MINISTRY OF EDUCATION OF THE REPUBLIC OF BELARUS

Vitebsk State
UNIVERSITY of
TECHNOLOGY

EDUCATION AND SCIENCE IN THE 21ST CENTURY

Articles of the VI International Scientific and Practical Conference

November 11, 2021, Vitebsk

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ASSESSMENT OF ADHESION OF NANOFIBER MATERIALS

ОЦЕНКА АДГЕЗИИ НАНОВОЛОКНИСТЫХ МАТЕРИАЛОВ

Demidova M.[1], Ryklin D.[2]
Vitebsk State Technological University, Belarus
e-mail: demidova.mariya00@gmail.com[1], ryklin-db@mail.ru[2]
Демидова М.А.[1], Рыклин Д.Б.[2]
Витебский государственный технологический университет, Республика Беларусь

Keywords: electrospinning, nanofibers, polymers, adhesion, peel-off force.
Ключевые слова: электроформование, нановолокна, полимеры, адгезия, сила отслаивания.

Abstract. The work is devoted to assessing the adhesion of electrospun nanofiber materials to various types of substrates. A test procedure for determining the adhesion strength of nanofibrous materials based on a Time WDW tensile testing machine is described. A technique has been developed to reliably estimate the average value of the peel-off force of electrospun materials.

Аннотация. Работа посвящена оценке адгезии нановолокнистых электроформованных материалов к различным видам подложек. Описана методика проведения испытаний по определению адгезионной прочности нановолокнистых материалов на базе разрывной машины серии Time WDW. Разработана методика, позволяющая наиболее достоверно оценить среднее значение силы отслаивания электроформованных материалов.

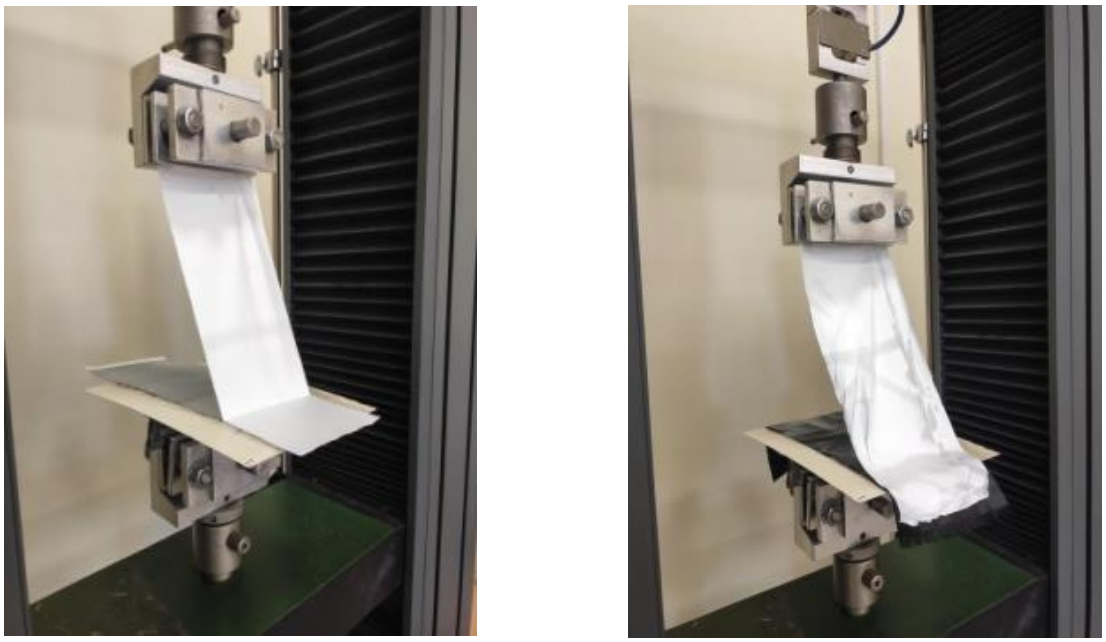
Currently, one of the most promising areas for the development of innovative materials for biomedicine and cosmetology is the creation of electrospun materials. Due to the variety of their properties, they have become alternative therapeutic agents for many areas of biomedicine [1, 2, 3]. Such innovative materials [4, 5] can be produced for use on a substrate or require removal from it before use, which makes it relevant to study the adhesion of electrospun webs to various types of substrates.

We reviewed the studies devoted to methods for determining the adhesion strength of various materials and found that currently there is no method for assessing adhesion for electrospun polymer webs. In this regard, we proposed criteria for assessing adhesion: the peel-off force of removing nanofibrous web from the substrate, the absence of a large proportion of nanofibers migrating to the substrate or damage of the material [6]. On the basis of a Time WDW tensile testing machine designed for static

tensile, compression and bending tests, a method for determining the adhesion of a nanofiber coating to a substrate has been developed.

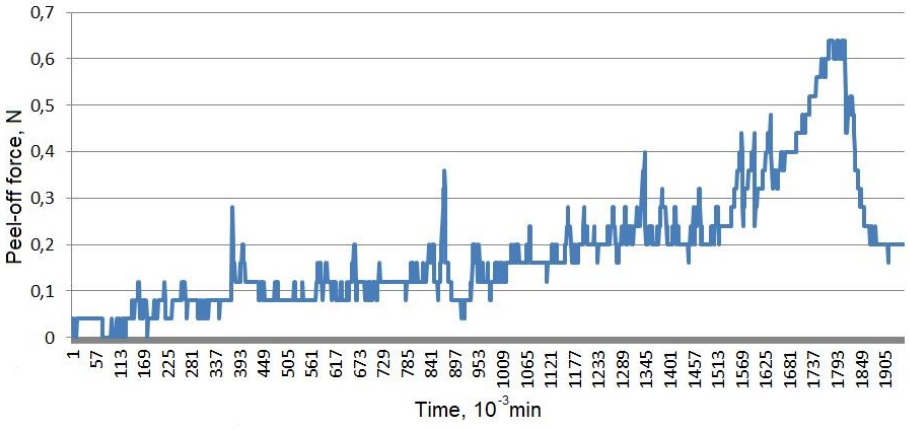
The pulling bottom clamp holds a horizontal plate to which the test specimen substrate is fixed. One end of the nanofiber material is fixed in the top clamp. The clamp is connected to the force transducer, the fluctuation of the force value is displayed by the oscillogram. The tensile machine helps to adjust the peeling speed of the material, as well as the clamping length.

Two samples of materials with nanofiber coatings were selected as objects of research [7]. The concentration of polyvinyl alcohol Arkofil PPL (Switzerland) in the fiber-forming solution was 14 %, the sample time was 30 min, tip-to-collector distance was 10 cm, the voltage applied to the emitter was 29 kV, to the collector – 9 kV, the polymer flow rate was 1.3 ml/h, the rotation speed of the collector – 250 min^{-1}. For the first sample, paper with the layer of black ink applied on the printer was used as a substrate. A black polyester fabric was used as a substrate for the second sample. The choice of these substrate materials is due to the fact that they both have relatively weak adhesion to nanofiber materials made of polyvinyl alcohol; coating defects and its fragments remaining after removing the coating are clearly visible on a black background. The clamping length at the beginning of the test was 5 cm, the width of the tested samples was 10 cm. The peeling process took place at a speed of 50 mm/min and was uniform. Photos of the samples and the oscillograms corresponding to the process are shown in Figures 1 and 2, respectively.

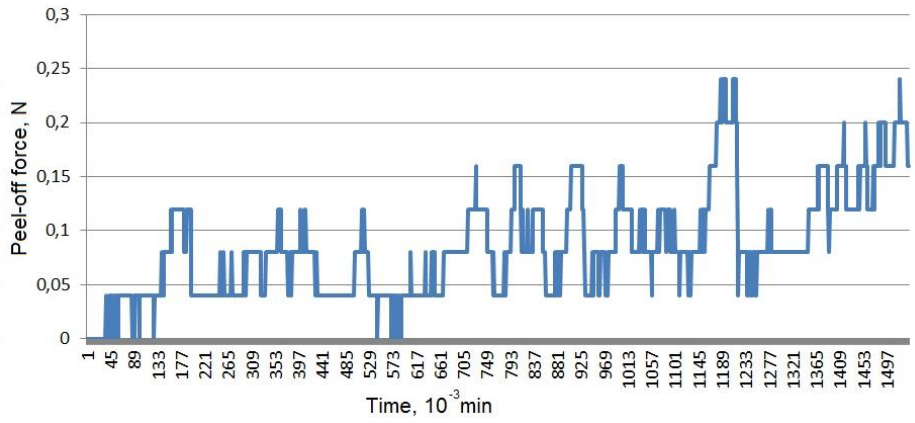


a) b)

Figure 1 – Removal of nanofibrous material from: a) paper, b) fabric



a)



b)

Figure 2 – Oscillogram of peeling of nanofiber material from a) paper, b) fabric

Analysis of the results obtained showed that both samples peel off well from the substrate. We have developed a technique that allows us to reliably determine the average value of the peel-off force. For the evaluation, a segment was chosen at which a sample of nanofibrous material peels off at an angle of 90° +/- 5°, since in this case the deformation force acting on the material will be minimal and can be neglected. The peel-off force of the nanofibrous material from the paper was 9.9 cN, while for the sample of nanofiber webs on the polyester fabric it was 15.3 cN. One of the drawbacks of the sample accumulated on paper was the partial migration of nanofibers onto the substrate and particles of the substrate onto the nanofiber material during its peeling off the substrate. At the same time, for the sample, for which a polyester fabric was used as a substrate, such a defect is absent. However, the sample on the fabric is characterized by less uniformity of the nanofiber web, which in the future may adversely affect its operational properties.

Thus, if its uniformity is important for the further use of a nanofiber material, it is advisable to use paper as a substrate in its production, since it not only produces a more uniform coating, but also can be removed with a uniform force. However, if the material is supposed to be used in biomedicine and cosmetology, where it is important to ensure that there is no migration of nanofibers to the substrate and the particles of

the substrate to the resulting material, it is advisable to use materials obtained on fabric, because there such migration tends to zero.

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UDC 685.34.017.82

ADVANTAGES AND DISADVANTAGES OF THE METHOD FOR TESTING OF THE TOTAL AND RESIDUAL DEFORMATION OF STIFFENERS

ДОСТОИНСТВА И НЕДОСТАТКИ МЕТОДИКИ ОПРЕДЕЛЕНИЯ ОБЩЕЙ И ОСТАТОЧНОЙ ДЕФОРМАЦИИ ЗАДНИКА

Derkachenko P.
Vitebsk State Technological University, Belarus
e-mail: pawelderk@mail.ru
Деркаченко П.Г.
Витебский государственный технологический университет, Республика Беларусь

Keywords: footwear, stiffeners, technique, shape retention, deformation.
Ключевые слова: обувь, задник, методика, формоустойчивость, деформация.

Abstract. The article discusses the current method for determining the total and residual deformation of stiffeners, which is used to determine the shape retention of footwear. It is shown that this technique has both positive and negative aspects. In particular, with its help it is impossible to determine the change in the shape retention of the footwear under static conditions. In addition, the design of the measuring device does not allow to reliably assess the shape retention of many types of fashion footwear. Thus, there is a need to develop new methods for assessing the shape retention of footwear.

Аннотация. В статье рассмотрена существующая на сегодняшний день методика определения общей и остаточной деформации задника, применяемая для определения формоустойчивости обуви. Показано, что данная методика имеет как положительные, так и отрицательные аспекты. В частности, с её помощью невозможно определить изменение формоустойчивости обуви в статических условиях. Кроме того, конструкция измерительного прибора не позволяет достоверно оценить формоустойчивость многих видов модельной обуви. Таким образом, существует необходимость в разработке новых методов оценки формоустойчивости обуви.

To evaluate of the shape retention of stiffeners, the technique is used regulated by GOST 9135-2004 "Footwear. Method for determination of total and residual deformation of toe puffs and stiffeners". For evaluation an instrument ZhNZO-2 is used. In footwear industry this technique has proven to be a relatively reliable method in certain cases for assessing the total and residual deformation of stiffeners. Due to measurements simplicity, the method is widely used to this day. However, because of the scientific and technological progress, in particular, due to the use of new materials for stiffeners, the advent of new methods of molding footwear, etc., the instrument ZhNZO-2 has become unsuitable for use in some situations:

– firstly, the device evaluates the shape retention of stiffeners only under static conditions, while most deformations can occur in the shoe during exploitation, that is, in dynamic conditions;

– secondly, the technique regulated by GOST 9135-2004 allows to measure the shape retention of stiffeners only in the final product and does not allow to evaluate this indicator for stiffeners and footwear blanks;

– thirdly, in some cases it is impossible to obtain an objective evaluation of the shape retention of stiffeners. This is because of the shape and dimensions of the standard inserts which are used for measurement, often do not correspond to the inner shape and dimensions of the modern models of stiffeners. These models are currently distinguished by a great variety. Also, it is not always possible to rigidly fix footwear with high tops. This leads to distortion of the test results;

– at fourth, the existing method does not make it possible to determine the magnitude of the force acting on the sample, and therefore it is not possible to compare the magnitude of the load and deformation of footwear of different models and designs;

– at fifth, the principle of loading is questionable, since the foot acts on the shoe statically or cyclically from the inside, and external loading is extremely rare.

The foregoing allows us to conclude that there is a need to develop new methods for evaluation the shape retention of stiffeners, footwear blanks, and final footwear not only under static, but also under dynamic conditions. These methods would make possible to compare the magnitude of the load and deformation of footwear of various models and designs.

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THE MECHATRONIC OF JACQUARD WOVEN MACHINE FOR QUALITY OF PRODUCTION

Elsayed Ahmed Elnashar
Kaferelsheikh University, Egypt
e-mail: Smartex@kfs.edu.eg

Keywords: mechatronic, jacquard woven machine, quality, production.

Abstract. High-speed electronic Jacquard woven machine was recognized as a quality of production. It can easily produce any kind of pattern of woven fabrics, while the printing and dyeing cloth technology may produce wastewater, which hardly polluted the environment. A new electronic Jacquard technology has replaced the traditional printing and dyeing technology. A mechatronic control system must be researched to satisfy the high-speed Jacquard woven machine. This article introduced the mechatronic control system structure and the organization of the pattern data, tested the pattern data accuracy by feedback acquisition system, and used mechatronic electronic design automation technology implemented the production of the acquisition mechatronic system, emulated the time sequence accuracy by professional software,

and tested the frequency of the pin selector. The result is that the pattern data organization and acquisition testing and implementation have offered the theoretical foundation for the production of mechatronic control system.

Introduction

Mechatronics, as a discipline, has been around for a long time in textiles industries, applications such as Jacquard woven machine of mechatronics opportunities in textiles the combination of mechanical applications with electronic textiles production used by researchers was a good example of integrated design. Indeed, most early workers in which branch of textiles industries, which was to become electrical engineering were equally at factures with electronic and mechanical artifacts and combined them in various experiments and products. mechatronic design in textile engineering contains a selection of contributions to the advanced search, which took place in the introductory sections on the mechatronics concept and design methodology and the impact of advance in technology on the mechatronics concept; the importance of the mechatronic design in the textile industries is highlighted, together with many examples of Jacquard woven machine[4], these include: mechatronics in the design of textile machinery, such as 3D woven and braiding; Jacquard woven machine and intelligent systems as applications of mechatronics for Jacquard woven machine compensation; texturing; measurement automation and diagnosis, knowledge-based expert systems; automated textiles manufacture and assembly; and apparel manufacture. [3] [4] this article unique in which it brings together many applications of mechatronics in textile machinery and system design. In which respect it will serve as a reference article for inventors and designers as well as for students of textile technology and engineering [4].

Mechatronics of textiles

Textile mechatronics[1, 4], also called mechatronics engineering, mechatronics is an interdisciplinary branch of textile engineering which focuses on the integration of mechanical of textiles with other files such as electronic, and electrical engineering systems, and also includes a combination of mechatronics robotics of textiles, electronics, computer science mechatronics of textiles[1], telecommunications, systems control mechatronics of textiles, and product engineering mechatronics of textiles. [5, 6]. Industrial textiles as technology has advanced mechatronics over time, many subfields of engineering have succeeded in both adapting and multiplying industrial textiles. [1] The goal of mechatronics is to produce a design solution which unites each of these diverse sub-fields as of textiles [4] Jacquard woven machine. Originally, the field of Mechatronics of textiles was intended to be nothing more than a combination of mechanics of textiles and electronics of textiles, hence the name as a carryover of advanced Mechatronics and electronics; however, as the complexity of technical systems continues to evolve, the definition has been expanded to include more technical of textiles areas [2, 4].

Textiles Implementations

Mechanical modeling requires the physical modeling and simulation of complex phenomena of textiles within the scope of the multi-scale and physical textiles

approach. This means implementation in textiles and management of modeling and optimization methods and tools, which are combined into a systematic approach. The major is aimed at students in textile mechanics who wish to open their minds to systems engineering, able to integrate different physics or techniques, as well as students in textile mechatronics who wish to further develop their knowledge in interdisciplinary optimization and simulation techniques in textiles [4].The major teaches students in robust for improved visualization methods of structures or many technological systems of textiles, and into key textile modeling and textiles simulation tools used in research and development in Mechanical modeling of textiles. Special courses for indigenous textiles applications (textiles machine in multi-material composites, innovative transducers and actuators, integrated textile systems,) are also proposed to prepare students for the next breakthrough in areas covering materials and textile systems. For some textiles mechatronic systems, the main issue is no longer how to implement a textiles control system of fields of Jacquard woven machine and apparel lines, but how to implement the actuators. In the field of mechatronic textiles, two basic techniques are used to produce Mechanical modeling motion/motion in textiles [2, 6].

Problems [4]:

- The curricula are empty in the faculties of engineering, specializing in textile engineering, from studying these modern types of specializations in many countries of the world, which makes the graduate weak and does not keep pace with the local or international labor market.
- Similarly, the curricula are empty of textile engineering applications in faculties of artificial intelligence
- Many countries import modern machinery and equipment, sometimes used in the field of textiles.
- And it does not have the capabilities and elements of maintenance, repair, development and innovation. This puts it at the bottom of the industrialized countries.

Objectives:

- To develop innovations for the textile industry the easy way and this throw:
- Experienced experts in this sector understand your requirements and the tasks you are faced with Innovative hardware and software for the implementation of energy
- Efficient solutions
- Reliable drive systems for typical textile applications
- Use of open standards
- Global production based on uniform quality standards
- Worldwide efficient logistics concept
- Global service network and training courses

For the leading specialists in drive and automation technology with extensive know-how and a worldwide network of experts in the textile industry, Department of Textiles Engineering must work with you to devise the very best solution for your needs; for setting technical ideas in motion. Irrespective of whether to optimize existing equipment or develop a new textile machine, in line with individual requirements and

aims, and provide with support for all aspects and in all phases of production projects, and cooperating in these projects is also useful to implement an innovative overall concept

Results and Discussion

The subjective decisions during Mechatronics of textiles and garment manufacture are mimicked and implemented in the next generation of intelligent apparel manufacturing environments. Mechatronics of textiles Integrated Environment has been devised which consists of three mechatronic systems: the waving Prediction System, which can automatically predict material problems and advise correction of properties prior to manufacture; the Intelligent Jacquard woven machine System, which can automatically set the optimum static and dynamic Jacquard woven machine parameters of the Mechatronics of textiles machinery; and the Safeguard Quality System to ensure high quality and consistency.

These Mechatronics of textiles systems are integrated to form an on-line intelligent environment which is capable of self-learning (automatic updating). These Mechatronics of textiles systems have been designed and developed to enable on-line, automatic measurement of fabric properties such as tension, bending, thickness and compression as well as Jacquard woven quality, which are all interconnected with each other. Two different paradigms are implemented: seam pucker, as it is mostly found in Jacquard woven fabrics, and textiles damage, found in densely woven fabrics. The operation of these environments is Mechatronics robust and should not require special operational skill. Pilot industrial trials have identified improvements from implementing such systems in production efficiency, flexibility of manufacture quality and design enhancements of products. It can rely on every aspect of high-quality standards. From extensive range of services to our consistent product portfolio, for outstanding product quality and service, the service modules must have specifically set up to guarantee the reliability of your machine and increase its performance. From inspections and preventive maintenance, as a tailored process chain, in the future based on the data recorded over a longer period of time, you can derive predictive data models and obtain insight into what will happen.

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DEVELOPMENT OF THE CAPACITIVE SENSOR FOR MONITORING THE QUALITY OF INDUSTRIAL OILS FOR TEXTILE MACHINES

РАЗРАБОТКА ЕМКОСТНОГО СЕНСОРА МОНИТОРИНГА КАЧЕСТВА ПРОМЫШЛЕННЫХ МАСЕЛ ДЛЯ ТЕКСТИЛЬНЫХ СТАНКОВ

Jezhora A.[1], Navumenka A.[2], Zhiznevsky V.[3], Leonov V.[4]
Vitebsk State Technological University, Belarus
e-mail: jezhora@mail.ru[1], andrew.navumenka@gmail.com[2], isap@vstu.by[3], leonov203509@gmail.com[4]
Джежора А.А.[1], Науменко А.М.[2], Жизневский В.А.[3], Леонов В.В.[4]
Витебский государственный технологический университет, Республика Беларусь

Keywords: dielectrometry, nondestructive testing, IDS sensors, degradation, industrial oils.
Ключевые слова: диэлькометрия, неразрушающий контроль, IDS-сенсор, деградация, промышленные масла.

Abstract. The article discusses the design and characteristics of the interdigitated dielectrometry sensors (IDS). Investigation of the effect of interelectrode gaps on the deviations of the dielectric constant, sensitivity, and working capacity of the sensor. It is established that sensors must be shielded to reduce the level of interference. A sensor design with high metrological characteristics is proposed. The developed design of the IDS sensor is advisable to be used in quality monitoring systems for industrial oils for textile machines.

Аннотация. В статье рассмотрена конструкция и характеристики IDS-сенсора. Исследование влияния межэлектродных зазоров на отклонения диэлектрической проницаемости, чувствительности, рабочей емкости сенсора. Установлено, для снижения уровня помех сенсоры должны быть экранированы. Предложена конструкция сенсора с высокими метрологическими характеристиками. Разработанную конструкцию IDS-сенсора целесообразно использовать в системах мониторинга качества промышленных масел для текстильных станков.

Oils perform an important role in the textile industry. They determine the reliability and durability of machines, mechanisms, and power plants. The theoretical forecast of the shelf life of industrial oils is complex and depends on many factors. A more reasonable approach is to screen the condition of oils online using quality sensors at the control points. To date, it has not been possible to create a reliable and cost-effective sensor system for determining the condition of industrial oils according to standards.

The purpose of the work is to determine the parameters of the IDS sensor for remote monitoring of industrial oil.

The design of the IDS sensor is shown in Figure 1. The sensor contains a system of parallel tape electrodes (high-potential 1 and low-potential 3). The electrodes lie in the same plane on the surface of the flat substrate 4. Power lines 5, 6 pass from high-potential electrode 1 to low-potential electrode 3 and create a useful capacitance. Security electrode 2 shields part of power lines 7 passing through substrate 4 and reduces the parasitic capacitance.

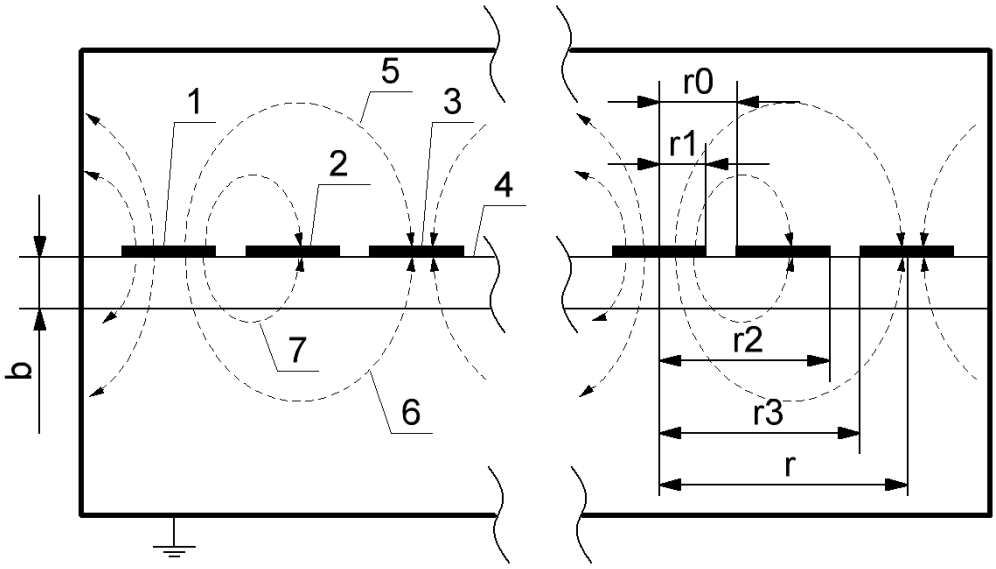

Figure 1 – IDS sensor cross section

The design of the IDS sensor of an open space surrounded by a Faraday screen has a number of advantages. Firstly, the IDS sensor does not have a grounded shield on the substrate and has a large working capacity. Secondly, the security electrode minimizes parasitic capacitances in the substrate. Thirdly, the Faraday screen eliminates the

influence of external electromagnetic fields. Due to this, the signal-to-noise ratio is used as much as possible.

The capacity of IDS sensors cannot be calculated analytically. Analytical models are based on simplified configurations and idealized assumptions, which limits their calculation accuracy for real structures [1].

The mathematical model of capacitive sensors described in [2] is used for the research. Design parameters of the IDS sensor: section dimensions **r**, metallization **w** of the sensor varied in order to see their influence normalized capacity $\mathbf{C_{IDS}}$ and accuracy **D**:

$$D = (\varepsilon_r - \varepsilon_{r,IDS})/\varepsilon_r * 100\%, \quad (1)$$

$$w = (r - r0 + r1 - r3 + r2)/r, \quad (2)$$

where ε_r – reference value of the dielectric constant; $\varepsilon_{r,IDS}$ – the value of the dielectric constant measured by the IDS sensor.

The simulation is carried out for a structure of 10 electrodes (10 r) and the thickness of the substrate b = 0.3 mm. The model is constructed taking into account the actual thickness of the electrodes **b**, which is important when designing sensors on thin substrates. Sensor fields are considered in electrostatics since the frequency of the electromagnetic field $v \leq 10^6$ Hz and the design dimensions of the sensor are much smaller than the length of the electromagnetic wave. In addition, the electrical conductivity of the oil at low frequencies is disregarded [3].

The simulation results are shown in Figure 2, 3. It is established that a decrease in metallization leads to a decrease in accuracy and working capacity. High accuracy is achieved when the section size is **r** = 3 - 5 mm. The size of the section does not significantly affect the normalized capacity of the sensor.

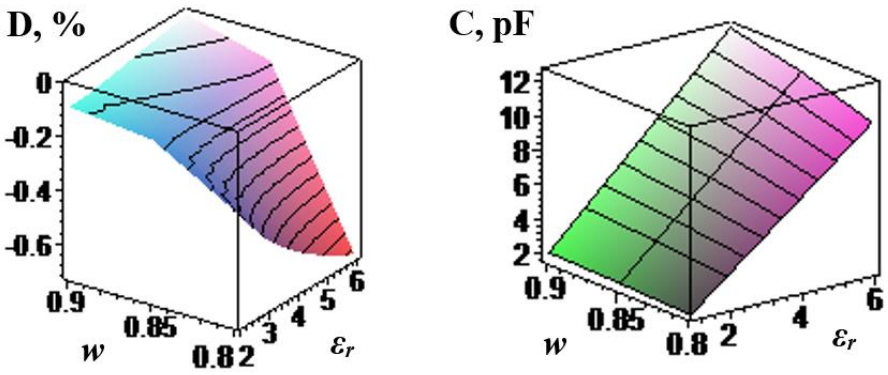

Figure 2 – Dependence of accuracy **D** and capacitance **C** on metallization of the sensor **w** and reference dielectric constant ε_r

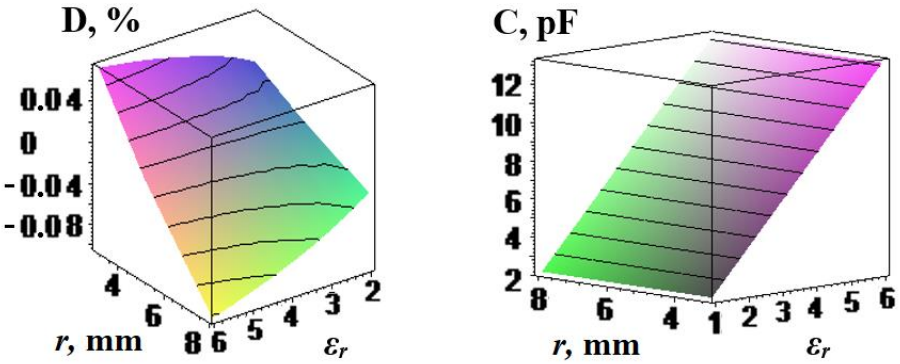

Figure 3 – Dependence of accuracy **D** and capacitance **C** on the size of the section **r** and reference dielectric constant ε_r

As a result of the simulation, the sensor dimensions were selected: the length of the electrode **l** = 50.0 mm, the size of the section **r** = 4.40 mm, the size of the electrode 2*r0 = 2.18 mm, the size of the security electrode r2 - r0 = r3 - r2 = 1.42 mm, the distance between the electrodes r0 - r1 = 0.4 mm, metallization w = 0.82. Further reduction of the distance between the electrodes is limited by the manufacturing technology. The measurement error of the dielectric constant is no more than 0.25 %, the normalized capacitance is 1.025 pF for 6 sections. The developed design of the IDS sensor is advisable to use in quality monitoring systems for industrial oils for textile machines.

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UDC 691.4

INVESTIGATION OF THE CONTENT OF SLUDGES OF CHEMICAL WATER TREATMENT OF COMBINED HEAT AND POWER PLANTS ON THE PROPERTIES OF CLINKER CERAMIC BUILDING MATERIALS

ИССЛЕДОВАНИЕ ВЛИЯНИЯ СОДЕРЖАНИЯ ОСАДКОВ ХИМИЧЕСКОЙ ВОДОПОДГОТОВКИ ТЕПЛОЭЛЕКТРОЦЕНТРАЛЕЙ НА СВОЙСТВА КЛИНКЕРНЫХ КЕРАМИЧЕСКИХ СТРОИТЕЛЬНЫХ МАТЕРИАЛОВ

Kauchur A.[1], Manak P.[2], Hrachanikau A.[1*], Sheleh V.[3]
[1]Vitebsk State Technological University, Belarus, [2]Obolsky Ceramic Plant Company, Belarus, [3]Belarusian National Technical University, Belarus
e-mail: grec_alex@rambler.ru[1]*

Ковчур А.С.[1], Манак П.И.[2], Гречаников А.В.[1*], Шелег В.К.[3]
[1]Витебский государственный технологический университет, Республика Беларусь, [2]Обольский керамический завод, Республика Беларусь, [3]Белорусский национальный технический университет, Республика Беларусь

Keywords: ceramic tiles, man-made products, combined heat and power plant (CHPP), chemical water treatment
Ключевые слова: керамическая плитка, техногенные продукты, химическая водоподготовка ТЭЦ.

Abstract. The article presents the results of research of the anthropogenic products content in clinker ceramic materials as a result of chemical water treatment at the heat and power plant. The research resulted in the possibility of using of technogenic products of chemical water treatment of CHPP in the production of clinker ceramic materials. Also, the area of rational values of the content of inorganic waste in the ceramic mass and the value of the sintering temperature is determined.

Аннотация. В статье приведены результаты исследования содержания техногенных продуктов химической водоподготовки ТЭЦ в клинкерных керамических материалах. В результате проведённых исследований установлена возможность использования техногенных продуктов химводоподготовки ТЭЦ в производстве клинкерных керамических материалов и определена область рациональных значений содержания неорганических отходов в составе керамической массы и значение температуры спекания.

The term "building ceramics" refers to materials and products made of mixture of clay or loam and various additives, manufactured by ceramic technology – preparation of raw materials, molding, drying and firing to a stone-like state. According to its purpose the building ceramics is divided into the following types: wall and roofing products, products for facade cladding, architectural and artistic design of the interior space of buildings, aggregates for lightweight concrete, thermal insulation and sanitary

ware, floor tiles, road bricks, refractory and acid-proof products, products for underground utilities – sewage pipes and drains [1].

Clinker or clinker ceramics is an artificial stone material of a set form, made of clay by firing it at temperatures up to 1300 °C to complete sintering without vitrification of the surface. They are referred to the so-called coarse-grained stoneware. In contrast to conventional products of rough building ceramics the clinker ceramic materials have higher mechanical strength (in compression, friction and bending), lower water absorption (0–6 % by mass). They are used for finishing of facades, covering of bridges, manufacturing of steps, etc. [1].

The main raw materials used for the production of clinker ceramic materials are clays, and kaolins. To give the necessary properties in the manufacture of clinker ceramic materials pigments of BaC_2 are used to bind water-soluble salts, pore-forming, burning, softening or plasticizing additives. Powder-forming materials (substances that dissociate during firing with release of gas, for example, CO_2 (ground chalk, dolomite), or burn out, are added to the raw mass to get light ceramic products with higher porosity and lower thermal conductivity. Burning additives: sawdust, crushed lignite or hard coal, coal combustion plant wastes, TPP ash and lignin not only increase the porosity of ceramic wall products, but also some of them contribute to a uniform sintering of ceramic tiles. Plasticizing additives are highly plastic clays as well as surface-active substances [1].

In the production of clinker ceramic building materials, firing is the most energy-consuming step in the production of ceramic products. Recently, technologies allowing to reduce energy costs at the firing stage through the use of various additives, such as burners, plasticizers, etc., are increasingly in demand [2].

At the same time the solution of the actual national economic problem on rational use of natural resources assumes development of effective wasteless technologies at the expense of complex use of raw materials that leads to minimization of ecological damage [3].

Within the framework of the project "Innovative, resource-saving technology for manufacturing paving tiles using industrial waste", carried out by the State Research Institute "Physical Material Science, New Materials and Technologies", the Department of Ecology and Chemical Technologies together with Obolsky Ceramic Plant Company conducted research on the possibility of using man-made products of energy complex (sludge of chemical water treatment of thermal power plants) as an additive in the manufacture of ceramic clinker materials [3].

Preliminary analysis of the literature showed the lack of information on the use of man-made products of chemical water treatment of thermal power plants as an additive in the manufacture of clinker ceramic materials. To conduct further research in accordance with the requirements of STB 1450-2010 at Obolsky Ceramic Plant the recipe was developed for a composition of raw materials and manufactured samples of ceramic clinker paving tiles (clinker brick) using sludge chemical water treatment CHPP [3]. The aim of the study formulated the following task: to determine the rational values of the content of sludge of chemical water treatment of thermal power plant,

providing the required physical and mechanical properties of tiles and temperature regime of the final firing with the lowest energy consumption [2].

