

MINISTRY OF EDUCATION OF THE REPUBLIC OF BELARUS  
VITEBSK STATE TECHNOLOGICAL UNIVERSITY

**EDUCATION AND SCIENCE IN THE 21<sup>st</sup> CENTURY**

**Articles of the International Scientific  
and Practical Conference**

*October 27, 2016*

Vitebsk 2016

UDK 378  
BBC 74.48  
E 21

The edition is intended for teachers, students and scientists, experts and managers of the enterprises.

E 21 Education and science in the XXI century: Articles of the International Scientific and Practical Conference, October 27, 2016. – EI "VSTU". – Vitebsk, 2016. – 98 p.

ISBN 978-985-481-472-8

Reviewers: Vankevich A., prof., doctor of science,  
Ryklin D., prof., doctor of science,  
Bugaev A., prof., PhD.

This edition includes the articles recommended for publication by the organizing committee of Institution Scientific Practical Conference "Education and science in the XXI century".

In this edition the Researches of VSTU scientists on the following directions are presented: technology and production of threads, fabrics, knit and nonwoven fabrics; design and production of clothes; equipment of the clothing, textile and shoe industry; economics and management in clothing, textile and shoe industry.

Articles are typed from author's hard copies.

The editorial board doesn't responsible for the possible inaccuracies in the course of computer imposition.

**UDK 378**  
**BBC 74.48**

**ISBN 978-985-481-472-8**

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**Section 1. INDUSTRIAL TECHNOLOGIES AND EQUIPMENT**

UDC 687.017

**PRELIMINARY STUDIES IN THE CREATION OF SPECIAL PURPOSE CLOTHES FOR SOLDIERS***T. Andrasiuk, assistant of Clothes Technology and Design Department**S. Alakhova, assistant professor of Clothes Technology and Design Department**E. Artanovich, student**Vitebsk State Technological University, Belarus*

*Key words: sewing Industry, field uniforms soldiers, rational design, anthropometric compliance.*

*Abstract. Improving clothes for military service is the main goal. Analysis and creation of models for military uniforms, including field-purpose clothing is one of the main tasks. Overall analysis includes consideration of all the advantages and disadvantages of clothes similar to those of clothes. Methods of analysis and ergonomic pre-studies requires improving to the synthesis of structural and technological solutions to ensure the required level of quality indicators at all stages of the design work on the basis of research and analysis of the operating conditions.*

When designing new models of special clothing military basic requirement is that it corresponds to the nature and conditions of service and combat missions. Non-compliance of the existing clothes anthropometric characteristics and the power cause a significant limitation of the amplitudes of movements, general discomfort and leads to a rapid development of the state of fatigue.

The task of developing research-based ergonomic parameters clothes soldiers and, above all, to ensure compliance with the dynamic structures motor component of service combat activity is relevant.

In order to ensure the dynamic comfort of the product in the design of various types of clothing is important to take into account information about modifying anthropometric features, depending on the different body movements made by a person. It is known that during physical activity a person performs various movements that can be combined on the basis of the classification of movements in three groups:

- movement of the upper limbs (flexion and extension at the elbow joint, abduction of the shoulder joint , etc.);
- lower limb movements (support , with springs and locomotor function);
- body motion (flexion and extension in the form leaned forward, backward and sideways).

All anthropometric studies are conducted according to certain programs. When developing dynamic measurement of dimensional attributes of the program types of human movements have been chosen, the most characteristic of the work needed to ensure that this freedom of movement have been identified correctly [1,2].



Analyzing the conditions of operation for the field of clothing uniforms soldiers formed the structure of the internal and external factors affecting the conditions for the functioning of the system "soldier - clothing - environment" and identify ways to reduce the degree of influence, notably through the implementation of compliance with the requirements of consumer products.

Analysis of normative - technical documentation, survey direct consumers it possible to establish the basic requirements for field uniforms:

- ergonomic construction;
- maintaining the heat balance in the different temperature regimes;
- protection from adverse weather conditions (rain, wind);
- low weight;
- compactness;
- functionality that provides effective removal of moisture at different levels of physical activity;
- camouflage properties;
- durability.

The established requirements and the study of ergonomics allow soldiers to choose the right materials, impregnation and structural elements, such as the type of fastener, hem design products, the determination of the necessary stress concentration sites in the clothing, the location of the protective lining of reinforcing areas of maximum friction and amortization, pockets, ventilation elements.

Using the developed taking into account the requirements set apparel to outfit military will reduce the risk of adverse effects of harmful factors on the employee, namely:

- decrease in the incidence of risk of injury, ensure safe conditions of service;
- increase in clothing ergonomics, providing reduction in the movement of the human resistance at the time of performance of service operations;
- improved coordination of employee movement, concentration, reduced fatigue;
- increase efficiency by reducing general and local discomfort.

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UDC 677/07 / 677/017/42 / 677/017/82

**EVALUATION OF CONSUMER-ORIENTED  
PROPERTIES OF UPHOLSTERY FABRICS***L.V. Antonina, associate professor**I.G. Leontyeva, senior lecturer**Omsk State Technical University, Russian Federation*

*Key words: compound materials, car seat covers, consumer-oriented properties, durability and strength.*

*Abstract. This article presents the findings from my research devoted to examination of durability of tripled compound materials composed of polyester knitted fabric and polyurethane foam that are used for car seat covers.*

Recently, use of textile materials became more popular in automotive industry. Replacement of artificial leather with textile materials allows us to improve the quality of car interior, provide comfort and create more aesthetic appearance. Tripled compound materials are among the most common materials used for interior trim. Exterior layer of such materials is usually made of various upholstery fabrics (flocked fabrics, tweed, artificial or genuine leather, velour, napped fabrics, flat knitted fabrics and textile). Polyurethane foam is usually used for the middle layer. Each layer is made of knitted fabric or spunbond (fine nonwoven fabric).

The properties of compound materials are determined according to the properties of raw materials and methods of layers combination. Raw materials are used according to technical standards and their properties have been sufficiently studied. However, complete and accurate information about the properties of modern compound materials (including data on their modification during utilization) doesn't exist. Neither do technical standards. Hence the practical interest of this research devoted to examination of the properties of complex materials is obvious [2, p. 81].

Consumer-oriented properties of upholstery fabrics are paramount. They include various physical and mechanical parameters, namely high durability and wear resistance, colorfastness to friction, dry-cleaning, light and weather, fire resistance and low level of static electricity. According to questionnaires answered by drivers and producers of car seat covers, the most important consumer-oriented properties of upholstery fabrics are durability, resistance to abrasion, deformation behavior and fire resistance.

Subjects of this research are compound materials constituting of polyester fabric (made of air texturised yarn) tripled by polyurethane foam and knitted fabric (layers are attached by thermal melt of polyurethane foam (table 1)).

Table 1 – Description of research subjects

Sample	Description of exterior layer			Surface density, g/m <sup>2</sup>	Thickness, mm
	type of material	fibre composition	weave		
1	knitted fabric	polyester thread	warp knitting	348	1,05
2	knitted fabric	polyester thread	warp knitting	336	0,96
3	knitted fabric	polyester thread	warp knitting	356	1,32
4	knitted fabric	polyester thread	warp knitting	464	1,25

Resistance to flat abrasion was tested according to developed technique on IT-3M apparatus. All studied samples withstood more than 10,000 cycles which proves high endurance of materials. Such endurance can be explained by fibrous composition of the exterior layer (polyester fibers) [1, p. 33].

