manufacturing such equipment, a company should be oriented not only to consumers, but also to dealers and shops. Therefore the equipment has to:

- suit shops of different types;
- have the minimum area of placement (up to 1 sq.m.);
- correspond to the general principles of trade;
- be simple at installation and operation.

Organizing additional shelf space shops often begin to reduce a product exposition in the place of the main laying out. At the same time the main objective of producers, especially at a stage of the organization of additional expositions, is to stipulate rigidly a question of laying out of their goods on the main shelves. Many companies faced this problem, and some of them had even to remove the additional presentations of goods in order to return a product on the main shelf space. If a company cares for efficiency of promoting its product and for the competitive advantages, this aspect should be considered by all means.

The organization of merchandising in retail trade should consist of a number of effective measures aimed at stimulating buyers. To date, there can be the following methods of merchandising in a trading enterprise used, the effectiveness of which has been verified as a result of the research [6, 45]:

- Correct placement of goods on trade racks. Besides, an integrated approach to the laying out of goods of various groups is capable to provide timely realization of perishable production.

- Correct arrangement of modules of the trade equipment taking into account all significant characteristics of a room: area, topology, artificial and natural light, aesthetics of decorative and finishing materials.

- Sound and light design of sales area. The merchandising in shop includes the organization of conditions for increasing a positive of an emotional background of buyers and, as a result, formation of psychological loyalty to the offered production.

- Use of special fragrances for strengthening comfort atmosphere of the sales area.

- Organization of mobile merchandising on the basis of mobile points for free tasting of products.

- Developing uniform policy of placing goods in all sales points of commercial association.

- Creating the optimum scheme of buyer routes taking into account features of the goods being offered. At the same time the scheme should eliminate “dead zones” and create additional “hot spots”.

- Creating motivation elements for regular customers by means of various bonus programs.

Summing up the research results, it is possible to draw a conclusion that merchandising raises the status of the retail dealer in a manufacturing-buyer chain. At the same time accurate distribution of functions in the whole manufacturer - consumer chain, combination of efforts for the coordinated actions focused on formation of the strongest relationship with consumers and development of the assortment policy according with the principles of merchandising and which is in harmony with needs of consumers are of great importance. Having achieved the high status in a manufacturer - consumer chain, retail trade enterprises will stimulate those suppliers, which quality of goods and other terms of delivery will be coordinated with these requirements.

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**Tanicheva T. S.**

## **REAL AND «PHANTOM» DIFFERENCATION OF THE PRODUCT IN THE BRANCH MARKET**

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The branch market is a part of the market space characterized by a combination of specific consumer segments and special products, works and services that have a common material, technical and technological basis.

Practice of functioning of the branch markets testifies, that it is difficult to find two absolutely identical goods not from one party:

- producers are never at equal distances from customers;
- goods from different manufacturers are not perfect substitutes (complete analogs).

Thus, there is a variety of goods in the market, which should be considered by both, by buyers and producers (sellers). Before the first is the problem of choosing from several products. Before the second is the problem of developing the distinctive characteristics of its products in order that the buyer turned his attention to it. (This is differentiation).

Differentiation of products or services is a two-way process, including the manufacturer's development of a number of distinctive properties of a specific product, and the allocation of the latter by the consumer from the world of competitor products offered in this particular market.

Differentiation of goods means the allocation of a product of a firm in the eyes of consumers from other products of this product class.

Differentiation, product differentiation strategy is the process of developing a number of significant features of the product, designed to distinguish it from competing products.

Differentiation is a form of non-price competition of firms. The factors (characteristics) of product differentiation can be both internal qualities of the product – changes in its internal characteristics (properties of products related to methods and comfort of its use and durability of its use) and external qualities (changes in the form of products) – color, size, packaging, services, which accompany its sale. The external characteristics of the

product also include its availability for the buyer (the location of the outlet) and the degree of reliability of information about the quality of the product and its availability in a particular place of sale.

It should be noted that product differentiation takes place as long as consumers themselves regard different brands as imperfect substitutes. In a certain sense, product differentiation is a subjective characteristic of the behavior of buyers.

Product differentiation can be real, including the differences in the quality of goods, longevity or other functional characteristics, or "phantom". In this case, the differences in trademarks are purely external in nature, including changes in color, packaging, appearance. To "phantom" differentiation can be attributed to differences in the distribution channels of the product, for example, when the seller of a low-quality product uses prestigious stores to sell their goods.

Differentiation of the product leads to two important consequences for the firm.

First, the product variety creates the market power of the firm, since there are always customers who are committed to the product of this particular brand or company. Accordingly, if buyers view different brands as imperfect substitutes, a firm can raise the price of its special (unique) product above the competitor's price level and not lose customers.

Secondly, product differentiation benefits buyers. Expanding the variety of product offerings, differentiation contributes to more detailed consideration of customers' requests. Product differentiation expands the possibilities of consumer choice.

However, excessive product variety entails difficulties in targeting the consumer in the world of goods, forcing him to spend a considerable amount of time either to make mistakes in it or to spend his money on obtaining advice on the properties of products from specialists. Therefore, the differentiation can be assessed negatively both by consumers and producers.

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**Tarasow S. A.**

**DIE ARBEITSLOSIGKEIT IN DER UKRAINE**

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Das Problem der Beschäftigung bleibt immer unter der Frage in der Ukraine. Jeder von uns will die Ausbildung beenden und einen Job mit hohem Gehalt. Aber die Situation im Land nicht garantiert Beschäftigung. Daher das Problem der Arbeitslosigkeit relevant ist.

Dieser Artikel ist in drei Teile gegliedert: der erste theoretische Studien zusammengefasst, der zweite Teil enthält die Analyse der Arbeitslosigkeit in der Ukraine, und der Dritte Teil beschreibt die Politik der Arbeitslosigkeit (wie die Situation im Land verbessert werden kann).

Also, lasst uns beginnen und das erste, was ich möchte darauf hinweisen, das Wesen der Arbeitslosigkeit. [1].

Einerseits die Arbeitslosigkeit ist ein wichtiger ein Stimulans für die Bevölkerung im erwerbsfähigen Alter, aber andererseits die Arbeitslosigkeit ist das größte soziale Problem. Alle Länder machen große Anstrengungen zur Bekämpfung der Arbeitslosigkeit, aber noch nicht geschafft, vollständig zu beseitigen. Selbst in Ländern mit gut entwickelten sozial-orientierte Volkswirtschaften wie den USA, Deutschland, Japan und andere, das Niveau der Arbeitslosen, nach verschiedenen Schätzungen erreicht nicht weniger als 3,0% des insgesamt verfügbaren Arbeitskräften . Im Allgemeinen, die Experten der Internationalen Arbeitsorganisation glauben, dass in wenigen Jahren die Durchschnittliche Globale Arbeitslosenquote wird etwa 10%, und alle Länder werden nicht in der Lage zu verhindern, dass es überhaupt. [2].

Der amerikanische Wissenschaftler Arthur Okun verwenden mathematische Berechnung zu bestimmen, die Bewegung der Arbeitslosigkeit und der Beschäftigung. Er schuf ein Gesetz, Wonach die jährliche Zunahme des realen Bruttosozialprodukts von etwa 2 % hält die Arbeitslosenquote unverändert.

Das Gesetz *окена* können Sie definieren, das normale Niveau der Arbeitslosigkeit, der sagte, dass die Arbeitslosigkeit steigt im Zusammenhang mit der Entwicklung der Marktwirtschaft. So, in den 1960er Jahren die Natürliche Arbeitslosenrate in den USA erreichte 4%, und in den 1980er - 6 - 7% . In anderen Ländern kann es niedriger sein wegen der kleineren Ausmaße und die Mobilität des Arbeitsmarktes. [3].

Nun möchte ich Ihre Aufmerksamkeit auf die Dynamik der Arbeitslosigkeit in der Ukraine.

Der Ukrainische Arbeitsmarkt und Beschäftigung hat seine eigenen Besonderheiten. Es handelt sich um jene, die erst in den 90er Jahren. Die sich auf diese Frist, dann ist die Ukraine hatte ein anderes Wirtschaftssystem.

Rückgang der Beschäftigung und Anstieg der Arbeitslosigkeit begann seit Mitte der 90er Jahre. Der Hauptgrund für die Arbeitskräfte müssen entlassen werden, denn die Regierung hat mit der Umgestaltung der Struktur der Wirtschaft.

Im Allgemeinen, alle Regionen der Ukraine können in mehrere Gruppen unterteilt werden nach den Kriterien der registrierten Arbeitslosigkeit. [4].

Es gibt hohe Arbeitslosigkeit in einigen Regionen der Ukraine, wie: Tschernigow, Shitomir, Ternopil und andere. Warum ist das passiert?