The experiment was conducted according to the D-optimal matrix Kono 3^2, implementing all possible combinations of varying the input parameters. As a result of the experiment in accordance with the matrix different variants of ceramic mixture compositions were developed. After further processing of the results, mathematical models of the dependence of output parameters on input factors were obtained. Having carried out the analysis of the received models, it is possible to draw the following conclusions [2]:

– the compressive strength is influenced by the temperature of the final firing of tiles and the content of precipitation of chemical water treatment of thermal power plant in the mixture. Increasing the temperature of the final firing of tiles from 1100 °C to 1300 °C leads to an increase in the compressive strength; however, at the same time, increasing the precipitation of chemical water treatment CHPP from 1 to 3 % leads to a gradual decrease in the compressive strength;

– on the bending strength is characterized by the influence of the temperature of the final firing of tiles. Increasing the final firing temperature of the tiles from 1100 °C to 1300 °C leads to an increase in the bending strength. At the content of sludge of chemical water treatment of CHPP 1 % the minimum value of the bending strength is observed;

– the density is significantly influenced by the temperature of the final firing of the tiles. The content of precipitation of chemical water treatment of CHPP in the composition of ceramic mass is a minor factor of this indicator. Increasing the temperature of the final firing of tiles leads to a denser clinker structure;

– water absorption is equally influenced by both factors. With the increase of firing temperature with low content of precipitation of chemical water treatment the lowest water absorption is observed – 2.5 %. Maximum water absorption (4.5 %) corresponds to the minimum temperature of the final firing of tiles and the highest content of precipitation of chemical water treatment of CHPP.

As a result, the area of compromise solutions at the set restrictions is revealed: minimum density is 2000 kg/m^3; minimum ultimate strength in compression is 25 MPa; minimum ultimate bending strength is 1,7 MPa; maximum water absorption is 4 %. Analyzing the area of rational solutions, we can recommend the following values of the parameters of the manufacturing process of tiles [2]:

1) The temperature of the final firing of tiles to be set in the range from 1150 ºC to 1300 ºC;

2) The content of the sludge of the chemical water treatment of the thermal power plant shall not exceed 2.6 %.

A pilot batch of tiles was manufactured using parameters from the area of optimum: the temperature of the final firing of tiles – 1150 ºC and the content of sludge from chemical water treatment of CHPP in the ceramic mass – 2 %. During the laboratory tests conducted by the technical control department of Obolsky Ceramic Plant it was found that the experimental samples of tiles according to STB 1787-2007 "The ceramic clinker brick. Technical conditions" correspond to a class A [4].

The research of physical and mechanical properties of experimental samples of ceramic clinker tiles conducted at Obolsky Ceramic Plant showed the possibility of using of man-made products of power complex (sludge of chemical water treatment of combined heat and power plants) as an additive in the manufacture of ceramic building materials of general purpose. Addition of sludge of chemical water treatment allows to reduce the firing temperature of products, which is important in terms of energy saving.

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ENZYME-CONTAINING SILICONE COMPOSITIONS IN THE TECHNOLOGY OF SOFTENING COTTON FABRICS

ФЕРМЕНТСОДЕРЖАЩИЕ СИЛИКОНОВЫЕ КОМПОЗИЦИИ В ТЕХНОЛОГИИ УМЯГЧЕНИЯ ХЛОПЧАТОБУМАЖНЫХ ТКАНЕЙ

Lenko K.*, Yasinskaya N., Skobova N., Lisovsky D.
Vitebsk State Technological University, Belarus
*e-mail: kotya240497@mail.ru**

Ленько К.А.*, Ясинская Н.Н., Скобова Н.В., Лисовский Д.Л.
Витебский государственный технологический университет, Республика Беларусь

Keywords: silicone softener, biotechnology, drape, air permeability, hygroscopicity.
Ключевые слова: силиконовый мягчитель, биотехнология, драпируемость, воздухопроницаемость, гигроскопичность.

Abstract. The paper deals with softening researches of cotton bedding fabric with silicone Softsilicone softener and enzyme-containing silicone Softsilicone composition produced by Ferment LLC according to the periodic method in order to determine the effect of the enzyme use in the composition of this manufacturer on hygienic and physical-mechanical properties of the fabric during the final softening finish.

Аннотация. В работе проведены исследования по умягчению хлопчатобумажной ткани постельного назначения силиконовым аппретом-мягчителем «Софтсиликон» и ферментсодержащей силиконовой композицией «Софтсиликон+» фирмы ООО «Фермент» по периодическому способу с целью определения влияния использования ферментных препаратов в составе аппрета данного производителя на гигиенические и физико-механические свойства ткани в процессе заключительной умягчающей отделки.

At the stage of final finishing the textiles are given a beautiful appearance, fixed the width of the canvas, and smoothed. The solution to the issue of giving softness, bulk, silkiness to cotton fabrics and products is the technology of softening them in the process of final finishing.

The classic methods of softening fabrics provide an effect by applying various types of softening finishing agents. Their significant drawback is the short duration of the achieved result and its instability to household treatments [1].

Currently known methods of softening textile materials from cellulose fibers using enzyme preparations of cellulolytic and pectolytic action. Enzymatic modification of cellulose fibers is an innovative and environmentally friendly approach to solving the problem of softening terry fabrics and products.

Enzymes are natural biochemical catalysts of selective action – proteins with molecular weights from tens of thousands to a million or more, the macromolecules of which are built of amino acids linked into long chains by peptide bonds [2].

Earlier the authors conducted research on tissue bio-softening in a periodic way, where the operation of biological treatment with enzymes was preliminarily carried out, and the subsequent stage was processing in a silicone softener.

In Belarus, relatively recently, Ferment LLC entered the market of textile auxiliaries, offering a wide range of silicone softeners and enzyme preparations for processing textile materials.

In order to determine the effect of the enzyme use in the composition of this manufacturer on hygienic and physical-mechanical properties of the fabric in the laboratory of VSTU, studies were carried out to soften the cotton bedding fabric (surface density 120 g/m^2) with the silicone Softsilicone softener (optimal conditions of action pH = 5, working t = 30–50 °C) and enzyme-containing silicone Softsilicone composition (optimal conditions of action pH = 5, working t = 30–50 °C) according to the periodic method.

The properties that affect the consumer characteristics of cotton bedding fabrics have been studied: drape coefficient (%), hygroscopicity (%) according to GOST 3816-81 "Methods for determining hygroscopic and water-repellent properties" and air

permeability (dm^3/cm^2*s) according to GOST 12088-77 "Interstate standard. Textile materials and articles thereof. Method for determining air permeability".

The drape coefficient was determined by 3D scanning using an ARTEC SPIDER portable 3D scanner. The scan results were saved in STL format and processed in the SolidWorks software package [3]. The assessment of the hygroscopicity and drape coefficient of the samples is shown in Figure 1. The assessment of the air permeability of the samples is shown in Figure 2. The control sample is taken as a bedding fabric without a final softening finish.

The hygroscopicity of the tissues treated with the test preparations is higher than that of the control sample. However, the presence of enzymes in the composition leads to a decrease in hygroscopicity.

When analyzing the coefficient of drape, one should take into account the following fact: the lower the value is, the softer the material will be. According to the histogram (Figure 1), there is a decline in this indicator after processing using two technologies. Moreover, the presence of enzymes in the composition also lowers the drape coefficient.

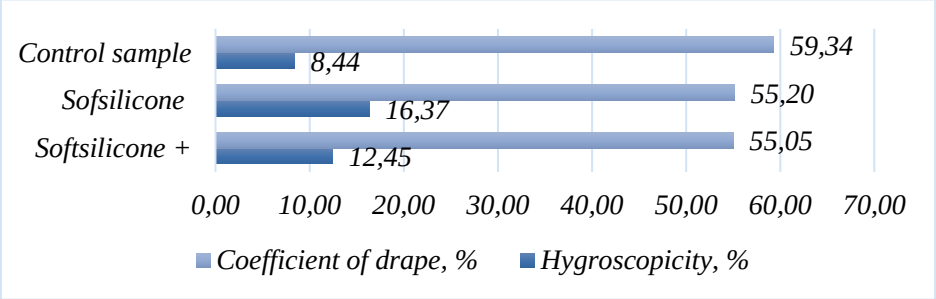

Figure 1 – Evaluation of hygroscopicity and drape coefficient of the test samples

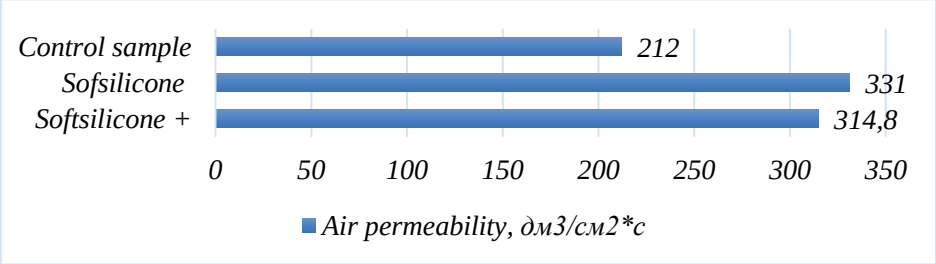

Figure 2 – Evaluation of air permeability of the test samples

The air permeability of the samples (Figure 2), which have undergone treatment with the investigated drugs, significantly increases compared to the control sample. This is probably due to the smoothing of the fibers with a silicone sizing, which creates an invisible film on the yarn, due to which the air spaces between the warp and weft threads increase in size. The numerical value of this indicator is within acceptable limits (more than 100 dm^3/cm^2*s).

Conclusion: The presence of an enzyme preparation in the composition leads to an increase in the softness and air permeability of cotton fabrics, but it results in a decrease in the hydrophilic properties of the textile material.

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INVESTIGATION OF THE DEPENDENCE OF THE QUALITY INDICES OF ROTOR SPUN YARN ON THE PROPORTION CONTENT OF REGENERATED FIBROUS WASTES IN THE MIXTURE

ИССЛЕДОВАНИЕ ЗАВИСИМОСТИ ПОКАЗАТЕЛЕЙ КАЧЕСТВА ПНЕВМОМЕХАНИЧЕСКОЙ ПРЯЖИ ОТ ДОЛЕВОГО СОДЕРЖАНИЯ РЕГЕНЕРИРОВАННЫХ ВОЛОКНИСТЫХ ОТХОДОВ В СМЕСКЕ

Makhkamova Sh.**, Valieva Z., Temirov Sh.
Tashkent Institute of Textile and Light Industry, Uzbekistan
*e-mail: shoira-0218@mail.ru**
Махкамова Ш.Ф.**, Валиева З.Ф., Темиров Ш.И.
Ташкентский институт текстильной и легкой промышленности, Узбекистан

Keywords: rotor spinning machine, fibrous wastes, regenerated fiber, yarn, physical-and-mechanical properties.

Ключевые слова: пневмомеханическая прядильная машина, волокнистые отходы, регенерированные волокна, пряжа, физико-механические свойства.

Abstract. The article studies the influence of the proportion content of regenerated waste on the quality indicators of rotor spun yarn. Empirical formulas were compiled, allowing to predict the quality of yarn and breakage on spinning machines when changing the content of components.

Аннотация. В статье приводятся исследования влияния долевого содержания регенерированных отходов на показатели качества пневмомеханической пряжи. Были составлены эмпирические формулы, позволяющие прогнозировать качество пряжи и обрывность на прядильных машинах при изменении долевого содержания компонентов.

The strategic direction of the further development of the textile industry in Uzbekistan is the introduction of the cluster model. In fact, it provides for the creation of a 100% waste-free production facility with a closed chain "production of cotton raw material-processing-finished products" on the basics of creating and implementing an industrial-type cluster scheme. In this regard, the problems of producing competitive products for calculating the deep processing of cotton fiber and the use of fibrous waste in the conditions of an external cluster model of the development of an actual and necessary universal training.

The use of expensive mixtures is economically unprofitable, it is necessary to process cheaper mixtures. It is important to reduce the cost of raw materials and at the same time ensure the normal passage of the technological process without reducing the quality of the yarn, and without increasing the breakage in spinning. One of the effective ways to reduce the cost of raw materials can be the rational processing of fiber waste from spinning production [1].

The possibility of producing a 50 tex (Ne 11.8) linear density yarn on an R-35 rotor spinning machine (Rieter) from a 100 % mixture of fibrous waste was investigated. The mixture was compiled to align the properties of the fibers. Waste regenerated by modern technology was mixed: st 7/11 (card sweeps and strips) and st 16 (combing noil). Experimental studies were carried out under the production conditions of the Shovot Texstil JV LLC.

The effect of the proportion of regenerated fiber in the blend on the quality of the yarn was studied in three variants: variant 1 – st 7/11 – 40 %, st 16 – 60 %; variant 2 – st 7/11 – 50 %, st 16 – 50 %; variant 3 – st 7/11 – 60 %, st 16 – 40%. The semi-finished product and yarn of all variants were produced on the same technological equipment, on the same spinning rotors sequentially.

The average indicators of the main physical and mechanical properties of the yarn of the three variants are shown in Table 1.

Table 1 shows that the relationship between the breaking tenacity of the yarn, the coefficient of variation in breaking force, breakage from the content of waste in the mixture has a linear form, which are shown in Figures 1–3.

From the obtained equation, it can be seen that with an increase in the content of waste st. 7.11 in the mixture for every 10 %, the breaking tenacity of the yarn increases by 0.24 sN/tex.

Table 1 – Indicators of physical and mechanical properties of yarn

№	The name of indicators	Variants		
		1	2	3
1	Share content st 7/11, %	60	50	40
2	Linear density of yarn, tex	50	50	49.9
3	Coefficient of variation of linear density, %	1.71	1.82	1.9
4	Breaking force, cN	462.48	450.18	438
5	Coefficient of variation of breaking force, %	9.5	10.54	11.53
6	Breaking tenacity, cN/tex	9.4	9.15	8.92
7	Elongation %	6.12	6.10	5.90
8	Work to break, N/Cm	7.81	7.58	7.14
9	Breakage per 1000 rotors/hour per 1000 km/yarn	26 5.82	35 7.84	42 9.41

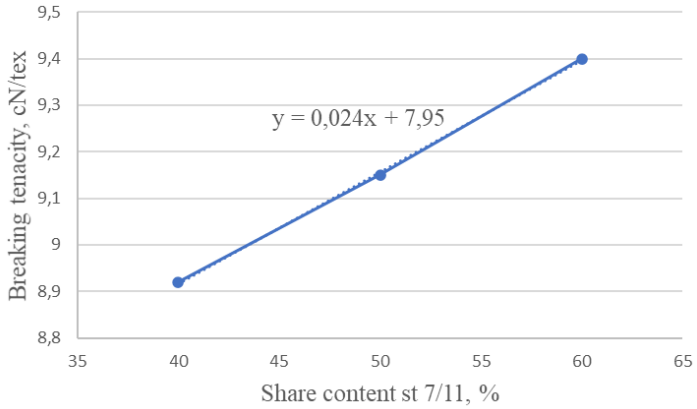

Figure 1 – Dependence of the breaking tenacity of the yarn from the proportion content in the mixture of st. 7/11

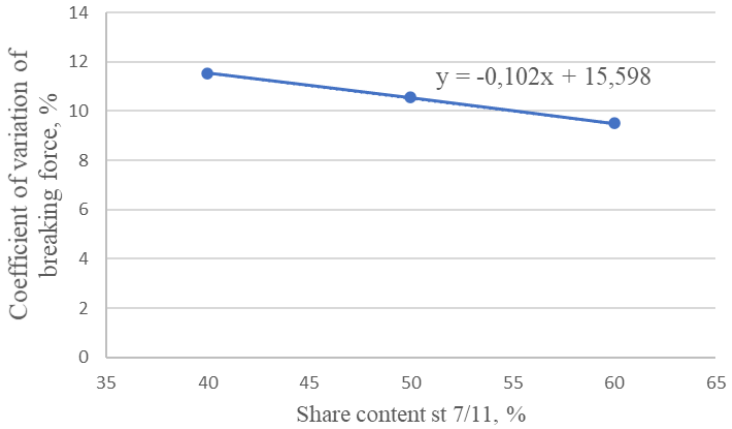

Figure 2 – Dependence of the coefficient of variation on the breaking force of the yarn from the proportion content in the mixture of st. 7/11

It can be seen from the equation that with an increase in the waste content for every 10 %, the coefficient of variation decreases by 1.02 %.

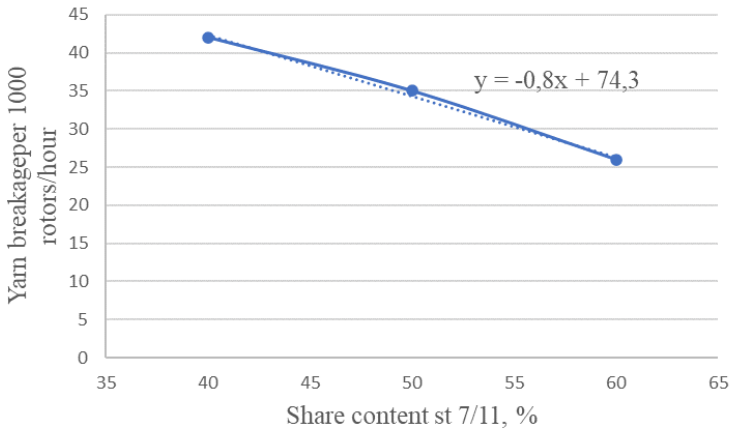

Figure 3 – Dependence of the yarn breakage on the percentage content in the mixture of st. 7/11

From the obtained equation, it can be seen that the breakage per 1000 rotors per hour decreases by 8 units for every 10 % increase in the proportion of regenerated fiber in the mixture.

The obtained empirical formulas allow us to predict the quality of pneumomechanical yarn and breakage on spinning machines when the proportion of regenerated fibrous waste in the mixture changes.

One of the most important indicators on the basis of which the yarn is evaluated is the breaking tenacity and unevenness in strength. From Table 1 it can be seen that the breaking force of the yarn increases and the unevenness in strength decreases with an increase in the share of st 7/11. Quality Score (Po/C1) when changing the proportion of st 7/11 from 40 to 60 % increased from 0.77 to 0.989.

It was found that an increase in the proportion of waste st 7/11 leads to an increase in strength and uniformity in the main indicators of yarn quality, an increase in the proportion of st 16 leads to a decrease in the number of imperfections.

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INTERACTIONS OF ESTER-BASED FATS ON LEATHER PROPERTIES FOR SHOE UPPER

ВОЗДЕЙСТВИЕ ЖИРОВ НА ОСНОВЕ ЭФИРОВ НА СВОЙСТВА КОЖИ ДЛЯ ВЕРХА ОБУВИ

Makhammadieva Kh.**, Shamsieva M.
Tashkent Institute of Textile and Light Industry, Uzbekistan
*e-mail: hilola.norbekovna@mail.ru**

Махаммадиева Х.Н.**, Шамсиева М.Б.
Ташкентский институт текстильной и легкой промышленности, Узбекистан

Keywords: fatliquoring process, fatliquoring composition, leather for shoe uppers, ester, dermis.

Ключевые слова: процесс жирования, жирующий состав, кожа для верха обуви, сложный эфир, дерма.

Abstract. The article describes the possibility of using an ester as a fatty component in the process of fattening leather for the shoe upper. It was determined that the use of an ester leads to a deeper and more even distribution of fat in the dermis, increasing the strength indicators of the leather.

Аннотация. В статье приводится возможность применения сложного эфира как жирующего компонента в процессе жирования кожи для верха обуви. Определено, что применение сложного эфира приводит к более глубокому и равномерному распределению жира в дерме, повышая прочностные показатели кож.

Universal possibilities of application of leather materials are confirmed by the fact that they are suitable both for making footwear, clothes and haberdashery products of everyday use. It is known that consumer properties of leathers, being a set of physical-mechanical, hygienic and aesthetic indicators, are formed mainly in the greasing process. That is why the choice of materials used for greasing is a decisive factor influencing the quality of finished leather.

Long-term practice of leather production convinces of the fact that obtaining especially valuable types of leather is achieved through the use of fat compositions containing various additives obtained from natural fats of vegetable and animal origin [1–2].

Natural fats and oils are mostly expensive foodstuffs and, in addition, have a number of negative properties, so the efforts of scientists in all countries are aimed at finding artificial and synthetic fatty substances to replace them. In order to produce fatty materials, it became necessary to replace it with available products and semi-products of petrochemical, chemical and other industries.

Emulsifier composition [3], which contains (%) 20–60 alkanol with C_{6-14}. alkoxylated 4–12 units alkoxy, or a mixture of many such alkanols, 20–70 mixture of

fatty alcohols with C_{6-14}, alkoxylated 15–30 units alkoxy, and 10–50 mixture of fatty alcohols with C_{12-24} alkoxylated 40–100 units alkoxy, and used for fatty leather has been developed.

The fatty agent used as an emulsion contains the product of interaction of an organic polyisocyanate with a fatty alcohol or fatty amine with C_{6-30}, a simple polyester alcohol with 2–70 units of polyalkylene oxide and a blocking agent. The fatty agent includes an ionic or non-ionic emulsifier. The fatty isocyanates released in the oily leather bind to it and other substances in its composition covalently and give it new and diverse properties [4].

However, the use of such imported fats nowadays leads to increased production costs of finished products, production disruptions due to untimely undersupply from outside and other financial complications.

The binding strength and distribution of fatty substances in the leather is important for the effect of fatting. Fatty acid esters bind best to the leather [5]. They form not true, but micellar, colloidal solutions in water, which provides deeper penetration of fatty substances inside leather fibers.

In this connection, technologies of leather greasing process based on ester obtained from secondary and by-products of local productions, such as oil and hydrolysis productions, were improved.

On this basis the composition for leather greasing with the use of ester in combination with other greasing materials under condition of replacement of fat bunches, imported, expensive greasing substances was developed (Table 1).

Table 1 – Compositions of experimental and control fatty leather mixtures for footwear upper, fatty mixtures consumption in %

№	Options	Components					
		Fish oil	Synthetic fat	Ester	Technical fat	Paraffin	Spindle oil
1	Control	30	70	-	-	-	-
2	Experienced	-	-	40	35	10	15

Experimental and control batches of bovine semi-finished products were taken for the study. Fatting of leathers was carried out in hanging drums. In liquid remaining after dyeing with temperature 55–60 °C, duration 1–1.5 hour, with liquid factor LCD=2.0–3.0 on running of a drum through a hollow axis the calculated quantity of greasing composition was poured.

The process of greasing of control and experimental batches of leathers was normal. All processes before and after gelling were carried out according to the traditional methods. No difficulties were observed during their performance.

The leathers of experimental and control batches, according to organoleptic evaluation, did not differ appreciably. They were clean, even and with significant gloss on the front surface. The quality of finished experimental leathers was the same as that of control leathers.

Characteristics of control and experimental leathers by chemical and physical-mechanical parameters are given in Table 2.

Table 2 – Chemical and physical-mechanical properties of experimental and control leathers for footwear upper

Options	Indicators					
	Content, %			Thickness, mm:	Tensile strength in leather, 10 MPa:	Elongation at a voltage of 10 MPa, %:
	moisture	chromium oxide	substances extractable with organic solvents			
Control	12.15	2.85	4.85	1.25	2.13	30.9
Control	12.24	2.75	4.52	1.22	2.02	32.3
GOST 939-94	10–16	maximum 3.7	3.7–10	1.2–1.4	minimum 1.5	20–40

The indicators given in the table show that there is no noticeable difference between experimental batches of leather greased on the basis of ester and control batches greased by the traditional method. Consequently, experimental batches of leather greased on the basis of ester meet the requirements of the state standard, and have no negative impact on the chemical and physical-mechanical parameters of leather.

It should be noted that in the process of greasing the composition based on the ester penetrates into the empty cells of the dermis. This process changes the chemical and physical-mechanical characteristics of the leather, making it softer, more elastic, stronger, more flexible and giving a smooth textured surface.

Thus, based on laboratory and production tests, it was found that the use of ester is possible as a fatty ingredient for the production of natural leathers. Also, the use of ester leads to a deeper and more uniform distribution of fat in the dermis, increasing the strength properties of leathers. In addition, making fatty materials cheaper, due to the ester obtained from by-products and secondary products (the production cost is 3–5 times lower than the cost of natural fats).

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UDC 745.521

DESIGN OF HOUSEHOLD LIGHTING DEVICES
ДИЗАЙН БЫТОВЫХ ПРИБОРОВ ОСВЕЩЕНИЯ

Samutsina N.*, Justine A.
Vitebsk State Technological University, Belarus
*e-mail: samusiya@mail.ru**
Самутина Н.Н.*, Жюстин А.А.
Витебский государственный технологический университет, Республика Беларусь

Keywords: household lighting device, suprematism style.
Ключевые слова: бытовой прибор освещения, стиль супрематизм.

Abstract. The article discusses the work on the design of a household lighting device. For this purpose, the history of the emergence of lighting devices, the evolution and forms of devices for lighting residential and non-residential premises have been studied. The typology and classification of household appliances lighting, their functions and purpose are determined. One of the main tasks has been solved, namely a design project of a lighting device in the UNOVIS style was created in compliance with the necessary functional, ergonomic, modern aesthetic requirements. The structure of the designed lamp, its functionality and characteristics have been thought out. A detailed analysis and selection of materials and processing technologies existing in industrial production was carried out, the choice of materials for the project implementation was validated. The design elements of the projected lighting device, the layout of the parts were developed, taking into account the production technology

Аннотация. В статье рассматривается работа по проектированию бытового прибора освещения. Для этого изучена история возникновения осветительных приборов, эволюция и формы приборов для освещения жилых и нежилых помещений. Установлена типология и классификация бытовых приборов освещения, их функции и назначение. Решена одна из главных задач – создан дизайн-проект осветительного прибора в стиле УНОВИС с соблюдением необходимых функциональных, эргономических, современных эстетических требований. Продумана структура проектируемого светильника, его функционал и характеристики. Проведен подробный анализ и подбор существующих в промышленном производстве материалов и технологий их

обработки, обоснован выбор материалов для реализации проекта. Разработаны конструкторские элементы проектируемого осветительного прибора, компоновка деталей, с учетом технологии производства.

Industrial design covers a wide range of objects, from the most insignificant and simple to global and complex ones.

Currently, the view of lighting devices is changing, the very concept of the "lamp" is expanding and changing. It is no longer enough to produce just a household appliance. It is necessary to create an accessory for the room that could reflect the inner world of the owner of the space.

2020 was the year of the 100th anniversary of the creative association "UNOVIS", which was created by Kazimir Malevich at the Vitebsk National Art School. This trend became one of the starting points of the innovative art trends of the twentieth century. The performance of a lighting device based on suprematism is relevant as a souvenir, unexpected and possible to implement. As a result, the aim of the work is to create a design project of a household lighting device in the style of UNOVIS in compliance with the necessary functional, ergonomic, modern aesthetic requirements. To achieve this goal, it is necessary to solve the following practical tasks:

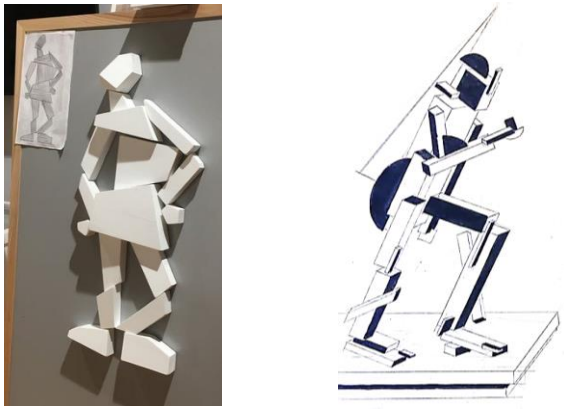
- to study analogues in Belarus and abroad;
- to define design requirements;
- to develop a general concept of the project, taking into account the features;
- to think over the structure, study and select materials;
- to develop a 3D model.

The practical significance of this work lies in the fact that the creation of a lighting device in the style of UNOVIS will be a landmark solution of a focused attitude to the historical and cultural heritage of our country, because the avant-garde ideas of UNOVIS, which have already become classics, and even after 100 years look more modern than the new ones.

As a result of the research work, the history of the emergence of lighting devices, their evolution and forms have been studied. The typology and classification of household appliances lighting, their functions and purpose are determined. Lighting devices in Europe, the USA and the CIS countries, ways of their connection to sockets are analyzed.

Most of the research is devoted to the study of the possibility of using the works of supremacists of the creative association UNOVIS for the design of a lighting device. It was decided to use the works of D.A. Yakerson to develop a single iconic image that would set the direction in creating the design of the suprematist figure (Figure 1).

The stylization of the work revealed clearer lines and the constructiveness of the main shape of the lamp. The contour image of the generalized figure corresponds well to the UNOVIS style, the idea of which is a departure from the usual shapes and smoothness.



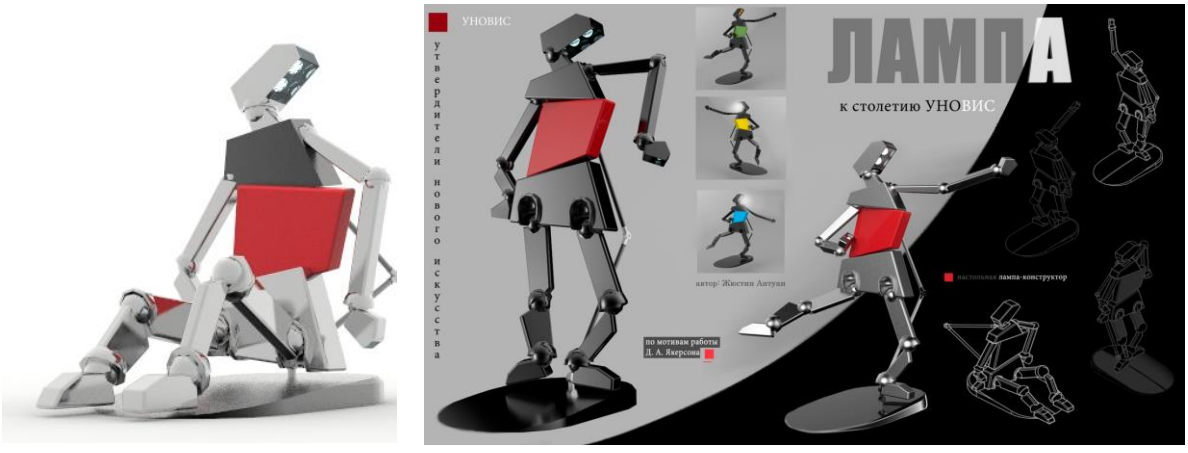
a b

Figure 1 – Example of a three-dimensional structure based on the work of D. Yaskerson (a, b)

In the design part, work was carried out on the design of a household lamp. The so–called "gestalt" was taken as the fundamental figure – a wooden human doll (mannequin) depicting a human figure with movable arms, legs, and head. The object is mounted on a metal pole with a wooden stand for stability. At the end of the process, the shoulder-tripod was modified so that the figure could squat and turn at will. Spotlights on a tripod can be mounted on a tripod or directly on the floor.

The spotlight on a tripod is more versatile, which makes it possible to use the lighting device both indoors and outdoors (Figure 2). In this case, the moisture-proof characteristics of a particular model are taken into account.

To visualize this project, the following computer software was used: Autodesk 3ds Max 2014; and a V-Ray plugin to obtain a photorealistic image. A three-dimensional model of the lamp was created in the Inventor Autodesk program, and finally rendered in Luxion KeyShot Pro.



a b

Figure 2 – Images of a designed lamp (a, b)

It is established that the directly proposed version of a household lamp carries the following ergonomic tasks:

- distributed weight of the product, which allows the lamp to be stable;

− convenient shape of the lamp stand for hand grip, which makes it possible to carry the lamp while holding it in one hand;
− lighting of the working area directly;
− the use of matte light of the lampshade glasses, so that the light of the bulbs does not hit the eyes;
− performing the function of the main decorative element in the zone within the zone space, it does not compete with other lighting devices.

The analysis of materials and technologies existing in industrial production for the implementation of the project is carried out. It was decided to carry out the case by 3D printing from materials available on the territory of Belarus.

The designed household lamp has good technical and economic indicators and is a competitive product on the market, as it is new and extravagant. the lighting device can be used directly as a household lighting device, both in residential and public premises, as well as as a decorative item or a stand for accessories.

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UDC 746

IMAGES OF FRAGMENTS OF CIRCUIT BOARDS AND MICROCHIPS OF ELECTRONIC DEVICES IN A TEXTILE DRAWING

ИЗОБРАЖЕНИЯ ФРАГМЕНТОВ ПЛАТ И МИКРОСХЕМ ЭЛЕКТРОННЫХ УСТРОЙСТВ В ТЕКСТИЛЬНОМ РИСУНКЕ

Shchepochkina Ju.
Ivanovo State Polytechnical University, Russia
Щепочкина Ю.А.
Ивановский государственный политехнический университет, Российская Федерация

Keywords: textile pattern, fragments of boards and microcircuits, electronic devices, fabric, clothing
Ключевые слова: текстильный рисунок, фрагменты плат и микросхем, электронные устройства, ткань, одежда.

Abstract. To create a textile pattern, it is proposed to use compositions that include images of fragments of circuit boards and microcircuits of computers, mobile phones, and other electronic devices.
The use of compositions that include images of fragments of circuit boards and chips of electronic devices, as well as their combination with color fields and, possibly, with a traditional textile pattern, creates prerequisites for the emergence of a new style direction in the design of fabrics.
Аннотация. Для создания текстильного рисунка предложено использовать композиции, включающие изображения фрагментов плат и микросхем компьютеров, мобильных телефонов, других электронных устройств.
Использование композиций, включающих изображения фрагментов плат и микросхем электронных устройств, а также их сочетание цветовыми полями и, возможно, с традиционным текстильным рисунком, создает предпосылки к появлению нового стилевого направления в оформлении тканей.

The main criterion for evaluating textiles and drawings is novelty [1]. To date, a huge number of various textile drawings have been created. When working on a new drawing, designers usually think over its general concept, taking into account fashionable world trends, while almost always the level of technical development of society imposes its imprint [2, 3]. For example, during the last century, the textile drawing often reflected new technical achievements for that time period: steamships, airplanes, tractors, airships, etc., Figure 1.

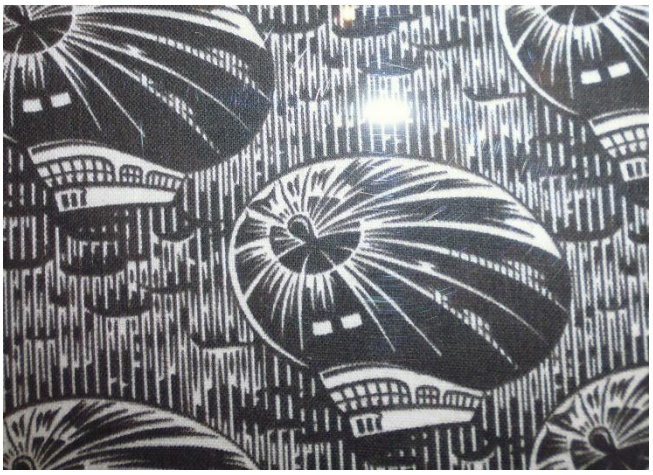

Figure 1 – Fragment of the "Zeppelin" fabric (artist A. Medvedev), 1930

Such drawings were in demand, as they showed the involvement of society in technical progress.