Tensile behavior of materials was tested on PT-250M tensile testing machine. Resistance of studied samples of compound materials is good enough, but their shape deforms under strain stress (table 2). These particular qualities shall be taken into account while choosing materials for thread seams of car seat covers made of tested fabrics.

Table 2 – Description of tensile behavior of materials under strain stress

Sample	Tensile strength P <sub>p</sub> , N		Tensile elongation, %	
	lengthways	transversely	lengthways	transversely
1	976	478	43	180
2	701	1240	56	83
3	942	941	54	130
4	927	401	56	153

Thus the presented findings from my research devoted to examination of some consumer-oriented properties of tripled fabrics indicate high durability of such materials and their resistance to abrasion. Hence all tested fabrics can be recommended as upholstery for car seats and as a material for car seat covers. Findings from this research can be helpful to producers and consumers of fabrics. This research is still in progress. List of testing indices and research subjects is extended according to questionnaires.

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UDC 687.01

**RESEARCH OF STREET FASHION STYLES**

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*Key words: street style, streetwear, fashion, collection, style concept, clothes.*

*Abstract. This article presents information about the reasons of appearance of street fashion and its history, as well as an analysis of street fashion styles, their characteristics, concept, attributes and clothes elements. There was considered a question of the influence of street fashion on haute couture fashion, the use of fashion trends elements of street styles in the creation of modern clothing collections by fashion designers.*

Street fashion or Street style is a modern alternative to high fashion and promotion any clothing style and appearance that emerged, developed and acquired their fans due to his demonstration on the street. Street fashion is a part of the youth culture. It is in contact with non-traditional sports, musical trends, the political and social movements that arise among the youth. Street fashion phenomenon has become the best known in large cities.

Street fashion appeared in England in the early 50s of the 20th century as a result of the aggravation of relations between the generations. Tastes in clothing were formed under the influence of various youth subcultures (see figure, a). Leather jackets became the main attribute of the street fashion of that time.

Japanese are also considered the founders of street style (see figure, b). In the late 80-years of XX century after long living under the strict subjection they rebelled and arranged a revolution against the conservative ideals of beauty and social principles. This Japanese fashion presented a bright colors and a retreat from rules of combination [1].



Figure. Street fashion: a – in London, b – in Tokyo

Later, street style has become a practical implementation of the right of everyone to dress, as he wants. Street fashion is a manifestation of the general trend of democratization of society and its main views on the clothes. It gives everyone a free choice of mood, social position and aesthetic settings that allows to express their individuality through appearance.

This style is characterized by the most incredible combinations of colors and styles. Everyone is trying to use the most original things in the wardrobe to look stylish and unique. Particularly interesting are looks that are reviving fashion trends of ancient times and combine their elements with items of more modern style. Also, street fashion of each country has its differences [2].

From arts and music to politics, there is a popular culture at the heart of street fashion. That is why you can follow general trends even in a free phenomenon as street fashion. According to the results of the conducted analysis, there are separate styles of street fashion (see table). Each style has their own characteristic traits and attributes. There is a concept of each style that characterizes not only clothes, but also consumer.

Table – Characteristics of street fashion styles

Name of style	Style concept	Characteristic features of style
1	2	3
Casual	Good and convenient	Simple hairstyles, contrasts of outfits and textures of materials, jeanswear
Hipster	The outer and inner freedom, a combination of new and long-forgotten	The combination of vintage outfits with modern fashion trends. Skinny-jeans, jackets with prints, T-shirts with pictures of the old rock bands, glasses, beanies, sneakers, ties, suspenders, plaid shirts, beards etc.
Thrash	Attract attention combined incompatible items of clothes	The extravagant style, which combines incongruous. This is a style that shocking. This is avant-garde



Table continuation

1	2	3
Fruits (Kawaii)	The desire to be kid forever	Pink "puppet" dresses, lace panties and a lot of plastic decorations. The wealth of bright colors
Youth style	The protest against system of prohibitions and everyday life	The style of those who constantly needs change and life improvement for themselves
Grunge	Derision of glamour and chic. Worn, rumpled and comfortable clothes	"Old-fashioned" looks, Used Clothes effect: frayed jeans, wrinkled shirt, sneakers. The combination of dense and non-dense transparent fabrics
Punk	A significant power of character and way of life in appearance	Aggressive hairstyles and colors, accessories, body piercing. Lots of leather, black tones, torn clothes and T-shirts with provocative slogans
Country	Conveniently, naturally and a little rough	Blue jeans and red leather (suede), plaid shirt, hats and boots with a wide top. Jackets and shoes with fringes
Gothic	Estrangement from the world and all living in favor of the death	Black is a main color, massive coats and boots, gloomy makeup and dark tones
House	Attract attention, to emphasize their uniqueness	Club style: shirts with toxic colors, high platform, a short denim skirt and sack-denim pants, tight mini dresses with sparkling elements. The style of those who identifies themselves as rich youth
Hip-hop	Relaxedness and freedom	Ultra-baggy pants and shirts, hoods and baseball caps, "workers" shoes (sneakers), shirts (T-shirts, sweaters) of "hoodie" types
Anime	The more decorations, the better	Looks taken from cartoons and comics, as well as children's fashion
Lolita	Coquetry from past centuries	Infantile appearance, using of the elements of historical costume, such as hats, corsets, lace and umbrellas. Multilayered costume elements
Androgenic	No gender limitations in the choice of clothes	Form-fitting jackets and loose jackets. Gender averaging of looks

Street style in fashion is a conservative, despite the apparent progressiveness and extravagance. This is because of the fact every fashion style includes details of the stylistic appearance – specific attribute and distinctive sign. These outfits do not need

to be changed and are worn to emphasize the membership of a particular social group.

Over time, as a symbol of various youth movements, street style turned into a separate fashion direction. Haute couture is often being influenced by street fashion and follows its trends. Making a collection is a long and complicated process that requires accuracy in the formation of the concept even in the early stages of development. A fashion designer should design the clothes that society definitely needs with the purpose of their successful sales.

Previously, street fashion styles were formed as an echo of high fashion shows. Street fashion today quite often goes a way back: from the streets to the runways as new clothing models. The most authoritative fashion designers closely follow the youth trends. Street styles of different epochs inspire fashion designers as well as the archival collection of the world's legendary couturiers.

Today street fashion is a challenge to high fashion. It opposes to any fashion trends, and allows you to wear something that you really like. At the same time, the modern fashion industry is democratic more than ever. The borders between street style and collections of the famous fashion brands that are shown on the catwalk are blurred. And famous designers often draw inspiration for their new collections exactly in the colorful street fashion.