Erstens, diese Gebiete haben eine hohe Natürliche Bevölkerungswachstum. Hier eine große Anzahl junger Menschen auf den Arbeitsmarkt kommen, während die Zahl der Arbeitsplätze nicht erhöht, sondern sogar verringert. Zweitens, die Existenz der benachteiligten Regionen, die auf den Verantwortlichen Bereichen der Produktion. Derzeit ist es - die Leichtindustrie, deren Produktion wurde drastisch reduziert. Wenn wir uns die Statistiken über die Arbeitslosigkeit, seit 2010, werden wir sehen, wie alles hat sich verändert seit. Seit 2014 hat die Arbeitslosenquote begann zu wachsen. Der Grund dafür war der Konflikt mit Russland.. Aber die Situation stabilisiert, und viele Ukrainer bereits jetzt Arbeit finden können.

In der Zeit, als der nationale Arbeitsmarkt nur zu bilden beginnt, ist es nicht möglich zu vermeiden. Die grundlegende Strategie der Beschäftigung muss für die Erreichung und Aufrechterhaltung des Grundsatzes der vollen und produktiven Beschäftigung. Die Regelung der Beschäftigung der Bevölkerung in der Ukraine sollten möglichst organisch Verbindung mit dem Mechanismus der Selbstregulierung und den Mechanismus der staatlichen Regulierung, damit die Bedingungen für die Entwicklung der Humanressourcen und der wirtschaftlichen Aktivität. [5].

In einer Marktwirtschaft, die Beschäftigung unterliegt grundsätzlich dem Staat, entsprechend der üblichen Politik der Beschäftigung. Die Haupttrichtungen der aktuellen Politik dazu beitragen, die auf Unterstützung bei der Ausbildung oder Umschulung, sowie die Entwicklung von flexiblen Arbeitsmarkt.

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**Tkachenko M. O.**

## **ESSENZ UND ARTEN VON PREISEN**

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Abscheiden folgende Funktionen:

1. Uchetnaya Funktion. Preis bestimmt, wieviel es ist aufgewandt Arbeit, Rohstoff, Materialien auf Betrieb des Artikels. Uchetnaya Funktion versorgt Äquivalenz des Abtausches, d.h. Geldeinnahme ab Ausführung produkci (Arbeiten, Gefallen) bei übrigen gleichen Bedingungen versorgt Abfindung des Aufwands auf Betrieb und Ausführung, sowie Ausbildung ankamen in Abmaß, das erlaubend zu ausbilden und zu ausführen Betrieb, Lebensniveau der Arbeiter zu erhöhen ist.

2. Die Verteilungsfunktion besteht darin, dass die Preise an der Verteilung und Umverteilung von Einkommen zwischen Erzeugern und Verbrauchern beteiligt sind. Bei einem hohen Preisniveau können die Erzeuger ihre Unternehmen aktiv entwickeln, und umgekehrt, bei einem niedrigen Preisniveau, erhöhen die Verbraucher ihren Lebensstandard.

3. Die stimulierende Funktion ist, dass der tatsächliche Preis der Waren fördern oder umgekehrt ein Hindernis für die Realisierung eines bestimmten Produkts werden kann.

4. Die regulierende Funktion äußert sich im Ausgleich von Angebot und Nachfrage, dh durch Preise wird die Verbindung zwischen Produktion und Verbrauch, Angebot und Nachfrage realisiert.

5. Die rationale Verteilungsfunktion der Produktion manifestiert sich darin, daß das Kapital unter Berücksichtigung des Preisniveaus in Wirtschaftssektoren und Produktionstypen mit höherer Profitrate fließt.

6. Die soziale Funktion hängt mit der Struktur und dem Umfang des Verbrauchs von Gütern und Dienstleistungen, den Ausgaben, dem Lebensstandard der Bevölkerung, dem Konsumbudget der Familie und dergleichen zusammen.

7. Die Informationsfunktion soll den Verbrauchern Informationen über die Höhe der Kosten für die Herstellung bestimmter Waren, Bauleistungen und Dienstleistungen geben [2].

Preise werden nach verschiedenen Kriterien klassifiziert.

1. In Abhängigkeit von den Transportwegen der Waren vom Erzeuger zum Verbraucher und unter Berücksichtigung der Kosten ihrer Herstellung und Vermarktung werden die Preise in Groß- und Einzelhandel aufgeteilt.

2. Hinsichtlich des Grades der Unabhängigkeit des Unternehmens im Hinblick auf die Wahl der Preispolitik können die Preise (Tarife) wie folgt sein: frei (unabhängig gegründet) vertraglich (vertraglich) reguliert; behoben.

3. Entsprechend der Sphäre der Warenzirkulation sind die Dienstleistungen unterteilt in: Preise für Industrieprodukte, Preise für Bauprodukte, Einkaufspreise (Landwirtschaft), Tarife für den Fracht- und Personenverkehr, Tarife für kommunale und haushaltsnahe Dienstleistungen für die Bevölkerung, Preise Außenhandelsumsatz (Export- und Importpreise) Weltmarktpreise (Preise für Handelsgeschäfte in frei konvertierbarer Währung).

4. Auf den Formen der Verkäufe werden unterschieden: Vertragspreise (in dem Dokument fixiert) Aktienkurse (es gilt als die genaueste Spiegelung der Situation auf dem Markt); Preise von Messen und Ausstellungen (möglicherweise nicht genau) Auktionspreise.

5. Abhängig von der territorialen Differenzierung werden die Preise in einzelne (nationale), regionale, zonale und Gürtel unterteilt.

6. Zum Zeitpunkt des Handelns sind die Preise in permanente, temporäre und einmalige unterteilt.

7. Moderne Preisgestaltung bietet ein System der Preisfrankatur. Kostenlose Preise sehen die Verteilung der Verantwortung zwischen dem Verkäufer und dem Käufer des Produkts vor, dh die Kosten der Ware beinhalten die Kosten für Versicherung und Lieferung der Produkte an den vertraglich vereinbarten Ort.

8. Eine besondere Gruppe bilden die in der Buchhaltung und Statistik verwendeten Preise. Dazu gehören: aktuell, durchschnittlich, vergleichbar und unverändert [3].

Wie Sie sehen können, gibt es eine große Anzahl von Zeichen, auf denen die Preisklassifizierung durchgeführt wird. Daher kann der gleiche Preis gleichzeitig für mehrere Klassen oder Arten von Preisen gelten.

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**Tkachenko V.**

### **FINANCIAL STABILITY AS A PART OF FINANCIAL SECURITY ASSURANCE SYSTEM OF THE BANK**

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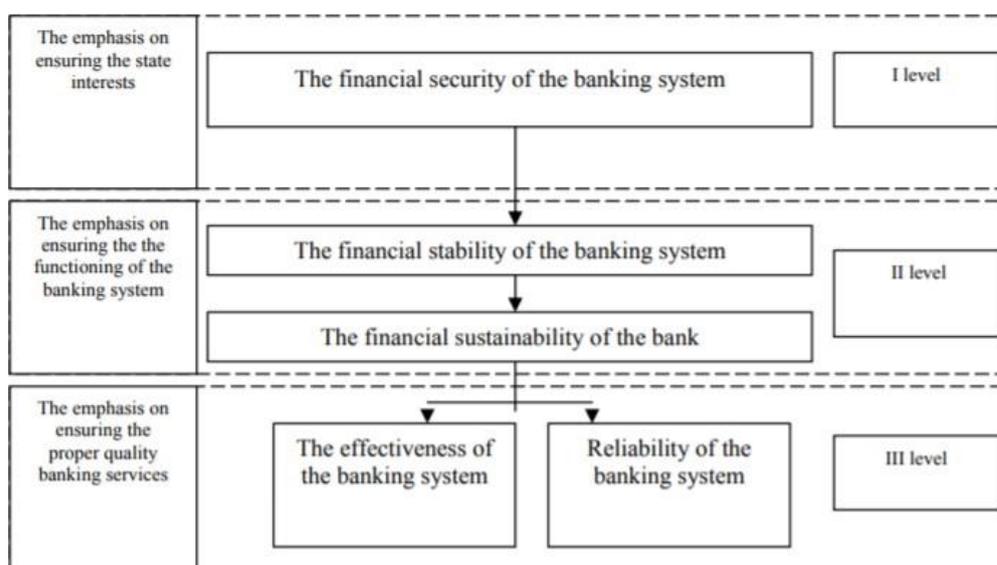
The Financial Stability Review (FSR) assesses developments relevant for financial stability, including identifying and prioritizing the main sources of systemic risk and vulnerabilities for the euro area financial system – comprising intermediaries, markets and market infrastructures. It does so to promote awareness of these systemic risks among policymakers, the financial industry and the public at large, with the ultimate goal of promoting financial stability. Systemic risk can best be described as the risk that the provision of necessary financial products and services by the financial system will be impaired to a point where economic growth and welfare may be materially affected. Systemic risk can derive from three sources: an endogenous build-up of financial imbalances, possibly associated with a booming financial cycle; large aggregate shocks hitting the economy or the financial system; or contagion effects across markets, intermediaries or infrastructures. Financial stability is a state whereby the build-up of systemic risk is prevented.

The openness of the market economy to the external environment and the vital role of the financial sector led to the necessity of focusing on bank financial stability issues. The impact of internal environment causes the appearance of threats that inhibit the implementation of strategic directions of bank development in the terms of profitability and minimization of risks. In this regard the study of bank financial stability in relation to financial security is particularly important. That determines the relevance of the chosen topic and feasibility of studies for the development of this issue. The formalization

of bank financial stability depends on the bank development analysis and bank risks assessment and includes: the system of economic standards; CAMELS rating system; the system of risk assessment; the adaptation of analytical evaluation system of financial stability offered by the International Monetary Fund.