In the age of the digital economy, new knowledge and technologies are a priority, which can and should also be reflected in the textile drawing.

Back in the 70s and 80s of the twentieth century, when information technologies were just beginning to enter daily lives, and computers seemed something unusual, artists reflected these trends in their works. So, in one of the works (Figure 2), a combination of bright color fields of a quadrangular shape is presented as a kind of vision of information technologies of the future.

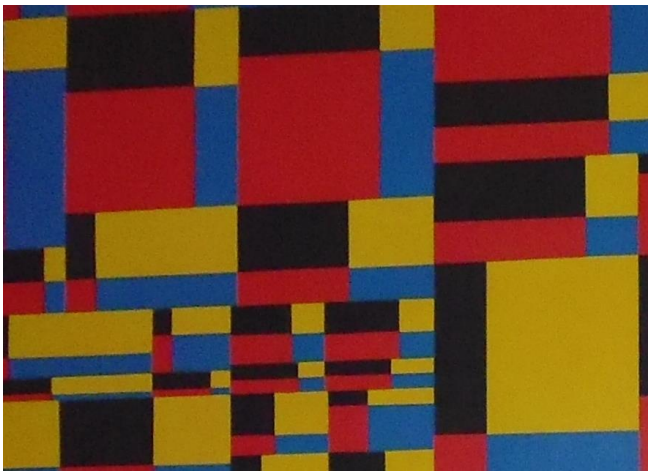

Figure 2 – Fragment of the painting "Computer series I, No. 1"
(artist Y. Pamula), 1980

Note that such combinations of color fields could serve as the basis for creating a new textile pattern. At the same time, one of the motives for the design study of the drawing could be images of fragments of boards and chips of computers, mobile phones, and other electronic devices.

Below, as an example, a sketch of a textile drawing is presented, including images of fragments of computer boards, Figure 3.

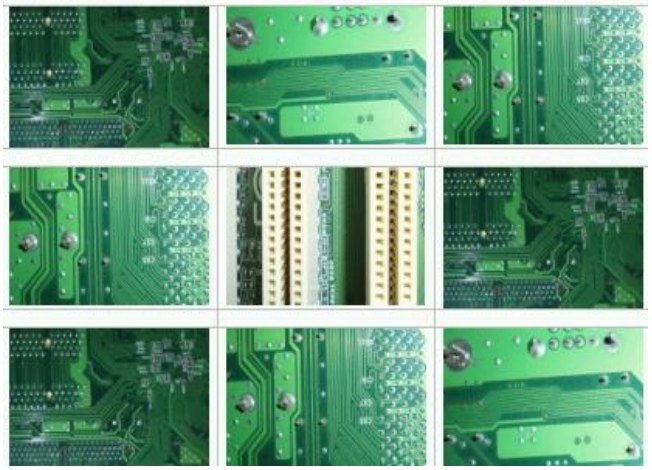

Figure 3 – Sketch of a textile drawing with the image of fragments of computer boards

Since it is known that the greatest interest in digital technologies is shown by young people, a survey was conducted (April 2021) of a group of young people (40 people) aged 16-17 years regarding the above sketch of a textile pattern. According to the results of the survey, it was revealed that 42.5 % of respondents rated the sketch of the drawing as interesting and would like to have clothes with such a pattern; 37.5 % of respondents positively assessed the drawing; and 20 % of young people did not show interest in the drawing. This fully corresponds to the desire of the majority of young people to demonstrate their familiarization with modern information technologies and technological progress. Therefore, there is reason to believe that fabrics with drawings, including images of fragments of circuit boards and microchips of electronic devices, may be in demand when sewing clothes for young people.

The use of such compositions, as well as their combination with color fields and, possibly, with a traditional textile pattern, creates prerequisites for the emergence of a new style direction in the design of fabrics.

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UDC 677.072.32

DISPERSION ANALYSIS OF THE EFFECT OF AUTOGENOUS ABRAISON ANGLE ON WEAR RESISTANCE OF SEMI-RIGID YARN

ДИСПЕРСИОННЫЙ АНАЛИЗ ВЛИЯНИЯ УГЛА САМОИСТИРАНИЯ НА ИЗНОСОСТОЙКОСТЬ ПОЛУШЕРСТЯНОЙ ПРЯЖИ

Valieva Z.[1], Makhkamova Sh.[2], Temirov Sh.
Tashkent Institute of Textile and Light Industry, Uzbekistan
e-mail: zulfiya-valieva-76@mail.ru[1], shoira-0218@mail.ru[2]
Валиева З.Ф.[1], Махкамова Ш.Ф.[2], Темиров Ш.И.
Ташкентский институт текстильной и легкой промышленности, Узбекистан

Keywords: wool yarn, linear density, abrasion angle, wear resistance, dispersion analysis.
Ключевые слова: шерстяная пряжа, линейная плотность, угол истирания, износостойкость, дисперсионный анализ.

Abstract. This article presents the results of the study of the resistance to autogenous abrasion of half-grained yarn at various values of the abrasion angle. Based on the results of the studies, a dispersion analysis was carried out, which makes it possible to graphically cite the effect of the abrasion angle on the wear resistance of wool yarn and give formulas for the functional dependence of the abrasion angle degree on the number of cycles.
Аннотация. В данной статье приведены результаты исследования стойкости к самоистиранию полушерстяной пряжи при различных значениях угла истирания. По приведённым результатам исследований проведён дисперсионный анализ, что даёт возможность графически привести влияние угла истирания на износостойкость шерстяной пряжи и приведены формулы функциональной зависимости градуса угла истирания на количество циклов.

One of the integral parts of the national economy is the textile industry, and within its framework, one of the most multivendor is woolen production.

The processes of primary processing of wool and spinning are the most important at the preparatory stages of spinning production, from the point of view of a complex irreversible effect on many characteristics (properties) of fibers.

One of the important properties of textile materials is their resistance to abrasion, since it allows to predefine the wear resistance of products made from them. The abrasion resistance of the filaments depends mainly on their fibrous composition and structure.

Research work was carried out in the conditions of the Centexuz laboratory. The objects of study in this work were: half-grained yarn with different PAN fiber content: Samples 1–50 % wool + 50 % PAN; Samples 2–70 % wool 30 % PAN.

To measure the resistance of threads to abrasion Universal PPI device was used for self-cleaning testing of different types of yarn. Any abrasion angle that can be set on the device ranges 0–120°. The principle of operation of the device is that the bar has a reciprocating motion; rubbing of thread against thread occurs in area of loop crosshairs, which is formed by special filling of the thread. The yarn in this case is both a sample and an abrasive.

Carriage speed (80 cycles per minute) is set by turning handle located on device rear wall to position corresponding to specified speed. Depending on the purpose of the study, the speed of the carriage can be changed. After that, the device is switched off by pressing the stop button. Establish a mobile level by means of the lock screw on the angle of attrition 90°, and the counter – on zero by means of dumping handles. Suspensions with lower clamps are installed in filling position, for this purpose handle is turned on side wall of device clockwise until click. Conduct tests. Threads 6 are filled into device clamps taking into account direction of final twist. A thread 0.5 m long is unwound from the package.

One end of the thread is brought into upper clamp and clamped, and the second end of the thread envelopes guide bushing and bushings located on movable plate. As a result, a loop of two is formed on the bushings thread sections; besides, loop crosshairs should be on the same level with the central risk of the bar. The free end of the thread, enveloping the guide roller, is passed through the lower clamp, and then enveloped with this end pin on the preload lever, on the right end of which there is a load providing the preload of the thread. Lifting the pin to horizontal position, lower clamp jaws are clamped. The weight of the preload is selected depending on the linear density of the yarn. Actual thread load is calculated by formula:

$$P_{act}=13P^{/}/5$$

where $P^{/}$ – preloading thread, cN.

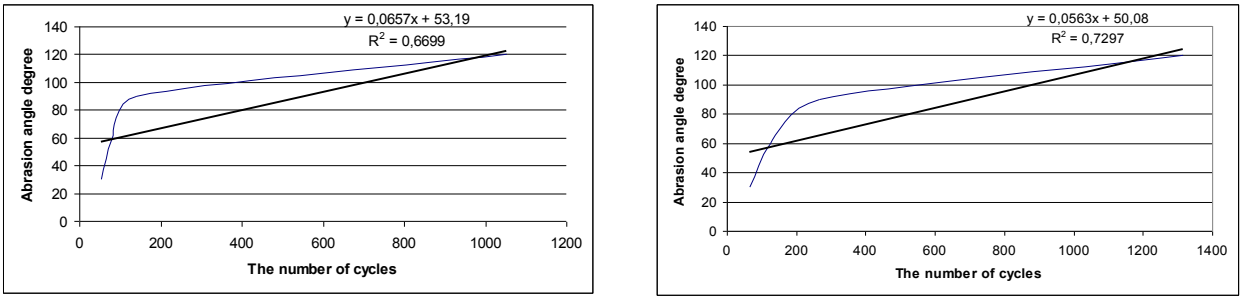
The thread load is set at 1 cN/tex. If the working load is higher than the actual load, the missing load is installed on the suspension. After that, suspensions with weights are brought to operating position by turning the handle located on the side wall of the device counterclockwise; at that suspensions hung on tested threads. A movable plate is installed at working abrasion angle 90°. The crosshairs of the loop when the bar is installed at the working abrasion angle must coincide in level with the central mark of the bar. Switch on the sound toggle switch, and then press the "Start" button to start electric motor. In this case, the carriage will start to reciprocate and the thread will rub at the place where the loop is formed. After one of the threads is broken, which is signaled by the sound signal, and the motor stops, the segments clamped in the upper and lower clamps are removed from the bushings of the movable bar and allow them to sag freely in the vertical position so that they cannot prevent abrasion of the remaining threads. Start the motor again by pressing the start button. These operations are repeated until all 10 yarns have been tested. After all the 10 strands are broken, the clamps are released from the rest of the tested strands. This finishes the test cycle of

one filling (10 threads) and the instrument is ready for the next filling. In total, at least 50 tests are carried out.

A dispersion analysis was carried out of the angle effect during self-destruction on the number of cycles of hemispherical yarn with a different PAN fiber content.

Table 1 – Influence of the angle during self-abrasion of semi-woolen yarn on the number of cycles

№	Yarn Name	Angle at self-destruction			
		30^0	60^0	90^0	120^0
1	50 % wool +50 % PAN fiber	66	124	265	1314
2	70 % wool +50 % PAN fiber	54	80	140	1053



Samples 1 Samples 2

Figure 1 – Graph of the dependence of the angle of abrasion of semi-woolen yarn on the number of cycles

Samples 1 – 70 % wool 30 % PAN; Samples 2 – 50 % wool + 50 % PAN

Testing yarn samples for autogenous abrasion using instruments and PCBs, it was obtained that as the abrasion angle increases, the number of sustained cycles increases with the linear dependence.

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SECTION 2. SOCIAL AND ECONOMIC PROBLEMS OF EDUCATION AND SCIENCE DEVELOPMENT IN THE 21st CENTURY

UDC 338.2; JEL Classification: O11, O14

STUDY OF SECTORAL SHIFTS IN THE CONTEXT OF DIGITALIZATION OF THE ECONOMY

ИССЛЕДОВАНИЕ ОТРАСЛЕВЫХ СДВИГОВ В УСЛОВИЯХ ЦИФРОВИЗАЦИИ ЭКОНОМИКИ

Aliakseyeva A.
Vitebsk State Technological University, Belarus
e-mail: Alekseeva@vstu.by
Алексеева Е.А.
Витебский государственный технологический университет, Республика Беларусь

Keywords: digitalization of the economy, economy sectoral structure, sectoral shifts.
Ключевые слова: цифровизация экономики, отраслевая структура экономики, отраслевые сдвиги.

Abstract. This article discusses the impact of digitalization on the sectoral structure of the economy. A review of the literature on the problem under study and the results of similar studies conducted in other countries is given. Structural shifts in the economy of Belarus have been identified, confirming the movement of the national economy towards digitalization, both from the standpoint of the structure of gross value added and from the point of view of the employment structure. However, assessing the impact of digitalization on the economy is a difficult task that requires the search for new theoretical approaches and analytical tools.

Аннотация. В данной статье рассматриваются вопросы влияния цифровизации на отраслевую структуру экономики. Приведен обзор литературных источников по исследуемой проблеме и результатов подобных исследований, проведенных в других странах. Выявлены структурные сдвиги в экономике Беларуси, подтверждающие движение национальной экономики в сторону цифровизации, как с позиции структуры валовой добавленной стоимости, так и с точки зрения структуры занятости. Однако оценка влияния цифровизации на экономику представляется сложной задачей, требующей поиска новых теоретических подходов и аналитических инструментов.

The digital transformation of the economy is understood by scientists as a change in the economic structure, a change in traditional markets, social relations, public administration, associated with the penetration of digital technologies into them; changing the structure of the economy through the formation of more efficient

economic processes supported by digital infrastructures; transition of the function of the leading mechanism for the development of the economy to institutions based on digital models and processes. Digital transformation is inextricably linked with the most important global trend in the formation of modern society – the transition from a resource-based and industrial economy to a new economy based on knowledge, intellectual resources, high-tech and information technologies [5]. A number of authors consider digital transformation as "... the process of changing (transforming) established economic and social institutions in connection with the introduction of digital technologies" [2].

Among the consequences of digital transformation, the authors note such a phenomenon as industry shifts, which reflect a change in the main ways the market or economy functions [1, 2, 4]. Some authors consider the change in the sectoral structure of the economy towards a decrease in the share of industrial production and an increase in the share of the service sector as the consequences of digital transformation [1, 2, 5]. However, this trend was typical for the global economy even earlier, before digitalization, and reflected the transition to a knowledge economy, an innovative economy, etc.

The results of an ad hoc ECB survey of leading euro area companies looking at the impact that digitalization has on the economy shows, that in the manufacturing and energy sectors, artificial intelligence, the "internet of things", robotics and 3D printing are almost equally widespread, with respondents tending to report that the real impact comes when these technologies are combined. The main obstacles to the adoption of digital technologies are the difficulty of adjusting the organization of the company and the need to recruit and retain highly skilled ICT staff [3].

As the authors [4] point out, the impacts of digital transformation on innovation in specific sectors are largely unknown. Since industries significantly differ in their products and processes, their structures and in how they innovate, the impacts of digitalization on innovation are also likely to differ [4].

Most authors recognize the existence, state and development of digital technologies and information and communication infrastructure as an essential factor in digital transformation. It is these indicators that are most often used in the formation of international ratings of the digitalization of the economy [7]. The share of the IT sector in GDP and the availability of digital skills of the staff are also recognized as important factors of digital transformation. Fluctuations in the position of Belarus in global rankings related to the processes and results of digital transformation indicate the uneven process of digitalization of the economy in the country [7].

The sectoral structure of the economy of Belarus for the period from 2010 to 2020 is characterized by an increase in the share of the service sector and a decrease in the share of the production sector (according to the National Statistical Committee of the Republic of Belarus, https://www.belstat.gov.by/), which is in line with global trends. Thus, in the structure of the gross value added of the Republic of Belarus, the share of the production sector over this period decreased from 50.5 to 43.7 %. The main industries for which there was a decrease are agriculture, forestry and fisheries (by 2.3 %), construction (by 4 %), manufacturing (by 1.3 %). In the services sector, the

main growth was provided by informatization and communications (by 5.4 %, which is more than 2.5 times), real estate operations (by 1.3 %), professional, scientific and technical activities (by 0.7 %), healthcare and social services (by 1.5 %). However, the share of the industrial sector in the economy of Belarus is still much higher than in neighboring countries, including European ones.

National statistical indicators of the development of the digital economy in the Republic of Belarus (their list was developed by the National Statistical Committee of the Republic of Belarus) indicate a positive trend in the digitalization of the national economy. The calculation of these indicators is based on such criteria as information and communication infrastructure, the use of information and communication technologies by the population and organizations, informatization infrastructure, digital transformation, and the national ICT industry.

The possibilities for measuring structural shifts are not limited to the analysis of shifts in the structure of gross value added. It is also necessary to study the structure of employment in the economy. A number of authors note that digitalization presents unequal opportunities for developed and developing countries [6]. Among the reasons, they note a different level of information, digital and innovative infrastructure, a different level of technological development. At the same time, developing countries have high hopes for digital technologies. Literature on structural change views technology as one driver of employment shifts between economic sectors, but underlying mechanisms are often overlooked. Similarly, evidence on digitalization highlights its impacts on employment, but the causes and effects require further investigation. Research [6] suggests that digitalization is likely to affect sector productivity, but is unlikely to cause cross-industry shifts.

However, it should be noted that the number of people employed in the field of informatization and communications in the Republic of Belarus is also growing in absolute and relative terms. The prestige of the profession of a programmer stimulates the influx of young personnel into this area, while, for example, a decrease in the prestige of the profession of an engineer reduces the influx of personnel into the sphere of industrial production. In addition, professional mobility (learning a new profession) is also a modern trend in the field of employment.

Thus, the digitalization of the economy leads not only to an increase in labor productivity due to the introduction of digital technologies, but also to structural shifts in the sectoral structure of the national economy.

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UDC 338.45

METHODOLOGICAL TOOLS FOR ASSESSMENT OF BALANCE IN THE DEVELOPMENT OF INDUSTRIAL ENTERPRISES

МЕТОДИЧЕСКИЕ ИНСТРУМЕНТЫ ОЦЕНКИ СБАЛАНСИРОВАННОСТИ РАЗВИТИЯ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ

Bykau K.
Vitebsk State Technological University, Belarus
e-mail: krbykoff@mail.ru, krbykoff@gmail.com
Быков К.Р.
Витебский государственный технологический университет, Республика Беларусь

Keywords: balanced development, methodological approach, integral indicator, textile and sewing enterprises.

Ключевые слова: сбалансированность развития, методический подход, интегральный показатель, текстильные и швейные предприятия.

Abstract. The article summarizes the methodological tools for assessing the balance of development of industrial enterprises. The key relative indicators characterizing the

structural, dynamic and intensive balance are highlighted on the example of textile production and clothing in Belarus. An integral indicator was developed on the basis of applied statistics methods and the main stages of the implementation of the methodological approach in assessing the balance of development of enterprises for management decision making were highlighted.

Аннотация. В статье обобщён методический инструментарий оценки сбалансированности развития промышленных предприятий. Выделены ключевые относительные показатели, характеризующие структурную, динамическую и интенсивную сбалансированность на примере текстильного производства и одежды Беларуси. Разработан на основе методов прикладной статистики интегральный показатель и выделены основные этапы реализации методического подхода в оценке сбалансированности развития предприятий для выработки управленческих решений.

Theoretical and applied issues of methodological support for assessing the balance of development of industrial enterprises (organizations) of various types of activity are developed in the works of scientists Tkachenko E.S., Rybachuk M.A., Kuzovleva I.Yu., Mordvinov S.V., Fomin V.P., Alifanov K.A., Evseev D.A., Ulyanova O.B., Tsykavkin N.M. and others, see Table 1.

Based on the economic analysis of light industry (according to OKED, subsection CB, sections 13–14) in the intersectoral balance of Belarus and reports on the socio-economic development of textile and garment enterprises of the Bellegprom Concern for 2014–2016, the author of the article proposed relative indicators for assessing the level of development balance. By preliminary calculation, all relative indicators were formed into the following groups, see Table 2.

Structural balance, meaning the ratio of structural parts in the aggregate as a whole. With the help of structural relative indicators, it is possible to assess the internal structure and content of the phenomenon under study. Dynamic balance characterizes the change in the growth rate of indicators over time. The growth rate shows how many times the indicator of the current period is in comparison with the baseline. Intensive balance is the ratio of opposite absolute values to each other and characterizes the level of economic and social development.

To assess the level of balanced development of enterprises, the most important element of the methodology is the technical analysis toolkit applied to the study of complex organizational systems. A number of authors single out in their works probabilistic-statistical and economic-mathematical methods for the economic assessment of the balance and stability of the economic system, including works of E. V. Broilo, S. N. Bobylev, S. G. Ezerskaya, Yu. N. Galitskaya, M. V. Kharchevnikov, E. R. Miskhozhev, M. A. Makarova, A. V. Schmidt, V. V. Ioffe, B. P. Rukin, N. S. Popova, A. N. Tischenko. Heuristic methods in modeling the assessment and forecasting the balance of development and sustainability of organizations are practiced by T. E. Melnik, Yu. M. Suleimanova, N. A. Khomyachenkova, S. Yu. Tchmel, F. M. Safin, O. N. Zaitsev, Yu. N. Galitskaya, E. A. Kazyuka, M. E. Tsybareva, R. V. Rusinov and others.

Table 1 – Methodological approaches of the authors to assessing the balance of development of industrial enterprises

Author	Research direction	Economic activity (industry)	Methods and integral indicator for assessment
Tkachenko E.S	management processes	meat processing production	scoring of the actual values of indicators
Rybachuk M.A.	balanced system structure	industrial enterprise of various organizational and legal forms	− index of systemic balance; − return on assets (ROA)
Kuzovleva I.Yu	designing a balanced innovation infrastructure	economic systems at the macro, meso and micro levels	geometric mean formula and integral exponent
Mordvinov S.V.	methods for assessing the balance of development	on the example of timber industry enterprises	selection of relevant indicators (based on the method of expert assessments)
Fomin V.P	methodology for the formation and analysis of balanced development indicators	electrical industry and rocketry	− methodology for rating evaluation of fractional time intervals; − a modified methodology for dynamic rating assessment by percentage distances has been developed; − the methodology for assessing economic sustainability is based on the identification and generalization in the integral interpretation of trends of the degree of balance by its levels and types
Alifanov K.A.	mathematical models for the formation of a balanced structure of the product range	textile enterprises	a complex of mathematical models for calculating the balance of the product range and the structure of the production program of the enterprise based on the apparatus of the support vector machine has been developed
Tsykavkin N.M.	formation of a sustainable development strategy	garment industry of the Russian Federation	a method of forming a strategy for sustainable development of holdings of the garment industry using the method of expert assessments. Application of the "VBM-approach" – defines the concept of management aimed at the qualitative formation of strategic and operational decisions at all levels of the organization.

Source: compiled by the author.

Table 2 – Relative indicators for assessing the level of balanced development of industrial enterprises of Bellegprom Concern

The name of the group of relative indicators and their designation		Indicators and their units of measurement
Structural balance	K_S	− the share of exports of goods and services in the production of goods and services, % − the share of labor costs in the structure of costs for the production of goods, % − the share of imports in the production of goods and services, % − the share of imports in the cost of production of goods and services, % − the share of exports of goods and services in the foreign trade turnover of the industry, % − the share of material costs in the structure of costs for the production of goods and services, % − share of net profit in added value, % − the share of value added in the production of goods and services, %
Dynamic balance	K_D	− growth rate of exports of goods and services, % − growth rate of added value, % − growth rate of proceeds from product sales, % − growth rate of production costs, % − growth rate of imports of goods and services, % − growth rate of output of goods and services, % − growth rate of net profit, % − growth rate of material costs, %
Intense balance	K_I	− added value per 1 rub. release of goods and services, rub. − added value per 1 rub. cost of goods sold, rub. − added value per employee, RUB mln. − added value per 1 ruble of imports of goods and services, rubles. − added value per 1 ruble of export of goods and services, rub. − added value per 1 ruble of fixed assets, rub. − ratio of export to import

Source: developed by the author.

In economic knowledge, it is customary to refer to the number of quantitative methods as two key methods: mathematical and statistical ones. In their applied meaning, these methods are often combined into a general one – the econometric method [1, p. 129].

To determine the level of balanced development of organizations, it is proposed to use the author's integral coefficient of development balance (R), the value of which is calculated on the basis of applied statistical analysis methods and the application of the SPSS application package designed to process a large amount of data [2–4].

As a result of multivariate factor analysis, the values of the factors were determined (based on the "Varimax" rotation method), integral coefficients were constructed that characterize the level of balanced development of each studied textile and garment enterprise for each period from 2014 to 2016, see Formula 1:

$$R_{i\,(t)} = d_1 K_{1i} + d_2 K_{2i} + d_3 K_{3i} \quad (1)$$

where $R_{i\,(t)}$ – integral coefficient characterizing the level of balanced development of the i-th enterprise for the t period, rel. units; $d_1 \geq d_2 \geq d_3 > 0$ is the share of the total variance explained by the main factors $К_1$, $К_2$, $К_3$, constructed in descending order of their values (weight coefficients reflecting the relative importance of indicators, their "contribution" to the value of the integral coefficient), rel. units; d_1 – variance of the first principal component (with the largest eigenvalue – λ_1) explains the share of its variance in the total population, rel. units; $К_{1i}$, $К_{2i}$, $К_{3i}$ – normalized (standardized) values of the main factors $К_1$, $К_2$, $К_3$ for the i-th enterprise, rel. units.

For comparability of indicators measured in different units, the initial indicators were normalized (standardized), that is, reduced to a single measurement scale from the interval [from -1 to +1].

According to Formula 1, enterprises are assessed and ranked according to the value of the integral coefficient of development balance.

Thus, we have developed a methodological approach for a factor-based economic assessment of the level of balanced development of textile and clothing enterprises of Bellegprom, which includes a number of stages:

Stage 1. Pre-processing of primary data;

Stage 2. Standardization of quantitative indicators (based on "MS Excel");

Stage 3. Modeling the assessment of the level of development balance;

Stage 4. Calculation of the integral coefficient of balanced development for each enterprise (based on "MS Excel" and standardized indicators);

Stage 5. Grouping of enterprises by the level of development balance (based on the average intergroup value of the integral coefficient).

Based on the results of ranking enterprises by the value of the integral coefficient of balanced development, we have developed an algorithm for making management decisions, including the calculation of general criteria (coefficients), according to the values of which all enterprises were assigned to groups with appropriate management recommendations to ensure balanced development.

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UDC 330.88

THE TERM "INNOVATION POTENTIAL" IN THE SCIENCE OF ECONOMICS

ПОНЯТИЕ ИННОВАЦИОННОГО ПОТЕНЦИАЛА В ЭКОНОМИЧЕСКОЙ НАУКЕ

Gladevich J.
Daugavpils University, Latvia
e-mail: jevgenijs.gladevics@gmail.com
Гладевич Е.Г.
Даугавпилсский Университет, Латвия

Keywords: innovation, innovation potential, evolution of term of innovation potential.
Ключевые слова: инновация, инновационный потенциал, эволюция понятия инновационного потенциала.

Abstract. The definition of innovation potential is closely related to the concept of innovation. For many centuries, the role of innovation has not been properly appreciated. In the late 19th century, humanity began to value innovations as an important and integral part of life; however, the concept of innovation potential was formulated only in the late 20th century. The author explores the approaches of many scientists in explaining the concepts of innovation and innovation potential, and offers his own definition of innovation potential.
Аннотация. Определение инновационного потенциала тесно связано с понятием инноваций. На протяжении многих веков роль инноваций не была достойно оценена. В конце 19 века человечество начинает рассматривать инновации как важную, неотъемлемую составляющую жизни, однако понятие инновационного потенциала формулируется только в конце 20 века. Автор исследует подходы многих ученых к объяснению понятий инноваций и инновационного потенциала, и предлагает собственное определение инновационного потенциала.

The evolution of the concept of innovation potential stems from the history of development of the concept of innovation. Throughout human history, technical progress has played a major role in the development of civilization. From stone processing and fire making, agriculture, invention of wheels and writing system to the creation of the World Wide Web and the decipherment of DNA structure, discoveries and inventions allow people reaching a new stage of evolution.

Regardless of this fact, the attitude towards innovations, inventions and discoveries has not been in the spotlight of the contemporaries for many centuries. From ancient times, when the first works in mathematics, mechanics and astronomy appeared, the innovator was more of a rationalizer, the impact of science on the life of the society was insignificant if compared to religion, military industries and agriculture. It is

related also to the resistance of the science to technologies unlike the Ancient China, where different religion allowed developing the science, inventions and innovations for many centuries. In many cases, religious dogmas, especially in the Middle Ages, became the hindering factor in the innovation development and the fields of their application (mainly the social and political history of the society's development), the tools (religious and moral procedure activities) and the principles of moral. The Renaissance, the secular nature of its culture and anthropocentrism give impetus to the development of thinking, creativity and innovation and strengthen their importance. These qualities are promoted and it becomes possible to evaluate the role of thoughts and talents in human activity, and its result has the highest value, and it is a criterion for the evaluation of the society. The Reformation and the birth of Protestantism, when diverse attitude towards amassment, labor, creativity and entrepreneurship made a huge contribution leading to innovation as a key factor of the development. Protestant work ethics and its characteristics – the introduction of trade, and not only the growth of personal consumption, but also favorable activities facilitated the development of the coming era of capitalism. In their works, the European encyclopedists of the 18th century emphasized the importance of the relationship between science and industry in human history: Jean Condorcet, Adam Smith, etc.

In order to find out the essence of innovation, it is necessary to examine the definitions of the given term in the scientific literature. World scientists distinguish a number of basic approaches, where the innovation is considered as: the changes (J. Shumpeter, P. LaPierre, P. Whitfield, K. Knight, L. Blyahman, J. Yakovets, F. Valenta, A. Prigozhin, J. Morozov), the body of resources (M. Bendikov, J. Khrustalyev, T. Chekulina, J. Tamakhina, O. Moskvina, S. Yemelyanov, A.Suvorinov), the process (T. Brayan, B. Twiss, B. Santo, V. Rapoport, K. Pass, B. Louss, E. Pendlton, L. Chadwick, Johnson, H. Harman, S. Glazyev, V. Makarov, V. Medinskiy, S. Valdaicev, G. Gvishiani, V. Lapin), the result (R. Fathutdinov, P. Lemerl, I. Molchanov, E. Utkin, A. Kulagin, S. Beshelev, I. Balabanov, G. Goldstein, S. Ilyenkova, L. Kantorovich, V. Medinskiy, G. Kiperman, N. Moiseyeva, J. Aniskin, A. Levinson, F. Gurvich, D. Sokolov, A. Titov, M. Shabanova).

Thus, the innovative activity is considered to be an important component of the economic growth, still, its role is evaluated as rather secondary, and it does not become the subject of a separate and serious economic research. The innovative activity has not been historically properly valued and has not been legally protected for many years. Only in the late 19th century, the scientists rated the innovations as a very important component of life and development, but the researchers did not discuss the innovation potential stating only indirect factors, which affect its formation.

In the 20th century, the scientists performed active studies of the operation of innovation, its interaction with various factors – both public and private. However, the concept of innovation potential has not been studied in practice, only a few studies have implicitly mentioned it, as well as the factors influencing it and actually forming

the innovation potential have not been studied. The concept of innovation potential was formulated only in the late the 20th century.

In the modern economic literature, some authors define the innovation potential as a body of innovation resources (material, financial, intellectual, scientific and technical), which provides opportunities for innovation and development of innovation technologies, products, services, which is a resource approach to defining innovation potential, which ensures opportunities for innovation operation and establishment of the innovation technologies, production and services, which is the resource approach in defining the innovation potential. Others evaluate the innovation potential viewing the position of the innovation performance, i.e., from the aspect of the real product obtained during the innovation process. In this case, the innovation potential is considered to be the possible future innovation output.

The innovation potential is the ability of different economic sectors to produce high-technology products complying with the world market requirements. That is why the innovation potential is closely related to the specific level of economics – the national economy. The modern economics does not clearly define the concept of innovation potential, herewith, there is no specific approach to their quantitative determination. The concept "innovation potential" was introduced by C. Freeman [2], which the scientist uses to define the system growth with measures for development, acquisition and operation of production and economic, social and organizational potentials.

The practical aspect of the concept of innovation potential is reflected in the works of P. Drucker, in which he studies the sources of modern industrial development [1]. For example, he noted that innovation begins with an analysis of existing potential in order to use it effectively. For example, he noted that the innovations start with analysis of the available potential to use it in an effective way.

The modern researchers give various definitions for the innovation potential. M. Porter, S. Stern, G. Furman [3] define the national innovation potential as the ability of the national economy to develop and commercialize the sustainable flow of new technologies. Thus, this approach allows considering only the technological innovations. K. Poznanska asserts that the innovation potential is the ability to effectively implement innovations, i.e., new products, new technologies, organizational methods and marketing innovations. The potential defined this way depends on the four basic elements: the financial potential, the human potential, the material potential and the knowledge. G. Zhits explains the innovation potential as a body of economic resources, which the society may use for its development in a certain period. He mentions the scientific and technical, the educational potential and the investment potential. The body of these factors, according to G. Zhits, forms the macrosystem's innovation potential. M. Danko defines the innovation potential as the accumulated and specific amount of information about the introduction results of scientific and technical works, inventions, designing elaboration, new equipment and products. A. Bakhtizin, E. Akinfeeva define the innovation potential as a triple structure with the following components: agents causing innovation, innovation

mediums and innovation consumers. D. Kokurin says that the innovation potential is the unused and hidden opportunities of the accumulated resources, which can be implemented to reach the goals. L. Borisoglebskaya, A. Polyakov define the innovation potential as an ability and readiness of the economics to implement the innovation. S. Alekseev mentions availability of all required resources and opportunities in the region for innovative measures as the main factor defining the innovation potential. G. Samostroenko, A. Martemyanov provide the following definition of the innovation potential – a body of external and internal opportunities and conditions, which ensures implementation of the regional socially economical system's innovation strategy. J. Baklanova emphasizes that the innovation potential includes sources, opportunities, funds, to create conditions for optimization of the science and the technologies investments in the development of the economics, introducing market principles into this sector and its restructuring. In their turn, L. Fathulina, L. Shabaltina believe that it is a body of human, social, legal, materially technical, information and other resources, which is meant for development of the region's innovations.

These approaches are not mutually contradictory, they reveal the essence of the term "innovation potential" in the integrity of its components, one approach complementing the other. Summarizing the above, according to the author, the innovation potential should be understood as a body of resources (factors, conditions) characterizing the ability of the economic system and the real opportunity to develop in an effective manner. The innovation potential of the region must be defined not only as a body of innovation resources required for the implementation of an innovation activity, but also as an opportunity and ability of the region to create and use the results of an innovation activity.

Thus, the author defines the innovation potential of a region as the region's readiness for innovations, which manifests itself as the region's opportunity and ability to transform the initial resources available to the region into a competitive and market-demanded innovation – which is a new product or service.

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UDC 332.012

STRUCTURE OF THE REGIONS' INNOVATION POTENTIAL

СТРУКТУРА РЕГИОНАЛЬНОГО ИННОВАЦИОННОГО ПОТЕНЦИАЛА

Gladevich J.
Daugavpils University, Latvia
e-mail: jevgenijs.gladevics@gmail.com
Гладевич Е.Г.
Даугавпилсский Университет, Латвия

Keywords: innovation potentials, meso level, resource component, process component, resulting component.
Ключевые слова: инновационный потенциал, мезо уровень, ресурсный компонент, процессная составляющая, результирующий компонент.