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UDC 675.92.01

### **THE STRUCTURE AND PROPERTIES OF ECO-LEATHER**

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*Key words: artificial leather, eco-leather, footwear, physical–mechanical properties, quality.*

*Abstract. Nowadays, artificial leather is often used in footwear manufacture. It allows you to lower the cost of the product, get beautiful appearance. Artificial leather does not have sufficient physical and mechanical properties. The article presents the results of the study of physical and mechanical properties of the artificial leather in comparison with natural leather.*

In recent years, the demand for footwear with artificial leather has been growing fast due to the rapid growth of the consumer demand. Artificial leathers are becoming

popular as an alternative material owing to limited availability of natural leathers. This material is multilayered and composite. Artificial leathers are generally produced by coating PU over a base fabric, which generally comprises woven or knitted fabric made of synthetic fibers and forming open cells to maintain air permeability. PU is a polymer compound that has a urethane bond (-NHCOO-) and a chemical structure in which soft segment, which is formed by the reaction of diisocyanate and polymeric polyol, and hard segment, which is formed by the reaction of diisocyanate and chain extender, exist simultaneously in a molecule. Due to this molecular structure PU has both tenacity and elasticity, which is a very unique property [1].

The subject of the research in this paper has been Eco-leather and natural leather (Nappa 2, Nappa 3, Russian leather) for the footwear. Eco-leather is used at JSC “Krasny Oktyabr” in the shoe model №839003. This material has four layers: finishing layer, nanopur layer, woven fabric and leather layer. Microscopic image of Eco-leather is presented at the figure.

This article reads about the research of the basic physical-mechanical properties: breaking load, tensile strength, breaking elongation, coefficient of non-uniformity in elongation, stress elongation 10MPa.

Physical–mechanical properties were tested according to GOST 17316-71 “Artificial soft leather. Measuring method of tearing load and elongation break” and GOST 938.11-69 “Leather. Tensile strength test” on a tensile machine IP 5158-5 [2, 3]. All tests were carried out according to standard test methods in conditioned atmosphere of  $(20 \pm 2) ^\circ\text{C}$  and  $(65 \pm 2) \% \text{RH}$ .



*1- finishing layer, 2 – nanopur layer, 3 – woven fabric, 4 – leather layer  
Figure – Microscopic image of Eco-leather*

The table displays the physical–mechanical properties of tested artificial and natural leather.



Table – Physical–mechanical properties of Eco-leather and natural leather

Physical–mechanical properties	Eco-leather (China)	Nappa 2 (Britain)	Nappa 3 (Britain)	Russian leather (Russia)
Thickness, mm	1,78	1,08	1,38	1,45
Surface density, g/m <sup>2</sup>	784	328	453	524
Breaking load, N	258	221	381	442
Tensile strength, MPa	7	13	15	16
Breaking elongation, %	33	48	65	62
The coefficient of non-uniformity in elongation, %	74	88	74	77
Stress elongation 10 MPa, %	24	34	36	33

The table shows that Eco-leather has higher thickness and surface density than natural leather. The breaking load is the greatest effort to withstand the material destruction and expresses its ability to take the load. Eco-leather has higher breaking load than the Nappa 2, but lower than the value of Nappa 3, Russian leather. Tensile strength is the ability of a material to withstand a longitudinal pulling force. The table indicates that Eco-leather has lower tensile strength than natural leather. The elongation at break and elongation at stress 10MPa characterize the elasticity of the material. As shown in table Eco-leather has the lowest elongation at break and elongation at a stress 10MPa than Nappa 2, Nappa 3, Russian leather. The coefficient of non-uniformity in elongation characterizes the anisotropy of the material. Eco-leather has fine anisotropic properties as natural leather. As a result of the analysis we can conclude that Eco-leather does not have sufficient physical and mechanical properties. The use of eco-leather in footwear manufacture does not allow to create high-quality footwear.

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UDC 004.9:677.11.021.16/.022:658.652

**INFORMATION SYSTEM FOR LINEN YARN  
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*Key words: linen yarn, Information system, quality control, statistical reports, quality indicators.*

*Abstract. Information system for linen yarn quality control reduces the time required to examine physical and mechanical properties of the final product and eliminates necessity of paper reporting. Developed information system allows making statistical reports online and automatically determining appropriate corrective action if produced yarn deviate from required quality.*

RUPTP «Orsha Linen Mill» is the biggest enterprise in Eastern Europe, which processes flax fiber and produces linen fabrics. The linen yarn is the final product of spinning production at 2nd and 3rd factories of the enterprise. Therefore, quality control of linen yarn is the most important. The quality of the produced yarn affects on the quality and cost of produced fabrics.

At the production quality control of linen yarn in textile laboratories of RUPTP «Orsha Linen Mill» various physical and mechanical properties are tested: breaking load, elongation at break, humidity, linear density. Coefficients of variation for breaking load, elongation at break and linear density are calculated. Manual processing of laboratory data and preparation of relevant reports takes time. Data stored on paper do not allow sufficient speed to produce reports on the current state of quality of textile materials and state of the industrial equipment. This makes the task of automating routine operations performed by laboratory technicians during the study of physical and mechanical properties of linen yarn and textile materials relevant. It is important to accelerate the generation of statistical reports and increase its visibility.

Information system for quality control, which covering all technological processes of spinning production of RUPTP «Orsha Linen Mill», was developed and implemented by specialists of Vitebsk State Technological University. Using of the specialized information system allows to completely get rid of the paper documents. This information system allows building different types of reports and statistical analyzes online. It also allows automatically determining appropriate corrective action if produced yarn deviate from required quality. Modern information and communication technologies make possible to quickly inform all relevant engineering

and technical workers about the results of laboratory testing of yarn and textile materials.

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UDC 681.327.1

### **CREATIVE DESIGN METHODOLOGIES FOR TEXTILES AND FASHION EDUCATION**

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*Key words: design, Research methodologies, textiles, fashion, trends.*

*Abstract. Understanding market intelligence, trends, influences and personal approaches are essential tools for design students to develop their ideas in textiles and fashion. Identifying different personal approaches including, visual, process-led or conceptual by employing creative methodologies are key to developing a brief. A series of ideas or themes start to emerge and through the design process serve to underpin and inform an entire collection. These investigations ensure that the design collections are able to produce a diverse range of outcomes. Following key structures and coherent stages in the design process creates authentic collections in textiles and fashion.*

## Introduction

The focus of this paper is to consider the importance of authentic concepts and ideas in textile and fashion design education. The BA (Hons) Textile Art, Design and Fashion course encompasses embroidery, knit, print, weave and pattern construction with outcomes for fashion, interiors, product or artwork. Understanding how to nurture creativity and ideas generation will be investigated through a range of different approaches and ways of developing original work. Comprehending key trends and market intelligence, while important, can result in pastiche outcomes, while a unique design collection is often the catalyst for finding graduate employment. Threshold concepts in design education may be laden with anxiety for the learner, overcoming this liminal state can result in the creation of original design collections and graduate employment. Therefore understanding how students engage with design development through visual investigation, process-led and conceptual starting points is essential for success.

## Research Methodologies

The research methodology employed will be reflective, qualitative and quantitative in enquiry. Qualitative method includes student, external examiner and industry feedback following 3-year interventions. Quantitative research will focus on the marks profile, graduate destinations and employability statistics over 3 years. Categorizing students as visual investigators, with observational drawing, conceptually led where they have an idea to pursue or process-led where process is the key driver to their inspiration. In this context process-led will include embroidery, print, knit, weave, and pattern cutting/draping. Understanding Kolb's learning cycle and the principles of divergent and convergent gathering and editing of the information is also part of the liminal experience for the design student.