Now the National Bank of Ukraine calculates and distributes data only according to 12 basic and 10 recommended bank financial stability indicators. There are 2 levels of financial stability indicators. Thanks to generalization and analysis of existing approaches to bank stability indicators it was possible to structure and provide official information on the level of financial stability of the banking system.

Picture 1 shows the hierarchy of the concepts "financial security", "financial sustainability", "financial stability", "efficiency" and "reliability" in the banking system.



*Picture 1. Hierarchy of concepts of "financial security", "financial stability", "financial sustainability of the bank", "efficiency" and "reliability" in the banking system [1]*

The analysis of sources dedicated to banking, points to the practice of common use of such economic categories as "sustainability", "stability", "reliability" which are closely linked. For the correct identification of these concepts it is appropriate to distinguish their economic substance and determine the relationship between them.

Thus, the development of the financial stability mechanism requires a systematic approach to all components of the financial system and their interaction under the influence of external factors generated by globalization processes that ensure maximum synergy through the restoration of its integrity.

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### **FINANCIAL AND CREDIT SYSTEM OF FRANCE**

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Recently the developed countries with market economy have had changes because of the growing internationalization of the world economy and international monetary and financial relations. As a result, they united their financial markets.

So it's important to research changes in structure of economy of countries of the European Union, find their advantages and disadvantages. It's **the main goal** of the article to research features of the financial and credit system of France.

France is a highly industrialized and agrarian country. By size of GDP and volume of industrial production in France, it occupies one of the leading places in the western world (together with the USA, Germany, Great Britain, etc.).

According to researching of The Heritage Foundation in 2001 France's GDP is \$ 1600 billion. The GDP growth rate is 3.2%. GDP per capita - \$ 27,975. Direct foreign investments - \$ 12.5 billion. Import (machinery and equipment, oil, coal, non-ferrous metals, cellulose, cotton, wool, wood) is \$ 334 billion from Germany - 17.2%, from Italy - 9.9%, from the United States - 8.8%, from Great Britain - 8.4%, from Benelux - 7.7%). Export (transport equipment, cars, agricultural and food products, chemical products and semi-finished products) is \$ 377.8 billion (to Germany is 15.9%, to Great Britain - 10%, to Italy - 9.1%, to Spain - 8.7%, to Benelux - 7.7%).

The one of main features of credit system of France is status of central bank - Bank of France. It was opened in 1800, but it wasn't state. The joint-stock bank became an issuing bank. It was nationalized only in 1945. The shareholders received bonds with a yield of 3% per annum.

Also there is National Credit Council in France. Quality of functioning of the system is expressed as standards which are set by National Credit Council.

The important thing is the presence of diversification of credit and financial institutions with a predominance of institutions of a universal type. This is advantageous in the context of the globalization of the world economy, competition, concentration of capital. Firstly it helps to ensure high quality of banking and financial services and maximally satisfy the most diverse needs of clients. Secondly it develops international activities, going beyond the narrow national market and providing its services around the world.

The financial system of France includes central (state) budget, local budgets, special funds and finances of state enterprises. There is developed system of special purpose funds, special accounts and off-budget accounts. Every of them has certain autonomy and own sources of income.

There are two main constituents of economy of France:

1) Financial resources with irreversible transactions. It means transactions doing within one fiscal year. They account for 90% of all financial transactions of France.

2) Financial transactions which provide cashback. They can be realized outside one fiscal year and account for 10% of all financial transactions of France.

The main posts in financial relationship are obtained by president, governments, parliament, the Ministry of Economy and Finance, the National Credit Council, the Banking Control Commission, the Economic and Social Council.

The budgetary process in France is regulated by the Constitution, as well as by numerous laws and decrees regulating the functions of the central and regional authorities involved in the budgetary process

The period from the beginning of preparation of the project of budget to the preparation of the report about the implementation of the budget in France takes more than three years. The fiscal year coincides with the calendar year.

There are four main stages of the budgetary process:

1. Development of the project budget. The Ministry of Economy and Finance is responsible for this process. Each ministry and department forms own estimate, which then are coordinated in a single project. Usually it takes about 9 months.

2. Adoption of the budget. The project of budget is considered in the financial committee of each chamber of parliament. First, the project is discussed in the lower chamber, after which the project is transferred to the upper chamber. If the project of budget is not approved after two joint discussions in both chambers of parliament, the president can declare a budget by his decree.

3. Implementation of the budget. Treasury conducts cash settlement and budget operations. Generalized information about budget execution for the

year are provided to the Accounts Chamber for the analysis and drawing up of a declaration on the correspondence of central accounting information to individual organizations.

The control over the execution of the budget is divided into three types: administrative, judicial and parliamentary. The administrative is conducted on a hierarchical structure, when the top-level bookkeepers supervise the lower accountants. Judicial control is carried out by the Accounts Chamber, which verifies the correctness of accounting and reporting in a particular organization. Parliamentary control is carried out during the discussion and adoption of the law on the execution of the budget on the basis of accounting documents, the reports of the Chamber of Accounts and the general declaration on the accounts of individual ministries, fulfilled the budget.

Compilation by the Ministry of Economy and Finance of the budget execution report.

The ratio of the tax share to GDP is 44%. It means France has comparatively high level of taxation (other EU countries have 41%). There are many different taxes, rates and institutions involved in the counting and levying of taxes. In total there are about one hundred different taxes and fees (direct, indirect, registration fees) in France.

Local budgets are the main financial instrument of administrative units. France is divided into 22 regions, 96 departments and about 36 thousand communes. The administrative-territorial units have their own system of electoral bodies of self-government: regional, general and municipal councils, which approve the corresponding budgets.

Local budgets consists of two main sections: budgets for current activities (functional) and budgets for new construction (investment). Sources of income are divided into internal (income from municipal property, local economy, tax) and external (grants, loans, both public and private).

The modern credit system of France is characterized by the following trends, which have a stable character and have significantly increased in the late 80s - 2000s:

- the concentration of the Bank's capital,
- increased competition between different types of credit and financial institutions,
- the universalization of the activity of credit and financial institutions, which caused a significant expansion of their functions.

The important trend is the concentration of the Bank's capital in the modern France. The main reasons of that are development of information technologies and mass computerization of credit and banking activities, growth strategy to meet the needs of industrial corporations researched by many large French financial institutions, aspiration to economy.

The financial system of France includes the state budget, local budgets, extra-budgetary funds and finances of state enterprises. A distinctive feature of the financial system of France is the high degree of its centralization.

Special funds are a collection of monetary resources that are at the disposal of the state or local authorities and have a designated purpose. These include numerous special accounts of the Treasury, affiliated budgets, various funds of financial and credit institutions and the social budget.

The totality of these funds is called the social budget of France. France among the developed countries in terms of the size of the public sector is one of the first places.

But in the modern world France can't lag behind other developed countries, globalization, technology development. It needs some economic reforms as reducing the role of the state in the economy and strengthening the role of entrepreneurship, liberalization of the economy, tax cuts etc.

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**Tsurkan P. M.**

### **CONTROL OVER USES OF WAYS TO ENSURE FINANCIAL RELIABILITY OF INSURANCE COMPANY**

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Insurance management has to investigate the causes and consequences of previous negative experience in the economy in furtherance of development of short- and long-term anti-crisis strategies upon the analysed data [1]. This policy of the insurance company will enable it to establish a set of effective preventive measures on early stages of destabilization of the market of insurance services as well as others adjacent markets of financial services (stock market, currency market, real estate market, banking market and so on), consequently allowing the insurer to overcome the crisis faster and with minimal losses.

Therefore there appears a necessity to control implementation of operational tasks and achievements of planned results in the full volume and on time. Thus, it is necessary to differentiate two areas of current control – middle and upper level. Middle level of control is carried out by the executives of operational tasks. Upper level of control is performed by the head of financial planning service and board of directors of the insurance company [2, 141].

Thus, the essence of the financial control lies in regular checking of the economic law abidance, detection of corresponding violations.

Great value in clarifying the nature of financial control has its classification. Scientifically substantiated classification allows to understand deeper the essence of this extremely important element of financial flow management, to reveal the mechanism of functioning of relationships which it expresses, to detect specific features of its different components.

However, so far the standardized approach to the selection of classification attributes and classification of varieties of the financial control has not been approved, and its classification models have not been elaborated and cleared with authorities yet. Often, in the theory and practice they use the following classification criteria: the subjects of control, its forms and methods.

The system of internal control is a key element for managing risks and the basis for safe and reasonable operations of insurance companies. That is why the basis of financial control of insurance companies is rating the risks of insurers.

According to the general approach to regulation, based on assessments of risks, insurers with higher risk or the scope of activity of insurers with increased risk require more attention from the state bodies of regulation.

The state financial control of the insurance company is regulated by the rules of law activity as for verification of the timeliness and accuracy of financial planning, the validity and completeness of revenue income in the respective funds of costs, the correctness and efficiency of their use. Moreover, it is an important element of the financial management system that implements the main tasks of financial policy of the state in general [3, 326].