Abstract. Today, the development of innovation potential in solving economic and social protection issues has an increasingly important role. Different scientists and officials define the innovation potential in different ways, emphasizing its resource component or end result. However, the author believes that looking from the regional point the greatest attention should be paid to the process component of the innovation potential, combining it with the resource and the resulting components.
Аннотация. В современном мире все большая роль уделяется развитию инновационного потенциала в вопросах экономики и социальной защищенности. Различные ученые и должностные лица инновационный потенциал определяют по-разному, делая акцент на ресурсной или результирующей составляющей. Однако автор считает, что в региональном аспекте наибольшее внимание следует уделять процессной составляющей инновационного потенциала, объединяя ее с ресурсной и результирующей составляющими.

The innovation potential is one of the most important objects of the social development. Its effective implementation today affects the development of various aspects of goods and services.

The structure of innovation potential consists of the interaction of different resources. The significance of these resources at the meso level has been confirmed by many scientists in their works [2, 3, 4, 5, 5]:

− scientific and technical and educational resources – J. Schumpeter, N. Kondratyev, J. Condorcet, A. Smith, S. Kuznets, S. Yemelyanov, A. Suvorinov, G. Etzkowitz, L. Leydes-dorff, S. Kline, N. Rozsenberg, N. Yastreb, K. Fakuda, K. Watanabe, V. Vasin, L. Mindeli, B. Lisin, V. Freedlanov, I. Shevchenko, V. Matveikin, I. Kasataya, B. Santo, O. Lyubova, A. Misbakhova, A. Zholnierski,

K. Poznanska, G. Zhits, T. Sterzer, L. Fathulina, L. Shabaltina, J. Lununarski, D. Stadnicka;

- labor force resources – C. Freeman, S. Yemelyanov, A. Suvorinov, A. Schlesinger Jr., A.Trifilova, I. Shevchenko, V. Matveikin, I. Kasataja, B. Santo, O. Ljubova, L. Fathulina, L. Shabaltina, A. Misbakhova, A. Zholnierski, K. Poznanska, M. Porter, T. Sterzer, P.Romer, J. Lununarskis, D. Stadnicka;
- production resources – J. Shumpeter, A.Smith, S. Kuznets, J. Lununarski, D. Stadnicka, V. Kalashnikov;
- economic resources – S. Yemelyanov, N. Kondratyev, A. Suvorinov, K. Fakuda, K. Watanabe, J. Schumpeter, A. Smith, S. Kuznets, B. Lisin, V. Fridlanov, A. Trifilova, V. Matveikin, I. Kasataya, B. Santo, B. Twiss, S. Kline, N. Rosenberg, I. Shevchenko, O. Lyubova, OECD, A. Misbakhova, K. Poznanska, T. Sterzer;
- investment resources – S. Yemelyanov, A. Suvorinov, K. Fakuda, K. Watanabe, G. Zhits;
- market resources – J. Shumpeter, B. Twiss, J. Lununarski, D. Stadnicka, V. Kalashnikov;
- infrastructural resources – S. Kuznets, V. Matveikin, B. Lisin, V. Fridlanov;
- organizational resources – J. Shumpeter, B.Tviss, S. Kline, N. Rosenberg;
- management resources – J. Shumpeter, B.Tviss, J. Lununarski, D. Stadnicka;
- resources of juridical base development – B. Tviss, L. Fathulina, L. Shabaltina;
- ecological resources – K. Fakuda, K. Watanabe, R. Ayres;
- information resources – N. Yastreb, M. Danko, J. Lununarski, D. Stadnicka, L. Fathulina, L. Shabaltina;
- outer cooperation resources – N. Kondratyev, OECD, J. Lununarski, D. Stadnicka.

Analyzing the development of these factors in different regions, it is possible to identify innovative development and define many difficulties, as well as to find their solutions. The analysis of these resources is a very labor-intensive process, indicators for many resources are not available in official statistics, and some resources include duplicate indicators or indicators of similar importance. Considering the above, the author optimizes the number of influencing resources by combining several factors into one and eliminating the less important factors, the indicators of which are not available in the required quantity.

The structure of innovation potential differs for different levels of the economy. When determining the region's innovation potential, it is necessary to evaluate the level of innovation development of the regional economy, as well as the innovation development opportunities of existing organizations in the definite territory. Therefore, the assessment of the region's innovation potential must be carried out comprehensively and in the context of various components (see Image 1).

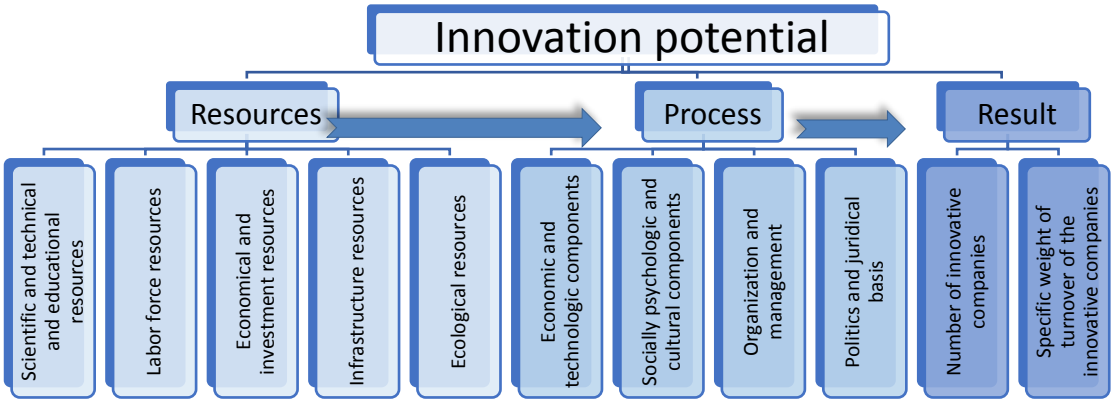

Image 1 – Structure of the innovation potential in the innovation system
Source: made by the author according to [1, 2, 3, 4, 5, 5].

The author explores the region's innovation potential according to the following components:

- resource component [2, 3, 4, 5, 5] (J. Shumpeter, S. Kuznets, A. Smith, J. Condorcet, C. Freeman, N. Kondratyev, A. Schlesinger Jr., K. Fakuda, K. Watanabe, S. Kline, N. Rosenberg, G. Etzkowitz, L. Leydesdorff, B. Santo, S. Yemelyanov, V. Matveikin, N. Yastreb et al.):
  - scientific and technical and educational resources;
  - labor force resources;
  - economic and investment resources;
  - infrastructure resources;
  - ecological resources;
- process component [5] (B. Santo, V. Matveikin, I. Shevchenko, B. Lisin, V. Fridlanov):
  - economic and technologic components;
  - socially psychologic and cultural components;
  - organization and management;
  - politics and juridical basis;
- resulting component [1] (P. Drucker, D. Kokurin):
  - number of innovative companies;
  - specific weight of turnover of the innovative companies.

The style of innovation management depends on the level of technological and economic development of the economy and the innovation potential of the territory.

Summarizing the above, the main principles of development of the innovation potential are as follows:

- the development of science and technology at this stage is inseparable;
- the innovation and technological development cause profound structural changes in the economic, social and political sectors;
- the effective introduction and development of science and technology requires appropriate economic conditions and institutions to be created;

− the innovation development may not only have positive, but also negative consequences;

− the economic downturn is creating a new wave of innovation development;

− the innovation and technological development are cyclic;

− based on the analogy with natural systems, economic development can be viewed through the prism of innovation ecosystems, the distinguishing feature of which is the ability and development of internal dynamics under the influence of both endogenous and external factors;

− the innovation potential can be defined as a combination of different resources: science, education, labor force, economics, investments, infrastructure and ecological resources.

The above classification of approaches is also not final. A body of these approaches can be developed in a completely different way if other criteria are adopted and used, for example by direct use of the approaches to the definition of the concept of innovation potential. The regional innovation development must meet at least two requirements – to transfer state-level powers up to the regional level, to promote the development of state, public and private organizations in a particular region.

The innovation potential on the regional level is a strategic factor in the market as a part of an overall business development strategy aimed at gaining or maintaining the leading position in this sector. Without the development of innovation potential, it is almost impossible to create competitive products in order to ensure sustainable development.

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UDC 331.5

CONTEMPORARY APPROACHES TO THE DEFINITION OF LABOR FORCE MOBILITY IN THE LABOR MARKET

СОВРЕМЕННЫЕ ПОДХОДЫ К ОПРЕДЕЛЕНИЮ МОБИЛЬНОСТИ РАБОЧЕЙ СИЛЫ НА РЫНКЕ ТРУДА

Gutorova A.
Vitebsk State Technological University, Belarus
e-mail: gev2509@mail.ru
Гуторова Е.В.
Витебский государственный технологический университет, Республика Беларусь

Keywords: labor force mobility, geographical mobility, movement in the space of many jobs, virtual mobility, mobility as economic behavior.

Ключевые слова: мобильность рабочей силы, географическая мобильность, перемещение в пространстве рабочих мест, виртуальная мобильность, мобильность как экономическое поведение.

Abstract. The article presents the results of studying the development of a system of views on labor force mobility in the labor market, as well as systematizes modern approaches to the interpretation of this concept.

Аннотация. В статье представлены результаты изучения развития системы взглядов на мобильность рабочей силы на рынке труда, а также систематизированы современные подходы к трактовке данного понятия.

The development of methodological approaches to the understanding of mobility in the labor market can be considered as a movement away from the assumptions about the absolute mobility of the labor force (classical school of economic studies) to a multiple description of this phenomenon, characterized by discreteness and limitation by various factors (Figure 1).

The systematization of various interpretations of labor force mobility made it possible to identify the main approaches to determining the essence of this category (Table 1).

Thus, the study of methodological approaches to understanding the essence of labor force mobility allows us to draw the following conclusions:

– at the present stage, there is no single approach to understanding labor force mobility in the labor market;

– the development of various theoretical approaches went in the direction from the assumption of absolute labor mobility to the clarification of the factors that limit it (geographical, social, microeconomic, transaction costs, etc.).

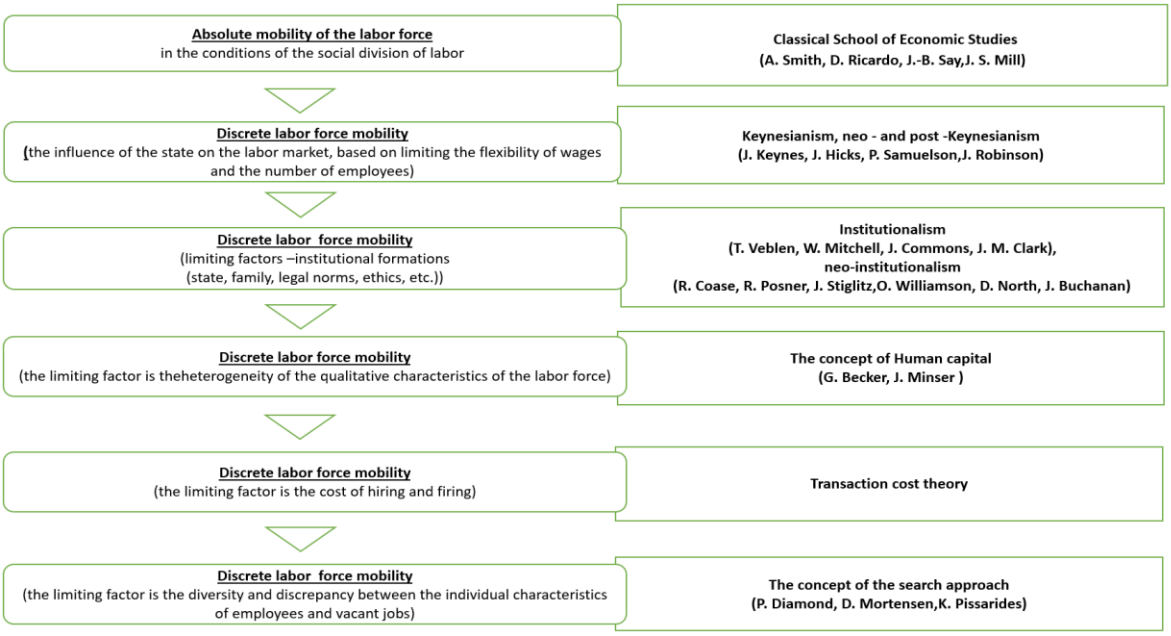

Figure 1 – Methodological approaches to understanding labor force mobility
Compiled by the author according to sources: [1, 2, 3, 4].

Table 1 – Modern approaches to the definition of the concept of "labor force mobility"

Approaches	Definitions	Comments
as a labor force movement	"the movement of labor from places overflowing with labor resources to regions experiencing an acute shortage in them" [4]	Distribution and redistribution of labor force for the most effective use. Only geographical movement is considered.
in the context of personnel management	turnover	The narrowest definition used at the level of a specific organization
in the context of only physical movement	"the ability and willingness of employees to move to different geographical areas" [5]	A narrow definition that reflects the subjective opinion of a particular employee about the possibility of changing the geographical location
readiness for various transformations in professional activity	"potential ability, readiness of an employee to change work" [6, c. 117].	The subjective opinion of the employee regarding not only professional development, but also changes in the direction of labor activity. There is no factor of physical displacement.
comprehensive characteristics of the labor force	"characteristics of the labor force, reflecting the ability to [7, c. 246]: 1) quickly and flexibly navigate the situation associated with the performance of a complex or urgent task;	A fairly broad definition that takes into account both the psychoemotional characteristics of the employee and his attitude to changing the location, the need for further training and other changes

	2) the possibility of moving to another area to perform the necessary work; 3) readiness for training, retraining in order to meet the qualifications and direction of the proposed work"	
within the framework of the concept of human capital	"the most effective use of the components of human capital (knowledge, experience, in-demand skills, reputation)" [8, c. 121]	As a basis for the development of the economy and society as a whole, the means of which are education, intellectual and physical development, as well as the reasonable functioning of labor resources
as a form of social mobility	"changing the employee's social positions" [9, c. 126]	The process of vertical (from one social layer to another) and horizontal (within one social layer) movement of employees according to the social structure of society
within the framework of the concept of digitalization of the economy	virtual labor force mobility is the movement of workers in the space of many workplaces using modern technologies, excluding physical movement	Virtual mobility as a characteristic of the digital labor market
as an economic behavior	"an action that depends on the type of economic behavior of employees who function in certain working conditions and are guided by their change or preservation" [10, c. 79]	Mobility is explained by the economic behavior of employees and is presented as the result of a search of available alternatives associated with a change in the place of work [10, c. 79]

Compiled by the author according to sources: [4, 5, 6, 7, 8, 9, 10].

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UDC 336

SHADOW BANKING : STATUS QUO ANALYSIS AND REGULATORY APPROACHAES

ТЕНЕВОЙ БАНКИНГ: АНАЛИЗ СТАТУС-КВО И НОРМАТИВНЫЕ ПОДХОДЫ

Liu Leilei
Vitebsk State Technological University, Belarus
e-mail: 360340529@qq.com
Лю Лэйлей
Витебский государственный технологический университет, Республика Беларусь

Keywords: banks' shadow, traditional shadow banking, credit money creation, bank accounting, regulation.

Ключевые слова: теневой банк, традиционная теневая банковская система, создание кредитных денег, банковская бухгалтерия, отчётность.

Abstract. The banking shadow, namely the money creation by banks beyond traditional loans, plays an important role in China's money creation process, which brings many challenges to monetary policy operation and financial risk management. This paper provides a detailed analysis of the money creation mechanism in China's shadow banking sector, provides an accurate measure, studies its impact on financial risk, and investigates recent regulation. To strengthen supervision, Chinese regulators should closely track the evolution of various shadow banking channels, both on – and off-balance sheet. Specific macro-prudential supervision tools, such as asset reserve

and risk reserve, should be applied to shadow banking and traditional shadow banking respectively.

Аннотация. Теневая банковская система, а именно создание банками денег помимо традиционных кредитов, играет важную роль в процессе создания денег в Китае, что создает множество проблем для проведения денежно-кредитной политики и управления финансовыми рисками. Статья дает подробный анализ механизма создания денег в теневом банковском секторе Китая, представлены точные измерения, изучено влияние механизма на финансовый риск и исследованы последние нововведения в регулировании. Чтобы усилить надзор, китайские регуляторы должны внимательно отслеживать эволюцию различных теневых банковских каналов, как балансовых, так и внебалансовых. Конкретные инструменты макропруденциального надзора, такие как резерв активов и резерв рисков, должны применяться к теневой банковской деятельности и традиционной теневой банковской деятельности соответственно.

Introduction

In recent years, China's shadow banking system has become an integral part of the financial system. Different from developed economies, China's shadow banking is dominated by commercial banks due to the bank-dominated financial system. A key feature of shadow banking in China is that banks hide loans in other accounting categories. We can define China's shadow banking system from the perspective of credit money creation, and highlight the differences between two categories of shadow banking in China: bank shadow banking and traditional shadow banking.

Shadow banking is defined as the money creation by which banks generate liabilities from assets through accounting treatment, while traditional shadow banking refers to the creation of credit by non-bank financial intermediaries through money transfer. Both provide funding under the general shadow banking system, but only the banking shadow can create new money supply and thus influence the intermediate monetary policy objectives of the People's Bank of China (PBC).

This paper highlights for the first time the role of shadow banking in money creation in China and how it affects financial risk and its impact on the effectiveness of monetary policy. While traditional shadow banking in China operates in much the same way as in developed economies, the shadow of banks mainly involves loans taking the form of other types of assets, posing challenges to the effectiveness of monetary policy and financial regulation. First, the banking shadow reduces the ability of monetary policy to influence money creation and risk taking, thus increasing financial stability risks. Second, it weakens the effectiveness of bank loan supervision and leads to the accumulation of systemic risks.

Banks' shadow and traditional shadow banking

Shadow banking in China has much in common with that of other countries, such as credit creation and regulatory arbitrage, but some of its features are products of China's financial and regulatory system. Thus, it is necessary to define China's shadow banking

system more accurately as the basis for further research. Considering the different credit creation mechanisms (credit money and non-money mechanisms), we classify Chinese shadow banking into two categories: banks' shadow and traditional shadow banking.

Banks' shadow entails banking activities that provide money for real sectors through asset expansion (which is inherently identical to bank loans) and related credit money creation (asset expansion simultaneously creates deposits), but which circumvent regulatory restrictions – such as credit allocation constraints – by hiding loans as alternative balance-sheet items. Banks' shadow is channeled mainly through third-party financial institutions, including other banks and non-bank financial institutions.

Analyzing the composition of bank assets facilitates our understanding of the operational mode and business types of banks' shadow. Banks' shadow can be decomposed into "interbank" and "investment" channels according to asset type.

Measuring China's shadow banking

One strand of the literature uses the aggregation approach to measure the scale of shadow banking, that is, directly sum up the products or subcategories of shadow banking. This creates two issues. First, the different definitions or classifications of shadow banking lead to significant differences in measurement results. For example, Yan et al. (2014) define six measures of Chinese shadow banking according to regulation intensity. The broadest measure of shadow banking is RMB 67.03 trillion, whereas the narrow measure is only RMB 10.3 trillion. Liu (2013) estimates the size of "other debts than formal credit lending" at approximately RMB 25 trillion, of which the scale of shadow banking is approximately RMB 10 trillion. Gao et al. (2013) focus on banks' off-balance sheet financing and make an estimation based on the indicators of total social financing, which they find to range from RMB 7.1 trillion to RMB 21.9 trillion.

Second, the aggregation approach cannot avoid double-counting or omission. The approach is applicable to off-balance sheet securitization (a major component of U.S. shadow banking) rather than to China. For example, the overlapping of shadow banking subcategories may induce double-counting, and the different accounting practices of different institutions, such as identical items listed under different accounting items, may result in omission.

Monetary policy challenges and regulation

Strict regulation of traditional banking gives rise to the shadow banking system. The rapid growth of shadow banking in China was driven largely by the credit tightening policies introduced in 2010 and by China's unique banking regulation system. In the second quarter of 2010, Chinese monetary authorities began to implement a more prudent monetary policy, introduced macro-prudential policies characterized by capital constraints to strengthen regulation, and applied specific credit regulations to sectors with excess capacity (e.g., real estate). To circumvent regulations and meet financing needs in certain sectors, shadow banking activities rose sharply, posing threats to financial stability.

Conversely, shadow banking undermines the effect of monetary policy. The effectiveness of some regulatory policies and tools has been compromised or partially offset by the shadow banking system. For example, the Chinese government set credit restrictions – such as restrictions on loans from traditional banks and the equity ratio of developers – on the real estate sector to prevent housing bubbles, but shadow banking provides an alternative source of funding. A similar case holds for enterprises with excess capacity. Furthermore, capital adequacy requirements for banks have become less effective, as shadow banking activities have enabled banks to move some assets off-balance sheet, such as the above-mentioned entrusted and trust loans through bank-trust cooperation.

Conclusion

This paper's in-depth analysis of China's shadow banking system highlights the key role of shadow banking in creating credit money and hiding bank credit risks. It also assesses the challenges facing monetary policy regulation and financial risk management.

First of all, the definition of shadow banking in China is clarified, which is divided into shadow banking and traditional shadow banking, and the money creation mechanism of shadow banking channel (interbank channel and investment channel) is analyzed in detail. From the perspective of credit money creation, it also clarifies some misconceptions about wealth management products and their role in shadow banking in China. Secondly, this paper quantifies the size of China's shadow banking (including the shadow banking of banks and traditional shadow banking) by deduction and subtraction method, and compares it with the summing method commonly used in literature, indicating that deduction and subtraction method can avoid miscalculation problems, such as double calculation and overestimation. Thirdly, this paper examines the relationship between shadow banking credit and financial risk from both macro and micro levels. China's shadow banking funds are mainly used by local government financing vehicles, companies with overcapacity and property developers. The banking shadow is closely related to M2, the money creation indicator, while the traditional shadow banking has little correlation, which reduces the accuracy of M2 as a policy measurement indicator. At the micro level, based on the balance sheet information of 311 banks (including listed and unlisted banks) in the past decade, this paper finds that although the banking shadow has pushed up the credit risk of banks, banks have not fully assessed the risk or taken corresponding countermeasures. Finally, the paper discusses the monetary policy challenges posed by shadow banking in China and examines recent trends in regulatory tightening.

Both shadow banking and traditional shadow banking are inextricably linked with the banking system, with banks as the main source of capital. Regulators should strengthen macro-prudential management of the banking system to prevent excessive growth of financial risks in the future.

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STAKEHOLDER THEORY
ТЕОРИЯ ЗАИНТЕРЕСОВАННЫХ СТОРОН

Nikolaeva Yu.
Vitebsk State Technological University, Belarus
Николаева Ю.Н.
Витебский государственный технологический университет, Республика Беларусь

Keywords: stakeholder, internal environment, owners, buyers, suppliers, employees, investors, creditors, the state.

Ключевые слова: стейкхолдер, внутреннее окружение, собственники, покупатели, поставщики, работники, инвесторы, кредиторы, государство.

Abstract. Current business development trends require the company to take into account the interests of a wide range of stakeholders that have a positive and negative impact on the company's performance. The article discusses historical milestones in the study and classification of stakeholders. A generalizing conclusion is made.

Аннотация. Современные тенденции развития бизнеса требуют от компании учитывать интересы широкого круга заинтересованных сторон, оказывающих положительное и отрицательное влияние на результаты деятельности компании. В статье рассмотрены исторические вехи в изучении и классификации стейкхолдеров. Сделан обобщающий вывод.

Stakeholder theory (or the concept of stakeholders) is one of the most important areas in modern management. Any organization in the course of its activities interacts in one way or another with stakeholders who can influence the achievement of the goals of the organization's activities or be influenced by the organization. They can be groups or individuals. If a business seeks to achieve successful results, both current and promising, then it needs to take into account the interests of the stakeholders around it.

Stakeholder theory began to take shape in the 1960s in the business world. According to this theory, a company is a part of the environment in which it exists and a system capable of influencing and being influenced by other environmental participants – stakeholders: buyers, suppliers, society, shareholders, investors, employees and other categories of stakeholders. According to research by Charles Fontaine, Anthony Haarman and Stefan Schmid, attempts to identify major stakeholder groups began much earlier. Researcher Dodd argued that General Electric already in 1932 identified four main groups of stakeholders: shareholders, employees, buyers and society as a whole. Johnson & Johnson, as noted in the survey, back in 1947 looked at buyers, workers and managers. In 1950, Sears named "the four parts of every business according to their importance: customers, employees, community, and shareholders." Thus, attempts to identify stakeholders have been undertaken by various companies, but have not been conceptually identified. In the mid-1970s, Russell Ackoff conducted research on stakeholder theory; he singled out suppliers, buyers, employees, investors, lenders, the state and future generations as the main groups of stakeholders. R. Ackoff considered the organization to be an open system capable of solving social problems through effective interaction with stakeholders and believed that the interests of future generations should be taken into account by managers when making decisions. But with the development of economic sciences and organizations as a whole, the number of interested parties increased and such a division into groups, as suggested by R. Ackoff, was not enough. The term stakeholder first appeared in the management literature in 1963 and was coined by a group of researchers at the Stanford Research Institute. It was used to generalize the concept of "shareholder" as the only group to which managers should be held accountable. Initially, in the scientific literature, stakeholders were perceived as "groups without whose support the organization would cease to exist" and included shareholders, employees, customers, suppliers, creditors and society. The researchers argued that without managers understanding the interests and concerns of stakeholders, they will not be able to formulate the corporate goals that need to be achieved for the survival and development of the business. Later on, the concept of "stakeholder" was expanded. A group of scientists from the Stanford Research Institute classified government bodies, local communities, the media, society as a whole, etc. as stakeholders.

Stakeholder theory as it is currently presented was proposed by the American scientist and economist Edward Freeman in Strategic Management: The Stakeholder Concept in 1984 and became widespread in the mid-1990s. In his work, he describes the process of forming a corporate strategy with the participation of stakeholders in

this process. Edward Freeman defines the term "stakeholders", considering that the stakeholders are "persons or groups of persons influencing the activities of the company, and in turn, subject to its influence". As stakeholders, he considers the internal environment: employees, owners, buyers, suppliers; and the external environment: government authorities, competitors, consumer protection societies, environmental protection groups, special interest groups, the media. According to the author, stakeholder theory is a concept of how business actually works. "To be successful, any business must create some value for buyers, suppliers, employees, the community and lenders, shareholders, investors, banks and other groups and individuals. You cannot look at each stakeholder and their influence in isolation; the interests of all interested parties should be assessed. The interaction of managers or entrepreneurs with surrounding stakeholders is aimed at achieving efficiency in the process of meeting their interests and the expectations of stakeholders.

It is worth noting that E. Freeman divided stakeholders into only two groups: internal and external ones in relation to the organization. In our opinion, buyers and suppliers are more likely to be external stakeholders, since they are not part of the organization and, as a rule, require the organization to meet its requirements in relation to the company's products, its activities in general, and can set their own conditions when interacting. Such a phenomenon as "supplier bargaining power" is the confidence of suppliers of raw materials or products in the market to such an extent that they themselves are able to choose customers for cooperation, thereby dictating conditions and influencing the company's activities. However, practice has shown that the classification of stakeholders into two groups is not enough, and later this classification was supplemented by other researchers. In his work, E. Freeman, in the study of relationships with stakeholders, notes the work of I. Ansoff "Corporate Strategy", which examines the concept of balancing the requirements of various stakeholders with the goals of the organization. For the successful functioning of organizations, the author recommends analyzing and taking measures to develop relationships with key stakeholders. Stakeholders in this context are considered managers, employees, shareholders, suppliers, sellers.

To identify key stakeholders, as a rule, the R. Mitchell model is used. The identification of stakeholder groups in this model is based on indicators of power, legality and urgency of stakeholder demands. The most significant stakeholders will have all three characteristics. As can be seen from the figure, the key stakeholders are the "categorical group" (interests have the characteristics of urgency, power and legitimacy); "Dangerous group" (power and urgency of demands), "dependent group" (legality and power) and "dominant group" (legitimacy and urgency of interests).

G. Newbold and G. Luffman offer a different classification of stakeholders. They distinguish four groups of stakeholders: 1) a group of stakeholders financing the organization (shareholders, investors, credit institutions); 2) management, leading the organization; 3) main employees; 4) economic partners (suppliers, buyers).

M. Clarkson subdivided stakeholders into two groups: primary stakeholders (without interaction with which the organization cannot exist): shareholders and

investors, buyers, suppliers, company employees and public stakeholders (state authorities, local administrations) and secondary: groups on interests, media and other non-obligatory stakeholders.

In the process of systematizing the classifications of stakeholders, proposed by domestic and foreign authors, the main criteria have been identified by which groups of stakeholders are determined; a criterion for the direction of influence of stakeholders on the company was introduced. An amended classification of stakeholders is proposed, corresponding to the current level of development of relations between Russian companies and stakeholders; the classification includes four groups: 1) internal or intragroup stakeholders (including subsidiaries and affiliates), 2) external strategic and operational stakeholders, 3) external regulatory and controlling stakeholders, 4) other external stakeholders.

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FEATURES OF THE STRATEGY OF "SMART SPECIALIZATION" AS A PRIORITY DIRECTION OF SOCIO-ECONOMIC DEVELOPMENT OF REGIONS

ОСОБЕННОСТИ СТРАТЕГИИ «УМНОЙ СПЕЦИАЛИЗАЦИИ» КАК ПРИОРИТНОГО НАПРАВЛЕНИЯ СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РАЗВИТИЯ РЕГИОНОВ

Sherstneva O.
Vitebsk State Technological University, Belarus
e-mail: olga_sherstneva@mail.ru
Шерстнева О.М.
Витебский государственный технологический университет, Республика Беларусь

Keywords: regional policy, innovation policy, strategy, smart specialization.
Ключевые слова: региональная политика, инновационная политика, стратегия, умная специализация.

Abstract. The article discusses the main theoretical provisions of the European strategy of "smart specialization", and its tools. The main priorities of the strategy are identified. The key principles of the development of "smart specialization", as well as directions for the development of regional strategies in the Republic of Belarus on the basis of the participation of: the business environment, the scientific environment, civil society and local authorities are determined.

Аннотация. В статье рассмотрены основные теоретические положения европейской стратегии «умной специализации» и ее инструментарий. Выявлены основные приоритеты стратегии. Определены ключевые принципы развития «умной специализации», а так же направления разработки региональных стратегий в Республике Беларусь на основе участия: бизнес-среды, научной среды, гражданского общества и местных органов власти.

In the global economy, many countries, regardless of the level of development, perceive innovation as a solution to problems, both old and new. In this regard, close attention is paid to various instruments of regional development, such as the strategies of "smart specialization" (regional innovation strategies of smart specialization, RIS3), which were initially implemented in the European Union (EU) and, as practice has shown, are able to stimulate innovation in lagging regions.

Smart specialization is defined as a model of regional policy that stimulates economic growth through investment in research and development of innovations and effective coordination of public resources in order to develop entrepreneurship and increase competitiveness.

Smart specialization is aimed at mitigating certain regional problems: the lack of human capital and inequality in access to innovation. These problems hinder the realization of regional potential and make technological changes in the basic sectors of the regional economy impossible.

Smart specialization sets priorities defined on the basis of participation in order to create a competitive advantage by developing the strengths available in the field of research and innovation, correlating them with the needs of the business environment for a coordinated approach to emerging opportunities and market development, while avoiding duplication or fragmentation of efforts [1].

In order to strengthen and stimulate the implementation of the concept of smart specialization, the following conditions are required: 1) The existence of an advanced and genuine administrative, economic and financial decentralization in which local public administration bodies are endowed with all economic, financial and social instruments and can freely use them. 2) State strategies should include elements linked to regional development: encouraging the development of local business, infrastructure development and attracting investments focused on competitive advantages at the local level. 3) The following components should be implemented: support for entrepreneurship, existing business infrastructure (incubators, parks, economic zones). 4) In order to determine the specialization of regions, it is necessary to carry out the processes of opening an entrepreneurial activity within the framework of the

intellectual specialization strategy. 5) The implementation of the goals of the smart specialization concept requires significant funds.

A smart specialization strategy should be developed based on the following key principles: Smart specialization is a place-based approach, meaning that it is based on the assets and resources available to regions and Member States, as well as their specific socio-economic challenges, in order to identify unique opportunities for development and growth; Member States and regions should support only a limited number of clearly defined priorities for knowledge-based investments and/or clusters; Specialization means focusing on competitive advantages and realistic growth potentials supported by a critical mass of activity and entrepreneurial resources. Setting priorities should not be a top-down winner selection process. It should be an inclusive process of stakeholder engagement focused on "opening up entrepreneurship", that is, an interactive process in which market forces and the private sector discover and produce information about new activities, and the government evaluates the results and empowers those actors who are most capable of realizing this potential. The strategy should embrace a broad view of innovation, supporting technological as well as practical and social innovation. This would allow each region and a Member State to form a political choice in accordance with its unique socio-economic conditions. A good strategy should include a reliable monitoring and evaluation system, as well as a review mechanism to update strategic decisions.

The smart specialization strategy should identify priority areas, regions and types of economic activities in which regions or countries have competitive advantages or potential to ensure knowledge-based growth and implement economic transformations necessary to solve the main and most urgent tasks for society and both the natural and man-made environment. The number and nature of these priorities should vary from region to region. However, it should be noted that although the first set of priorities should be defined when the strategy is designed, they can be changed or modified when appropriate by new information/developments.

Priorities can be formulated in terms of areas of knowledge or activities, subsystems within the same sector or different.

The involvement of stakeholders in the process of introducing "smart specialization" in the overwhelming number of regions in the EU took place through the creation of working groups and focus groups, expert meetings and public consultations. In about 30 % of the regions, methods such as road maps and foresight were used [2].

In August 2020, the European Commission signed an agreement on behalf of the European Union with the Government of the Republic of Belarus represented by the Ministry of Economy of Belarus. The agreement provides for the financing of the program from the EU budget in accordance with the European Neighborhood Instrument. The program is aimed at supporting the introduction and research of new approaches to regional development in Belarus, based on European experience. In this case, it is a proven strategy of "Smart Specialization" with the use of public-private partnership mechanisms. The EU will allocate 18.6 million euros to Belarus for the implementation of the regional investment and competitiveness program. The goal of

the program is to promote more effective governance to improve economic growth and employment in regions and districts, as well as to reduce geographical and social inequality. The program is planned to be implemented in Gomel, Mogilev and Vitebsk regions. The program will be funded by grants, which are planned to be sent to local authorities in cooperation with partners to support priority economic and social projects in the centers of economic growth. The program should help reduce geographical and social inequality, as well as promote more effective governance to improve economic growth and employment in regions and districts [4].

"Smart" specialization is important in determining the priorities and directions of regional development, which was first introduced in Belarus in 2015 when developing regional sustainable development strategies [3].

The main provisions of regional development in the Republic of Belarus are formulated in the current National Strategy for Sustainable Socio-Economic Development for the period up to 2030 and the Program of Socio-Economic Development of the Republic of Belarus for 2016–2020. New approaches to regional policy are set out in the National Strategy for Sustainable Socio-Economic Development for the Period up to 2035 (NSUR-2035) and the Program of Socio-Economic Development of the Republic of Belarus for 2021–2025, which are being developed today. The draft document NSUR-2035 indicates that the strategic goal of regional development is to create equal opportunities in the regions to achieve a high level and quality of life of the population based on the realization of personal potential and meeting the needs of citizens, rational allocation of productive forces, efficient, saving and developing use of resources. The main efforts will be focused on ensuring the growth of competitiveness and sustainability of regional economies, strengthening the economic framework of the country through the formation of strong territorial and economic complexes.