Figure 1: Kolb's learning cycle

## Approaches to design

Understanding market intelligence and customer buying trends are essential for textiles fashion. This awareness is honed through visiting trade shows such as Pitti Filatti, Pitti Uomo, Premier Vision, and the London Design Festival.

Online platforms also give direction with a plethora of information, instantly accessible for students such as ‘Trend Tablet’ and Worth Global Style Network (WGSN). While these are essential tools for educational development it is also important for a design student to understand where they are positioned within this framework. Some of the ‘starting points’ in this research refer to approaches whether an individual is concept, visual or process driven. The first step in the design process is the selection of themes or ideas to work on as Mbonu states that,

*“Research is what defines each season or collection. It starts with the very first decision – so at that stage I try to surround myself with what I understand to be the ‘right’ stuff for the season, including good books films and images”* (Mbonu, p20).

Some of the recurrent themes with longevity include,

**Memory:** The use of objects, photographs, memorabilia invoking an emotional response or journey that is personal to an individual but can evoke a response with a wider audience through its individual setting or period of history.

**Nature:** looking at aspects of nature, one final year student recorded her location during placement through photography and blogs.

*“Creating a tonal range of colour has been an essential part of my collection. As my work is process driven through rigorous experimentation, I work with the machine to see how the yarn will react and sit on the body. This forms the main ethos of my work”.* Jordan Currie, Graduate TADF 2016.

**Architecture:** Award winning knit graduate explains,

*“I have quite a minimalist aesthetic. I took a trip to New York last year, and I was influenced by the architecture but I wanted to look at it more in depth. I wanted to focus on the aspects of it that are overlooked because when people say architecture, they think buildings and stuff like that. I was inspired by the repetition and the print. For example, looking at the shapes of the windows. There are so many buildings and so many windows, and those were kind of my starting point. I was looking at everything from their shapes to their properties as well as the materials and their translucency. Also the reflection of the windows, which is where I got my colours from”* Natalia Lees.

Music, and Film genres, can convey an era and depict the mood. Fabric Collections, such as jacquards, prints, checks, paisleys and then imagining how these fabric collections previously made by designers and working backwards examining how they developed their ideas becomes the story.

Often it is difficult to start work and the creative process can become a series of words, colours and processes selected by the throw of a dice to take away decision making and create a more random or abstract approach, removing direct decisions from the designer.

Iteration occurs through drawing or making the same object, place or person over a period of time. With this approach each time applying the elimination of a mark, or reducing the allocated time allowing for economy of line.



The Muse or narrative is often important to forming ideas in textiles and fashion and the storytelling or narrative aspect of this approach can result in an interesting and eclectic collection of information with juxtaposition unique to the designer.

Following these starting point's visual and written mind-maps were created charting ideas in a more formal and theoretical way exploring many aspects of the concept. This way of divergent thinking supports ideas exploration. Following the divergent thinking students then engage in convergent thinking techniques to focus on the essence of the project by editing ideas.

**Results**

While students found this methodology challenging, overcoming threshold concepts in design is evident in the final outcomes and the elevation of student confidence. The increase in confidence over the 3 years is evident in the marks profile and the final classifications, the information below clearly maps progress particularly in the elimination of fails and the improvements in the 2:1 and 1<sup>st</sup> category.

Marks Profile 2013

1 <sup>st</sup>	2	3%
2:1	18	31%
2:2	22	38%
3 <sup>rd</sup>	11	19%
Fail	5	9%

Marks Profile 2014

1 <sup>st</sup>	3	5%
2:1	39	63%
2:2	11	18%
3 <sup>rd</sup>	9	14%

Marks 2015

1 <sup>st</sup>	10	23%
2:1	25	58%
2:2	6	14%
3 <sup>rd</sup>	1	2.5%

Design Studies Map of Employability

Employability Cambridge 2015	Employability East London 2015	Employability Ulster 2015
80%	77%	90%

Graduate destinations have increased with a greater number of students in graduate positions within 6 months. The diversity of graduate skills and experience, work-based learning and placement opportunities have enabled this increase. The burgeoning film industry in Northern Ireland has also been pivotal in providing employment over the past 5 years, and this is clearly a growth area for the textile and fashion industry with HBO Game of Thrones and the course has made provision for this expansion through incremental change and revalidation.

Employer responses to the course have been very positive with industry stakeholders seeing the benefits of tripartite relationships through Knowledge Transfer Partnerships and IntertradeIreland Fusion Projects,

*“No other educational institution is teaching knitted textiles on the island of Ireland like Ulster University, and we are benefiting from talented and dedicated placement students”* Tarlach de Blacam Inis Meain Knitting Company.

Graduates have been selected for external exhibitions and exposure with online networks including Not Just a Label and Fashion Houses such as Bureau Seutail, with invites to attend Copenhagen, Shanghai and Toronto Fashion week. Graduates have also been winners of national competitions such as New Designers and Graduate Designer of the Year, Ireland.

Comments from the external examiner have included,

*“Best features of the course include the diversity of student outcomes. This clearly indicates how the change to course structure now allows students to take an individual approach to their study programme and approach to contextual outcomes. This celebrates the diverse nature of the course itself and also accommodates for the diverse range of students coming on to the course. Programme curriculum incorporates an approach to pedagogy that is both agile and flexible to meet with the challenge of delivering a programme that includes textiles and fashion from both an art and a design perspective”* Julie Haslam, MMU.

### **Conclusion**

Therefore through the diverse approaches supporting individual learning styles the outcomes can be authentic, original and rich. The resultant work has rigor in its development and creates confident graduates who can identify and discuss the uniqueness of their own work and its relevance to the identified client or market. The marks profile improved as the work is contemporary, and the rigor and authenticity of the journey is as important as the final outcome. External feedback is the real test, and through responses observed by external stakeholders such as the external examiner, industry, and national competitions such as New Designers the results show that original work needs to have a firm foundation at the inception stage. The importance of students identifying their individual approach and creating novel work brings innovation and improvement in the overall marks profile. Students raise the reputation of the course through ambition and success at national and international level. Furthermore produces an increase in graduate employability and opportunities for entrepreneurship and the development of a community of practitioners.

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UDC 677.072

## **RATIONAL FOR CHOOSING PHASE CHANGE MATERIALS FOR THE PRODUCTION OF THERMOREGULATION TEXTILE MATERIAL**

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*Key words: phase change materials, thermoregulation, textile material, microcapsulation, thermal properties.*

*Abstract. The article deals with the concept of "phase change material", defined the principle of their action. Designated substances which have thermoregulation properties which can be used in the manufacture of textile materials intended for making clothes. Noted that as thermoregulation materials are optimal paraffin's. Maximum specific heat capacity and optimum temperature of the phase transition material have octadecane (C<sub>18</sub>H<sub>38</sub>) and nonadecan that can provide the most comfortable settings space under clothing. To preserve the thermoregulation properties of the materials used microencapsulation technology.*

Phase change materials (PCM) - a substance that can change phase (aggregate) state in a specific temperature range. Latent heat energy released (absorbed) in the phase transition between the liquid and solid states is about 200 times more than during the heating (cooling) of the same material by weight.

When heated PCM absorbs a small amount of heat, and the temperature is constantly increasing. When the melting temperature of the phase transition occurs and further there is the absorption and conservation of latent heat. This PCM and the environment temperature remains constant. When PCM cooling and crystallization, heat is released and moves into the environment. This PCM and environment temperature also remains constant.