A crucial role in the system of state financial control belongs to a financial control that is carried out by the state executive body, which activities are aimed to control finances, including special insurance funds. That is the Ministry of Finance of Ukraine, which according to the entrusted tasks:

- suspends the execution of operations with insurance funds in case of an identified violation;

- approves the draft plan of the main directions of control and audit work of the bodies of the state control and audit service and receives monthly reports from the Main Control and Audit Department;

- defines the main organizational and methodological principles of state internal financial control, assesses the functioning of internal control systems and carries out internal financial control in insurance companies and audit;

- receives from the central and local executive authorities of enterprises, institutions and organizations of all forms of ownership data, which is necessary for the control of rational and indented use of insurance funds and insurance payments;

- within its capacity supervises the compliance with insurance legislation, issues orders, arranges and monitors their execution.

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**Tykhomyrova A. A.**

### **DEFINITION OF THE ESSENCE OF THE TERMS OUTSOURCING AND OUTSTAFFING**

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The terms outsourcing and outstaffing literally 7-10 years ago were not familiar to even experienced managers, but now these areas are considered incredibly promising for business. This is particularly evident in such areas as management, trade and marketing. The problem of delimiting these terms is relevant in our time.

The purpose of this work is to identify the essence, features, traits and the relationship of terms outsourcing and outstaffing. We will analyze the meaning of two terms. Outsourcing and outstaffing are very popular abroad and in Ukraine, as it helps clients to better optimize the costs and accounting of your enterprise, especially when you just started your business. Two types of processes can be effective when you know all the advantages and disadvantages, so after that you can easily focus on the main business goals.

The two terms mean remote work on tasks and the provision of results in accordance with the deadline. In fact, IT areas today are dedicated to remote work, as many foreign customers prefer this kind of work. The main difference is that outsourcing involves the whole process of developing software for a third party, while outstaffing involves finding employees to run a project where most processes control the business owner. When you are going to choose between two types pay attention to the main differences.

Let's start with an explanation what the difference between outsourcing and outstaffing is. Outsourcing is a situation in which a company employs another organization to do some of its work, rather than using its own employees to do it. It is basically business relations between the **customer and contractor**. Outsourcing is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or

processes to an external contracted third party for a significant period of time. The functions that are contracted out can be performed by the third party either onsite or offsite of the business.

#### **Pros of outsourcing**

- all the aspects concerning quality and delivery are in the service provider's responsibility;
- less management effort needed from the client;
- the service provider is fully responsible for all the equipment and software needed to complete the project;
- the client doesn't have to take part in hiring process.

#### **Cons of outsourcing**

- the client hardly can intervene or control the development process;
- if the project scope is not well-defined the cost can be much higher than with outstaffing;
- the software development rates for outsourcing are usually higher than for outstaffing.

Outstaffing is a HR (human resource) technology when a service provider company employs the existing staff of the client company. An outstaffing supplier is responsible only for the qualified personnel they provide to clients. This process is also sometimes referred to as FTE (Full Time Equivalent) and basically allows clients to "rent" IT professionals. The general way that outstaffing works is that any business can hire an outstaffer's employees, who then continue to work at the outstaffer's offices — though these employees essentially change the employer they work for.

In other words, outstaffing takes place when the company transfers a part of its employees to another organization, while employees continue to work at the same place and perform their former duties. In simple words, we employ staff of client company and take all the responsibilities for the wage calculation and payment, taxes, HR management.

Outstaffing exists in three forms: staff Leasing, the selection of temporary staff, removing personnel from the staff, consultations (employment in the agency, recruitment of staff for the needs of the client company).

#### **Pros of Outstaffing**

- outstaffing provides the ability to hire great professionals without having to pay high price and taxes;
- significant flexibility in increasing or decreasing the number of dedicated employees you hire;
- full control over the software development process;
- full access to any of the team members;
- the rates for outstaffing are the lowest compared to other business models.

#### **Cons of Outstaffing**

- the communication channels and process should be high quality, otherwise it can cause some issues;

- all the delivery concerns are in responsibility of the client and his team.

So, the main difference is that outsourcing refers to the whole project support, while outstaffing provides hiring and maintenance of individuals.

Now when you know the difference, let's talk how to apply this difference to your business. If your company is not very much technology-focused and you don't have in-house professionals to oversee the work of the development team, then outsourcing can be a better idea for you. On the other hand, if you have well-defined processes and a proper management to handle the remote team, then you are welcome to stick with outstaffing. However, each case is unique, and it's always a good choice to consult with the experts first.

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### **FEATURES OF EXPORT OF GOODS AND SERVICES OF UKRAINE AND THE WORLD IN THE CONDITIONS OF GLOBALIZATION**

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Globalization is one of the main trends in the development of the modern world, which has a significant impact on the economic life of almost all countries of the world and, of course, Ukraine, which is fully consciously, actively and purposefully moving towards integration into the international economy.

Ukraine has sufficient conditions for actively integrating into general civilizational world processes. Trade is a strong category: an openness indicator for trade above average, and a high percentage of trade revenues (exports + imports) in GDP (111%, while the average index is 99%).

If you walk into a supermarket and can buy South American bananas, Brazilian coffee and a bottle of South African wine, you are experiencing the effects of international trade.

International trade allows us to expand our markets for both goods and services that otherwise may not have been available to us. It is the reason why you can pick between a Japanese, German or American car. As a result of international trade, the market contains greater competition and therefore

more competitive prices, which brings a cheaper product home to the consumer [1, 11-12].

Exports are the goods and services produced in one country and purchased by citizens of another country. It doesn't matter what the good or service is. It doesn't matter how it is sent. It can be shipped, sent by email, or carried in personal luggage on a plane. If it is produced domestically and sold to someone from a foreign country, it is an export [2, 456-457].

Most countries want to increase their exports. Their companies want to sell more. If they've sold all they can to their own country's population, then they want to sell overseas as well. The more they export, the greater their competitive advantage. That's because they gain expertise in producing the goods and services. They also gain knowledge about how to sell to foreign markets.

Governments encourage exports. That's because it increases jobs, brings in higher wages and raises the standard of living for residents. They become happier and more likely to support their national leaders [1, 12-15].

Exports also increase the foreign exchange reserves held in the nation's central bank.

That's because foreigners pay for exports either in their own currency or the U.S. dollar. A country with large reserves can use it to manage their own currency's value. They have enough foreign currency to flood the market with their own currency. That lowers the cost of their exports in other countries.

Countries also use currency reserves to manage liquidity. That means they can better control inflation, or too much money chasing too few goods. To control inflation, they use the foreign currency to purchase their own currency. That lowers the supply, making the local currency worth more [2, 456-457].

Ukraine is the 50th largest export economy in the world and the 43rd most complex economy according to the Economic Complexity Index (ECI). In 2015, Ukraine exported \$41.7B and imported \$39.6B, resulting in a positive trade balance of \$2.1B. In 2016 the GDP of Ukraine was \$90.6B and its GDP per capita was \$7.94k [3, 13-16].

Ukraine has a well-developed industrial base and rich farmlands. The country also has quite a lot of mineral resources which are drawn on for both local use and exportation. The main exports from Ukraine are ferrous and nonferrous metals, chemicals, machinery, fuel and petroleum products, transport equipment and food products. Currently the country's gross domestic product is an estimated 81.4 billion. Some 34.29 billion was made from Ukrainian exports last year alone. Currently Ukraine's main export partners are Russia, Germany, Turkey, Italy and the USA.

As things stand, Ukraine is seeing a lot of financial gain from exports. The country has immense agricultural, mineral and industrial resources which it continues to draw on and profit from. Despite suffering eight years of economic decline, Ukraine has emerged as a country of immense economic

importance. Since the turn of the century the country's economic growth averaged 7.4% a year, but this dropped to about 2.6% last year.

The high rate of poverty has begun to drop as personal incomes continue to rise. Ukraine's currency has remained fairly stable since its introduction in 1996 and, all in all, the country's economy has improved in leaps and bounds. Ukraine is now recognized as having the potential to become a major European economy.

Ukrainian exports have certainly helped the country's economy to stabilize over the past few years. Besides the country's major exports mentioned above, the country is involved in many spheres of commerce. Crop farming, timber harvesting, coal, ironstone, complex ore and mineral deposit mining are major contributors to the country's GDP. Grain, sugar and sunflower seeds are the main agricultural yields. Besides metals and oil products the country is also involved in producing coke, fertilizer, airplanes, turbines, metallurgical equipment, diesel locomotives and tractors. Ukraine also imports energy, mineral fuel, oil, machinery and parts, transportation equipment, chemicals, paper and textiles [4, 31-35].

One of Ukraine's national symbols, the sunflower produces both cooking oil and sunflower seeds and brings in \$3 billion in export revenue to the country.

According to the U.S Department of Agriculture, corn crops are grown on roughly 60 per cent of Ukraine's arable land, and earn Ukraine an estimated \$3 billion in export revenues.