Thus, the main task of regional policy in the Republic of Belarus is to increase income from economic activity by stimulating the potential of self-development of territories, improving the quality of life and opportunities for self-realization of citizens in urban and rural areas. To this end, it is planned to comprehensively develop and rationally deploy productive forces, develop resource-efficient and comfortable "smart" cities and towns, increase the sustainability of the development of lagging areas and rural territories, as well as build up the competencies and potential of self-development of territories. The introduction of "smart specialization" can contribute to a more effective solution of the task, as well as open up new directions in regional policy.

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ANALYSIS OF THE STRUCTURE AND GEOGRAPHICAL FOCUS OF TRADE AND ECONOMIC RELATIONS BETWEEN CHINA AND FOREIGN COUNTRIES

АНАЛИЗ СТРУКТУРЫ И ГЕОГРАФИЧЕСКОЙ НАПРАВЛЕННОСТИ ТОРГОВО-ЭКОНОМИЧЕСКИХ ОТНОШЕНИЙ КИТАЯ С ЗАРУБЕЖНЫМИ СТРАНАМИ

Sovetnikova O.
Vitebsk State Technological University, Belarus
e-mail: sovetnikova@bk.ru
Советникова О.П.
Витебский государственный технологический университет, Республика Беларусь

Keywords: export of goods, international trade, trade balance, partners, foreign trade values.

Ключевые слова: экспорт товаров, международная торговля, торговый баланс, партнеры, внешнеторговые ценности.

Abstract. The article analyzes the structure of exports of goods and services of China with foreign countries; an assessment of the main trading partners was carried out; the main trends in the development of China's foreign trade were identified.

Аннотация. В статье проведен анализ структуры экспорта товаров и услуг Китая с зарубежными странами; проведена оценка основных торговых партнеров; определены основные тенденции в развитии внешней торговли Китая.

Thanks to its enormous trade surplus over the past few years, China has become the world's largest exporter and ranks second among the world's largest importers. Despite its strict policies, the country is fairly open to foreign trade, which represented 35.7 % of its GDP in 2019. China's main exports include transmission apparatus for radio-telephony (9 %), automatic data processing machines and units (5.9 %), electronic integrated circuits and microassemblies (4.1 %) and petroleum oils (1.5 %). On the other hand, the country mainly imports electronic integrated circuits and microassemblies (14.8 %), petroleum oils (11.5 %), iron ores (4.8 %), petroleum gas (2.5 %) and motor vehicles (2.3 %). The International Monetary Fund (IMF) is forecasting a rebound of 7.8% in the volume of exports of goods and services of this country in 2021, after a nil increase (0 %) in 2020, and a jump of 10 % of its imports, after a fall of 2.7 % in 2020 [1].

The country's main partners include the United States, Japan, South Korea, Vietnam, Australia and Germany. Increasing tensions in the U.S.-China economic relationship have heightened business uncertainties in 2020, given that the US is the country's main trade partner (China's 2019 trade surplus with the U.S. was USD 295.8 billion after an all-time record of 323.3 billion in 2018). Similar tensions were at play with Australia although with less consequences for China (Table 1).

Table 1 – Main Partner Countries

Main customers	2020, % of exports	Main Suppliers	2020, % of imports
United States	17.5	Japan	8.5
Hong Kong	10.5	South Korea	8.4
Japan	5.5	United States	6.6
Vietnam	4.4	Australia	5.6
South Korea	4.3	Germany	5.1
More Countries	57.8	More Countries	65.8

Source: compiled by the author.

However, the Chinese government has been adopting looser economic policies to mitigate mounting risks to future growth. On the 15th of November 2020 China has signed the Regional Comprehensive Economic Partnership (RCEP) with 14 other Indo-Pacific countries. This free trade agreement is the largest trade deal in history, covering 30 per cent of the global economy.

It includes the Association of Southeast Asian Nations (ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam) and ASEAN's free trade agreement partners (Australia, China, India, Japan, New Zealand and Republic of Korea).

The RCEP covers goods, services, investment, economic and technical cooperation. It also creates new rules for electronic commerce, intellectual property, government procurement, competition, and small and medium sized enterprises (Table 2).

Trade has become an increasingly important part of China's overall economy, and it has been a significant tool used for economic modernisation. As reported by WTO in 2020, exports of goods in 2019 were USD 2,499.4 billion and imports USD 2,078.4 billion, while exports and imports of services in 2019 reached USD 281.6 billion and USD 497 billion respectively (Table 3).

Table 2 – Main products

2,590. 6 bn USD of products exported in 2020	%	2,055. 6 bn USD of products imported in 2020	%
Electrical apparatus for line telephony or line….	8.6	Electronic integrated circuits and micro assemblies	17.1
Automatic data processing machines and units….	6.6	Petroleum oils and oils obtained from bituminous…..	8.6
Electronic integrated circuits and micro assemblies	4.5	Iron ores and concentrates….	5.8
Made up articles of textile materials…..	2.1	Motor cars and other motor vehicles principally….	2.2
Lamps and lighting fittings….	1.5	Electrical apparatus for line telephony or line….	2.1
More products	76.7	More products	64.3

Source: compiled by the author.

China reported an overall 19.5 % increase in exports and 18.7 % rise in imports for 2019. According to the World Bank data of 2019, China's trade surplus for goods stood at USD 425.2 billion, an increase from USD 395.1 billion in 2018 [2].

Table 3 – Foreign trade values (in million USD)

Foreign trade values	2015	2016	2017	2018	2019
Imports of Goods	1 681 951	1 587 431	1 843 793	2 135 748	2 078 386
Exports of Goods	2 274 949	2 098 161	2 263 345	2 486 695	2 499 457
Imports of Services	466,330	453,014	464,133	520,683	496,967
Exports of Services	285,476	208,488	226,389	269,697	281,651

Source: compiled by the author.

The overall trade balance (including services) was USD 164.1 billion in 2019, from 103 billion the previous year. The current stage of development of the world economy is characterized by increasing trends of internationalization of production, interweaving of national economic structures and production processes, increasing the level of economic openness and interdependence of states.

In 2020, China was the third largest partner for EU exports of goods (10.5 %). It was preceded by the United States (18.3 %) and the United Kingdom (14.4 %) and followed by Switzerland (7.4 %) and Russia (4.1 %). It was the largest partner for EU imports of goods (22.4 %), It was followed by the United States (11.8 %), the United Kingdom (9.8 %), Switzerland (6.3 %) and Russia (5.6 %).

The COVID-19 crisis caused both exports and imports between the EU and China to fall in 2020. Exports reached a minimum of EUR 15.0 billion in March 2020. By December 2020 they had recovered to EUR 19.2 billion.

There are the following trends in the development of China's foreign trade:

− continuous growth of the share of foreign trade in the international market, the growth rate of Chinese exports and imports exceeded the growth rate of world trade;

− rationalization of the structure of export and import goods, (China has made the transition from the structure of export goods based on the finished industrial products of surface processing with low added value to the finished products of deep processing with high added value);

− formation of the structure of pluralism of forms of foreign trade;

− during the period of reforms, the People's Republic of China has formed a system of state regulation of foreign trade activities that meets the long-term objectives, and the process of reforming the tariff policy and the application of non-tariff measures in the regulation of foreign trade has also passed several stages, coinciding with the stages of the formation of legislation in the field of foreign trade;

− the flexibility of using the instruments of state regulation of foreign trade allowed minimizing the impact of the global economic crisis on the foreign trade of the People's Republic of China and the country's economy as a whole;

− it ensures that the government in any country achieves favorable conditions for exports, carries out extensive comprehensive multi-level cooperation with various countries and regions, uses significant experience in participating in the globalization of the economy and conducting multilateral negotiations, which is a very valuable asset and allows you to actively participate in the processes of economic globalization within the framework of the World Trade Organization.

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UDC 336.012.23

THE CURRENT STATE OF THE SECURITIES MARKET IN THE REPUBLIC OF BELARUS

ТЕКУЩЕЕ СОСТОЯНИЕ РЫНКА ЦЕННЫХ БУМАГ В РЕСПУБЛИКЕ БЕЛАРУСЬ

Vankevich A., Kolokolchikova A.*
Vitebsk State Technological University, Belarus
*e-mail: alina.kolokolchikova@gmail.com**
Ванкевич Е.В., Колокольчикова А.С.*
Витебский государственный технологический университет, Республика Беларусь

Keywords: securities market, shares, bonds, issuers, investors.
Ключевые слова: рынок ценных бумаг, акции, облигации, эмитенты, инвесторы.

Abstract. All formal conditions have been created in Belarus to ensure that the functions peculiar to the securities market are fulfilled, but in practice, this segment of the financial market is underdeveloped. The Belarusian stock market is characterized by insignificant capitalization, low liquidity, and insignificant turnover. The bond segment of Belarus' securities market is more developed, the role of the bond market in financing the real economy is insufficient.

Аннотация. В Беларуси созданы все формальные условия для того, чтобы обеспечить выполнение функций, свойственных рынку ценных бумаг, однако на практике данный сегмент финансового рынка недостаточно развит. Белорусский рынок акций характеризуется незначительной капитализацией, низкой ликвидностью и несущественными оборотами. Облигационный сегмент рынка ценных бумаг Беларуси развит в большей мере, однако его роль в финансировании реального сектора экономики недостаточна.

The securities market in the Republic of Belarus emerged in 1992 when the Law of the Republic of Belarus "On Securities and Stock Exchanges" was passed. By its 13th anniversary, the market had formed the necessary infrastructure, developed legal regulation mechanisms, and offered investors and issuers some available investment and lending instruments.

In particular, Belarus has a national electronic trading floor "Belarusian Currency and Stock Exchange" JSC, a two-tier depository system, 56 professional participants, and about 3 thousand certified securities market specialists (as of January 1, 2021).

Legislation regulating the issue and circulation of securities is gradually approaching international standards. In the near term, the market will see further changes to simplify the procedure for issuing securities, create an institution of nominee holder of securities, and introduce a new instrument – structured bonds. The relevant draft law will be considered in autumn 2021.

The range of securities market instruments to be issued is represented by stocks of joint-stock companies, bonds of legal entities, state and municipal securities, and securities of the National Bank. As of January 1, 2021, there were 4105 issuers of shares and 269 issuers of bonds in the Belarusian market. The total volume of securities of all types was 70.3 billion Belarusian rubles, which demonstrates, to a certain extent, the potential capacity of the market.

Thus, all formal conditions have been created in Belarus to ensure that the functions peculiar to the securities market are fulfilled, but in practice, this segment of the financial market is underdeveloped.

The Belarusian stock market is characterized by insignificant capitalization, low liquidity, and insignificant turnover. As of January 1, 2021, the weighted average share market capitalization was 59.1 billion Belarusian rubles. The popular Buffett indicator, calculated as the ratio of stock market capitalization to GDP and indicating, among other things, market saturation with securities, was 0.4 %. By comparison, in Russia, the ratio of capitalization of shares included in the Moscow Exchange Index to GDP is 44.5 %, while on the Kazakhstan Stock Exchange this indicator was formed at 27.5 %. Low market liquidity is evidenced by the insignificant number of transactions: by the end of 2020, the Belarusian exchange market had 2853 stock transactions or an average of 11 transactions per day, while in Kazakhstan an average of 795 transactions per day is made. The volume of equity transactions in 2020 was less than 1 % of GDP.

The bond segment of Belarus' securities market is more developed, accounting for more than 97 % of market turnover. Total transactions in all types of bonds in 2020 amounted to 26.9 billion rubles (18.3 % of GDP). In terms of this indicator, Belarus ranks third in the EAEU after Kazakhstan and Russia. However, the structure of issuance shows that this debt instrument is predominantly used by banks and the state, and the share of bonds issued by enterprises is 32.3 % of total issuance. It is becoming clear that the role of the bond market in financing the real economy is insufficient.

In a certain sense, a market is a place where sellers and buyers meet to buy and sell some commodity. In our view, the reserves for the development of the securities market in the Republic of Belarus are primarily concentrated in filling the market with a sufficient number of attractive commodities – investment instruments. This could be facilitated by the sale of state-owned blocks of shares on the stock exchange (without losing control of the state over priority areas). The distribution of stocks to small and medium-sized investors would increase the number of buyers and sellers in the market, which in turn would increase the liquidity of the stock market.

Observations in the financial sector suggest a lack of public awareness of bonds as an alternative to deposits. Increasing financial literacy, making the market accessible to the general public through direct access of non-professional investors to the market for highly reliable securities, and the development of digital technologies will help to boost the securities market in Belarus.

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UDC 004.4 : 336.717.3

CONSTRUCTION CALCULATOR
СТРОИТЕЛЬНЫЙ КАЛЬКУЛЯТОР

Vardomatskaya E.**, Belskaya A.
Vitebsk State Technological University, Belarus
*e-mail: el_v@tut.by**
Вардомацкая Е.Ю.**, Бельская А.А.
Витебский государственный технологический университет, Республика Беларусь

Keywords: algorithm, software, automation, calculator, programming methods, macro programming language VBA, programming environment "Visual Studio-2013", programming language Windows Forms C++.

Ключевые слова: алгоритм, программные средства, автоматизация, калькулятор, методы программирования, язык макропрограммирования VBA, среда программирования Visual Studio 2013, язык программирования Windows Forms C++.

Abstract. The article discusses the capabilities of the VBA macro programming language and the Windows Forms C ++ programming language using the example of the Building Calculator software application. This application is designed to automate the calculation of cost estimates for building materials in the design of residential and office buildings.

Аннотация. В статье рассмотрены возможности языка макропрограммирования VBA и языка программирования Windows Forms C++ на примере

программного приложения «Строительный калькулятор». Это приложение предназначено для автоматизации расчета сметы расходов на строительные материалы при проектировании жилых и административных зданий.

In accordance with the Decree of the President of the Republic of Belarus dated February 25, 2020 No. 70 "On the development of the agro-industrial complex of the Vitebsk region" [1], young specialists who received full-time education at the expense of public funds, as well as on the basis of targeted training, are provided with certain social support measures, a key role among which is the provision of housing and the possibility of building personal housing on concessional lending terms. These measures are aimed at attracting and retaining qualified employees in farms and organizations of the agro-industrial complex.

The purpose of this work is to create a simple and easy-to-use software application "Construction Calculator", with the help of which it is possible to automate the calculation of a preliminary estimate costs for building materials in the design of residential (and office) buildings. The application should provide the user with the following capabilities [2]:

- selection of the calculation object;
- input of initial data - object parameters;
- selection of the type of building material or components;
- calculation of the consumption of building materials of the selected type,
- calculation of the cost of building materials,
- obtaining the result in the required measurement systems.

The subject of research is programming systems for creating automated applications with a graphical interface for calculations according to specified algorithms.

The research toolkit is the "Visual Studio 2013" programming environment, the Windows Forms C ++ programming language and the VBA macro programming language.

The design of the Building Calculator software application was carried out in several stages.

Stage 1. Development of the algorithm and scheme of the application.

The algorithm of the application is a branching structure, each branch of which implements the calculation of a certain indicator of a construction project. The diagram of the application operation algorithm is shown in Figure 1.

Stage 2. Analysis of software products for creating software applications.

Since the application should be simple and easy to use, provide a graphical user interface that allows visualizing the options for building materials under consideration, the Visual Studio 2013 programming environment and the Windows Forms C ++ programming language supporting visual programming methods were used to develop the software interface. To implement the calculations of the estimate elements, constructions of the C ++ language and the macro programming language VBA were used.

Stage 3. Development of the main form of the application.

In accordance with the algorithm of work, after starting the application, the main form with a graphical interface appears (Figure 1). On this form, you can select the direction of calculation: house component, required building materials, type of roof. To do this, select with the mouse pointer the corresponding figure, which is a button, and, as a result, go to the corresponding window-form for calculating the quantity and cost of the required materials. To implement such transitions, the corresponding procedures were written in the C ++ language.

The calculation of each of the indicators is based on well-known mathematical formulas implemented in the corresponding program modules-subroutines written in the C++ language. For ease of implementation and scalability, these modules are combined into a single software structure. A fragment of the subroutine for calculating the consumption of materials when designing, for example, a shed roof is shown below.

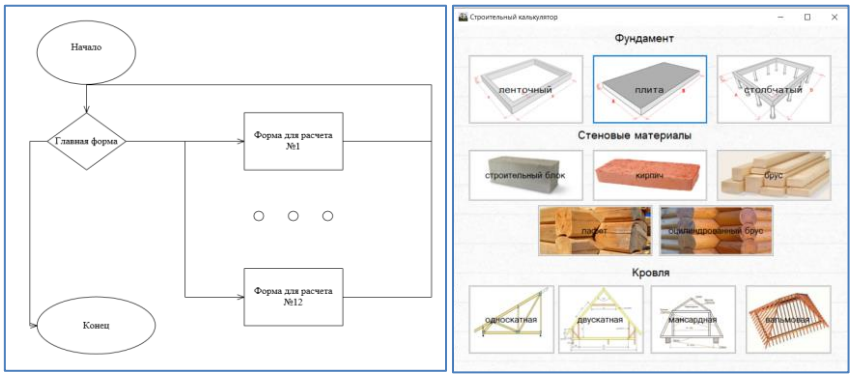

Figure 1 – Scheme of the algorithm and the main form of the application

```
if (a <= 0 || b <= 0 || c <= 0 || d <= 0){
  listBox1->Items->Add("Input error ");}
else{ Ds = sqrt(pow(a, 2) + pow(b, 2));     // slope length
  S = c*(Ds + d);                           // roof area
  Ks = b / 0.7;                             // number of rafters
  Sr = (0.1 + 0.9) *d;//
  K = S / Sr;                               // rows on the lathing
  Ss = (0.1 + 0.9) * 6;                     // lathing area with a board width of 100 mm and a pitch of 90 cm and a long board of 6 m
  Kr = S / Ss;                              // number of boards for lathing
if (Ds<=0 || S<=0 || Ks<=0 || Ss<=0 || Kr<=0, K<=0)
  {listBox1->Items->Add("Check if the data is correct");}
else
  {listBox1->Items->Add("Roof area "+Convert::ToString(S) + " м2");
  listBox1->Items->Add("Number of rafters" + Convert: :ToString(round(Ks)));
  listBox1->Items->Add("A board with a width of 100 mm and a length of 6 m is used ");
  listBox1->Items->Add("Lathing step 90 cm ");
```

```
        listBox1->Items->Add("Number of rows per lathing" +
Convert::ToString(round(K)));
        listBox1->Items->Add("Number of boards per lathing" +
Convert::ToString(round(Kr)));}}
```

Thus, the user only needs to enter the initial data – the estimated parameters of the object, and click the "Calculate" button. This button activates the execution of the corresponding program module, the result of which can be seen in the output window. If necessary, the calculations can be repeated by changing the initial data. To do this, use the "Clear" button.

The developed application is simple and easy to use, has a friendly interface, and does not require any special programming skills. Its versatility lies in the possibility of an initial assessment of the consumption and cost of various combinations of building materials in the design of residential and office buildings. A potential applicant for the construction of his own house, including a young specialist, before contacting a construction organization, using this application can make certain decisions for himself. At the same time, such a construction calculator may, to a certain extent, be in demand in construction companies. However, it is worth noting that any calculator software products are still not professional calculation tools and the calculations performed with their help may have some inaccuracies.

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ANALYSIS OF THE CHARACTER AND MEASURES OF RELATIONS BETWEEN PERSONAL AND SUBSTANTIAL ELEMENTS IN THE PRODUCTION ENVIRONMENT

АНАЛИЗ ХАРАКТЕРА И МЕРЫ СВЯЗЕЙ МЕЖДУ ЛИЧНОСТНЫМИ И ВЕЩЕСТВЕННЫМИ ЭЛЕМЕНТАМИ В ПРОИЗВОДСТВЕННОЙ СРЕДЕ

Vardomatskaya E.*, Sysoev I., Ivanova A., Ilyina D.
Vitebsk State Technological University, Belarus
*e-mail: el_v@tut.by**
Вардомацкая Е.Ю.*, Сысоев И.П., Иванова А.А., Ильина Д.А.
Витебский государственный технологический университет, Республика Беларусь

Keywords: anonymous survey, working conditions, educational level, labor efficiency indicators, coefficient of mutual conjugation, Pearson criterion.

Ключевые слова: анонимное анкетирование, условия труда, уровень образования, показатели эффективности труда, коэффициент взаимной сопряженности, критерий Пирсона.

Abstract. The article discusses some of the issues of the effectiveness of the use of human resources based on the study of satisfaction with working conditions. A quantitative and qualitative assessment of the performance of labor and its dependence on the degree of satisfaction with the labor of workers is carried out on the basis of the method of correlation tables using the MS Excel spreadsheet processor as a toolkit.

Аннотация. В статье рассмотрены некоторые вопросы эффективности использования человеческих ресурсов на основе изучения удовлетворенности условиями труда. Количественная и качественная оценка результативности труда и зависимости его от степени удовлетворенности трудом работников проводится на основе методики корреляционных таблиц с использованием в качестве инструментария табличного процессора MS Excel.

The widespread development of a market economy requires constant improvement of the production process based, first of all, on the active introduction of new technologies and new economic relations into production, designed to achieve competitive advantages based on the results of labor activity. Such advantages can be achieved not only by improving the technological process, but also by introducing new forms and methods of labor organization, optimal use of human resources. Personal characteristics of employees, social and moral relations in the team, satisfaction of employees with working conditions affect labor productivity to no less extent than new machines, processes and mechanisms.

Modern studies of economists and production psychologists, carried out on the basis of experimental data, show that the following can be singled out as the main factors that form the estimated attitude of personnel to the work performed [1]:

− organizational, characterizing the state of labor organization, sanitary and hygienic conditions, wages and performance of norms and functions by employees;

− personal, reflecting the age, seniority and educational composition of employees, satisfaction with hours of work, their specialty, work performed;

− social and economic relationships, reflecting both the relationship in the team and the social development of the organization.

The purpose of this study is to analyze the data of a sociological survey and determine the nature and extent of the relationship between the personal characteristics of workers and indicators of labor and production efficiency.

The object of research is the production team of the open joint-stock company "Krasny Oktyabr". The proportion of respondents was about 15 % in relation to the total number of workers at the enterprise. The material for the study was the data obtained as a result of an anonymous correspondence survey of employees of the Vitebsk enterprise "Krasny Oktyabr". This type of survey provides the most complete and reliable information.

The primary sociological information that was collected during a survey of employees of the above-mentioned enterprise was processed in the MS Excel environment.

The results of the percentage distribution of answers to the questions of the questionnaire concerning the job satisfaction of workers of OJSC "Krasny Oktyabr" are shown in Figure 1.

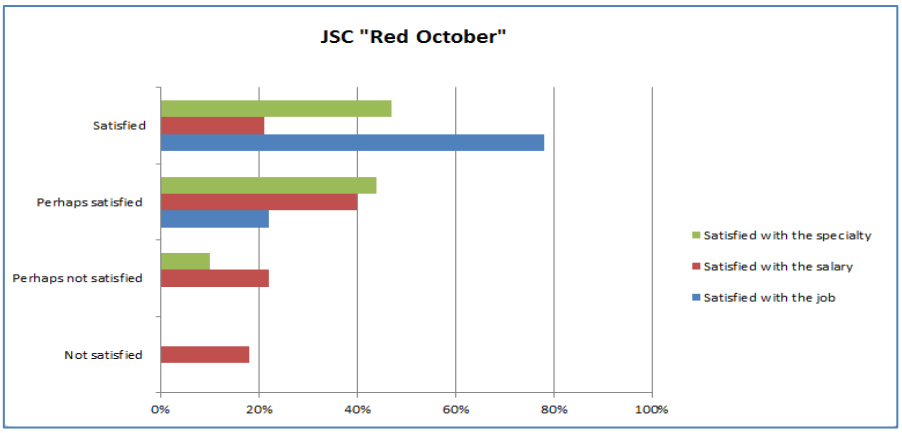

Figure 1 – Satisfaction with the work (received by the specialty, wages, work performed) of the personnel of OJSC "Krasny Oktyabr"

According to the results of the analysis, it can be noted that the level of satisfaction with the work of the enterprise personnel according to these indicators (Figure 1) is quite high. As you can see, the largest share of complete satisfaction (more than 75 %) is the specialty received and the work performed (more than 45 %). At the same time, the level of satisfaction with wages is quite low (from 20 % to 40 %).

To assess the randomness (or non-randomness) and the tightness of the relationship between qualitative characteristics, the methodology of V.V. Kovalev was used [2]. In accordance with this technique, if there are more than two qualitative features (that is, they are not alternative), then the presence of a connection between them is determined by the Pearson's mutual conjugacy coefficient *C*. The value of the Pearson's mutual conjugacy coefficient is within the same limits as the correlation coefficient. At the same time, conclusions about the dependence of qualitative characteristics, made only on the basis of the coefficient of mutual conjugation, should be supported by statistical criteria. For example, Pearson's $\chi 2$ test. allows you to judge the randomness (non-randomness) of the distribution in the tables of mutual conjugation, and, consequently, the absence or presence of a relationship between the characteristics of the grouping. In accordance with the described methodology, the assessment of the tightness of the relationship between the level of education and the rate of output among workers and specialists of OJSC "Krasny Oktyabr" was carried out in several stages.

Stage 1. On the basis of tables with "closed" survey data, tables of mutual conjugation were compiled, in which the actual empirical values *f1-f9* were calculated using the built-in functions of MS Excel.

Stage 2. The total values of the number of employees with different production rates (m1, m2, m3) and the number of employees with the corresponding educational level (n1, n2, n3) were calculated.

Stage 3. Based on the table of mutual contingency with empirical (actual) frequencies, the theoretical (expected) frequencies of distribution of answers to questions were calculated.

Stage 4. The coefficient of mutual conjugation *C* was calculated, which characterizes the tightness of the existing connection between the studied features.

Stage 5. The tabular values of the Pearson criterion $\chi 2$ were calculated for the significance level p = 0.05 and six degrees of freedom (4-1) * (3-1) = 6, corresponding to the contingency table, and the significance value of the Pearson criterion $\chi 2$.

The results of the analysis of the dependence of the fulfillment of production standards on the level of education of the personnel of OJSC “Krasny Oktyabr” are presented in Table 1.

Table 1 – The results of the analysis of the dependence of the fulfillment of production standards on the level of personnel education

Secondary education,%	Higher education, %	Pearson Mutual Contingency Coefficient (*C*)	Pearson criterion ($\chi 2$)	Significance ($\chi 2$)
43.33	56.67	**0.685**	26.49 > 12.59	0.00018<0.05

* compiled by authors

The value of the coefficient of mutual conjugation C = 0.685 allows us to conclude that for the considered enterprise, the relationship between the fulfillment of the

production rate by workers and the level of education is statistically significant and significant.

According to the results of the analysis, it can be noted that a tendency towards an increase in the dependence of labor productivity on the level of education is clearly manifested. However, among personnel with incomplete higher and higher education, the degree of dissatisfaction with the chosen profession is growing, which may affect this trend. This situation can be explained by the low profitability of the enterprise and the low level of sales of manufactured products at the present time [3].

The proposed approach to the analysis of the performance of workers makes it possible to study and assess the level of labor organization at enterprises of various forms of ownership and, as a consequence, to develop recommendations for drawing up a plan of measures aimed at improving the conditions for organizing labor and production and encouraging personnel to increase the level of education.

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JEL Codes: G30, G32, G33

FINANCIAL RATIO ANALYSIS AS A SOURCE OF INFORMATION FOR USERS CONCERNED

ФИНАНСОВЫЙ КОЭФФИЦИЕНТНЫЙ АНАЛИЗ КАК ИСТОЧНИК ИНФОРМАЦИИ ДЛЯ ЗАИНТЕРЕСОВАННЫХ ПОЛЬЗОВАТЕЛЕЙ

Wang Rui[1], Yang Siyan[2]
Vitebsk State Technological University, Belarus
e-mail: 100203377@qq.com[1], 952659348@qq.com[2]
Ван Жуйн[1], Ян Сыянь[2]
Витебский государственный технологический университет, Республика Беларусь

Keywords: financial ratio analysis, ratio, users, interest group, information expectations of users.

Ключевые слова: финансовый коэффициентный анализ, коэффициент, пользователи, группы пользователей, информационные ожидания пользователей.

Abstract. The article deals with the ratio analysis as the most basic tool in financial analysis. Despite the inherent informational limitations of financial statements, they are still the main source of information for financial analysis. The users of the financial information are the ones who read the financial statements of the company because they have an interest in the company directly or indirectly. The article present the users interested in the financial ratio analysis information and a list of factors of professional interest for each of these users.

Аннотация. В статье рассматривается коэффициентный анализ как базовый инструмент финансового анализа. Несмотря на присущие финансовым отчетам информационные ограничения, они по-прежнему являются основным источником информации для финансового анализа. Пользователи финансовой информации – это те, кто читает финансовую отчетность компании, поскольку прямо или косвенно заинтересован в компании. В статье представлены пользователи, заинтересованные в информации финансовой отчетности, и перечень факторов профессионального интереса для каждого из этих пользователей.

Despite the inherent informational limitations of financial statements, they are still the main source of information for financial analysis. This is due to the following. First, it is reliability. The information contained in the accounting reports is the final product of specialized information technology – accounting, which functions according to the legally established rules. This ensures the reliability of the received information. Secondly, it's a certain accessibility. Accounting implements the right to information in the business environment. Thirdly, accounting reports are the best information model of an organization's activity. Moreover, cost indicators represent it, which allows the use of formalized methods of financial analysis. This, in turn, ensures the objectivity of its results. Fourthly, the possibility of applying unified methods of financial analysis. However, despite a certain demand, the evolving information expectations of users should be taken into account in the formation of reporting.

Financial statements, as a financial means, reflect the financial results of business activities by reflecting the financial situation, operating results and cash flow of the enterprise. However, the data on the financial statements alone cannot directly or comprehensively explain the financial situation of the enterprise. Only by comparing the financial indicators of the enterprise with the relevant data we can explain the position of the financial situation of the enterprise. Therefore, the ratio analysis method should be used to analyze the financial statements of the enterprise. Ratio analysis is the most basic tool in financial analysis, but it also has limitations. We can pay attention to the comprehensive point between indicators and solve the problem of ratio analysis

correctly. Financial ratio analysis mainly includes solvency, profitability, operating capacity and so on.

The users of the information will want to know the information that can be seen in Table 1. However, such information is not at all complete information that they would ever want to know about a problem of interest to them, but such information is a starting point for us to think about various information needs and issues for both different users and questions of different users.

Table 1 – Information needs of accounting data users

Investors	To help them determine whether they should buy shares in the business, hold on to the shares they already own or sell the shares they already own. They also want to assess the ability of the business to pay dividends.
Lenders	To determine whether their loans and interest will be paid when due
Managers	Might need segmental and total information to see how they fit into the overall picture
Employees	Information about the stability and profitability of their employers to assess the ability of the business to provide remuneration, retirement benefits and employment opportunities
Suppliers and other trade creditors	Businesses supplying goods and materials to other businesses will read their accounts to see that they don't have problems: after all, any supplier wants to know if his customers are going to pay their bills!
Customers	The continuance of a business, especially when they have a long term involvement with, or are dependent on, the business
Governments and their agencies	The allocation of resources and, therefore, the activities of business. To regulate the activities of business, determine taxation policies and as the basis for national income and similar statistics
Local community	Financial statements may assist the public by providing information about the trends and recent developments in the prosperity of the business and the range of its activities as they affect their area
Financial analysts	They need to know, for example, the accounting concepts employed for inventories, depreciation, bad debts and so on
Environmental groups	Many organizations now publish reports specifically aimed at informing us about how they are working to keep their environment clean.
Researchers	Researchers' demands cover a very wide range of lines of enquiry ranging from detailed statistical analysis of the income statement and balance sheet data extending over many years to the qualitative analysis of the wording of the statements

There is no doubt that any analysis is aimed primarily at obtaining useful information for making management decisions, while each level of management of your business will not always be interested in the same information. But in addition to internal users, external (in relation to your business) users are also interested in the analysis

information, the largest of which in this country is the government, i.e. ultimately a collection of officials pretending to be concerned about the development of your business. Therefore, Table 2 below presents the users interested in the financial ration analysis information and a list of factors of professional interest for each of these users.

Table 2 – Financial ratios of interested user groups

Interest Group	Ratios to watch
Investors	Return on Capital Employed Earnings per Share Dividends per Share Dividend Yield Interest Cover Liquidity P/E Ratio
Lenders	Gearing ratios Interest cover Dividend payout ratio Dividend Cover Dividend Yield
Managers	Profitability ratios Asset turnover ratios Liquidity ratios Investor ratios Stock, debtors and creditors turnover ratios
Employees	Return on Capital Employed Profitability Cash flow figures Investor ratios
Suppliers and other trade creditors	Profitability Liquidity Creditors' turnover Working capital management
Customers	Profitability Liquidity Return on Capital Employed
Governments and their agencies	Profitability Liquidity Return on Capital Employed
Local community	This could be a long and interesting list
Financial analysts	The majority of all ratios
Environmental groups	Expenditure on anti pollution schemes Expenditure on animal based research Donations to charities and political organisations
Researchers	Depends on the purpose of their study

Undoubtedly, it is very important to have a list of ratios and a list of persons for whom such ratios are of professional interest, but it is also important to know where to get all the necessary information to calculate these ratios. Expanding the informational boundaries of accounting reports is a necessary and objectively possible process. After all, the quality of initial information determines the quality of economic decisions made on its basis.

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UDC 339.32

ASSESSMENT AND CLASSIFICATION OF CLUSTERS ACCORDING TO THE METHODOLOGY OF THE EUROPEAN UNION: EXPERIENCE FOR BELARUS

ОЦЕНКА И КЛАССИФИКАЦИЯ КЛАСТЕРОВ ПО МЕТОДОЛОГИИ ЕВРОПЕЙСКОГО СОЮЗА: ОПЫТ ДЛЯ БЕЛАРУСИ

Yashava G.*, Nikolaeva Yu.
Vitebsk State Technological University, Belarus
*e-mail: gala-ya@list.ru**
Яшева Г.А.*, Николаева Ю.Н.
Витебский государственный технологический университет, Республика Беларусь

Keywords: cluster, cluster approach, economic growth, cluster strength, cluster size, cluster specialization, cluster performance, European Union, SMEs, innovation leader.

Ключевые слова: кластер, кластерный подход, экономический рост, сила кластера, размер кластера, специализация кластера, производительность кластера, Европейский Союз, МСП, лидер инноваций.

Abstract. For the effective implementation of cluster policy in Belarus, it is necessary to study and summarize more than 30 years of foreign experience in creating clusters and national programs to support their development. The article defines the importance of cluster formations for increasing the country's competitiveness; the European experience of classification of clusters is analyzed, the methodology of "three stars" is studied; cluster formations in Belarus and the tendencies of their formation are determined.

Аннотация. Для эффективной реализации кластерной политики в Беларуси необходимо изучить и обобщить более чем 30-летний зарубежный опыт создания кластеров и национальных программ поддержки их развития. В статье определено значение кластерных образований для повышения конкурентоспособности страны; проанализирован европейский опыт классификации кластеров, изучены методология «трех звезд», определены кластерные образования в РБ и тенденции их формирования.