The ability to absorb or release such a large amount of latent heat without temperature change makes PCM attractive for use as a means of storing heat [1].

There are about 500 kinds of substances that can change phase state of a change in temperature and absorb heat, but not all maybe used in practice.

So, today, widely used phase change materials for the production of a new generation of textile and clothing, providing a comfortable climate under clothing in all weather conditions. Great development such materials have been in the European Union and the United States of America.



Now, an important task is to find and study the properties of materials with changes phase state for use in the textile and clothing industry.

It is known that it is necessary for its production, a thermoregulatory phase change material in the human body thermo physiological range of 27-35<sup>0</sup> C for thermal stabilization under clothing space.

It was established experimentally that for use in textile materials intended for the manufacture of clothing most suitable heat storage material with a phase transition temperature in thermo physiological human body temperature range are hydrocarbons having from 18 to 20 carbon atoms (paraffin's): octadecane (C<sub>18</sub>H<sub>38</sub>) nonadecan (C<sub>19</sub>H<sub>40</sub>) eicosane (C<sub>20</sub>H<sub>42</sub>). This oil distillation products, it is cheap, nontoxic, hydrophobic, have a melting point state for the practice of crystallization and high latent heat. Also suitable thermal parameters are contains inorganic salts [2].

As a result of experimental studies by Russian scientists, the basic main indicators of thermal heat storage materials (table 1).

Table 1 – Basic thermal performance materials with change phase state

Thermoregulation material	Solidness, kg/m <sup>3</sup>	Phase change temperature, °C			Specific heat of fusion, J/g		Specific heat, J/g, °C	
		Method TA	Method DSC	informational	experimental	informational	experimental	informational
Octadecane	778	27,6	27,6	28,2	306	303	2,1	-
Nonadecane	777	31,2	31,2	32,2	289	-	1,9	-
Eicosane	778	35,0	35,0	36,6	309	284	1,9	-
Glauber's salt (Na <sub>2</sub> SO <sub>4</sub> *10H <sub>2</sub> O)	11490	332,0	332,0	332,4	258	250	1,9	1,9

Source: [1].

Many experimental studies established instability of Glauber's salt (sodium sulfate dehydrate). Although Glauber's salt is a safe substance, as a result of its expansion in humans of an allergic reaction may occur. Therefore, as the heat storage materials for use in textile materials intended for the production of clothing, recommended paraffins.

Maximum specific heat capacity and optimum temperature of the phase transition material have octadecane ( $C_{18}H_{38}$ ) and nonadecan that can provide the most comfortable settings under clothing space.

Since for melting these substances melt, the problems of fixation of the textile material. To solve this problem, using microencapsulation technology. Microencapsulation - a process to incorporation of small particles in the thin shell material film-forming material. As a result, microencapsulation product obtained in the form of individual microcapsules ranging in size from submicron's to hundreds of microns. Substance inside the capsule called the contents of the microcapsules, the active or basic substance, forms the core of the microcapsules, and the encapsulating material is a material of shells [3].

Size of the microcapsules is 1-20 micrometers (the same as the size of the pigment particles). Wall material - an elastic polymer (acrylates, melamine derivatives), the wall is approximately 20% by weight of the capsule. It is important to note, that the encapsulation reduces the amount of latent heat [2].

PCM microcapsules can be incorporated into the spinning polymer of manufactured (e.g., acrylic, viscose), incorporated into the structure of foams and these foams applied to fabric in a lamination process, or embedded in a coating compound and coated onto fabrics. Filling hollow fibers is another method to incorporate PCM in textile material [4].

Textile materials with phase change materials are one example of Active Smart Textile. Textiles containing PCM are considered smart, because they react to changes in environmental temperature, absorbing and releasing latent heat and provide a thermoregulation effect.

Thus, it can be concluded that the present PCM list is not too wide. Paraffin's (octadecane and nonadecan) is the preferred kind of PCM for textile application, because the melting point of paraffin is very close to the temperature of the body. PCM microcapsules can be incorporated in the textile material in different ways.

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UDC 687.016

**DEVELOPMENT OF INFORMATIONAL SUPPORT  
OF THREE-DIMENSIONAL MODELING  
OF CLOTHES**

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*Key words: 3D-CAD, three-dimensional modeling of clothes, electronic mannequin.*

*Abstract. There were presented the results of the researches, aimed at the development of the initial data to create the programs of three-dimensional modeling of the clothes. In order to implement the mechanism of modification of work out to the last details clothing basic design of high quality in three-dimensional space the relations between the points of the mannequin and the surface of the clothes were identified on the electronic mannequin, as an example, the locations of the optimal decompositions were determined on the shoulder women's clothing, the recommendations on the use of modeling techniques according to the properties of the fabrics were given. The automatization of operations of constructive modeling of the clothes is a relevant task, which can be solved by studying the transformation mechanism of clothing constructions of different complexity, by determining the optimal values of transformations, as well as by establishing the special macro commands.*

At the current stage of development of the garment industry new industrial paradigm of designing and manufacturing of clothing has been formed – the transition from two-dimensional to three-dimensional designing of clothing. Virtual designing of clothing, based on 3D software, is becoming a global alternative to the traditional approach of estimation of projected products quality and designing of models in 2D conditions.

Nowadays three-dimensional designing of clothing is a generation according to the individual sizes or a choice from an existing database of three-dimensional images of the given shapes (virtual mannequin), creation of drawings of parts of design of the products, formation of three-dimensional image of the product on the dressed virtual mannequin by connecting flat product drawings details into the dimensional surface, simulation of fabric behavior etc. Such principle is implemented, for example, in JULIVI CLO3D program [1]. This program allows with a sufficiently high degree of reality to see how the clothing model will be looked in its finished form, taking into consideration mechanical and physical properties of the fabric, the nature of fabric interaction with the surface of the mannequin.

Further development of such programs aimed at the modeling of three-dimensional image of the clothing model on the electronic mannequin with further modification of templates. For example, application of the model lines on the product and transfer them to the templates, change of the model silhouette by modifying the «mannequin-clothing» section system, decoration of modeling edges of details etc. The principle of work of these programs is the connection of the product templates and its three-dimensional image on the electronic mannequin, during which the mechanism of modification of the bug-free basic design of the clothes of the high quality is implemented.

The analysis of techniques and methods of constructive modeling of the clothes made it possible to classify the existing methods into two groups: regular and irregular modification [2]. Under the regular modification the values of clothing details transformations are limited by the quantities of initial elements of the clothing basic design, as well as by the size of the details. The regular modification is easily implemented into the programs of two-dimensional clothing design and is promising for use in programs of three-dimensional clothing design. Under the irregular modification of the clothing basic design, transformation parameters are set arbitrarily. The irregular modification is an engineering task of a high complexity, where there is no single solution of the task and the end result needs to be verified in the material, so, that`s why this kind of modification is not used in programs of three-dimensional clothing design almost at all today.

For modeling clothes on the virtual electronic mannequin it is necessary to develop the informational and methodological support of the process of three-dimensional modeling of clothes of different types and purposes, namely development of databases of dimensions of modifications of the details of the clothes, design of geometric methods of transformation of the clothing basic surfaces according to the sketch of the model, the desired three-dimensional shape of clothing and so on.