The information technology services industry is among the fastest growing areas of Ukraine's economy, with entrepreneurs taking advantage of the large number of the country's workers who are highly educated in technical fields. Last year saw Ukraine make a whopping \$2.5 billion from providing IT services abroad.

Ukraine made around \$2.2 billion from its wheat exports last year. What was once the Soviet Union's breadbasket now serves the same purpose for Europe and the Middle East, Ukraine's vast fields of grain have given the country a relatively stable economic base on which to build over the turbulent years of independence [3, 11-16].

Iron ore is one of Ukraine's most abundant natural resources, and is an input for the massive furnaces and industries in the country's centre and east. But not all of it is smelted within Ukraine – \$2 billion worth of iron ore was exported last year.

Timber from logging, legal and illegal, is one of Ukraine's main exports. That could, however, be in question now that the European Union has mandated that Ukraine implement a ban on log exports that parliament approved in November 2015. The country made \$1.1 billion from such exports last year.

While economic woes get the most attention, it's worth remembering that Ukraine is still a nation that exports many products to the world. It is, in

fact, one of the leading exporters in several areas: jet engines, rockets and satellites are all produced in, and exported from, Ukrainian plants; while the country's vast agricultural sector provides huge amounts of food to Europe and the Middle East [4, 28-31].

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## ENERGETICS

**Afanaseva A. P.**

### **SOLAR ENERGY AS AN ALTERNATIVE SOURCE OF ENERGY**

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What is energy? Energy can manifest itself in different forms. Heat is a form of energy. It can produce changes in objects: melt a piece of ice, raise the temperature of any material and much more. Electricity is also a form of energy: it produces heat, cold, light, movement ... All kinds of energy are able to change the state of things. Thus, energy is the ability to make changes in everything that surrounds us [3, 36].

While there is life on Earth, a person will not stop in search of new alternative sources of energy. Some sources run out, others appear. Alternative sources of energy are solar, wind, geothermal, tidal energy, and wave energy, temperature difference between the depths of the seas and oceans, and other types of renewable energy.

The sun is the most powerful source of energy on our planet. Every day we are confronted with energy. We prepare food, work, and rest; heat the rooms and much more with the help of energy.

In just three days, the Sun is able to send to Earth as much energy as it is contained in all the reserves of fossil fuels. All the energy that is emitted by

the Sun is 1600 times the energy that all other sources give together. The solar energy incident on one lake is equal to the power of a large power plant.

The energy of the sun can be used for a variety of tasks. One of them is the conversion of solar energy into electrical energy. The conversion of solar energy into electrical energy has many merits. The main thing is reliability - the Sun will shine for us a few million more years. The energy of the Sun is a clean and safe source of energy for health.

Collectors of solar energy are technical devices intended for catching solar radiation, transforming it into heat and transferring this heat to an intermediate heat carrier fed to a heat-using technological or power plant. There are two types of solar collectors - flat and focusing. In flat collectors, solar energy is absorbed without concentration, and in focusing collectors, with concentration, i.e. with increasing the density of the incoming radiation flux. The most common type of reservoir in low-temperature solar energy is a flat collector of solar energy (CSE). Its work is based on the principle of a "hot box" or a greenhouse. Solar energy is transferred mainly light and to lesser extent infrared rays. Light rays pass fairly well through the upper glass (or from a polymeric film) the collector panel and are absorbed on the ray-absorbing surface, made of high-conductivity material and having a high absorption coefficient [2, 7-8].

Solar cells are used to convert sunlight to electricity. For the first time, solar batteries were used to master the Cosmos in 1957. They were installed on the satellite and produced electrical energy for its operation.

Solar, or photovoltaic (PV), cells are electronic devices that convert solar energy into solar energy. The physics of a solar cell is based on the same semiconductor principles as diodes and transistors, which form the building blocks of the entire world of electronics. Solar cells. In the evenings and during the cloudy conditions. It is completely at dusk and resumes at dawn. Solar cells do not store electricity, but batteries can be used to store the energy. One of the most fascinating aspects of solar cells is their ability to convert the most abundant and free forms of energy into electricity without moving parts or components and without producing [2, 23].

Solar photovoltaic cells are becoming one of the most promising sources of energy in emerging markets.

Increased attention to the issues of limiting emissions of greenhouse gases and other pollutants has become a positive incentive for the development of the global solar energy market. Favorable legislation and the growing need for safe and autonomous food sources all contribute to the growth of this sector.

The main volume of sales in the industry is concentrated in the Asia-Pacific region. However, the growth trend is also observed in other markets. The Asia-Pacific region accounts for 46% of the world's installed capacity. China, Japan, India and Australia are the most active consumers of these products in the region.

The European market of solar energy continues to grow. In 2006, Germany became the first EU country to introduce green tariffs to stimulate the industry. This led to a rapid growth of solar energy infrastructure - as a result, Germany remains today the largest solar energy market in the world. By 2020, Germany, France, Spain, Italy and the United Kingdom are planning to install more than 75 GW of solar power capacity. For comparison, in 2013 the world's total installed solar power capacity was 137 GW.

Meanwhile, the US has become an attractive market for industry participants. In this country, prices for photovoltaic solar cells went down due to a reduction in imports from China after import tariffs were introduced to combat dumping and illegal subsidies.

During the period under investigation, the dynamics of the market will depend on the policy of the authorities. In particular, environmental policies and projects to improve electricity supply networks will have a serious impact on the cost of electricity for end-users, which will affect the dynamics of this industry.

The potential of the solar energy market is constrained by the high cost of installation and maintenance of such systems. Among other factors limiting the growth of the industry are interruptions in the availability of solar energy, a low return on investment in photovoltaic systems, and the availability of less expensive technologies for obtaining energy from renewable sources. Banks are actively sponsoring projects that use these alternative technologies, thereby creating new competitors for solar energy suppliers. In addition, strong dependence on government support also in some cases hampers the development of this market, since the state can at any time cancel available subsidies and benefits [1, 54-55].

The use of solar energy with the help of solar panels is also found in Russia. For example, the competition of ships on solar batteries "Solar Regatta" was first held in Kaliningrad. Thirteen teams from eight regions of Russia, from Germany and Hungary, have come to show themselves and look at each other's engineering achievements. Each vessel that participated in the competition is unique [4].

Original structures appeared in the center of Sochi. Charging stations in the open air are made in the form of a bench in the football goal. At such a station, anyone can connect their mobile phone and charge it for free. Charging stations are powered by solar energy through solar panels. In the near future similar stations will appear in other resort cities [5].

But since the use of solar energy for everyday purposes is an expensive pleasure today, not every inhabitant and not every country can afford to use energy from the Sun. Science does not stand still, in this area, large studies are being conducted. New developments will appear in the near future. They will reduce the cost of producing solar electricity and provide humanity with cheap and safe energy.

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**Chergutsa Ye. Ya.**

### **DOUBLE BENEFIT OF ELECTRIC FENCING: ECONOMICAL FOR FARMERS - SAFE FOR ANIMALS**

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This article concentrates on the description of electric fencing (EF) as a perfect option for farmers looking for an inexpensive, safe and easy-to-maintain type of fencing.

Electric fence is a barrier that uses electric shocks to deter animals - both domestic and feral ones - from crossing boundaries; it is generally used for agricultural fencing and other forms of animal control as well as to enhance the security of sensitive areas [4].

Electric fences are frequently the best choice in many situations. Common advantages of EF include:

- *cost-effectiveness in both installation and maintenance*, since less materials are required and they take less time to install. EF costs less than 10 percent of the price of a typical four-rail board fence [4].

- *durability*. A well-maintained electric fence can last for nearly 25 years [4].

- *easy installing, maintaining and extending*; This is particularly useful during times of drought when there are pasture shortages and producers are looking for additional grazing options [3].

- *universal application (flexibility and versatility)*. Electric fences can be built in many different ways, taken down quickly and re-installed somewhere else. Depending on the type of livestock you'll be keeping in, or the type of predators you're trying to keep out, a suitable electric fence can be made from one wire or as many as 10 or more [4].

- less probability of livestock injuring (that will be discussed later).

However, electric fences do have a few disadvantages. If a power outage shuts off the electricity, the fence becomes much less of a barrier, and strong or clever animals can break through or slip between the wires [4].

EF works by “educating” animals to associate touching the fence with receiving an unpleasant shock. The source of the shock is an electric fence energizer, which provides regular pulses of electricity to the fence. When an animal comes into contact with the fence, it becomes part of an electric circuit between the output terminals of the energizer. So electric fences are rather mental than physical barriers for all classes of cattle and grazing situations. When livestock are trained properly and the fence is working the way it was designed to, cattle will touch the fence once and then leave it [3] so that they understand they will receive an electric shock if they get too close.

*The general principles* of EF can be explained by three basic systems [1]:

1. *The Earth Return System* delivers the pulse from the energiser. To complete the circuit, current must flow through the animal and back to the energizer through the earth, which should be sufficiently wet to provide low resistance back to the energiser terminal. This system is usually applied in high rainfall coastal areas and on irrigated pastures.