The cluster strategy for the innovative development of economies is widely used in many countries of the world. The importance and significance of cluster structures is confirmed by the following world facts:

- about 40 % of jobs in the world are formed in clusters;
- more than 90 % of industry in Denmark, Finland, Norway and Sweden is covered by clustering;
- about 25 % of the total number of jobs are in strong clusters, i.e. regional clusters with significant critical mass;
- almost 38 % of the workforce in the European Union is formed in more than 2.0 thousand clusters and related organizations registered with the European Cluster Observatory;
- more than 60 % of US GDP is formed in clusters and more than 50 % of US industrial companies are located in them [1].

At the same time, a number of issues related to assessing the effectiveness of clusters have not yet been resolved. This determines the relevance of the topic.

The purpose of the research is to study the methodology for assessing and classifying clusters in the European Union and to develop recommendations for Belarus.

Clusters, seen as points of economic growth on the map of Europe, have become important elements of the overall recovery program for the European economy. In the policy documents of the European Commission and the Council of the European Union, clusters are identified as effective means for strengthening regional innovation and narrowing the gap between business, research and resources, as well as those included in the programs of European regional policy for the period 2007–2013. Moreover, in the announcement of the new EU long-term budget cycle (2021–2027), clusters are mentioned as the core of industrial competitiveness under the European Union's flagship research and innovation program, Horizon Europe [2].

The cluster assessment methodology is given in the EU report "Methodological report for the European panorama of clusters and industrial changes" [3]. According to this methodology, cluster strength is measured using cluster stars introduced and identified earlier by the European Cluster Observatory. The European Observatory for Clusters and Industrial Change is expanding this methodology by adding two new stellar cluster sizes and introducing a new classification to measure the strengths of the cluster. Under the new methodology, the strength of a cluster is calculated using a cluster matching approach, but with an adapted approach. Cluster strength is based on traditional measures of cluster size, specialization, and employee productivity, and is complemented by two new categories of SMEs (high growth) and leadership in productivity and innovation. The newly introduced evaluation criteria are aimed at ensuring the right balance to better reflect the dynamics of cluster productivity and the role of cooperation between firms of different sizes.

The degree to which clusters have reached this specialized critical mass is determined by assigning them up to three stars for each of the following five categories:

1. Size: total number of employees in full-time equivalent units in the industry for a given region. This indicator reflects general employment indicators;

2. Specialization: measured by the location ratio, which is calculated as the ratio between the share of the industry in the total number of people employed in a given region and the share of the industry in the total number of people employed in all countries;

3. Productivity: measured by the average wage per worker. Performance levels vary across Europe, and these differences are accounted for as part of the cluster strength metric;

4. Productivity of SMEs: measured by the number of fast growing firms. Research shows that entrepreneurial activity drives economic growth, and entrepreneurship policies in highly developed countries should focus on potentially fast-growing new firms;

5. Innovation Leaders: measured by the number of the world's top firms (5 % of the top firms in terms of productivity). This indicator is important because the relative strength of such firms reflects their ability to innovate, quickly disseminate and replicate leading-edge ideas [3].

For the first three categories, a star is assigned to regions that rank in the top 20 % in all regions of Europe. These stars are then added up over three years to get the final one. For the latter two categories, leaders in SME productivity and innovation, three stars are assigned to regions in the top 20 percent in Europe over a nine-year period, two stars for those in the top 20–40 percent, and one in the top 40–60 percent. Thus, the number of stars in the cluster ranges from 0 to 15.

By the number of cluster stars, the following clusters can be distinguished:

1. High-performing clusters are regional concentrations of exporting industries with the participation of: high productivity in size, specialization and productivity, i.e. at least 3 stars for two of them and 2 stars for one of them, or at least 8 stars; medium to high performance indicators for SMEs and innovation leaders, i.e. at least 3 stars for one of them and 2 stars for the other, or at least 5 stars. Collectively, this gives at least 13 stars that can be earned in any possible combination across the five dimensions.

2. Medium-performing clusters are regional concentrations of exporting industries with the participation of: average indicators in terms of size, specialization and productivity, i.e. at least 3 stars for one of them and 2 stars for the other two, or at least 7 stars; average performance of SMEs and innovation leaders, i.e. at least 3 stars for both together. Together, this gives at least 10 stars.

3. Basic-performing clusters are regional concentrations of exporting industries with the participation of: low indicators in terms of size, specialization and productivity, i.e. at least 4 stars; low performance indicators for SMEs and innovation leaders, i.e. at least 3 stars for two indicators. Together, this gives at least 7 stars.

Figure 1 shows the distribution of identified clusters.

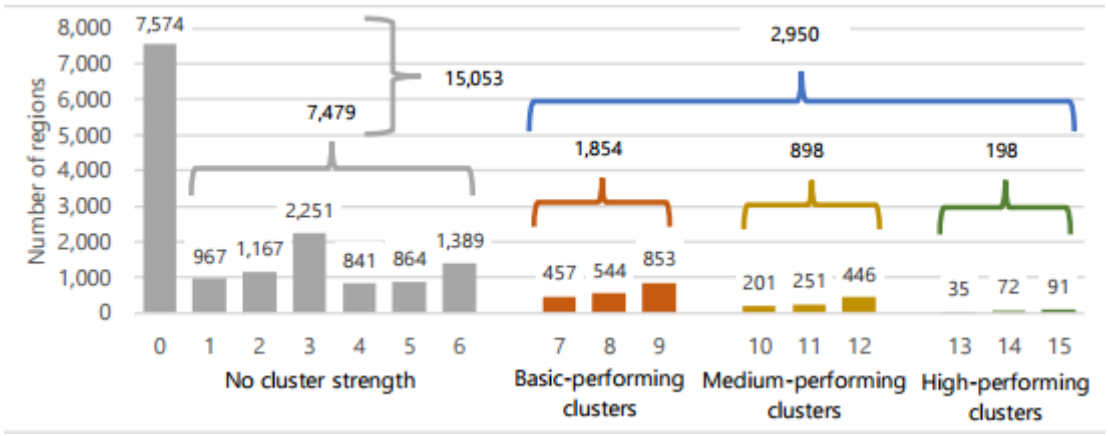

Figure 1 – Distribution of clusters according to the strength of the stars.
Source: compiled by the author.

In accordance with the above methodology, which mainly uses data for 2017, a total of 2,950 clusters were identified from the European cluster database, including 198 high-performance clusters, 898 clusters with average performance and 1,854 clusters with this performance. There are 15,053 exporting industries that do not have strong clustering, i.e., where the number of cluster stars is 6 or less.

In Belarus, the clustering process is at an early stage. Today the "cluster landscape" of Belarus is represented by the following categories:

− operating clusters – formations of legal entities that have taken shape organizationally, have elected the Cluster Council, implement a formalized cluster development strategy (cluster project), and regularly carry out activities in agreed areas of activity. Today there are four of them: an IT-cluster of the city of Minsk based on the scientific and technological association "Infopark" and the Park of High Technologies (unites more than 50 organizations); the medical and pharmaceutical cluster of the Vitebsk region on the basis of the union of legal entities "Medicine and Pharmaceuticals – Innovative Projects" (unites about 10 organizations); cluster in the field of instrument making in Minsk and the Minsk region on the basis of the Association "Innovative Instrument Making" (unites 10 organizations); cluster in the field of biotechnology and green economy of Pripyat Polesie on the basis of Polesie State University and Technopark Polesie LLC (unites 28 legal entities);

− emerging clusters – which have initiative groups for their creation, have formed Cluster Councils, and have also taken the first steps in cooperation based on the cluster development model. To date, four of them have been identified;

− potential clusters – fifteen groups of business entities that could become locomotives of economic development in their territories [4].

In the countries of Europe and the CIS, clusters have already proven their effectiveness and are perceived as one of the main tools for the development of entrepreneurship. The cluster model of the organization of the economy is able to stimulate the most dynamic development of the regions. The Belarusian business

community should follow the successful example and use the cluster approach for business development, first of all, in the regions of the country, where it is especially important to maintain the competitiveness of small and medium-sized enterprises, to attract additional investments in the regional economy.

For an in-depth analysis of clustering, as well as for the formation of cluster strategies in Belarus, the EU experience in assessing the effectiveness of clusters using the "three stars" methodology will be useful.

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UDC 33.011

THE EXPERIENCE OF THE EUROPEAN UNION IN THE FORMATION OF CLUSTER INITIATIVES AND PROGRAMS

ОПЫТ ЕВРОПЕЙСКОГО СОЮЗА В ФОРМИРОВАНИИ КЛАСТЕРНЫХ ИНИЦИАТИВ И ПРОГРАММ

Yashava G.*, Vailunova Yu., Panchenko K.
Vitebsk State Technological University, Belarus
*e-mail: gala-ya@list.ru**
Яшева Г.А.*, Вайлунова Ю.Г., Панченко Е.В.
Витебский государственный технологический университет, Республика Беларусь

Keywords: cluster, cluster policy, European Union, innovation, innovation strategy, regional program.

Ключевые слова: кластер, кластерная политика, Европейский Союз, инновации, инновационная стратегия, региональная программа.

Abstract. The purpose of the article is to study the European experience in the formation of cluster programs. The ways of organizing interventions within the framework of regional cluster policy are studied. The analysis of cluster initiatives and EU programs, including goals, objectives and areas of activity, is carried out. The

directions of formation of successful cluster initiatives of practical interest to Belarus are formulated.

Аннотация. Цель статьи – изучение Европейского опыта формирования кластерных программ. Изучены способы организации интервенций в рамках региональной кластерной политики. Проведен анализ кластерных инициатив и программ ЕС, включая цели, задачи и направления деятельности. Сформулированы направления формирования успешных кластерных инициатив, представляющих практический интерес для Беларуси.

The experience of the European Union in the formation of cluster initiatives and programs is very much in demand in Belarus for making decisions on the implementation of the Cluster Concept for innovative development.

In Europe, in most cases, support for cluster programs is carried out within the framework of regional innovation strategies. In regions such as Catalonia (Spain), Norte (Portugal), Wallonia (Belgium), Hovedstaden (Denmark), Normandy (France), Baden-Württemberg (Germany), there are regional cluster development programs.

The annual budget for cluster programs is quite varied – from 144 million euros in France for the Pôle de compétitivité program to 57 million euros in the UK (under the Strength in Territories fund) and 45 million euros in Germany for various programs. The sources of funds for the existence of cluster programs are the state and the participants themselves, paying certain contributions, private investments from various associations, foundations, international organizations. At the same time, it is important to note that the rapid popularization of the ideas of cluster development and cluster policy has caused skepticism from the academic community. Some researchers note the paradox of cluster policy or question the very need for government participation in the formation of clusters.

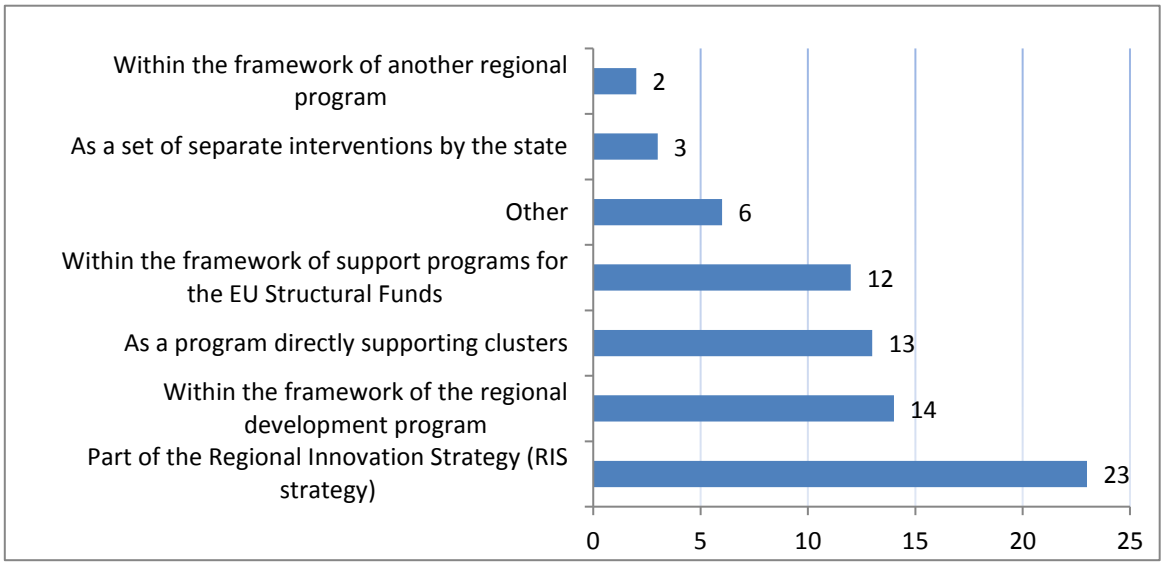

Figure 1 – Method of organizing interventions within the framework of regional cluster policy

Source: based on [3, 5].

The EU supports the clusters mainly through the European Regional Development Fund and its Regional Innovation Strategies program. Its main directions are the following:

- making innovations one of the priorities of regional policy;
- an increase in the number of innovative projects implemented by firms;
- development of cooperation and cooperation between enterprises and government agencies.

One of the organizations that stimulate the development of clusters existing in Europe - the European Secretariat for Cluster Analysis (ESCA) – was created to provide advice and disseminate knowledge and methodology to all participants in cluster development. As part of its activities, ESCA is engaged in the promotion and dissemination of best practices in cluster management through benchmarking and awarding "quality marks" to clusters and cluster management companies; forms a methodology for the formation of cluster development programs, and also supports an expert network on cluster development issues. European cluster initiatives and programs are presented in Table 1.

Table 1 – Cluster initiatives and EU programs

Name of the cluster initiative and programs	Goal	Tasks, directions of activity
European Cluster Alliance	Pooling of resources and further development effective cluster policies avoiding redundancy and duplication functions at the national level	development of political dialogue at the EU level between national and regional government bodies responsible for the development of the cluster politicians and those who run or finance the cluster programs
Europe INNOVA	Enhancement competitiveness and innovation development	− creation an innovative laboratory for the development, testing and promotion of new innovation support tools to simplify the creation process innovative enterprises; − become the main pan-European platform for managers individual companies, cluster managers, investors, politicians, within which they will have the opportunity to discuss, develop, test and share “best innovative practices”
The European Cluster Observatory	Access to statistical information about clusters, their participants, regional cluster policies in Europe. Activities are targeted at pan-European, national, regional and local policymakers as well as cluster leaders and representatives of SMEs	− analyzes and prepares reports on regional conditions of competition, transnational networks of cluster development, clusters in new industries, studying the best practices of creating cluster organizations; − functioning of the official European cluster mapping tool, providing access to sectoral and cross-sectoral as well as regional data on clusters and providing information on their geographical concentration in Europe in a visual form

Cluster partnership «EcoCluP»	Promotion of environmental solutions through clusters. Working in eco-innovative industries such as waste processing, water purification, reclamation of disturbed lands, pollution control, environmentally friendly sources energy	− implementation developing strategies for the internationalization of clusters; − promoting eco-solutions to the European market; − encouraging the exchange of skills and experience between cluster participants and cooperation in the field of R&D; − creation of training programs for cluster managers; − organization of trainings and coaching programs
Cluster partnership "ABCEurope"	Expansion of partnerships between European biotechnology clusters and their members to create world-class biotechnology clusters in the EU	− development of tools to support the internationalization of small and medium-sized biotechnology enterprises; − developing and testing new, more effective measures and tools to support innovation of SMEs and providing better tools to cluster managers; − provision of legal protection of intellectual property – development of standard agreements in the field of intellectual property rights; − facilitating access to the objects of the pan-European scientific and research infrastructure of individual clusters and organizations

Source: based on [1, 4, 8, 10].

The formation of such associations makes it possible to identify the needs of enterprises and organizations participating in the cluster in personnel, the amount of funding for cluster projects, thematic events, consulting services, information about potential partners, to promote the development of a modern legal and regulatory framework in the field of regulating the activities of clusters, to promptly inform about possible financial, organizational and information support, organize joint projects with the participation of the maximum number of clusters and cluster organizations, ensure greater transparency of government procedures and decisions for cluster members, provide equal access to information and support for cluster members, ensure collective interests when entering various markets, including international.

A study of the above initiatives and programs allows us to formulate the following main features of a successful cluster initiative:

− taking into consideration the interests and specific needs of the members of the association;
− providing information support and ensuring lobbying of interests;
− significance both at the regional and national level;
− awareness of national executive authorities about cluster;
− initiatives in the region or their determination of the right directions for the formation of clusters;
− taking part in specialized events initiated by the government;
− active positioning both at the regional and national and international levels (participation in competitive procedures, specialized events, surveys, etc.);

− the presence of a fairly clearly expressed innovative component;
− formation within the framework of the cluster initiative of a management team, cluster development centers, etc.

These directions are of practical interest for Belarus.

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COMPUTER MODELLING OF INVESTMENT RISKS

КОМПЬЮТЕРНОЕ МОДЕЛИРОВАНИЕ ИНВЕСТИЦИОННЫХ РИСКОВ

Yashava G.**, Vardomatskaya E., Mareckya V., Lebedeva V.
Vitebsk State Technological University, Belarus
*e-mail: gala-ya@list.ru**
Яшева Г.А.**, Вардомацкая Е.Ю., Марецкая В.Д., Лебедева В.С.
Витебский государственный технологический университет, Республика Беларусь

Keywords: investment analysis, startup project, key parameters of an investment project, performance criteria, startup sensitivity, startup risks, algorithm, software, computer model, programming methods, VBA macro programming language.

Ключевые слова: инвестиционный анализ, стартап-проект, ключевые параметры инвестиционного проекта, критерии эффективности, чувствительность стартапа, риски стартапа, алгоритм, программные средства, компьютерная модель, методы программирования, язык макропрограммирования VBA.

Abstract. The article discusses methods for analyzing the risks of investment projects; a computer model has been developed for calculating and assessing the risks of an investment project by the method of sensitivity analysis of performance criteria and the method of scenarios. For this purpose, on the basis of VBA programming technologies and macro programming technologies in the MS Excel spreadsheet processor environment, a software application has been designed. The methodology was tested on the example of a startup project.

Аннотация. В статье рассмотрены методы анализа рисков инвестиционных проектов; разработана компьютерная модель расчета и оценки рисков инвестиционного проекта методом анализа чувствительности критериев эффективности и методом сценариев. Для этой цели на базе технологий программирования на языке VBA и технологий макропрограммирования в среде табличного процессора (ТП) MS Excel спроектировано программное приложение. Проведена апробация методики на примере стартап-проекта.

In the context of the current state of the external environment – a downturn in business activity and stagnation of many economies of the world due to the Covid-19 pandemic, the development of a startup movement stimulates the innovative inclusive growth of the country. Startups are embedded in global value chains, in regional clusters, thereby promoting employment and creating new jobs [4]. The business model of a startup is based on the creation of an innovative product, therefore, in order to provide new accelerators for the growth of the economy of the Republic of Belarus, it is advisable to stimulate the development of innovative entrepreneurship and start-up movement. Support for the start-up movement in Belarus is one of the most important

tools for the development of innovative entrepreneurship. A feature of startups is a low level of business survival. Thus, according to the Startup Genome Report, 92 % of launched startups and 74 % of Internet startups are closed due to premature scaling and an increase in the company's staff.

At the same time, simple methods and algorithms for assessing the effectiveness of a startup project in the MS Excel environment and assessing the risks (sensitivity) of the project for making business decisions by startups have not yet been sufficiently developed.

The purpose of the study is to develop methods and tools for modeling and assessing the effectiveness and risks (sensitivity) of a startup project in the MS Excel environment.

Tasks:

− to develop a methodology for assessing the effectiveness of a startup in the MS Excel environment and to test it;

− develop an algorithm for assessing the sensitivity of a startup project and recommendations for its use in making business decisions.

− develop a computer model for assessing the effectiveness and risks of a startup project.

In accordance with the methodology of business planning [3, 4], an algorithm for evaluating the effectiveness of a startup (software application) is proposed, which includes the following stages of implementation.

Stage 1. Selecting indicators for evaluating the effectiveness of a startup. Indicators for assessing the effectiveness of a business project are determined in accordance with the regulatory document on business planning – Resolution of the Ministry of Economy of the Republic of Belarus dated August 31, 2005 No. 158 "On approval of the rules for developing business plans for investment projects" [2]:

1. net present value (NPV);
2. index of return on investment (ROI);
3. dynamic payback period (current);
4. internal rate of return (IRR);
5. the sensitivity of the startup project.

Stage 2. Determination of the initial data. Based on the data of the financial plan for each individual startup, the following indicators are calculated:

1.the size of the initial investment in a startup (one-time costs for the acquisition and installation of fixed assets; for registration and registration of a business, obtaining licenses, marketing, etc.);

2. calculation horizon (defined as the payback period plus 1 year) [2];

3. discount rate (taken at the level of the National Bank's refinancing rate or the actual interest rate on long-term bank loans. A risk adjustment from 5 to 25 % may be added) [2];

4. current costs of production and sale of a product by years of project implementation (costs are calculated by cost elements) [2].

Stage 3. Calculation of baseline values of startup performance indicators. The calculation is carried out in the MS Excel environment based on the developed software application.

To simulate the calculation of each of the four indicators of the investment project, the corresponding modules have been developed, placed on separate sheets of the MS Excel workbook and ensuring the execution of input operations, as well as the calculation of the corresponding indicator of the startup's efficiency and the formulation of conclusions based on the results. The mechanism for filling tables with data and calculating efficiency criteria is automated by means of a system for end-to-end addressing of cells with elements of macro programming. To implement the calculations, formulas have been compiled using built-in functions: financial, statistical, logical and mathematical categories. To navigate between application modules, controls and a system of hyperlinks have been developed.

Stage 4. Modeling and risk assessment of a startup project.

To simulate and analyze the risks (sensitivity) of start-up projects, a computer model has been developed, implemented using the MS Excel software application. When developing the application, VBA programming technologies and macro programming capabilities were used. The computer model is based on an algorithm compiled by the authors, which includes the following actions.

1. Calculation of efficiency indicators: net present value (NPV), profitability index (IR), dynamic payback period (Current) when the following factors change:
   - increase in the cost of production and sale of products (works, services);
   - increasing the volume of initial investment in a startup;
   - decrease in sales volumes (proceeds from sales).
2. Analysis of sensitivity indicators characterizing the sensitivity of the project for each of the factors.
3. Development of three types of startup scenarios – probable (the base one with a probability of 0.5), the worst one – "pessimistic" (with a probability of 0.25), and the best one – “optimistic” (with a probability of 0.25), with a corridor of changes in key parameters ± 5 % [1].
4. Investigation of the influence of a set of key project indicators on the value of the efficiency criterion for each of the scenarios based on the analysis of probabilistic estimates of its deviations.

Templates of tables with formulas in cells to automate the calculation of the sensitivity of startup project performance criteria to changes in the baseline indicators of the project are presented in the Sensitivity Analysis module in the application developed by the authors. When you enter into the template tables different variants of the values of the initial data – the size of the initial investment, cash flows – using the formulas and built-in functions of the "Financial" category, the values of the main performance indicators of the investment startup project are calculated. By varying the initial values of the above factors (initial investment, sales volume and production costs), it is possible to interactively simulate and evaluate the values of the net present value, the profitability index and the dynamic payback period of the startup in question.

Analysis of probabilistic estimates of deviations of key indicators of a startup allows not only to determine the break-even point of a project, but also to assess the viability of a startup in principle.

The application was tested on the example of a start-up project for organizing a virtual eco-farm "i-FerMir", developed under the supervision of Prof. Yasheva G.A, Doctor of Economics.

Thus, the methodology for analyzing and assessing the risks (sensitivity) of a startup, implemented with the help of a computer model developed by the authors in the environment of the MS Excel software application, allows in an interactive mode not only to simulate various scenarios for the implementation of the project, but also to determine the critical values of factors and, thereby, contribute to developing effective business solutions. Thus, in order to prevent the critical importance of changing factors, a startup can adjust their business strategy.

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UDC 336.2

FEATURES OF FINANCIAL LEASING AS A TYPE OF INVESTMENT ACTIVITIES

ОСОБЕННОСТИ ФИНАНСОВОГО ЛИЗИНГА КАК ВИДА ИНВЕСТИЦИОННОЙ ДЕЯТЕЛЬНОСТИ

Zanevskij E.
Yanka Kupala State University of Grodno, Belarus
e-mail: zanevskijzenia@gmail.com
Заневский Е.К.
Гродненский государственный университет имени Янки Купалы, Республика Беларусь

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Ключевые слова: лизинг, финансовый лизинг, инвестиционная деятельность, лизингодатель, лизингополучатель.

Abstract. This article considers such a concept as leasing, financial leasing in particular, its difference from rent and credit. Key information about some of its components is provided, such as the definitions of lessor and lessee, their key takeaways. The article highlights the features of financial leasing as a type of investment activity.
Аннотация. В данной статье рассматривается сущность понятия «лизинг», в частности «финансовый лизинг», отличие его от аренды и кредита, выделяя преимущества и недостатки одних перед другими, даются ключевые сведения о некоторых его составляющих, таких как лизингодатель и лизингополучатель, их отличия и важнейшие функции, выделяются особенности финансового лизинга как вида инвестиционной деятельности.

Now almost all organizations are in the conditions of a lack of money. And, despite the need to modernize production, they, largely, do not have the means to update them. In this case, financial leasing comes to the rescue, which allows getting the opportunity to modernize production lines at the expense of future income, without worsening its financial situation. In addition to all of the above, favorable taxation and freedom of contractual relations between leasing entities make it even more attractive [2].

There is no single and precise interpretation of the concept of "leasing", since a huge number of economists, considering it from different angles, give different formulations. Some consider leasing in different ways of lending activities, others do not see any difference with lending. However, it is still possible to formulate this concept as follows.

Leasing is an operation in which the lessor, at the direction of the lessee, buys equipment, property to be leased to the lessee. A lessor is essentially someone who grants a lease to someone else. As such, a lessor is the owner of an asset that is leased

under an agreement to a lessee. The lessee makes a one-time payment or a series of periodic payments to the lessor in return for the use of the asset.

Key takeaways:

− A lessor is the owner of an asset that is leased, or rented, to another party, known as the lessee.

− Lessors and lessees enter into a binding contract, known as the lease agreement, that spells out the terms of their arrangement.

− While any sort of property can be leased, the practice is most commonly associated with residential or commercial real estate – a home or office.

Although some economists identify leasing as a kind of lease and in many documents leasing is identified with one of its types, we must say that the possibilities and functions of leasing are much broader.

One of the main differences between leasing and lease is that equipment or property, specially acquired by the lessor for him at his request, is leased to the lessee for use. However, it must be said that this property is owned by the lessor throughout the entire term of the contract.

When renting for the acquisition of property, an additional purchase and sale agreement is concluded. In a leasing relationship, immediately in the initial contract, ownership rights are already spelled out after the expiration of the lease.

Thus, leasing can be considered a modified form; there are not many differences between them.

It is also worth representing leasing, in terms of its content, is similar to a loan. Credit – a loan provided by its owner (lender) to the borrower on terms of repayment and for a fee in the form of a certain percentage for the use of money capital.

So, what are the similarities and differences between leasing and credit?

Let's start with differences (advantages) of leasing:

− For financing organizations – the possibility of expanding the segmentation market, on which financial activities are carried out, allows to solve the problem of temporary settling of funds and the need to use them in circulation

− The ability to quickly attract the required assets in cases where it is not possible to obtain a loan. The basic principles of credit relations are implemented – urgency, payment, repayment

− Under the terms of the lease agreement, the object is transferred to the lessee only on the basis of the rights of use, when the owner of the leased property is the lessor [1, p. 5], which receives periodic lease payments made by the lessee for the right to use its owner for the aggregate period, after which, in addition to his principal amount, he also receives remuneration

− When leasing in the early years, the rent payments are less than the amounts usually paid to repay the loan (this difference can be used for other good purposes)

− 100 % of the leased property is financed – the buyer does not need to look for funds to pay off part of the cost of the goods

Now our conversation goes to the similarities:

− Allows you to solve the problem of temporary settling of funds and the need for their use in circulation

− The basic principles of credit relations are implemented – urgency, payment, repayment

− The owner of the capital provides it for a certain period, after which, in addition to their principal amount, they also receive remuneration.

Financial leasing is a complex set of contractual relations carried out on the basis of purchase and sale and property lease agreements. The sale and purchase agreement assigns to the lessor the obligation to acquire ownership of the equipment for the next lease to the lessee in accordance with the property lease (leasing) agreement.

You can have the following distinctive features of financial leasing:

− the lessee has the right to choose both the item of purchase and its seller;

− the property is purchased for some purposes with prior notice to the seller;

− claims for quality, equipment, etc. during the warranty period, the lessee presents the property to the seller;

− service maintenance and insurance of the leased object are the obligations of the lessee;

− the lessor retains the ownership of the property, and its use cedes to the lessee. [4]

Both for the lessor and the lessee, the goals of leasing are similar to the goals of the investment process: in leasing, free financial resources are invested in physical assets – fixed capital.

That is, we can say that if, when concluding a loan, there is a process of redistribution of ownership of the already necessary financial resources among themselves, then leasing allows purposefully creating new assets in the real sector of the economy: the lessee and the lessor enter into a relationship with respect to capital, but not in monetary, but in a productive form, acquiring some property.

Leasing activity is one of the types of investment activity for the acquisition of property and its transfer to lease, where leasing means a set of legal and economic relations arising in connection with the implementation of a lease agreement.

A leasing transaction consists of the following stages:

1. The lessor enters into a contract with the supplier.

2. When required, the lessor concludes receives a loan from the bank.

3. The lessee and the lessor enter into a lease agreement.

In all leasing relationships, the lessor acquires the required objects with only one purpose – their subsequent lease. In addition, the object of leasing relations for the lessor cannot be a product of its own production, since the lessor, being an intermediary between the manufacturer and the consumer, in no case has the right to combine these functions.

Thus, it can be stated that leasing, being a universal and flexible tool that allows you to implement investment schemes, for the most part meets the tasks of updating

production and developing the real sector, the interests of business entities and the needs of the market.

The use of leasing not only makes it possible to expand the possibilities of the subjects of the financial capital market, to put into operation new equipment, but, in the end, also enables the industry to offer consumers a greater number of goods and services. Moreover, it should be noted that leasing in the service sector contributes to an increase in the general standard of living of the population. At the micro level, the leasing decision depends on the profitability of specific projects and the associated cash flows. That is why the issues of using leasing schemes are often considered in the context of investment management.

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UDC 338

SMALL AND MEDIUM BUSINESSES AS COMPONENTS IN THE STRATEGY OF SUSTAINABLE DEVELOPMENT OF THE ECONOMY OF THE REPUBLIC OF BELARUS

МАЛОЕ И СРЕДНЕЕ ПРЕДПРИНИМАТЕЛЬСТВО КАК КОМПОНЕНТЫ В СТРАТЕГИИ УСТОЙЧИВОГО РАЗВИТИЯ ЭКОНОМИКИ РЕСПУБЛИКИ БЕЛАРУСИ

Zanevskij E.
Yanka Kupala State University of Grodno, Belarus
e-mail: zanevskijzenia@gmail.com
Заневский Е.К.
Гродненский государственный университет имени Янки Купалы, Республика Беларусь

Keywords: sustainable development, economy, business, small and medium business, state program.

Ключевые слова: устойчивое развитие, экономика, предпринимательство, малое и среднее предпринимательство, малый и средний бизнес, государственная программа.

Abstract. The article analyzes one of the strategic goals of sustainable development – building an economy with developed institutions of business, the contribution of small and medium-sized businesses to the main economic indicators of the development of the Republic of Belarus. The main directions of the implementation of state policy in the field of small and medium-sized businesses are demonstrated. Attention is paid to the country's positions in the World Bank's Doing Business rating. The main regulatory legal acts aimed at improving the business climate in the country are considered.

Аннотация. В статье проведен анализ одной из стратегических целей устойчивого развития – построение экономики с развитыми институтами предпринимательства, вклада субъектов малого и среднего бизнеса в основные экономические показатели развития РБ. Продемонстрированы основные направления проведения государственной политики в сфере малого и среднего предпринимательства, рассмотрены нормативно-правовые акты, направленные на развитие бизнеса в стране. Также в статье уделили внимание нашим позициям в рейтинге «Ведение бизнеса» от Всемирного банка.

Small and medium-sized businesses (SMBs) or small and medium-sized enterprises (SMEs) are enterprises with a headcount below certain limits. The abbreviation SME is used by international organizations such as the World Bank, European Union, United Nations and World Trade Organization (WTO).

The Belarusian model of a socially oriented market economy is a highly efficient economy with highly developed entrepreneurship and market infrastructure, ineffective government regulation that motivates entrepreneurs to expand and modernize production.

One of the strategic goals of sustainable development of the Republic of Belarus in the field of economics is the construction of an effective socially-oriented market economy with developed institutions of entrepreneurship.

The small enterprise is entrepreneurship based on the activities of small firms, small businesses that do not formally belong to the association [4].

The expansion of small and medium-sized businesses is the basis of social stability in any country. Small and medium-sized businesses are the dominant industry in the market economy, which gives it the required flexibility and can be considered a solid foundation for creating conditions for intensive economic growth. Stable socio-economic development directly depends on the level of activity of small and medium-sized enterprises (SMEs). SMEs are responsible for stimulating innovation and competition in various sectors of the economy.

The importance of the small business is manifested in its ability to both quickly respond to consumer demand and quickly satisfy it, showing high mobility. These characteristics become overly significant in the 21st century, because the rate of innovation in absolutely all areas is growing, and the entrepreneurship sector generates ideas that in the near future will provide a completely new development of the economy [2].

It is worth mentioning that the modern stage of entrepreneurship development in the Republic of Belarus is characterized by the fact that the small business is considered not only as a way to guarantee employment of the population, which leads to a corresponding decrease in the unemployment rate, but also as one of the significant sources of economic growth.

The development of entrepreneurship in the Republic of Belarus helps to solve such problems as:

- saturation of the market with various services and goods,
- strengthening the economic base of local authorities,
- development of villages, small and medium-sized towns,
- overcoming sectoral and territorial monopoly.

The state program for the development of small and medium-sized enterprises seeks to ensure a consistently high level of employment and economic growth. The most important areas for the implementation of this state policy include:

- improvement of documentation for the growth of small and medium-sized businesses (a simpler procedure for registering business entities, fewer administrative restrictions, etc.);
- development of credit and financial mechanisms, property support and other measures to encourage the development of SMEs;

− increasing the efficiency of functioning and subsequent development of the infrastructure for supporting small businesses (creation of support centers, technology parks, etc.);

− development of international cooperation in the field of small and medium-sized businesses;

− cooperation between government bodies and business unions.

The private small and medium-sized business sector in the Republic of Belarus has been growing steadily lately. Its contribution to the main macroeconomic indicators is increasing due to the fact that entrepreneurs are quicker to adapt to various emerging conditions.