In order to create a three-dimensional clothing modeling program, we made the following steps:

- defined the position of auxiliary lines on the electronic mannequin of the human`s figure and pointed out the main structural points;
- determined the relationships between the points on the surface of the electronic mannequin and the points on the surface of the basic clothing construction;
- defined the optimal locations of the points and directions of the lines of modeling clothing constructions on the three-dimensional mannequin;
- developed the databases of methods of transformation of details of the basic clothing construction of different types, considering the material properties;
- studied the sequence and experimentally determined the optimal parameters of construction of decomposition of the shoulder male and female clothing etc.

The abovementioned developed elements of informational support of the process of three-dimensional clothing modeling can be used in the development of 3D CAD software for designing of the clothes.

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UDC 7.05:745

## DESIGN OF A COLLECTION OF MODELS OF CLOTHES FROM DESIGNER'S KNITTED CLOTHS

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*Key words: designer's knitted cloths, collection of models of clothes.*

*Abstract. The creative source for design of knitted cloths and a collection of models on their basis is found in this paper. At the same time the history of creation of elements of a collection is studied and color scale is defined.*

At present work on creation of a new assortment of materials is urgent for production of a women's knitted clothing. Due to specified, two objectives are set: development of designer's knitted cloths and creation of sets of female models of casual clothes for young women. The main concept of a collection will be at the same time creation of functional and practical clothes. In a research the following tasks are set:

- to find a creative source for designing of knitted cloths and a collection of models on their basis;
- to study history of creation of elements of a collection;
- to develop designer's knitted cloths for collection models;
- to create a model range of a collection;
- to determine color scale of the sets constituting a collection.

In case of implementation of the first research problem work with analogues collections of brands of the famous designers of seasons of 2014 - 2016 was carried out. The main features were determined during creation of a collection of clothes for young women with use of knitted cloths. It is revealed that now urgent to constitute sets from the dresses and vests made of knitted cloths with various impressive surface. Creative sources such as pop art style, a font graphics and visual illusions are

established. Therefore the main image of a collection is determined as an active courageous young urban woman possessing sense of style.

In case of execution of the second research problem material about an origin of a vest, its feature and a version was built. It is also determined that this detail of a suit from the moment of the emergence became the most fashionable, integral and universal part of clothes which till today's time doesn't lose the relevance. Urgent types of sleeves and armholes in knitted fashion are established: a sleeve «bat» and a style, derivative of it, with a deep armhole. Change of a female silhouette of a knitted dress is considered and determined that now the fitted models and sheath dresses are urgent.

It is established that implementation of research purposes is necessary parallel work with analogs and creative sources that in interrelation to develop designer's knitted cloths. Materials are decided to be developed different types of drawings of the interlacing creating the various invoice on a surface. Combination of materials is also of great importance as utilitarian and information and esthetic qualities of models depend on it.

Basic data for production of a collection were chosen: for dresses – superimposed two-color bilateral Jacquard with the drawing in the form of the visual illusions created by placement in a cloth of small strokes and lines and also the combined interlacing, for vests – the two-color bilateral combined Jacquard with the relief invoice. In a rapport of drawings of knitted cloths the lines located in a chaotic order placed according to the law of composition with an identical size of elements and distance between them and different turns are used. As a result the kindled evenly drawing of a surface turns out. Additional finishing materials – an eraser 2/2 and an inlay from a smooth surface (figure 1). For designer's products high-quality raw materials are used and the most interesting interlacing is chosen, technical procedure of production of the developed product and the sequence of its handling is constituted.

Creation of a creative collection is based on two principles: color nuance and contrast. One of means of expression is the color accent: a combination of achromatic black and white colors to the accenting bright green. This choice is caused by the corresponding tendencies in which allocation of the composite center by means of a color spot is very urgent, bright, effectively and original. Also green color is a trend of this year.

With the knitted cloths containing the effective graphical drawing it was decided to emphasize with elements of pop art style – the active large texts in the form of alphabetic applications bearing in themselves semantic loading. Use of all these elements sets a certain style of models – the daily city «Casual» reflecting nature and the identity of the owner.

As the collection is creative, it was important to achieve high esthetic expressiveness of products. They possess optimal form, functional, constructive and esthetic value. The given images are courageous and effective therefore the collection makes emotional impact.



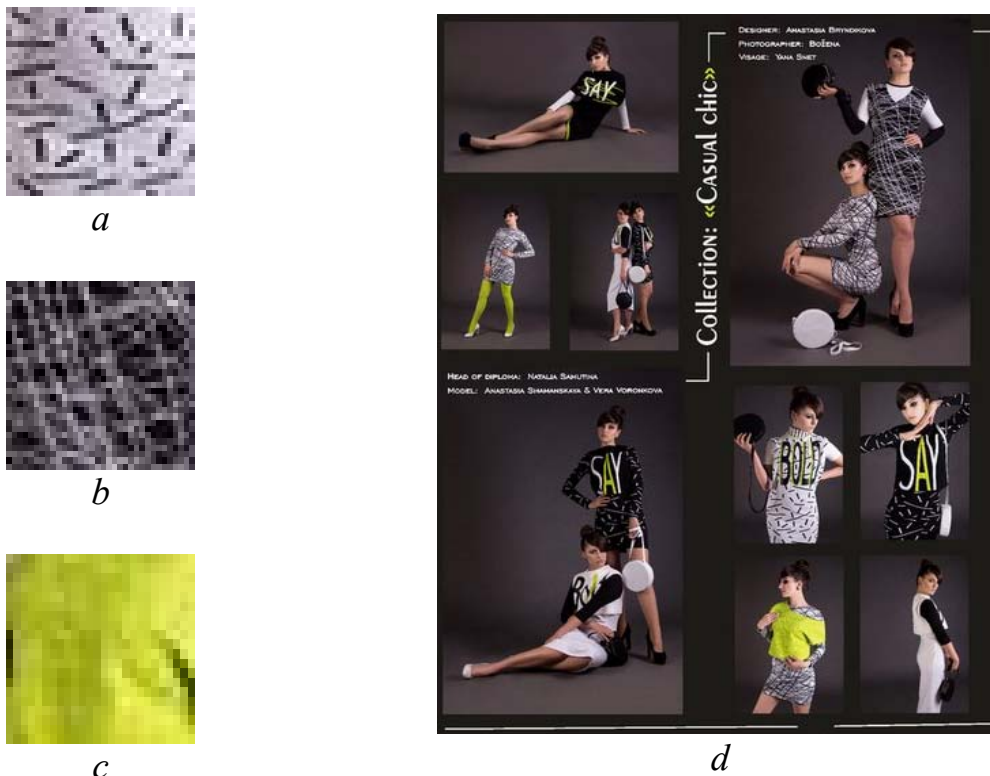


Figure 1 – Author's knitted cloths (a - c) and a clothes collection with their use (d)

Models were sent away during the work practice on LLC «Polesie», Pinsk, the Republic of Belarus. The combination of classical and sports styles brought a youth orientation, an opportunity to carry sets as casual clothes. Models can be produced also by small batches. They are exclusive, stylish, effective, original and quite comfortable that will allow them to be demanded both on national, and international markets.