2. To overcome the shortcomings of the earth return system, a *fence return system* may be used. This system uses both pulsed and earth wires in the fence. Therefore, the fence construction involves the use of two or more wires. To complete the circuit, current can flow through an animal from the pulsed wire to the earthed wire and back to the energiser. If the ground is sufficiently wet, the animal will receive a shock by touching only the pulsed wire. If the earth return does not work, the animal will receive a shock when it pushes far through the fence to contact two wires – pulsed and earthed. The animal will not receive a shock if it touches only the earthed wire. Fence return system is widely used for all types of temporary and permanent fencing

3. A *Bi-Polar Energizer* is capable of sending out two powerful simultaneous pulses of energy. One pulse is negative and the other one is positive. When an animal touches either one wire only, it gets a shock through the earth return system. If the animal touches both charged wires, it will receive a double strength shock.

EF energizers providing regular pulses of electricity to the fence vary in their sources of power and power outputs. They can be divided into three groups [1]:

1. *Battery powered energizers* range from very compact low power units designed for strip grazing up to high powered 12-volt units designed for permanent installation on long fences. They can be remotely installed right at the fence.

2. *Mains powered energizers* are the preferred option for permanent electric fence applications. They are less expensive, they require no battery maintenance and must be installed inside out of the weather to ensure safety

3. When trying to graze livestock in remote areas, where power is not available solar panels are an option. *Solar fencing system* consists of three parts: a battery powered energizer, a rechargeable storage battery which powers the energizer, and a solar panel which recharges the battery from sunlight. They should also be installed properly and facing the sun a high noon, well off the ground and high enough in an area offering maximum sunlight exposure.

When training livestock to respect an electric fence it is a good idea to use a smaller pasture, approximately three to four acres in size, with a 3 to 4 electrified wire fence. The goal is to shock the animals once and to do this you may need to attract the animals to the wire by tying tinfoil or ribbon to the wire. Cattle are usually quick learners, when shocked once with a 5000-volt fence, they rarely touch it again.

All equipment should be purchased from a reputable company, thus ensuring good materials that will be backed by your supplier. No less than 2000 volts in the summer and 4000 volts in the winter are required due to thicker hair coats on the livestock and you usually do not get a proper ground because of snow [3].

One of the most useful tools will be a volt meter or a fault finder. This will help you ensure the proper voltage is being delivered on a regular basis and if you have a fault finder it will speed up the repair process by indicating the direction of the problem [3]. Traditionally electric fence energizers for animal farming control did not have a fence monitor to detect a break in the fence. The detecting feature developed by some companies has become an integral part of game and animal control. It allows the user to monitor the condition of the electric fence at the energizer without having to patrol the fence regularly, thus saving time and money [2].

In practice, most problems which occur with electric fences, are caused by poor earthing. In order for the animal to receive a shock, there must be a good current flow from the pulsed output terminal of the energiser to the animal, and back to the earth terminal. An electric fence energizer should be always treated with respect. It can deliver a very powerful shock, which may be harmful to children or small pets. Never use your water pipes, windmill or household earth rod for your electric fence earth, because there is a risk of shock under certain conditions.

One of the keys to properly maintaining electric fences is controlling vegetation growth along the fence lines as growing plants can touch the wires and ground the fence, weakening the electric current and decreasing the fence effectiveness. So routine checking of the fence lines is a must as well as monitoring the tension of the wires. Over time, the wires can start to sag, raising the possibility that clever animals could slip between the wires and

escape from the pasture. Loose wires also make the fence more dangerous, as animals can become tangled in the wires [3].

To sum it all up, we should claim that electric fences offer a great choice for a wide variety of farming situations due to their obvious advantages. This information could be useful to all those planning to construct a new pasture, as they should be sure to strongly consider electric fencing.

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**SOLAR PANELS**

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Solar panels absorb the sunlight as a source of energy to generate electricity or heat.

A photovoltaic (PV) module is a packaged, connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. There are a few commercially available solar modules that exceed efficiency of 22% and reportedly also exceeding 24%. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic

modules, an inverter, a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.

The most common application of solar panels is solar water heating systems.

The price of solar power has continued to fall so that in many countries it is cheaper than ordinary fossil fuel electricity from the grid.

Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most modules are rigid, but semi-flexible ones are available, based on thin-film cells. The cells must be connected electrically in series, one to another. Externally, most of photovoltaic modules use MC4 connectors type to facilitate easy weatherproof connections to the rest of the system.

Modules electrical connections are made in series to achieve a desired output voltage or in parallel to provide a desired current capability. The conducting wires that take the current off the modules may contain silver, copper or other non-magnetic conductive transition metals. Bypass diodes may be incorporated or used externally, in case of partial module shading, to maximize the output of module sections still illuminated.

Some special solar PV modules include concentrators in which light is focused by lenses or mirrors onto smaller cells. This enables the use of cells with a high cost per unit area (such as gallium arsenide) in a cost-effective way.

Depending on construction, photovoltaic modules can produce electricity from a range of frequencies of light, but usually cannot cover the entire solar range (specifically, ultraviolet, infrared and low or diffused light). Hence, much of the incident sunlight energy is wasted by solar modules, and they can give far higher efficiencies if illuminated with monochromatic light. Therefore, another design concept is to split the light into different wavelength ranges and direct the beams onto different cells tuned to those ranges. This has been projected to be capable of raising efficiency by 50%. Scientists from Spectrolab, a subsidiary of Boeing, have reported development of multi-junction solar cells with an efficiency of more than 40%, a new world record for solar photovoltaic cells. The Spectrolab scientists also predict that concentrator solar cells could achieve efficiencies of more than 45% or even 50% in the future, with theoretical efficiencies being about 58% in cells with more than three junctions.

Currently, the best achieved sunlight conversion rate is around 21.5% in new commercial products typically lower than the efficiencies of their cells in isolation. The most efficient mass-produced solar modules—have power density values of up to 175 W/m<sup>2</sup>. Research by Imperial College,

London has shown that the efficiency of a solar panel can be improved by studding the light-receiving semiconductor surface with aluminumnanocylinders similar to the ridges on Lego blocks. The scatteredlight then travels along a longer path in the semiconductor which means that more photons can be absorbed and converted into current. Although these nanocylinders have been used previously (aluminum was preceded by gold and silver), the light scattering occurred in the near infrared region and visible light was absorbed strongly. Aluminum was found to have absorbed the ultraviolet part of the spectrum, while the visible and near infrared parts of the spectrum were found to be scattered by the aluminum surface. This, the research argued, could bring down the cost significantly and improve the efficiency as aluminum is more abundant and less costly than gold and silver. The research also noted that the increase in current makes thinner film solar panels technically feasible without "compromising power conversion efficiencies, thus reducing material consumption".

Solar panel conversion efficiency, typically in the 20% range, is reduced by dust, grime, pollen, and other particulates that accumulate on the solar panel. "A dirty solar panel can reduce its power capabilities by up to 30% in high dust/pollen or desert areas", says Seamus Curran, associate professor of physics at the University of Houston and director of the Institute for Nano Energy, which specializes in the design, engineering, and assembly of nanostructures.

There are many practical applications for the use of solar panels or photovoltaics.

It can first be used in agriculture as a power source for irrigation. In health care solar panels can be used to refrigerate medical supplies. It can also be used for infrastructure. PV modules are used in photovoltaic systems and include a large variety of electric devices.

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### **ALTERNATIVE POWER SYSTEM**

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Alternative energy is a set of promising methods of obtaining, transfer and use of energy, which are not as widespread as traditional, but are of

interest because of the profitability of their use at generally low risk of harm to the environment.

This energy is also known as «green» energy. Under the alternative sources are understood as renewable resources (such as water, sunlight, wind, wave energy, geothermal, alternative burning renewable fuel). This energy is based on 3 principles: Renewability, Environmental friendliness, Efficiency.

Alternative energy must address a number of acute problems in the world: minerals and waste release into the atmosphere of carbon dioxide (this happens when the standard methods of energy production using gas, oil, etc.), which leads to global warming, the irreversible change of the environment and the greenhouse effect [1].

The development of alternative energy

The direction is new, although attempts to use the energy of wind, water and sun were made in the 18th century. In 1774, the first scientific work on hydraulic construction ("Hydraulic architecture") was published. The author of the work of French engineer Bernard forest de Belidor.

A new impetus to the development of alternative energy received during the severe crisis of the 1970s. From the 90s to early 21st century in the world the critical number of accidents at the power plants was recorded, which was an additional stimulus for the development of green energy [1].

Alternative energy sources in power system

Promising area of alternative power engineering is the development of technologies using renewable energy sources (RES) and production on their basis of thermal and electric energy. One such source of energy is biomass.

The term "biomass" includes wood and vegetable waste from wood processing, agricultural production branches, sawdust, trimmings, bark, straw, leaves, reeds, peat, and organic municipal solid waste (MSW), including waste utilities and waste sludge treatment facilities. Biomass can be converted to biofuel.

Biofuel is a fuel from biological raw materials obtained, usually as a result of processing of stalks of sugar cane or rapeseed, corn, soybean. There are also projects of varying degrees of sophistication aimed at obtaining biofuels from cellulose and various types of organic wastes, but these technologies are in an early stage of development or commercialization e.g. different liquid biofuel (for internal combustion engines, for example, ethanol, methanol, biodiesel), solid biofuel (wood, straw) and gaseous (biogas, hydrogen) [2].