In order to increase the volume of activities of entrepreneurs and encourage their activity, the President's Decree No. 7 "On the Development of Entrepreneurship" of November 23, 2017 was adopted, which implies a radical change in the technology of interaction between business and government regulatory bodies, minimizing the degree of incursion by officials into their work and strengthening the self-control mechanisms of entrepreneurship. However, at the same time, the elementary required degree of control on the part of the state remains the same [1].

On October 17, 2018, the Council of Ministers adopted the Strategy for the Development of Small and Medium-Sized Businesses "Belarus – a Country of Successful Entrepreneurship" until 2030 with the aim of increasing the share of small and medium-sized businesses in the socio-economic development of the Republic of Belarus, creating an environment for equal competition.

This decree established the preferential vectors for the development of entrepreneurship not only for the medium term, but also for the long term, the key tasks and principles of regulation by the state [3].

As a result of the implementation of this strategy, it is planned to increase the representation of small and medium-sized businesses in the total gross value added up to 50 % by 2030.

According to the World Bank, we can say with pride that Belarus ranks 5th in the Business rating in terms of the number of reforms carried out (37 reforms were carried out).

In conclusion of this work, summing up all of the above, it should be noted that in the state program the development of SMEs (small and medium-sized enterprises) is declared as one of the national benchmarks for the development of the economy, which can be considered a solid basis for the formation of conditions for intensive economic growth, the program defines main vectors of SME development.

Due to the relatively low level of competition, small business in Belarus can improve quite well. It is known that our country is one of those where the state has the minimum number of restrictions on starting a business, if we compare other states. One of the distinguishing features of the business environment in Belarus is the fact that it is, for the most part, represented by small and medium-sized enterprises.

The high position of Belarus in the World Bank's Business rating testifies to the effectiveness of the country's reforms. The President's Decree "On the development of entrepreneurship" and the strategy for the development of small and medium-sized businesses "Belarus – a country of successful entrepreneurship" are considered the most important documents helping small and medium-sized businesses to develop.

The state program for the development of small and medium-sized businesses sets itself the goal of ensuring the level of employment of the population at a decently high level and contributing to a good rate of economic growth. This requires contributing to the improvement of the business environment, helping small and medium-sized businesses in their development, perfecting the infrastructure for supporting small and medium-sized businesses, and promoting the formation of a positive attitude towards entrepreneurs' initiatives.

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CONTEMPORARY INDUSTRIAL DEVELOPMENT AND TRANSFORMATION OF INDUSTRIAL POLICIES

СОВРЕМЕННОЕ ПРОМЫШЛЕННОЕ РАЗВИТИЕ И ТРАНСФОРМАЦИЯ ПРОМЫШЛЕННОЙ ПОЛИТИКИ

Zhao Xin, Vankevich A., Aliakseyeva A.*
Vitebsk State Technological University, Belarus
*e-mail: Alekseeva@vstu.by**
Чжао Синь, Ванкевич Е.В., Алексеева Е.А.*
Витебский государственный технологический университет, Республика Беларусь

Keywords: industrial development, industrial policy, transformation of industrial policies.

Ключевые слова: промышленное развитие, промышленная политика, трансформация промышленной политики.

Abstract. This article the transformation of industrial policy as part of the economic development strategy and the most important instrument for the economic growth of countries in the context of industrial development, taking into account the interests of various groups: politicians, business community and economists, etc. The article identifies the priorities of industrial policy: encouraging innovation and modernization of the industrial structure, support for effective competition in the market, improvement of market mechanism. An important part of China's industrial policy is the mechanism of coordination of interests to regulate the relationship of interests between central and local governments, giving local governments a leading role in epy industrial development.

Аннотация. В данной статье рассматриваются вопросы трансформации промышленной политики как части стратегии экономического развития и важнейшего инструмента экономического роста стран в условиях развития промышленности с учетом интересов различных групп: политиков, представителей бизнес-сообщества и экономистов и др. В статье определены приоритеты промышленной политики: поощрение инноваций и модернизация структуры промышленности, поддержка эффективной конкуренции на рынке, совершенствование рыночного механизма. Важной частью промышленной политики Китая является механизм координации интересов для регулирования отношений интересов между центральными и местными органами власти, передача местным органам власти ведущей роли в промышленном развитии.

Over the past several decades, the discussion of the development and implementation of industrial policy has attracted increased attention from various interest groups: politicians, representatives of the business community and economists. Industrial policy is part of the strategies for economic development of all advanced countries and the most important instrument for the economic growth, its content is

associated with the creation of conditions for increasing the competitiveness of manufacturers, manufactured products, specific industries, regions, and the national economy as a whole. The relevance of the topic is caused by the need to respond to global changes in the technical, technological and socio-economic spheres, to ensure that the structure of the national economy corresponds to them in order to maintain sustainable economic growth.

The objective of industrial policy is a set of economic variables set by policy makers in order to realize industrial development according to the industrial conditions in different periods. This paper holds that the goals of the new industrial policy should be based on the following aspects:

First, we should encourage innovation and upgrade the industrial structure. Innovation is a very complex activity, it is not a simple technical behavior, but a comprehensive of a wide range of economic, technological, political and social behavior. When a country has entered into the phase of modern economic growth, after analyzing the meaning of innovation from the Angle of industrial policy, is the core function of industrial policy to encourage innovation, which guarantee a certain stage of economic development in the overall industrial structure, organization, technology innovation, build the conditions favorable to the industrial innovation, encourage the development of creative industries, Expand the spread effect of industrial innovation, so as to promote the upgrading of industrial structure. Specifically, the selection of leading industries should be based on the market mechanism, and the policy focus should be on promoting the adoption of advanced technologies and processes, driving the development of relevant departments, and forming new production functions. For the adjustment of traditional industries, mainly to promote its Innovation in management and technology, and transformation of traditional industries with high and new technology.

In conclusion, under the current trend of world economic development, it is realistic to set the core goal of industrial policy as encouraging innovation. Whether it is based on the realization of diversified economic growth goals (sustainable growth, protection of resources and environment, relief of employment pressure), or it is based on the improvement of international competitiveness and encouraging innovation, The development of high-tech industry is the most fundamental way.

Second, we should promote competition and maintain competition order. Competition is an important part of market mechanism, and its role is to promote the effective operation of price allocation mechanism. The complexity of the real environment determines the diversity of competition. In the real market, perfect competition is impossible and has never existed, so the concept of "effective competition" is usually used to reflect the market competition.

Under the background of economic globalization, the governments of all countries realize that it is very important to foster an effective and fair competitive environment through industrial policies. A fair market environment will mobilize a steady stream of international resources. Therefore, to share the fruits of economic globalization, the government must create a fair market environment for competition. To the international

economic transition, the market should be cultivated and the market mechanism perfected. It is an urgent and arduous task to make the market the main regulator of resource allocation.

Mechanism of action of the new industrial policy – market mechanism is the basic form. China's economy in the new century will show many characteristics of mature market economy. China's industrial policy will also be run on the basis of a market economy. Therefore, in the formulation of industrial policies, it is necessary to pay more attention to the role of the market mechanism and use more fiscal, tax, price, information and other means to indirectly guide the development of the industry, while minimizing the use of administrative means. This also means that the formulation of industrial policies to understand more about the operation of the market economy, understand the use of various economic means of the law, which put forward higher requirements for the formulation of industrial policies.

To prevent the failure of industrial policy, industry coordinated development pattern should be embodied in, under the limited intervention of government to give play to the role of market mechanism to adjust the industry development, the central government not only to the intervention by limited to provide the necessary guidance to industry development policy, more should attach great importance to the construction of the market economy environment, the investment subject in the market under the guidance of industrial policy to achieve goals. At the same time, it is necessary to establish a corresponding interest coordination mechanism to regulate the interest relations between the central and local governments and between local governments, so that local governments can take the lead in industrial development.

The realization of interests as the premise of the implementation of the central industrial policy; By creating the market economy environment of equal competition, the local government can give play to its own advantages, reduce the interest friction between the regions, and break the regional blockade through the establishment of a unified market system. Under the guidance of the macro-industrial policy of the central government, the local industry development goals can be realized.

The traditional practical measures of industrial policy can no longer meet the practical needs of the current industrial policy, so we must design effective practical towing means according to the practical objectives, method principles, economic operation system and ownership structure of the current industrial policy.

China aims to advance its national development goals and future global economic position through industrial policies that seek global civilian and military leadership in advanced and emerging technologies. China’s policies feature a heavy government role in directing and funding Chinese firms to obtain foreign expertise and intellectual property (IP) in areas where the United States has strong comparative advantages (e.g., aerospace, semiconductors, microelectronics and pharmaceuticals).

Made in China 2025 (MIC 2025) – a broad umbrella industrial plan China introduced in 2015 – seeks to boost China’s economic competitiveness by advancing China’s position in the global manufacturing value chain, leapfrogging into emerging technologies, and reducing reliance on foreign firms. MIC 2025 emphasizes

technology advancement and innovation as drivers of growth and productivity, although the strategy looks to obtain foreign expertise to fill key technology gaps. The plan promotes diverse forms of state ownership and control and allows Chinese firms flexibility to access global markets, potentially obscuring the full extent of the role of the state.

China seeks to upgrade its economy from one that largely assembles goods for foreign firms to one that increasingly invents the products it makes. MIC 2025 notes that "China's manufacturing sector is large but not strong." The plan prioritizes upgrading manufacturing through advances in technology innovation (smart manufacturing) and manufacturing-tied services.

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UDC 656.078

ASSESSMENT OF THE TRANSPORT INFRASTRUCTURE OF THE WORLD MARKET

ОЦЕНКА ТРАНСПОРТНОЙ ИНФРАСТРУКТУРЫ МИРОВОГО РЫНКА

Zhuchkevich O.
Vitebsk State Technological University, Belarus
e-mail: olga_zh17@ mail.ru
Жучкевич О.Н.
Витебский государственный технологический университет, Республика Беларусь

Keywords: cargo transportation, transport infrastructure, transport routes, transport corridors, investments, gross domestic product, efficiency.

Ключевые слова: грузоперевозки, транспортная инфраструктура, транспортные пути, транспортные коридоры, инвестиции, валовой внутренний продукт, эффективность.

Abstract. The importance of transport infrastructure in the economy is considered. The assessment of the elements of the transport infrastructure of the world market has been carried out. The level of investments in transport infrastructure by countries and types of transport has been analyzed. A comparative assessment of the dynamics of GDP and investments in transport infrastructure of individual countries has been made.

Аннотация. Рассмотрено значение транспортной инфраструктуры в экономике. Осуществлена оценка элементов транспортной инфраструктуры мирового рынка. Проанализирован уровень инвестиций в транспортную инфраструктуру по странам и видам транспорта. Произведена сравнительная оценка динамики ВВП и инвестиций в транспортную инфраструктуру отдельных стран.

In the context of economic growth an increase in industrial output, sales and income growth, the demand for cargo transportation is also growing. The factors that increase the demand for transport also include globalization, the integration of international markets, the improvement of vehicles and transportation technologies, including through the development of logistics.

An increase in the efficiency of transport functioning is possible only with the sustainable development of the region, since this creates prerequisites for additional investments in transport infrastructure, additional opportunities for optimizing transport flows. In addition, it becomes really possible to solve environmental problems of the functioning of transport. As a result, there is a decrease in the level of the transport component in the final price of goods, the elimination of economic imbalances between individual regions, an increase in access to new markets, the development of cooperation, which is a significant competitive advantage of the region and affects economic growth.

Thus, there is a relationship between the level of development of the transport complex and the degree of sustainability of the region, between the quality of transport infrastructure and the country's macroeconomic indicators. Transport infrastructure is a set of elements that ensure the implementation and management of the transport process. At the same time, such elements of transport infrastructure as roads, railways and waterways, hubs, ports, as well as transport corridors are considered as factors of direct influence on the level of transport system development (Table 1).

A significant part of the world transport infrastructure is made up of transport corridors which combine several types of transport at once and pass through the territory of several countries. These are not only important transport routes, but also a special system of transport process management.

So, the implementation of large infrastructure projects in the Eurasian region includes transport routes of the Chinese initiative "One Belt – One Road" in the East-West directions, international road corridors of the Shanghai Cooperation Organization and transport corridors of the Central Asian Economic Cooperation Program (CAREC), "Europe - Caucasus – Asia "(TRACECA)," North-South " [1].

Table 1 – TOP-10 countries: total length of transport routes (2019)

Country	Railways lines, km	Country	Motorways, km	Country	Inland waterways, km
USA	149407,0*	USA	107227	USA	40000
Canada	62959,0*	Kazakhstan	95629	Finland	8125
Germany	38394,0	Uzbekistan	42695	Germany	7675
France	27483,0	Azerbaijan	19176	Netherlands	6297
Ukraine	19799,0	Spain	15585*	France	4827
Poland	19398,0	Germany	13183	Kazakhstan	4106
Italy	16779,0	France	11671	Poland	3722
United Kingdom	16289,0*	Italy	6966	Romania	2635
Kazakhstan	16060,8	United Kingdom	3838*	Belarus	1889
Spain	15526,0	Portugal	3065	Ukraine	1888

Note: * – data 2018.

Source: compiled by the author based on [2].

As for ports, the largest container processing takes place in the ports of China, as well as the Netherlands and South Korea (Table 2).

Table 2 – Leading global container ports

In million TEU

Container ports	2018	2019	Rate of increase, %
Shanghai, China	42,01	43,30	3,1
Singapore	36,6	37,2	1,6
Ningbo Zhoushan, China	26,35	27,49	4,5
Shenzhen, China	27,74	25,77	0,1
Guangzhou, China	21,87	23,23	5,9
Busan, Южная Корея	21,66	21,99	1,5
Hong Kong, China	19,6	18,30	-6,6
Qingdao, China	21,01	18,26	8,8
Tianjin, China	16,01	17,30	8,0
Rotterdam, Netherlands	14,51	14,82	2,1

Source: compiled by the author based on [3].

As can be seen from the Table, China leads both in the number of seaports and in the volume of containerized cargo handling. At the same time, European and North American ports represented only 12,4 % and 6,6 % of the total, respectively.

At the present stage of the dynamics of economic development, the effective functioning of the transport complex and ensuring a high level of the economic development depend on the the scale of investments in transport infrastructure. Infrastructure investment covers spending on new transport construction and the improvement of the existing network. Infrastructure investment is a key determinant of performance in the transport sector. Inland infrastructure includes road, rail, inland waterways, maritime ports and airports and takes account of all sources of financing.

Efficient transport infrastructure provides economic and social benefits to both advanced and emerging economies by improving market accessibility and productivity, ensuring balanced regional economic development, creating employment, promoting labour mobility and connecting communities.

Table 3 presents the volume of investments in the transport infrastructure of the leading countries of the world transport market.

Table 3 – Transport infrastructure investments (2019)

In million euros

Country	Rail	Road	Maritime ports	Inland waterways	Airports	Total
China	95008,7	614669,9	*	*	26678,7	736357,3
USA	11587,2	93962,1	*	294,7	*	105549,3
United Kingdom	13298,4	9642,6	*	*	*	22941,0
India	10368,6	12461,4	79,7	*	*	22909,7
Japan	9174,7	30027,3	2774,9	*	1882,4	43859,3
Germany	6948,0	16650,0	510,0	1100,0	1880,0	27088,0
Russia	6677,9	6710,8	469,4	121,8	472,8	14452,7
Turkey	1732,7	6138,7	91,2	*	2539,7	10502,3
Canada	1366,4	7543,2	944,3	*	1177,9	11031,8
Belarus	236,2	1157,8	*	0,598	5,1	1399,7

Note: * – no data.

Source: compiled by the author based on [4].

The volumes of investments show the importance of certain types of transport in the economies of different countries and differ significantly in absolute value. A more accurate assessment of the effectiveness of infrastructure policy in transport requires a comparison of investment growth rates and GDP growth rates (Table 4).

The analysis shows that in countries where there is a high increase in investment in the development of transport, there is also a significant increase in GDP. And Belarus takes leading positions in this assessment.

Table 4 – The dynamics of GDP and transport infrastructure investments (2016–2019)

Country	Growth rate, %	
	GDP	Transport infrastructure investments
China	128,3	126,1
USA	114,4	109,7
United Kingdom	104,7	103,9
Japan	103,2	95,3
Germany	111,3	133,5
Russia	132,9	108,9
Turkey	88,4	92,5
Canada	113,6	115,7
Belarus	134,9	130,1

Source: compiled by the author based on [4, 5].

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SECTION 3. LANGUAGE EDUCATION FOR SPECIFIC PROFESSIONAL SKILLS

UDC 811:004.9

FROM THE NEWWAVE EXPERIENCE OF THE FOREIGN LANGUAGE TEACHING AT TECHNICAL UNIVERSITY

ИЗ НОВОГО ОПЫТА ПРЕПОДАВАНИЯ ИНОСТРАННОГО ЯЗЫКА В ТЕХНИЧЕСКОМ УНИВЕРСИТЕТЕ

Burdyko O.
Vitebsk State Technological University, Belarus
e-mail: burdyko76@mail.ru
Бурдыко О.В.
Витебский государственный технологический университет, Республика Беларусь

Keywords: non-linguistic university, remote learning, distance learning, digitalization, university, advantages, disadvantages, electronic information, educational environment.

Ключевые слова: неязыковой университет, дистанционное обучение, цифровизация, университет, преимущества, недостатки, электронная информация, образовательная среда.

Abstract. The article deals with the situation of adaptation of universities to the digitalization of education, and the preservation of its quality. The experience of using the Moodle platform in teaching foreign languages is shown, when considering its advantages and disadvantages.

Аннотация. В статье рассматривается ситуация адаптации университетов к цифровизации образования и сохранения его качества. Показан опыт использования платформы Moodle в преподавании иностранных языков, при рассмотрении ее достоинств и недостатков.

Modern realities force us to look for new ways of learning with the use of the latest information technologies. Educational information and communication technologies, which seemed to be a form of education of the future, also changed their former essence and purpose. Universities were forced to solve many pressing issues in a short time: in what forms to conduct distance learning; what technical means to use for this; how to assess the assimilation of students of the material received; how to conduct final exams, defense of diploma projects, and how to recruit for the next academic year. The foreign language teachers also had to choose those from a huge number of educational platforms and services offered that would help us to continue the learning process in the best way, but already in the Internet space.

Teaching a foreign language involves direct communication between the students and the teacher in various forms. Moodle is a platform for online classes. A lot of teachers, speakers and students around the world use it for distance learning.

The Moodle platform where the teacher is also the organizer of the classes creates an opportunity for written communication, operating with various functions that this system offers.

It is coincided to be one of the greatest advantages especially for extramural students. It is known that the number of students in extramural groups usually exceeds 20 people and it is quite problematic to provide all of them with printed versions of the materials, grammar tables, handouts. So, having 5–6 groups of extramural students the foreign language teacher was obliged to print a lot of copies as not all classrooms are provided with special interactive equipment. Moodle solved this problem perfectly as it allowed to demonstrate all the materials on the screen. Our communication with students was also supported by chats in such messengers as "Viber" and "Whats App" which allowed to send PDF and Word files of the materials to students for them to learn the presented material at their own pace. One of the most important functions realized by a teacher is the control function as a teacher's task is to check knowledge, competences and skills in the studied subject acquired by students both in and out of class [6, 9]. For this purpose there were created distant educational courses with the use of different forms, kinds and methods of control.

During e-learning of foreign languages by students in non-linguistic higher educational institutions there are realized the following control functions: the testing function showing the results and evaluation of students' study; the educating function coming by means of recollection, consolidation, specification, updating of the acquired knowledge; the developing function consisting in developing the student's personality, his or her cognitive abilities, concentration, memory, thinking, imagination.

The preliminary control during e-learning foreign languages is realized by means of "placement tests" allowing to determine the initial level of students' training in order to look up to the permissible difficulty of the suggested educational contents. The analysis of the data of the preliminary control also allows a teacher to make changes in the distant educational courses with a focus on student's foreign language skills. The current control allows having continuous information about the progress and quality of education material acquisition, make changes in the process of education in a timely manner. The current control in the developed distant education courses is not so much inspection as education because it is connected with the consolidation, revision and analysis of the education material.

The midterm control allows determining the quality of students' studying the education material in the given subject. It's carried out in the form of tests during the term or credits at the end of the term for the courses, the final control of which is an examination.

The final control serves to show the final results of the education process in the given subject. It's realized in the form of credits or examinations. The control methods allow

determining the progress in students' learning and cognitive activity as well as the teacher's pedagogical work.

You can talk about many features of professional competence training, including the study of foreign languages. To date they work out training manuals, workshops and techniques, the purpose of which is development of speech, language and cross-cultural competence of students. They are designed to facilitate the development of grammatically correct and logically meaningful speech, improve analytical reading skills, expand vocabulary skills, ability to discuss and write, and at the same time reflect the actual problems of modern life. They serve as the basis for a specific model of teaching future specialists of international relations.

Today's graduates of technical university will have to work in multicultural environment. One should be aware that the duality and differences in the interpretation of certain phenomena by students of different cultures is inevitability inherent in the structure of the modern world. Therefore, according to modern scholars and teachers it is more important to teach students how to skillfully use a variety of competencies instead of writing what is prohibited or allowed in a particular country.

During e-learning English in the developed courses there are used such main control methods as written tasks and tests. Written tasks include translating profession-oriented texts from English into Russian, tasks to the texts in workbooks, tasks to the viewed video clips or listened in texts on the topic of the studied unit, creative tasks such as statement commentary, report writing, research doing, and for master students also - writing an essay, a précis of a scientific article, an abstract and a critique to it, a brief report and a presentation in Power Point on the issue of their scientific research. Each unit of distant education courses includes tests which are a number of standardized tasks on specific material stating the degree of adopting it by students.

A very useful element of a distant education course is a register. The Moodle system implements a very flexible and rather complex system of assessment on the basis of which as well as on the grounds of students' active work a teacher can create a rating system for each student.

As the survey showed, learning at an individual pace: it is choosing the rate of learning depending on students' individual needs is an advantage for 100 per cent respondents. The comprehensibility of the organizational, methodological and learning material was graded "nine" by 95 percent surveyed students. Mobility was graded "nine" by 70 percent respondents, "seven" – by 17 percent, "four" – by 8.7 percent, "two" – by 4.3 percent. The individual interview revealed that this advantage got lower grades because of the absence of anytime access to the Internet by some students. As for such an advantage as creativity, 65.2 percent students graded it "nine". It's explained by the fact that far from all tasks offered in a distant education course are creative. Some of them are of reproductive and partially research character. Finally, 60.9 percent student graded as "nine" interactivity as an advantage of Moodle-based distant education courses teaching foreign languages at a non-linguistic higher education institution. During the individual interview they noted that they would like to intensify the interaction with the teacher to get more detailed consultations.

On the basis of the presented material it should be noted that the creation of Moodle-based distant education courses is up-to-date and perspective both for the organization of the process of learning foreign languages at a non-linguistic higher education institution and for managing it. In particular, increasing the quality of control in e-learning a foreign language at a non-linguistic higher education institution allows not only to increase the efficiency of education but also to inspire students to further independent studying a second language.

UDC 304.2; 373.5

PROBLEMS OF CROSS-CULTURAL COMMUNICATION IN AN EDUCTIONAL INSTITUON (BASED ON THE ENGLISH LANGUAGE)

ПРОБЛЕМЫ ОБУЧЕНИЯ МЕЖКУЛЬТУРНОЙ КОММУНИКАЦИИ В РАМКАХ ОБЩЕОБРАЗОВАТЕЛЬНОЙ ОРГАНИЗАЦИИ (НА ПРИМЕРЕ АНГЛИЙСКОГО ЯЗЫКА)

Fedorov G., Shurupova M.*
State University of Humanities and Technology, Russia
*e-mail: shurupovamaria.en-ru@yandex.ru**
Федоров Г.А., Шурупова М.В.*
Государственный гуманитарно-технологический университет,
Российская Федерация

Keywords: cross-cultural communication, stereotyping, clichés, vocabulary, stages of communication.

Ключевые слова: межкультурная коммуникация, стереотипизация, клишированность, лексика, этапы коммуникации.

Abstract. The article is devoted to the study of a foreign language school lesson components, which lead to difficulties in cross-cultural communication of students with native speakers. The main disadvantages of a foreign language school curriculum, the consequences of using such curricula, the stages of cross-cultural communication process, as well as the difficulties of cross-cultural communication that students face and ways to eliminate such difficulties are considered.

Аннотация. Статья посвящена анализу элементов урока иностранного языка, которые приводят к затруднению межкультурной коммуникации обучающихся на иностранном языке с его носителями. Рассматриваются основные недостатки школьной программы по иностранному языку, последствия реализации подобных программ, этапы процесса межкультурной коммуникации, а также трудности межкультурной коммуникации, с которыми сталкиваются обучающиеся, и пути устранения подобных затруднений.

In the modern world, communication between representatives of different cultures is becoming an integral part of human life. The World Wide Web has allowed us to communicate with people from different parts of the world. Transnational corporations are increasing their influence in many countries, including Russia. The opening of borders and the availability of transport allow regular travel. All this brings the process of cross-cultural communication to a higher level. At present, it can be argued that the boundaries between representatives of different cultures and peoples within the framework of interpersonal, business and scientific communication are practically erased [3, p. 111]. The very fact of cross-cultural communication is becoming regular for most of the population.

The term "cross-cultural communication" is an adequate understanding of two participants in a communicative act belonging to different national cultures [2, p. 4].

However, typical difficulties are still encountered in the dialogue between different cultures representatives. One of the difficulties is stereotyping and clichéd communication, especially when communicating in a foreign language. Such difficulties are the result of improper selection by a foreign language teacher of didactic material and methods of teaching a foreign language. A foreign language lesson in a modern school should include not only work with the sections of the studied language, but also acquaintance with the history, life mode and customs of the people speaking this language. It is the lack of attention to this aspect of learning a foreign language at school that leads to difficulties in the process of cross-cultural communication in practice.

Clichés in the speech of interlocutors appear immediately upon realizing the fact of cultural differences. This is especially evident when communicating on the Internet in writing or orally. For example, if you inform an interlocutor, who is a representative of another country or culture, that you live in Russia or the CIS countries, you can often hear the cliché phrase: "Yes, I know vodka, matryoshka, perestroika, balalaika". Such stereotypes began to collapse almost half a century ago with the weakening of restrictions on crossing the borders of the USSR by foreign citizens, but similar clichés are still encountered today. Such stereotypes are the result of an insufficiently high level of "cultural education".

Many correspondences can be drawn with representatives of other cultures. For example, the study of a foreign language at school most often takes place on the basis of a learning package (hereinafter referred to as LP). Having opened any of the components of the LP in English, we will see a lot of pictures that are designed to visualize text material. A large number of illustrations from the English textbook cover the following topics: the royal family, tea drinking, London telephone booths and buses, taxis, Big Ben, etc. The text material includes similar topics, as well as topics affecting the problems of adolescents, the names of various professions, and hobbies. All this stereotypes the image of Great Britain. We can recall similar stereotypes in relation to many cultures and countries of the world.

The above topics are really important for study, but for the formation of a foreign language communicative competence it is important to acquaint students with the life

of ordinary people, talk about typical residential areas, elements of the life of the population, etc. It is a detailed study of everyday life that leads to the assimilation of communication norms with representatives of other cultures and is the basis for the correct construction of cross-cultural communication entire process.

A foreign language lesson is prepared by a teacher. It is he who is able to correct such shortcomings. The understanding of other peoples and countries culture can be formed by the study of traditions, customs and holidays of other peoples and cultures. Such material must be prepared by the teacher himself.

It is equally important to pay attention to working with vocabulary. Cross-cultural communication is often based on typical everyday situations in which a limited number of lexical units are used. It is necessary for the student to learn not only such lexical units, but also to know their synonyms, to understand the shades of lexical meanings, to know the etymology and the additional meaning of the word or its semantic shade.

The act of cross-cultural communication consists not only of the actual dialogue of two representatives of different cultures, but also the moments of greeting, farewell, facial expressions and gestures. It is from understanding the meaning of these stages of cross-cultural communication that its success depends. The foreign language school curriculum rarely considers these aspects.

For example, in male society in Russia and the CIS countries, a greeting in the form of a handshake is considered the norm. When communicating with representatives of other cultures, this may be unacceptable, an attempt to such a greeting can make the interlocutor, who is a representative of another culture, feel uncomfortable, which also complicates the communication process. "Here in America, it is generally not customary to shake hands. They do not greet like that, but just throw up their palm in greeting: "Hi", and go on. In Russia, they won’t understand you if you don’t shake hands", comments Russian hockey player E. Kuznetsov.

The farewell stage also has its own characteristics. For example, the process of farewell in Great Britain can be described by everyone with the well-known phrase "Leave in English/Take French leave", or with a humorous phrase: "The British leave without saying goodbye, and the Russians say goodbye, but do not leave."

It is from the knowledge of such subtleties that successful cross-cultural communication is formed. The main task of English teachers is to search for didactic material, as well as practical work with students, which will allow them to behave competently during communication. The student must learn not only to relay information from his native language to a foreign one, but to understand the peculiarities of the culture and language of the interlocutor, take them into account and correct his own statements, manners and facial expressions in the course of cross-cultural communication.

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ADVERTISING AS A FORM OF MODERN MASS COMMUNICATION

РЕКЛАМНЫЙ ТЕКСТ КАК ФОРМА СОВРЕМЕННОЙ МАССОВОЙ КОММУНИКАЦИИ

Ivanova N., Kirillova A., Merenkova D., Shurupova M.*
State University of Humanities and Technology, Russia
*e-mail: shurupovamaria.en-ru@yandex.ru**
Иванова Н.Г., Кириллова А.В., Меренкова Д.Е., Шурупова М.В.*
Государственный гуманитарно-технологический университет,
Российская Федерация

Keywords: advertising, slogan, expressiveness, communication, impact.
Ключевые слова: реклама, слоган, выразительность, коммуникация, воздействие.

Abstract. The article studies the advertising text in general and the advertising slogan in particular as tools of mass communication in modern society. The authors consider the main functions inherent in an advertising slogan from the viewpoint of achieving the ultimate goal of an advertising campaign – that of an impact on a potential buyer. The authors come to the conclusion that advertising as a modern form of communication is specific, and its potential has not been fully explored.

Аннотация. Статья посвящена анализу рекламного текста в целом и рекламного слогана в частности как инструментов массовой коммуникации в

современном обществе. Авторы рассматривают основные функции, присущие рекламному слогану, с точки зрения достижения конечной цели рекламной кампании – воздействия на потенциального покупателя. Авторы приходят к выводу, что реклама как современная форма коммуникации специфична, и ее потенциал до конца не изучен.

Modern advertising is a rapidly developing form of communication and as a phenomenon it is unique and multifaceted. In this respect scientists from completely different fields, such as politics, linguistics, psychology and sociology, distinguish the meaning and interpretation inherent in their kind of activity. Linguists work with means of speech expressiveness and process the incoming information from a linguistic point of view, as well as analyze the verbal aspect.

Psychologists and sociologists study the advertising phenomenon from the point of view of its impact on a person's consciousness and mind. Advertising requires a lot of attention from a psychological point of view, since an advertisement can create conditions for handling the mechanism in which a "dialogue" between a potential consumer and the advertiser occurs.

Political scientists view advertising as a way of influencing public opinion and controlling a person's consciousness. This can be especially clearly seen as a manifestation of loyalty in any political party. In such an advertisement, one can trace a listing of the significant advantages of a particular political organization, aimed at understanding on the part of a consumer.

Regarding the definition of the term "advertising", the most clear and understandable meaning for the modern reader will be as follows: "Advertising serves to notify in various ways (sometimes all available) about new goods or services and their consumer properties and is aimed at a potential consumer and serves to promote the company's products and ideas. Advertising is a part of the company's communication activities, along with publicity (propaganda, influencing consumers to increase demand for goods and services) and sales promotion" [3].

"The etymology of the word "advertising" itself helps to reveal some of its genetic aspects. The common source is generally recognized as the verb "reclamare" – to shout or shout out. This verb well reflects the stage of existence of oral verbal advertising. This lexeme was preserved in a number of Western European languages through French fusion and took root in Russia" [2].

Considering the concept of advertising in a narrow sense, one can single out the concept that advertising is a special type of communication between a consumer and an advertiser, where information about goods or services is supposed to be disseminated. Dissemination of information has a wide range of tools, such as advertising in the media or the use of advanced technologies. The most important thing is to have the communicator and the recipient together with a set of relationships between them. However, advertising has both advantages and disadvantages. Among the advantages of advertising, the following should be highlighted:

- ability to attract a large number of people from the target audience;
- ability to compose, change and edit advertising text or video;

- stimulating demand for a product or service;
- high probability of advertising to be seen by the consumer.

Among the disadvantages of advertising, the following should be considered:

- often high production and placement costs;
- possible negative interpretation of advertising by potential consumers;
- high competition on the market.

In today's world, we can hardly see any advertisement copy or integration without a slogan. It is an important component in the creation and promotion of a brand, product or service. The compilation of an advertising slogan is based on psychology, a competent understanding of marketing operations, and so on.

T.A. Chabaniuk characterizes the advertising slogan as follows: "this is a short advertising motto, call, headline, aphorism, preceding the advertising message" and also understands the slogan as "one of the main means of attracting the attention of the target audience, which most often determines the effectiveness of the advertising message" [6].

K.V. Safarli and K.K Tenenbaun consider the slogan as a special "mirror" of culture, objectively reflecting the communication environment of society. "This conclusion is justified, since the slogan seeks to "speak" the same language with the consumer, to be as clear as possible and close to the audience it is addressing. On the other hand, the slogan is designed to fulfill a specific pragmatic task: to attract the attention of a potential consumer, stimulate a purchase and bring profit to the advertising company. Therefore, it must be understandable to the target audience and influence its motives" [4].

At all times, the slogan has been an important part of an advertising campaign and is an excellent tool for attracting the attention of potential consumers. It can be called one of the main components of the corporate identity of the company. T.A. Chabaniuk considers the main requirements for the advertising slogan: "brevity, simplicity, ease of memorization. In the advertising message, the slogan is placed in the most advantageous position and is one of the mandatory elements. It must also meet the following requirements: to be memorable, encouraging to make a purchase, winning the attention of a consumer" [6].

A list of an advertising slogan functions as an element of any advertising text includes:

- acting function. Advertisers know that their slogans emotionally affect customers and thus literally force them to buy a product or use a particular service. A psychological and emotional load on a potential buyer is obvious, which thereby leads to an increase in the company's sales, E.g., Age is just a number [9];
- informative function. O.A. Turbina and M.S. Saltykova note that "to attract the addressee to the main idea and present it in an extremely laconic form is one of the main functions of the slogan: the meaning of the message content is condensed, pursuing the goal of involuntarily retaining in the memory a whole network of meanings and associations generated by the slogan" [5], e.g., Now every angle becomes your best angle [8];

− attractive function. This function affects the brand awareness of the company and attracts the attention of consumers to its mission, concept and type of activity. Due to the tough struggle in the global market, they often resort to promoting the brand through any conflict situations that will then be heard. Scandalous articles, violation of business ethics, aggression in advertising are also used, e.g., Join the cult. Drier skins welcome [7];

− presentation function. Creating a positive image and attitude of the company or the services it offers. Through advertising, one or another positive side of the company and the services it offers are emphasized. Here, an advertising slogan can in a nutshell reflect the readiness to solve any problems of a consumer and a high desire to do so, e.g., Look as beautiful tonight as you did this morning [10].