UDC 7.05 : 745

## HALF-WOOLEN COMPANION FABRICS FOR WOMEN'S CLOTHING

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*Key words: half-woolen fabrics, companion fabrics.*

*Abstract. The creative source for design of pack-fabrics is found in work. At the same time the history of creation of elements of a collection pack- clothes is studied and color scale is defined.*

Half-woolen fabrics are one of the most valuable kinds of materials. They are beautiful, strong, do not rumple and have high heat-shielding properties. At present

one of the directions of development of production capacities of the Belarusian textile industry is expansion of release of costume worsted fabrics of this group.

Proceeding from the above, the research has a particular purpose – to develop half-woolen fabrics for a women's clothing. For implementation of the purpose the following tasks were set:

- to determine ornaments for half-woolen worsted fabrics;
- to develop the art and composite solution of costume companion fabrics;
- to offer a collection of fabrics in urgent color scale.

In case of the solution of the first research problem it is established that all infinite variety of the ornaments applicable which are thought up by the person for this type of fabrics can be divided into three primary groups:

- vegetable, the stylized images of plants;
- meander pattern, in the form of the ongoing broken line;
- geometrical pattern.

Geometry set of Basic Elements of figures which are located on the area of a rapport in infinite options of a combination among themselves – the most demanded and popular ornament. In modern design of clothes various combinations of the horizontal and vertical strips capable are actively used. It is essential to influence visual perception of forms of a suit, to extend them or to do on the contrary stocky. Cages in the form of squares or rhombuses are also popular.

Today it is heavy to find the designer who wouldn't work with a checked pattern. It can be different, has no age restrictions and is suitable for any clothes style. This ornament is a favorite pattern in collections of such world brands as Roberto Cavalli, Max Mara, Alexander McQueen, Ralph Lauren, Moschino and many others. If earlier the checked clothes were a simplicity symbol, then now it is associated with refinement and elegance.

For implementation of the drawing of the developed fabric it has been decided to choose a checked linear ornament. At the same time the basis in the form of a square – a static figure has been chosen. At placement in a rapport of fabric it has been decided to achieve dynamics elements by means of color and contrast. Receptions of contrast are shown also in comparison of forms and scale of squares, the nuance is added for smoothing of perception of a surface to color, and the identity is expressed in symmetry of a rapport, an arrangement of identical elements on its square.

For the projected fabric it has been decided to choose a static rhythm which is based on alternation of identical strips of different flowers and elements of dynamics which are shown in use of other scales of lines and flowers (figure 1).

At the same time seven sketches of a small pattern checks which as much as possible represent structure, the handle and consumer properties of a projectable product were developed. Motive on a basis is an asymmetric strip. Violation of mirror symmetry is shown in application changed on the scale and color of the right part of the drawing at the left. Motive on a weft is the secular reflection of a pattern on a basis placed in the horizontal direction.





*Figure 1 – Projectable plaid material*

Developed fabric is acquired on LLC «Kamvol», Minsk. It carries the name «Veta» (from Finnish Vettä – water). Water is close to mankind from the moment of the birth, and the checked pattern accompanies people. Water is one of four elements and elements of life of which all consists live on the earth. The correct check in the form of a square is associated with number four there are also four times of day and four changes of a season.

The collection of costume half-woolen fabrics in the color scale urgent for a season spring – summer of 2016 was developed. General color is decided to be executed with prevalence of one of two flowers: leading and background. As primary colors monochrome – black and white which are present at each color were taken. Additional colors partners were offered: deep blue and blue, green and lime, red and pink.

White color is associated with purity, immaculacy, innocence, virtue, joy. It promotes clarity and freshness of a thought. Black color is elegant, but it isn't evident and doesn't distinguish from crowd. It causes positive associations: refinement, grace, advantage and mystery. Blue color for many people symbolizes the sky and eternity. It also personifies kindness, fidelity, constancy, reliability, trust and loyalty. Blue has always been a symbol of harmony and purity of reason, noble aristocratism. People who are quiet and balanced seek for self-checking and internal harmony like to put on green color. Lime shades are open and emotional, look fervently, actively and spontaneously. Dynamics and passion are shown in red shades, and pink colors symbolize tenderness, friendliness and romanticism.

With the developed fabric it is possible to carry grunge style and it is possible to use in youth fashion for any age groups.

UDC 677.02

## INFLUENCE OF POLYAMIDE CONCENTRATION IN SOLUTIONS ON THE ELECTROSPUN NANOFIBERS DIAMETER

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*Key words: electrospinning, nanofiber, polyamide, viscosity, web.*

*Abstract. The objective of the investigation was the obtaining of influence of concentration and type of the polyamide-6 solution on electrospun nanofibers diameter. Two solutions were used with the different PA6 (high- and low-viscosity granulate) concentrations, the formic acid – as solvent. The measurement results obtained the influence of the type polyamide-6 granulate and its concentration on the characteristics of nanofibrous webs.*

Method of nanofibers electrospinning is one of the most prospective technologies of up-to-date materials development for different applications. Electrospinning is a fiber production method which uses electric force to draw charged threads of polymer solutions or polymer melts up to fiber diameters in the order of some ten nanometers. [1, 2].

The feature of Nanospider technology is the lack of dosage spinning elements. It allows to obtain nanofibers of various polymers solutions in water, acids and other solvents or their melts. Experimental research of the technological process of electrospinning was carried out on the equipment Nanospider (Elmarco, Czech Republic) [3] in the laboratory of the Kaunas University of Technology (Lithuania).

Solutions of polyamide 6 (PA6) of high and low viscosity in formic acid were used as the raw material for fibers molding. Two different solutions were prepared with the following 15 wt.% of low and high viscosity PA6. Experimental research was carried out under the following climatic conditions in the laboratory:

- air temperature -  $20 \pm 2$  °C ,
- relative humidity –  $54 \pm 4$  %.

Polypropylene nonwoven with surface density  $21.5 \text{ g/m}^2$  was used as the base for coating by nanofibers web.

The experiment showed the following nanofibers' parameters:

*- from solution of high-viscosity polyamide:*

- average fibers' diameter – 105,4 nm;
- variation coefficient of fibers' diameter – 23,6 %;

*- from solution of low-viscosity polyamide:*

- average fibers' diameter – 56,3 nm;
- variation coefficient of fibers' diameter – 22 %.

The measurement results confirms that the investigated technique provides the nanoscale fibers molding. Type of used polyamide granulate significantly influences on the characteristics of nanofibrous web. The use of high-viscosity granules leads to increasing the solutions viscosity. It is the reason of more coarse nanofibres molding.

Dynamic viscosity low and high viscosity polyamide 15 wt.% and 12 wt.% are approximately equal (about 230 mPas). It can be assumed, that using different solutions with equal viscosity will provide the webs with almost similar geometric characteristics of the fiber. Verification of this hypothesis was carried out on the experimental equipment of the department “Machines and technologies of high-efficiency processing” "Vitebsk State Tehnological University" [4].

The scanning electron microscope images of Polyamide-6 electrospun webs from different viscosity solutions are obtained. Analysis measurements were made using program «ImageJ». Distribution diagrams of fiber diameter shown in figures 1 and 2. Diameters of selected nanofibers in webs were measured.