This type of fuel reduces the economic costs of thermal power plants. Thanks to the development of biofuels, price of oil, gas, coal are reduced, because it can replace traditional sources of energy.

From the point of view of ecology standards that apply to boilers running on straw, such as for boilers working on wood chips. Therefore, the choice between these two fuels depends only on convenience. However, the choice should be done before installation of the boiler, as boiler installations, boiler and the building should be totally different [2, 120].

The difference between the boiler operating on dry and wet biomass is in combustion technology and flue gas purification method. Furthermore, it is different ways of feeding fuel to the boiler.

If you use of all biofuels to ensure optimal combustion and minimize impact on the environment, it is important that the fuel flowed into the combustion chamber continuously and evenly, so the weight of fuel should be as homogeneous. This is achieved using automated processes, and therefore there is a significant difference between the boilers, where the operations are performed manually, and a modern boiler designed for Central heating [3].

Dry biofuel is straw, wood pellets, wood waste, wood chips, and waste from crops and other plants. An optimal burning of these fuel types for heat generation in boiler houses with iron grilles. During the development of boilers for biofuels must take into account the combustion temperature. At too high temperature increases the thermal stress, and when too low is too much slag. At the same time, the boiler needs to provide the optimal ratio of combustion air and products of gas fuel, in order to maintain a low allocation of carbon monoxide and nitrogen oxides.

Dry flue gas in these boilers is cleaned of harmful particles by means of cyclone separators and filters installed between boiler and chimney. On the market there are different types of filters, but in Denmark most often used by a variety of bag filters. If the sizes of the boiler meet the standards, there is no problem in the observance of rules of purification, even at high volumes [3, 13].

Storage and use of straw and wood pellets is significantly different. When one uses straw storage requirements then fire protection is much higher. Therefore, as alternative fuels (for example, at maximum load, in emergency situations or as a supplemental fuel) of all kinds of biofuels are preferable to wood pellets. However, the cost of fuel is much higher than the cost of a straw, so the choice of fuel should take into account all the parameters.

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**NANOTECHNOLOGY IN ENERGY APPLICATIONS**

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Nowadays energetic question is one of the most important global matters. Everybody understands how it is important to find more effective way of using energy and develop renewable resources industry. Over the past few decades, the fields of science and engineering have been seeking to develop new and improved types of energy technologies that have the capability of improving life all over the world. In order to make the next leap forward from the current generation of technology, scientists and engineers have been developing energy applications of nanotechnology. Nanotechnology, a new field in science, is any technology that contains components smaller than 100 nanometers. We can look closer at several spheres of power supply industry where nanotechnologies can be used [1].

**Energy sources.** An important subfield of nanotechnology related to energy is nanofabrication. Nanofabrication is the process of designing and creating devices on the nanoscale. Nanotechnologies provide essential improvement potentials for the development of both renewable energy sources like geothermal energy, sun, wind, water, tides or biomass and conventional energy sources (fossil and nuclear fuels). Nano-coated, wear resistant drill probes, for example, allow the optimization of lifespan and efficiency of systems for the development of oil and natural gas deposits or geothermal energy and thus the saving of costs. An increase in the efficiency of energy transformations requires a significant increase in temperature and, consequently, an increase in the thermal stability of the turbine blades, a reduction in the weight of the parts of the turbines (material of the alloy of titanium and aluminum). Reducing the emission of carbon dioxide is achieved using nanoscale membranes to capture carbon dioxide when burning coal in power plants. Further examples are high-duty nanomaterials for lighter and more rugged rotor blades of wind and tidepower plants as well as wear and corrosion protection layers for mechanically stressed components (bearings, gear boxes, etc.). Nanotechnologies will play a decisive role in particular in the intensified use of solar energy through photovoltaic systems. In case of conventional crystalline silicon solar cells, for instance, increases in efficiency are achievable by antireflection layers for higher light yield. In the production of electric energy, through the chemical in fuel cells, nanostructured electrodes, catalysts and membranes are used, which is very important for improving the efficiency of fuel cells in electric cars. In thermoelectric transformations, the same approaches are used. Nanostructured semiconductors with optimum boundary layers increase in efficiency. Thermoelectric energy conversion seems to be comparably promising. Nanostructured semiconductors with optimized boundary layer design contribute to

increases in efficiency that could pave the way for a broad application in the utilization of waste heat [2].

**Energy distribution.** Regarding the reduction of energy losses in current transmission, hope exists that the extraordinary electric conductivity of nanomaterials like carbon nanotubes can be utilized for application in electric cables and power lines. Furthermore, there are nanotechnological approaches for the optimization of superconductive materials for lossless current conduction. In the long run, options are given for wireless energy transport, e.g. through laser, microwaves or electromagnetic resonance. Future power distribution will require power systems providing dynamic load and failure management, demand-driven energy supply with flexible price mechanisms as well as the possibility of feeding through a number of decentralized renewable energy sources. Nanotechnologies could contribute decisively to the realization of this vision, inter alia, through nano-sensory devices and power-electronical components able to cope with the extremely complex control and monitoring of such grids [2].

**Energy storage.** Nanotechnologies can be successfully used to increase the efficiency of energy storage (Li-ion batteries with nanoceramic elements, heat-resistant, flexible, filtering nanomaterials, highly efficient electrodes). These elements of nanotechnology are used in electric and hybrid cars, as well as in stationary conditions of energy storage. Very promising is the storage of hydrogen in nanoporous materials, since hydrogen in the future will occupy one of the leading places among other energy carriers. Nanoporous organometallic materials are used for portable, mobile electronics. To store heat in buildings use nanomaterials with "memory" forms, like latent heat keepers. For the same purpose, an adsorption method for storing heat using natural nanomaterials from a zeolite is used [3].

**Energy usage.** To achieve sustainable energy supply, and parallel to the optimized development of available energy sources, it is necessary to improve the efficiency of energy use and to avoid unnecessary energy consumption. This applies to all branches of industry and private households. Nanotechnologies provide a multitude of approaches to energy saving. Examples are the reduction of fuel consumption in automobiles through lightweight construction materials on the basis of nanocomposites, the optimization in fuel combustion through wear-resistant, lighter engine components and nanoparticulate fuel additives or even nanoparticles for optimized tires with low rolling resistance. Considerable energy savings are realizable through tribological layers for mechanical components in plants and machines. Building technology also provides great potentials for energy savings, which could be tapped, for example, by nanoporous thermal insulation material suitably applicable in the energetic rehabilitation of old buildings. Nanotechnology is great sustainability promise is to bring about the much needed power shift in renewable energy.

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### **DETERMINING AND OPTIMIZING ENERGY REQUIREMENTS FOR EFFICIENT MILK PRODUCTION**

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The milk dairy enterprises are fast growing business but high energy costs present a serious problem. To understand the problems related to high energy consumption of milk processing and to suggest methods of their elimination with the help of different approaches we need proper management of the all production processes, first of all, the utilization of waste heat, which otherwise goes to the atmosphere and to control the pollution depending upon regulatory context.

World energy consumption is increasing day-by-day. The dairy industry is huge and it requires heating, refrigeration cooling and electricity loads. Different methods can be used for energy saving in milk production [4]. High energy costs of milk processing, especially, pasteurization, is rather an urgent problem as a considerable amount of electrical energy is required here [6].

This paper concerns only energy requirements connected with milk processing. Indeed, practice has shown that energy requirements and the types of energy used are highly dependent on the technological level of the equipment used.

In this context, it may be observed that [5]:

- the energy used is almost exclusively thermal;
- the system's efficiency is limited (about 15%);
- electricity is used little or not at all;

The following conditions are typical for a modern milk processing factory:

- thermal energy consumption is generally low as efficient generators are used;
- electric energy consumption is rather high for milk refrigeration and the widespread use of electric machinery (pumps, stirrers, etc.).

Here we consider modern plants of various complexity because:

- only modern plants are capable of guaranteeing quality, hygienic final products and long-term uniformity in milk and cheese production;
- milk refrigeration should be introduced in all rural areas, and this can only be made possible by the availability of advanced technologies;
- the employment of rationally designed plants by individual countries make it possible to plan the location of standardized processing centers. In addition, standardization may lead to the development of local industrial activities;
- all energy plants, even the simplest ones, are designed for the use of renewable sources have reached a certain technological level.

In other words, the kind of engineering needed (e.g., solar collectors used to heat water to 50°C) is more complicated than that required by simple milk processing plants. Consequently, a possibility of advancing modern milk processing and transformation plants is not clear in terms of energy. Indeed, energy and processing aspects should be technologically compatible [1].

The optimal use of energy sources would naturally lead to the modification of commercially available plants. For example, photovoltaic collectors would be better employed if their final users were direct-current electric motors to do away with inverters and increase the plant's utilization factor. Another example concerns the use of 70–75°C water to heat milk, which would make it possible to employ relatively simple solar collectors.

It is clear that prospective application of renewable sources is closely connected with the type and level of technology employed in milk processing plants.