The main purpose of using the advertising text in general and the advertising slogan in particular is to encourage a consumer to make a purchase, change his opinion towards a particular product from a positive point of view, evoke trust and prove the absolute irreplaceability and usefulness of the advertised product.

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USE OF INTERNET RESOURCES IN THE PROCESS OF TEACHING FOREIGN LANGUAGES

ИСПОЛЬЗОВАНИЕ ИНТЕРНЕТ-РЕСУРСОВ В ПРОЦЕССЕ ОБУЧЕНИЯ ИНОСТРАННЫМ ЯЗЫКАМ

Imperovich V.
Vitebsk State Technological University, Belarus
Имперович В.В.
Витебский государственный технологический университет, Республика Беларусь

Keywords: internet resources, foreign language, information technologies, practice, learning process, experience, purpose.
Ключевые слова: интернет-ресурсы, иностранный язык, информационные технологии, практика, процесс обучения, опыт, цель.

Abstract. This article deals with the use of modern internet resources in the practice of teaching foreign languages in universities. The use of internet resources is an important component of the learning process. The aim of the article is to study the experience of using of internet resources in the process of teaching foreign languages to students in universities.
Аннотация. Данная статья рассматривает использование современных интернет-ресурсов в практике преподавания иностранных языков в вузах. Использование интернет-ресурсов является важным компонентом процесса обучения. Цель этой статьи – изучить опыт использования интернет-ресурсов в процессе обучения иностранным языкам студентов в вузах.

The use of internet resources in foreign language lessons is an important component of the learning process of a foreign language. The purpose of internet resources is to study the experience of using information technologies in the process of teaching foreign languages in universities. The advantages and disadvantages of modern internet resources are characterized in the article. The experience of using internet resources in the process of teaching a foreign language in universities is described. It is pointed out that the experience of using internet resources in the process of studying a foreign language makes it easier for students and creates a common environment for them. They help to overcome the language difficulties for students. Thanks to new modern technologies the study of a foreign language can be carried out beyond the limits of practical lessons. The new achievements in the field of internet resources provide great

opportunities to obtain the most extensive base, and also provide the opportunities to reveal the creative potential of students, which makes the chance of learning process of a foreign language interactive, entertaining and productive.

Our century is the age of information technologies. It makes its own improvements to the traditional teaching of foreign languages. And the teachers try to learn how to use modern internet resources correctly and effectively in the educational process in the universities.

During the last years, the using of new internet resources for teaching foreign languages in the Universities has been raised. This is not only new information technologies, but also new forms and methods of teaching, and it is also a new approach to the learning process.

Various kinds of teaching technologies are used in practice, with the help of which the interests of students to the foreign languages increases greatly. The level of intellectual culture is also increased. One of the main tasks of the teacher is to create conditions for practical language situation for students. Teachers choose such teaching methods that allow every student to show his activity and his creativity in the process of teaching a foreign language. Modern technologies such as training in cooperation, the use of new information and communication technologies, and the Internet resources help to provide improvements in education. It allows to take into consideration the abilities of students and their level of education. It was carried out that in the process of using of information technologies by the teacher of the foreign languages, students show creative activities that include the ability to explain, study, describe, compare, analyze, express their opinions, argue with each other, choose independent necessary information, translate the text, and to make messages on different topics. It allows students to use the knowledge and skills in practical activities to communicate with people of other countries. They can receive necessary information from different foreign sources of information that needed for educational purposes. Students can expand opportunities in choosing future activities and study the values of different world cultures, achievements of other countries. They can communicate with the representatives of other countries and know more about the life in other countries. The use of information technologies and internet resources in the process of learning helps to form the ability of students to work with different kinds of information, to develop logical thinking, to increase interests of students to the foreign language, and help to activate their creative potential.

The use of computer and new internet resources in the high levels of teaching allows students to prepare better for the foreign lessons in accordance with the requirements of the state standard. In the process of teaching: students can not only improve the knowledge they need during the last periods of training, but also they can increase their vocabulary taking into consideration the practical knowledge of foreign languages in the common situations. Nowadays various kinds of forms of organization of the educational process are used in the process of teaching foreign languages. Since internet resources are not only a means of supplying material and a controlling aspect – such means of technologies can provide high quality of the material supply

and can use different communication aspects. All these means can increase students' motivation and can form their communicative competence. The computers and internet resources at the lessons of foreign languages make it possible to improve the knowledge of a personality who is oriented on the purpose of learning. It can provide for the differentiation of instruction, can increase activities of students, it can motivate students, improve the process of learning, and provide the students with a comfortable learning environment. For use of internet resources in the process of teaching foreign language lessons, a wide range of computer programs are usually offered. Educational programs are used to acquire necessary knowledge, skills and habits of students. Training programs are used for consolidation of knowledge and skills of students. Control programs are used for the purpose of monitoring the quality of knowledge of students and to correct it. Game programs are used for intellectual development.

Use of new internet resources to achieve the necessary purposes and tasks can be realized in many ways. The teacher can apply information technologies in the process of teaching phonetics, and by this means can improve listening and pronunciation skills of students in the relation to the new necessary material, to form the pronunciation and intonation skills. While teaching grammar the teacher can apply the number of grammatical means, to master new grammatical phenomena and their use in the speech of students. The teacher can use different exercises of using in speech various types of sentences and grammatical constructions.While working with vocabulary the teacher can systematize the necessary lexical units, to expand the common dictionary, to develop skills for recognizing and using lexical units in the speech of students, to form lexical skills of reading, listening and productive writing skills. While teaching reading the teacher can teach to recognize texts of different styles, using main types of reading, to form the abilities of students to overcome language difficulties, to provide language information.

The use of computer programs and internet resources makes it possible for the teachers to focus from reproductive activities to creative activities, to enrich learning, to develop emotional memory of students. Different texts in Russian and English also help to achieve great use of interrelation between various words. Listening to the different units helps the students to improve English, and can develop a correct intonation of the foreign languages. The use of information technologies and internet resources can also increase the improvement of group work; allows to get creative activities, active and purposeful communication. It can be used within the group and with the outside world; it can provide opportunities for organizing collective creativities, in the process of creating a project and preparation of individual tasks and in the process of preparation of reports on the work planned or the necessary events. Main opportunities for teaching students in foreign languages lessons provide information technologies. The main feature of information technologies is a wide information density and a full number of the most effective learning components – understanding foreign texts, and audio materials that can help students to get

information in a different manner, with the activation of some information means, which can help students to use the most effective ways of learning the foreign language.

Thus, the use of information technologies and internet resources in the process of teaching foreign languages at the lessons provides the necessary results, primarily due to the use of the creative potentials of students, this leads to the formation of the situation of success and increases the motivation in the process of teaching. The main pedagogical process is the cooperation of the teacher with the students. In the process of teaching foreign languages the teacher helps in overcoming main difficulties; the teacher explains, shows, reminds, points out, brings, advises, consults, prevents, empathizes, encourages, stimulates confidence and interests of students; inspires and gives the students different means of communication; helps learning to develop and improve the knowledge of students. The results of the necessary work can be achieved due to the necessary combination of innovative units and methods, teaching methods, which help to maximize the cognitive activities, the desire to solve problem situations and the independence of students. Thus, information and computer technologies and internet resources are the means of activating the creative potential and improving the quality of knowledge in the process of learning foreign languages. Information technologies are only for those teachers who are not indifferent to the levels of their professional competence, which cares how much the teacher of the modern universities meets the requirements of the modern century.

Many teachers have used information technologies and internet resources in the work during last years. Students really like these lessons, and they express their positive mood. Active work by the teachers is being done to create the improvement different types of foreign lessons and various electronic courses.

In the process of using internet resources, the students can create and store electronic learning materials and underline the process of their study. Due to this means of study students are not tied to specific places and time, they can move on the necessary material at their own place from any part of their living.

Electronic format allows students to use not only different foreign texts as common textbooks, but it is possible to use internet resources of any format forms. Various foreign course materials are stored in the internet systems; they can be organized using shortcuts and hypertext links.

In the process for this purpose a lot of means are provided: glossary, blogs, forums and workshops. At the same time, the process of study can be carried out asynchronously, when every student studies the material at his own place, and in necessary time. Teachers can organize online lectures and seminars. These means support the exchange of different files of any formats. It can be used both between the teachers and the students, and between the students themselves. The teachers of foreign languages are in touch with their students.

UDC 378

TYPES OF RESEARCH IN EDUCATION
ТИПЫ НАУЧНЫХ ИССЛЕДОВАНИЙ В ОБРАЗОВАНИИ

Izmailovich O.
Vitebsk State Technological University, Belarus
e-mail: izov@tut.by
Измайлович О.В.
Витебский государственный технологический университет, Республика Беларусь

Keywords: educational research, types of research, experimental research, correlational research, causal-comparative research, survey research, qualitative research, historical research.

Ключевые слова: сущность исследования в образовании, типы исследований, экспериментальные исследования, сравнительные исследования, исторические исследования.

Abstract. Our report deals with research problems and explains why knowledge of various types of research can be of value to educators as research is but one way to obtain knowledge, we describe several other ways and compare the strengths and weaknesses of each. We also give a brief overview of several research methodologies used in education.

Аннотация. В нашем докладе дается обзор сущности исследования в образовании, представлены способы получения знаний, объясняется необходимость постановки проблемы научного исследования. Таким образом, рассмотрев сущность исследования в образовании, его типы, можно сказать, что в зависимости от цели, предмета, объекта научного исследования, мы используем соответствующий тип изучения.

How can educators, parents, and students obtain the information they need? Many ways of obtaining information, of course, exist. One can consult experts, review books and articles, question or observe colleagues with relevant experience, examine one's own experience in the past, or even rely on intuition. All these approaches suggest possible ways to proceed, but the answers they provide are not always reliable. Experts may be mistaken; source documents may contain no insights of value; colleagues may have no experience in the matter; one's own experience or intuition may be irrelevant or mistaken.

This is why knowledge of scientific research methodology can be of value. The scientific method provides us with another way of obtaining information – information that is as accurate and reliable as we can get.

All of us engage in actions that have some of the characteristics of formal research, although perhaps we do not realize this at the time. We try out new methods of teaching, new materials, new textbooks. We compare what we did this year with what

we did last year. Teachers frequently ask students and colleagues their opinions about school and classroom activities. Counselors interview students, faculty, and parents about school activities. We observe, we analyze, we question, we hypothesize, we evaluate. But rarely do we do these things systematically. Rarely do we observe under controlled conditions. Rarely are our instruments as accurate and reliable as they might be. Rarely do we use the variety of research techniques and methodologies at our disposal.

The term "research" can mean any sort of "careful, systematic, patient study and investigation in some field of knowledge, undertaken to discover or establish facts and principles. In scientific research, however, the emphasis is on obtaining evidence to support or refute proposed facts or principles. There are many methodologies that fit this definition.

Some of the most commonly used scientific research methodologies in education are experimental research, correlational research, causal-comparative research, survey research, qualitative research, and historical research.

Experimental research involves manipulating conditions and studying effects.

Causal-comparative research involves the comparison of already known groups which have had different experiences to determine possible causes or consequences of group membership.

Correlational research involves studying relationships among variables within a single group.

Survey research involves describing the characteristics of a group by means of such instruments as interview schedules, questionnaires, and tests.

Qualitative research involves obtaining a holistic picture of what goes on in a particular situation or setting. Three of the most common forms of qualitative research are ethnographic research, case studies, and content analyses.

Historical research involves studying some aspect of the past.

Each of the research methodologies described constitutes a different way of inquiring into reality and is thus a different tool to use in understanding what goes on in education.

Individual research methodologies can be classified into general research types. Descriptive studies describe a given state of affairs. Associational studies investigate relationships. Intervention studies assess the effects of a treatment or method on outcomes.

Critical research raises basic questions about the assumptions and implications of educational research.

Almost all research plans include a problem statement, an exploratory question or hypothesis, definitions, a literature review, a sample of subjects, instrumentation, a description of procedures to be followed, a time schedule, and a description of intended data analyses.

The research problem. A research problem is the focus of a research investigation. It is exactly what its name implies – a problem that a researcher wishes to investigate.

Research problems are frequently stated as research questions. A problem can be anything that a person finds unsatisfactory or unsettling, a difficulty of some sort, a state of affairs that needs to be changed, anything this is not working as well as it might. Problems involve areas of concern to researchers as educators, conditions they want to improve, difficulties they want to eliminate, questions for which they seek answers.

The essential characteristic of a researchable question is that there is some sort of information that can be collected in an attempt to answer the question. Good research questions have four essential characteristics: they are feasible, clear, significant, and ethical. An additional characteristic of good research questions is that they often (but not always) suggest a relationship to be investigated. Three commonly used ways to clarify ambiguous or unclear terms in a research question involve the use of constitutive (dictionary-type) definitions, definition by example, and operational definitions. A constitutive definition uses additional terms to clarify meaning. An operational definition describes how examples of a term are to be measured or identified. The term "relationship", as used in research, refers to a connection or association between characteristics.

The problems touched upon in the report are of great importance. There are many different ways of obtaining information, including sensory experience, agreement with others, expert opinion, logic and the scientific method.

The scientific method is considered by researchers the most likely way to produce reliable and accurate knowledge. The scientific method involves answering questions through systematic and public accumulation of knowledge. The description of some of the most commonly used scientific research methodologies in education was given. They are experimental research, correlational research, causal-comparative research, survey research, qualitative research, and historical research. Individual research methodologies can be classified into general research types. Descriptive studies describe a given state of affairs. Associational studies investigate relationships. Intervention studies assess the effects of a treatment or method on outcomes.

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STRATEGY FOR IMPROVING THE PATRIOTIC EDUCATION SYSTEM FOR THE YOUNG GENERATION

СТРАТЕГИЯ УСОВЕРШЕНСТВОВАНИЯ СИСТЕМЫ ПАТРИОТИЧЕСКОГО ВОСПИТАНИЯ МОЛОДЕЖИ

Ostapenko O.[1], Ovchinnikova M.[2], Churiukanova E.[3]
State University of Humanities and Technology, Russia
e-mail: oxygri@mail.ru[1], mvovchinnikova@yandex.ru[2], edellvise@yandex.ru[3]
Остапенко О.Г.[1], Овчинникова М.В.[2], Чурюканова Е.О.[3]
Государственный гуманитарно-технологический университет,
Российская Федерация

Keywords: personality, patriotic education, youth, education strategy.
Ключевые слова: личность, патриотическое воспитание, молодёжь, стратегия воспитания.

Abstract. The article examines the main directions of modern patriotic education in educational institutions as one of the key points in the upbringing of the younger generation. The article highlights the goals of patriotic education for the near future. After analyzing the strategy for the development of education, the authors come to the conclusion that a systematic approach to educational work is the most effective tool in working with young people.

Аннотация. В статье рассматриваются основные направления современного патриотического воспитания в учебных заведениях как одного из ключевых моментов в воспитании подрастающего поколения. Статья освещает цели патриотического воспитания на ближайшее время. Проанализировав стратегию развития воспитания, авторы приходят к выводу, что системный подход в воспитательной работе является наиболее эффективным инструментом в работе с молодежью.

Modern education is focused on the formation of students' personal qualities, creative thinking, cognitive abilities that respond to dynamic changes in modern society [1]. In this regard, the system of patriotic education of young people is one of the main tasks in the field of education and personal development of students. A patriotic feeling is the result of a long-term purposeful educational impact on a person in an educational institution or team.

The "Concept of patriotic education of citizens of the Russian Federation" says that the educational potential of culture and art has slightly decreased, therefore, the spiritual improvement of the younger generation is associated, first of all, with patriotic education.

In the Strategy for the Development of Education in the Russian Federation until 2025, the priority task is to develop a highly moral person who shares Russian traditional spiritual values, possesses up-to-date knowledge and skills, capable of realizing his potential in a modern society, ready for peaceful creation and protection of the Motherland [2].

The Strategy is based on the idea of the priority of the creative, cultural and active life of young people in the process of socio-economic development of the country. At the same time, it is determined that the upbringing of patriotism consists in the socially conditioned formation of the personality of a citizen, spiritual and moral development, which is responsible for the fate of the native Fatherland.

The methodology of the Strategy is the concept of patriotism as an integral spiritual factor of long-term impact, covering the relationship between the state, society and the individual. In this respect, patriotism manifests resilience by providing conditions for the self-development of each individual, the orientation of this self-development to preserve the identity of society and preserve its security.

Achieving the tasks of educating patriotism among young people occurs through more specific tasks depending on the objects and subjects of education, the conditions in which it is carried out, the peculiarities of their solution in the economic, legal, social, political, spiritual, cultural and other spheres.

The goal of the Strategy is to establish and develop an efficiently operating regional system for forming a patriot of the Fatherland through executive and legislative authorities in the constituent entities of the Russian Federation, local governments, public organizations and institutions, regulating and directing their work to the younger generation and the family in which the upbringing takes place.

As the main tasks that will ensure the achievement of this goal, the strategy takes into account:

− the purposefulness of the education of patriotism in the field of the policy of the executive authorities, first of all, in the educational system;

− increasing the responsibility of representatives of executive authorities for the upbringing of a teenager, a true patriot of his Fatherland;

− an increase in the number of participants in patriotic education, the creation of new and improvement of old regulatory legal acts;

− modernization and improvement of the functional, structural, as well as constructive interaction of the bodies of the executive, legislative and judicial authorities of the country, educational and scientific institutions, public organizations, coordination of their actions in solving the tasks set to foster patriotism;

− educating young people in the spirit of constant readiness to defend their state, their Fatherland, fulfill their military duty, rational labor activity and the revival of a full-fledged family life.

The system of patriotic education of adolescents consists of the relevant state institutions, the regulatory and scientific base of educational, educational, educational activities, as well as a set of measures to develop patriotic feelings in the younger generation. It applies to all levels of the educational process, from the family, school,

institutions of art, culture, sports, and ending with public authorities. The system provides for the conduct of events of a patriotic orientation both at the regional and federal levels, in certain groups, and the organization of individual educational work with a specific person.

The family plays a special role in the system of patriotic education. Since at the initial stage, it is in the family that the process of upbringing the personality takes place, the development of patriotism, and later in the school, cultural and educational institutions, military collectives, in public organizations.

Mass patriotic work is the most important and fundamental element in the system of patriotic education. It is organized and carried out regularly by state bodies, with the direct participation of the media, representatives of creative and scientific unions, youth, and veteran associations.

The system of patriotic education is necessary to ensure that adolescents have an active life position, promote their inclusion in solving state problems, create conditions for the formation of nationwide thinking among young people, and the desire to act for the benefit of the interests of their homeland. It is necessary to prepare young people for a life in which knowledge and everyday experience will be combined with a position of civic duty and involvement in the fate of their native Fatherland, personal interests will unite with public ones.

At the same time, regional goals, objectives and methods of patriotic education of schoolchildren at the municipal and regional levels, with all their importance and paramount importance, are located in accordance with and subordination to the goals and objectives of the long-term strategy for the formation of a system of patriotic education. This principle also presupposes the coordination and purposefulness of the work of all state bodies that are involved in the implementation of the Strategy.

The main essence of the entire system is to ensure the greatest possible coverage of adolescents in the country through existing and newly created means, forms, and certain methods. The managerial components of the system are necessary to create appropriate conditions, both at the regional and municipal levels, using not only our own capabilities, but the resources and reserves of federal authorities, public associations, and commercial structures. The complementarity of these efforts, certain steps from top to bottom, are able to organize the effective and rational functioning of the system as a whole.

The upbringing of patriotic feelings among young people should be systematic, planned, constant, as well as the main direction at the state level. The system of instilling patriotism cannot be in its current form. Its changes are due to both the achievements of the primary tasks of the system of education of patriotism, and the changes that are taking place in the political, social, economic and other areas of Russian society, as well as the new requirements of the modern world.

In general, the formation of patriotism as a personality trait is determined both by the subjective efforts of parents, teachers, public associations and organizations, and by the objective conditions of the functioning of society – the peculiarities of the state

structure, the level of political, legal and moral culture of society. At the same time, patriotism is a significant structural element of the main culture of the individual.

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SUPERSTRUCTURAL MARKERS OF THE POLYCODE INTERPRETATION DISCOURSE

МАРКЕРЫ СУПЕРСТРУКТУРНЫХ КОМПОНЕНТОВ ПОЛИКОДОВОГО ИНТЕРПРЕТАЦИОННОГО ДИСКУРСА

Palubinski P.
Belarusian State University of Informatics and Radioelectronics, Belarus
e-mail: pavel.palubinski@gmail.com
Полубинский П.С.
Белорусский государственный университет информатики и радиоэлектроники, Республика Беларусь

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Ключевые слова: суперструктура, интерпретационный дискурс, поликодовый дискурс.

Abstract. By means of modelling and discourse markers methods, the prototypical categories and subcategories of the semantic structure of the English pictorial essays are identified, their language markers – the lexical-semantic groups and lexical-syntactic constructions specific to the polycode interpretation discourse – are determined.

Аннотация. С помощью методов моделирования и дискурсивных маркеров выявлены прототипические категории и субкатегории семантической структуры англоязычных эссе о произведениях живописи, определены их языковые маркеры – специфические для поликодового интерпретационного дискурса лексико-семантические группы и лексико-синтаксические конструкции.

The polycode discourse is characterised not only by a special structure with embedded pictorial and verbal elements, but also by a specific mechanism of

interpreting the content it represents. The peculiarity of the mechanism is determined by the formal and semantic interaction of its heterogeneous components. The combination of pictorial and verbal elements gives rise to a special kind of complex texts and specifically determines the process of sense perception.

The research deals with such superstructural components of the English pictorial essays, identified by means of modelling and discourse markers methods, as the artist's biography, the history of the painting creation, the description of the painting and its interpretation. The first two components mainly include content-factual information, and the third one – content-conceptual information, revealing the essence of interpreted meaning of the painting [1]. Each of the superstructural components of the English pictorial essays breaks down into a series of semantic subcomponents signalled by specific language markers.

The identified markers indicating the superstructural component artist's biography are:

− the subcomponent indication of the artist's birth place and education (the language markers are the words and phrases indicating the artist's birth place and education, for example, to be born, to come from, to be trained, to learn, to study): Mary Cassat was born into a wealthy Pittsburgh family but spent much of her youth in Europe, before returning to America where she studied at the Pennsylvania Academy of Fine Arts ("Young Woman Sewing in the Garden". M. Cassatt);

− the subcomponent indication of the artist's age, years of life and work (the language markers include direct indication of the artist's age, years of life and work, and phrases with the lexical component 'success', for example, to achieve success): Best-loved for his boldly painted self-portraits and powerful triptychs, Max Beckmann achieved early financial success with his Biblical art, and was elected to the board of the prestigious Berlin Secession when he was only 26 ("The Beginning". M. Beckmann);

− the subcomponent indication of the style and its features is signalled with the phrases indicating the artist's popularity and stylistic features, for example, to be famous for, to be associated with, a style: An important contributor to modern art, the Italian artist Giorgio de Chirico is associated with both Symbolism and Classicism, but he is probably most famous for developing a particular style known as "Metaphysical painting" ("The Song of Love". G. Chirico);

− the subcomponent indication of the cultural and historical context (the language markers are the phrases with the lexical component 'influence', for example, to be influenced by): However, he [Delacroix] was also greatly influenced by Old Masters like Paolo Veronese and Rubens, as well as more recent painters such as Goya ("Liberty Leading the People". E. Delacroix);

− the subcomponent description of the artist's work results is marked with the verbs with the general meaning 'to paint', for example, to paint, to produce paintings, to paint portraits, to produce drawings: He [Goya] painted official portraits of the king for a number of different bodies, but not for the king himself ("The Third of May 1808". F. Goya).

The identified markers indicating the superstructural component history of the painting creation are:

− the subcomponent indication of the motive for the painting creation is labelled with both the phrases with the lexical component ‘result’ and the verbs with the general meaning ‘to inspire’, for example, to come (about) as a result of, to inspire, fascination with, to encourage: This painting came about as a result of two main factors. First, Leger’s service as a stretcher-bearer in the French army during The Great War, which inspired him to create a type of art that would appeal to all social classes. Second, his fascination with the world of machines ("The Mechani". F. Leger);

− the subcomponent indication of the painting creation place and time (the language markers include direct indication of place and time of the painting creation – usually by means of the adverbial modifiers of place and time respectively): Matisse painted this picture in the summer of 1912 in the studio attached to his house at Issy-les-Moulineaux, then a country town a few kilometres south-west of the suburban fringe of Paris ("Nasturtiums and the Dance". H. Matisse);

− the subcomponent description of the painting creation process is signalled with the words and phrases indicating the speed of the painting creation and the number of attempts made, for example, to complete, a sitting, an attempt: "Impression, Sunrise" is a slight sketch, almost certainly completed on the spot in a single sitting ("Impression, Sunrise". C. Monet);

− the subcomponent description of the preparation for the painting creation is labelled with the nouns, adjectives and verbs with the general meaning ‘to prepare’, for example: In preparation for it, Picasso did hundreds of drawings and other preparatory studies, including the charcoal drawing "Nu aux bras levés" and "Head of a Sleeping Woman" ("Les Demoiselles d’Avignon". P. Picasso);

− the subcomponent description of the painting ownership history (the language markers are the phrases indicating the acquisition and transfer of the painting ownership rights, for example, to sell, to buy, to bequeath): After this, the painting remained with its creator until 1924, when it was sold to the designer Jacques Doucet for 25,000 francs ("Les Demoiselles d’Avignon". P. Picasso).

The superstructural component description of the painting and its interpretation, which mainly includes content-conceptual information, breaks down into five semantic subcomponents – the indication of the painting details; the indication of colours and shades; the indication of the artist’s techniques; the art critics’ opinions; the pictorial essay author’s impressions:

− the subcomponent indication of the painting details is marked with the verbs with the general meaning ‘to show’, for example, to depict, to appear, to show, to illustrate, to imprint; as well as the adverbs indicating the elements location on the canvas, for example, in the background, on/to the left, on/to the right, etc.: The picture depicts a wandering black-skinned woman who lies fast asleep beneath a moonlit starry sky ("The Sleeping Gypsy". H. Rousseau);

− the subcomponent indication of colours and shades is signalled with the words and phrases of the lexical-thematic group ‘colour’: Sisley captures the moment using a

silvery palette of blues and greys, thickening the paint for the highlights on the water ("Canal St Martin". A. Sisley) [2, p. 71];

− the subcomponent indication of the artist's techniques (the language markers are the words and phrases describing the painting techniques and their features, for example, a technique, a rhythm, to employ, a brushstroke): Oil paint was applied in glazes and linear strokes, in imitation of the technique of fifteenth-century German or Flemish painters ("The Midnight Ride of Paul Revere". G. Wood);

− the subcomponent art critics' opinions is marked with such introductory phrases as according to, in the opinion of, as claimed by, as stated by: According to some art critics, these umbrellas shield their owners not just from the rain, but, also from other passersby ("Paris Street, Rainy Day". G. Caillebotte);

− the subcomponent pictorial essay author's impressions is labelled with the words and phrases that reveal the interpretation of the artist's possible intention, for example, to give the impression, a symbol, to symbolize, a meaning, to resolve: Although much of the content of this masterpiece appears to be resolved, its ultimate meaning remains obscure ("A Bar at the Folies-Bergere". E. Manet).

Thus, by means of the logical and contextual analyses, the English pictorial essays prototypical components – the artist's biography, the history of the painting creation, the description of the painting and its interpretation, and their language markers – the lexical-semantic groups and lexical-syntactic constructions specific to the polycode interpretation discourse – are determined.

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USE OF VISUAL AIDS IN TEACHING ENGLISH FOR SPECIAL PURPOSES

ИСПОЛЬЗОВАНИЕ НАГЛЯДНЫХ МАТЕРИАЛОВ ПРИ ОБУЧЕНИИ АНГЛИЙСКОМУ ЯЗЫКУ ДЛЯ ПРОФЕССИОНАЛЬНЫХ ЦЕЛЕЙ

Stepanov D.
Vitebsk State Technological University, Belarus
e-mail: stepanoff.dm@gmail.com
Степанов Д.А.
Витебский государственный технологический университет, Республика Беларусь

Keywords: English for special purposes, visual aids, communicative act, grammar pattern, linguistic phenomena, charts

Ключевые слова: профессионально ориентированный английский язык, наглядные материалы, речевой акт, грамматическая структура, лингвистические явления, диаграммы

Abstract. Most people think that speaking English is the most important language skill, but at the same time speaking English is considered to be the most difficult learning skill. The purpose of this article is to study the application of visual materials in English teaching. Using the teaching presentation method, we discussed the feasibility of using visual aids to solve the problems of poor oral English, poor English expression ability, and lack of English thinking ability. The analysis of the research results shows that the application of visual materials in the teaching process not only enriches the teaching techniques, but also provides a new way of thinking for the teaching and experience of the course.

Аннотация. В статье рассматривается эффективность использования визуальных средств при обучении профессионально ориентированному английскому языку. Использование презентаций по основной специальности студентов призвано решить проблему низкого уровня навыков устного общения, умения размышлять и выражать мысли на английском языке. Результаты исследования показывают, что применение наглядных материалов в процессе обучения не только делает разнообразными методы обучения, но и формирует новые подходы к представлению учебного материала.

Today teaching English is becoming more and more concerned with teaching English for special purposes (ESP). The change from general English to English for special purposes brings the advantage that more tangible aims can be defined, and that student motivation can be increased by presenting obviously relevant materials. The teaching methods can now emphasise communicative competence rather than dwell on grammatical competence, since the teacher realises that the ability to construct correct English sentences does not automatically lead to the ability to communicate.

Teaching English for special purposes, however, is not without its problems. While the overall teaching strategies may be similar (i.e. based on an analysis of both appropriate linguistic items and communicative acts), the teacher will face a number of particular problems depending on the area of specialisation. These problems seem to be: (a) deciding on the exact sequencing of linguistic items, and (b) co-ordinating the teaching of linguistic items with communicative acts. In this article we are discussing the preparation and presentation of English teaching materials for students of economics.

Students at universities that train engineering specialists receive on average four hours of English language a week during the first one-two years of undergraduate study. Although they have undergone a secondary-school English programme, their average level at the end of it is rather insufficient, so the task of raising the standard to one at which they can read English authentic literature in the field of their specialisation and understand lectures in English appears to be quite challenging.

Since the major discipline is taught in national language (Russian), the students' knowledge of the subject outstrips their performance in English. The teacher attempts to remedy this imbalance by providing linguistic items and communicative acts of obvious relevance to the specialist subject. In our case, a general English course, to which a layer of specialised lexis may be subsequently added, is not the solution to this task. After their lack of success in school English courses, the students feel disinclined towards taking a similar course at university and thus they will not reach the stage at which a specialised layer may be added. However, they react more positively towards a course obviously geared to their vocational studies. Here the necessary communicative acts include explanation, description, definition, deduction, prediction, generalisation, etc. The linguistic items are presented and graded in a special way, with those causing the most problems in communication receiving priority. The teacher (in co-operation with the subject specialist) should provide material which is relevant and not intellectually insulting.

In general, the aim of the course is to use English to examine and solve problems in engineering, as it stated by the course Programme in the set of competencies. However, Engineering and Technology as an academic subject, starts to be taught only at a post-elementary level. Once again, the English which students have at their disposal initially is out of balance with the relatively complicated ideas which they want and need to express. The linguistic skills demanded by the theoretical characteristics of the major discipline entail the early introduction of certain relatively complex language forms. In engineering cause-and-effect relationships abound, especially in discussion of assumptions, predictions, and outcomes forecasting. Consequently, the conditional is a particularly frequent form. The frequency of the conditionals in texts on engineering suggests that it should be introduced earlier into the English course for engineering students than it would be in a general English course.

Comparatives and superlatives are also very frequently used, for example, in the language of predictions, e.g.: 'Under high temperatures, average number of defects is greater than average output'.

Connectives such as *although, whenever, therefore, however, consequently, as soon as*, are needed for the expression of advanced ideas in any subject. The teacher should bear all the above in mind when selecting and grading material for the lesson.

Apart from their language problems, students may have difficulty in interpreting visual data which are commonly used in English textbooks on Engineering subjects. These materials include statistical tables, diagrams, and graphs. Consequently, the teacher may be called upon to explain not only language phenomena, but the use of these data in relation to the language. What might seem to be a time-consuming process can be turned to an advantage. Visual materials can be used as teaching aids. Not only do the students need practice in 'reading' them, but there are other advantages: (a) The graphs, etc., have an obvious relevance to the language being learnt and to the theoretical characteristics of the main subject; (b) they have obvious relevance to the teaching situation: e.g. video frames showing some mechanical process can be used to illustrate a real situation and elicit meaningful, yet controlled responses; (c) diagrams make an essential summary of product features and are used by engineers to explain theory in a simpler form than language. Verbal reasoning has the advantage of appealing to common sense at every stage, and if the theory is simple, of being the easiest way of making deductions. It has the disadvantage of being long-winded; even in slightly complex theories it becomes cumbersome, and, as theories get more complex, it breaks down completely, in many cases, it is virtually impossible by using verbal methods to say whether or not a given conclusion is implied by the assumption of a theory. Geometrical analysis has the advantage of appeal to the eye. Most people find it easier to comprehend a relation between two things when a "picture" of it is drawn.

Conversely, these diagrammatic summaries can be expanded into language at a level of complexity commensurate with the degree of attainment of L2 ability. They can be used by the teacher as shorthand cues not only to practice structures and sentence connectives, but also to facilitate the introduction of a wide range of specialised lexis in realistic situations. They serve as a real stimulus to communication in themselves and, what is more, can be used to teach the specific language of description, prediction, explanation, and so on.

It is suggested that different graphs should be used to teach different linguistic features, in order not to confuse. For example, a graph which compares the velocity of different gears (and used to teach comparatives) may be of no use when teaching a lot and a little, since the difference in quantities is insufficient to make the point clearly. (Also, of course, a piece of visual material as abstract as a graph tends to have less impact the more often it is used.) Moreover, since the teacher has the job of familiarising the students with these materials used in an English-language context, graphs of varying complexity could be introduced. A lesson introducing conditionals can make use of a relatively simple graph, but a much more complicated graph might be used in conjunction with a later, or revision lesson. This suggests that teachers should be prepared to grade these visual materials as carefully as the language they teach.

Posters can be either specially drawn or chosen from stock, in particular, those which include relevant material. On the other hand, the language-teachers' maps will lose their realistic impact if they contain illustrative material not normally found on stock maps.

These aids can be used beyond their limitations: e.g. to try to teach tenses and other linguistic forms.

We have suggested the use of visual materials in the way outlined above as we have found that it provides a teaching strategy which helps us to overcome the major ESP problem of reconciling linguistic, situational, and communicative demands on grading and presentation. We hope that we have not only succeeded in reiterating the need to beware of, and integrate, the above factors in an ESP course, but that we have shown to some extent how it might be done. Although the discussion has necessarily been limited to the teaching of English to engineering specialists, the teacher of English for some other special purpose may discover that an analysis of the material used (visual or otherwise) in the study of the main discipline may help to arrive at a similar solution.

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