In evaluating energy requirements, reference is made to thermal and electric power requirements. The former concern water-milk or steam-milk heat exchangers, while the latter relate to the electric motors (e.g., pumps, stirrers, refrigeration plant compressors and various servomechanisms) [2].

The energy consumption of electric motors (e.g., cooling plant compressors) and heat exchangers (e.g., to heat water and milk) has to coincide with the output of electric or thermal generators. Therefore, this output represents the share of energy that has to be provided.

The analysis carried out in this section considers two basic operations:

- 1) milk collection (refrigeration and supplementary treatments);
- 2) milk processing (milk packaging, production of cheese, yogurt, etc.).

Energy is used for milk treatment and processing on three levels as [2]:

- hot water heated to temperatures under 80°C (washing and processing);
- steam at various temperatures and pressures (water heated to 80–90°C);
- electricity (220 or 380 V).

The availability of a heat-carrying fluid and electricity is essential. Low-temperature water could be generated from process waste, which include a limited number of energy conversion technologies.

Hot water production may include the following technologies [2]:

- flat solar collectors made with locally produced components;
- recuperators in on refrigeration equipment condensers;
- exchangers operating on geothermal fluids.

For steam production, the following technologies may be evaluated:

- boilers fed biological gas (produced by anaerobic fermentation of animal waste);
- biomass-fed boilers;
- electricity produced by wind generators, wheels or water turbines.

The following technologies may be considered for electricity production [2]:

- generators with Otto engines fed by gasification or biological gas;
- generators with steam engines fed by any kind of fuel (including solid);
- generators combined with wind or water mills;
- photovoltaic solar collectors.

The pasteurization process is the main process consuming a significant amount of energy. The optimization of pasteurization process is also essential to reduce milk production performance variations and associated losses such as preservation [7]. The literature suggests many methods for reducing loss in pasteurization process like CHP System, CIP process, solar energy application for heating and cooling, RAS network, programs based on MATLAB software, application such as sequential quadratic programming, etc. [1; 3].

Energy optimization in modern milk dairy plants means the development of a methodology for reducing energy different forms wastages and losses in a manufacturing system of dairy plant. It helps to develop capable manufacturing system with optimum energy efficiency for different products and grades.

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### **WAS IST ALTERNATIVE ENERGIE?**

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Alternative Energien sind Energiequellen, die nach menschlichen Maßstäben unerschöpflich sind. Zu den heute bestehenden alternativen Energien zählen die Solarenergie, die Wasserkraft und die Windkraft.

Die alternativen Energien werden in den Medien gern mit dem Problem der globalen Erwärmung angesprochen. Gegenwärtig stammt gängige Energie vor allem aus der Verbrennung fossiler Brennstoffe oder der Verwertung radioaktiver Stoffe wie Uran. Aber Atomkraftwerke zerstören nach und nach die Umwelt und haben eine schreckliche Bedrohung für das Leben der Menschen auf der Erde, durch Katastrophen wie Tschernobyl (die Ukraine) und Fukushima (Japan). Das Problem ist, fossile Brennstoffe sind nicht ewig verfügbar und nukleare Abfälle stellen eine Bedrohung für Mensch, Tier und Umwelt dar und machen daher billige Kernkraft nicht zu einer dauerhaften Lösung. Alternative Energien sind hauptsächlich Quellen, die derzeit ein großes Potenzial haben, aber noch nicht untersucht wurden und daher keine nationale Abdeckung bieten können. Sie werden allerdings erforscht und gelten als zukunftsweisende Technologien, weil sie in der Lage wären, das Problem der Rohstoffe und der mangelnden Energie für die künftigen Generationen langfristig zu lösen[1].

Die großen Fünf der erneuerbaren Energien

1. Sonnenenergie: Mittels der Sonne können die elektromagnetische Strahlungen durch Sonnenkollektoren, Solarzellen, Sonnenwärmekraftwerke und Solarkocher verwendet werden, um Wärme oder elektrische Energie zu gewinnen.

2. Windenergie: Die kinetische Energie bewegter Luftmassen wird mittels Windmühlen und Windkraftanlagen in elektrische Energie umgewandelt.

3. Wasserkraft: Die kinetische Energie bewegten Wassers mittels Turbinen und Generatoren wird in Strom umgewandelt. Im natürlichen Wasserkreislauf folgt das Wasser zuvor der Schwerkraft, bevor sie verdunstet und wandert mittels Regen.

4. Bioenergie: Auch kann aus Biomasse, z.B. pflanzlichen und tierischen Erzeugnissen Heizenergie, Strom oder Kraftstoff gewonnen werden. Hauptenergiequellen sind nachwachsende Rohstoffe wie organische Reststoffe, Holz und andere.

5. Geothermieenergie: Das ist in der zugänglichen Erdkruste gespeicherte Wärme, die entzogen und entweder direkt durch eine Wärmepumpenheizung und ähnliche Techniken in elektrische Energie umgewandelt und genutzt wird[2].

Als Windenergie bezeichnen wir die Energie, die aus Windkraftanlagen gewonnen wird. Diese Anlagen erzielen ab einer Windgeschwindigkeit von 4 bis 5 Metern pro Sekunde gute Leistungen. Bei Windkraftanlagen unterscheidet man zwischen Onshore- und Offshore-Windparks. Onshore-Windparks errichtet man an der Küste und im Binnenland – beispielsweise in der Region Hannover. Offshore-Windparks erzeugen ihren Strom auf dem Meer, in großem Abstand zur Küste. Über unterirdische Kabel leiten sie den Strom an Verteilstationen weiter. Von dort aus gelangt er in unsere Haushalte.

Unabhängig vom Standort funktionieren Windkraftanlagen immer gleich: Sie nutzen die natürliche Kraft des Windes, um daraus elektrische Energie zu erzeugen.

Das funktioniert folgendermaßen: Zunächst versetzt die Bewegungsenergie des Windes bzw. der Luftströmungen die Rotorblätter der Windkraftanlage in Bewegung und treibt über eine Drehachse den Stromgenerator an. So wandeln wir die Bewegungsenergie (kinetische Energie) in elektrische Energie – also Strom – um [3].

### **Vorteile der Windenergie**

- Wind steht uns unbegrenzt zur Verfügung. Die Stromerzeugung durch Windenergie ist sehr schadstoffarm.
- Die Windenergiebranche wächst stetig und schafft bzw. sichert viele Arbeitsplätze.
- Windstrom senkt nachhaltig die Emission von Kohlendioxid (CO<sub>2</sub>).
- Strom aus Windkraft ist günstiger als Strom aus konventioneller Erzeugung: Die Aufwendungen für den Abbau und die Entsorgung sind bei konventionellen Erzeugungsanlagen, wie Atomkraftwerken, weitaus höher als bei Windenergieanlagen.
- Windenergienutzung birgt keine elementaren Gefahren für Mensch und Natur, wie zum Beispiel Atomenergie oder Erdöl.

- Windenergie leistet einen Beitrag, die UN-Klimaschutzziele zu erreichen.
- Durch Windenergie können wir ökologische und ökonomische Ziele in Einklang bringen.

Nachteile der Windenergie

- Windräder erzeugen nur dann Strom, wenn ausreichend Wind weht.
- Die Bereithaltung ist aufwendig, da wir nicht immer auf zwischengespeicherten Strom zurückgreifen können.
- Windräder erzeugen neben hörbarem Schall auch Infraschall [3].

Die Sonne gibt, seitdem die Solarenergie überhaupt messbar ist, eine beinahe konstante Strahlungsenergie ab. Gravierende Schwankungen sind selbst aus längst vergangenen Zeiten nicht bekannt. Somit stellt die Solarenergie eine schier grenzenlose Energiequelle dar, die, anders als fossile Energieträger, kaum erschöpfbar ist. Die Sonne, bzw. die Solarenergie, ist demnach die größte, verfügbare Energiequelle der Menschheit und mit moderner Solartechnik in verschiedenen Energiebereichen für den Menschen nutzbar. Solarenergie lässt sich zum Beispiel mittels Sonnenkollektoren zur Wärmeerzeugung nutzen, erzeugt innerhalb von Sonnenwärmekraftwerken unter Zuhilfenahme von Wasserdampf Strom oder wird zur Gleichstromgewinnung durch Photovoltaiksysteme herangezogen. Allerdings unterliegt die Solarenergie, bzw. die solare Einstrahlung tages-, jahreszeitlichen und regionalen Schwankungen. Rein theoretisch würde eine Solarfarm auf einer Fläche von 700 x 700 Kilometern, aufgestellt in der sonnenreichen Sahara und mit einem Wirkungsgrad von nur 10 Prozent ausgestattet, ausreichen, um den globalen Gesamtenergiebedarf zu decken. Um sich der Solarenergie auch während der Nachtstunden bedienen zu können, kann die gewonnenen Sonnenenergie gespeichert werden. Die Speichermöglichkeiten gelten jedoch als eine der größten Herausforderungen und werden durch gezielte Forschungen stetig vorangetrieben. Das Ziel ist, die zur Verfügung stehende Sonneneinstrahlung möglichst effektiv und kostengünstig nutzen zu können [4].

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