As a results of the measurement we obtained the following parameters of nanofibers:

- *high viscosity polyamide (12 wt.%)*:
  - average fibers diameter – 72,1 nm (31 – 140 nm);
  - variation coefficient of fibers diameter – 28,4 %;
- *low viscosity polyamide (15 wt.%)*:
  - average fibers diameter – 55,3 nm (21 – 100 nm);
  - variation coefficient of fibers diameter – 20,8 %.

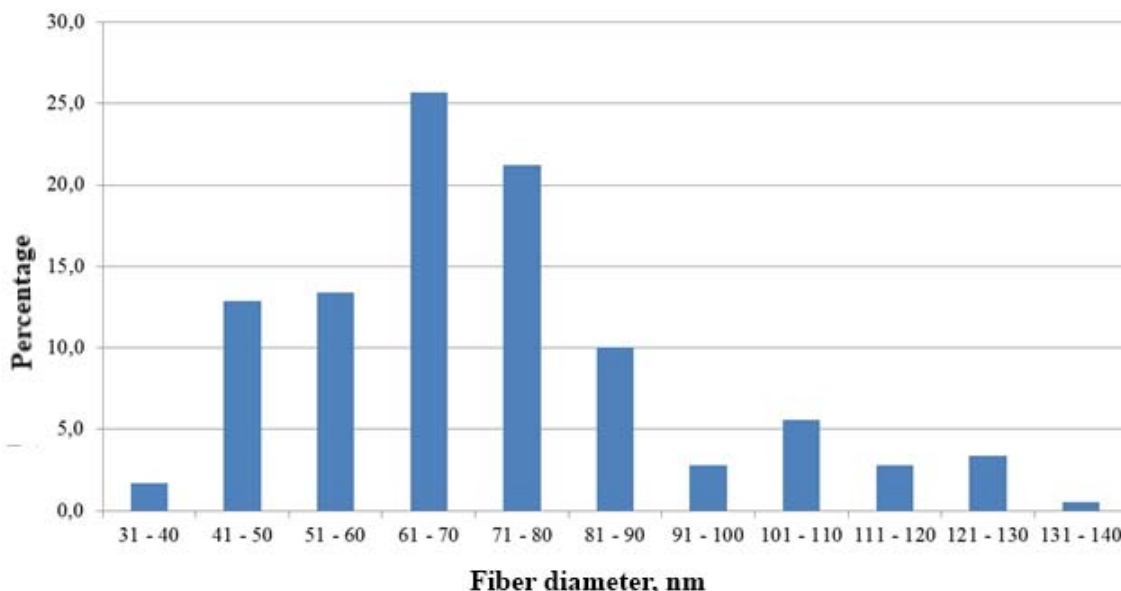


Figure 1 – Distribution diagram of fibers diameter obtained using 12 wt. % of high-viscosity polyamide-6

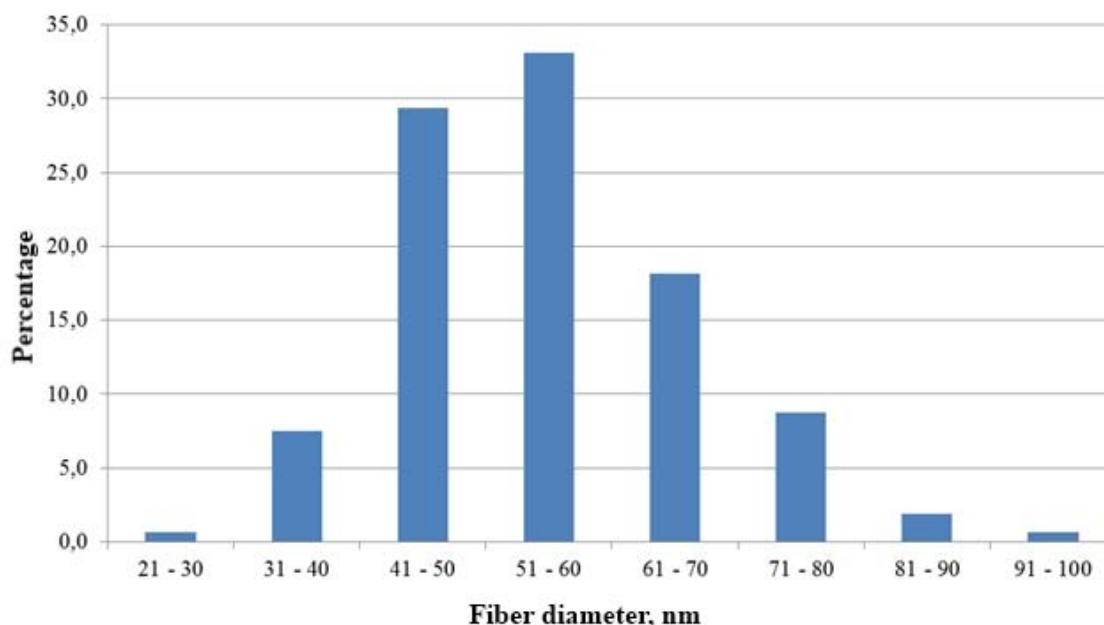


Figure 2 – Distribution diagram of fibers diameter obtained using 15 wt. % of low-viscosity polyamide-6

### Conclusions

The diameter of nanofibres does not depend on the used electrospinning equipment, since the average fibers diameters differ less by 2%. This difference is statistically not significant.

Reducing concentration of high viscosity polyamide from 15% to 12% decreases diameter of nanofibres almost by 1.5 times. However using solutions with equal viscosity are not provide nanofibers with similar diameter.

Interval between the minimal and maximal values of fiber diameter are increases for web obtained from solutions of high-viscosity polyamide.

Research carried out in the framework of the Belarusian-Lithuanian cooperation T15LIT-021 "Influence of composition of nanofibrous web on functional properties of textile materials" with the financial support of the Belarusian Foundation for Fundamental Research.

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UDC 677.026.4: 677.08

## PROCESSING NONWOVENS BY PRESSING

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*Key words: textile waste, nonwoven materials, recycling, compaction method.*

*Abstract. Use of technology can be developed to produce nonwovens with high fracture resistance, tear resistance, tensile strength, and wet strength due to the use of waste fibers, which have the properties of the feedstock.*

Compared to traditional methods of production in the textile industry - spinning and weaving - manufacture of non-woven fabrics is simple technology, hence, lower capital and labor costs, a variety of assortment of paintings, features the rational use of various raw materials, lower production costs, the ability to maximize the automation of production, .e. creation of production lines and factories, machines, and themselves nonwovens have good performance characteristics. Of particular relevance today have the technology of non-woven materials from recycled resources.

Textile waste is an integral part of municipal solid waste and waste are divided into production and consumption waste. Textile waste consumption are a major source of secondary raw materials for secondary textile materials.

Textile waste consumption are of mixed composition, not divided by types of fibers, often contaminated and are weighted flap tissue. Any technology of textile waste should include the preparation of the secondary textile raw materials.

Most of the textile production and consumption wastes used as secondary raw materials in the development of non-woven fabrics. The technological process of the production of such materials consists of three main stages: preparation of fibers (cleaning, mixing); forming fibrous web, fibers in fixing a canvas; treating the material and its finishing.

One of the promising areas of recycling textile waste is the production of nonwoven materials by hot or wet pressing, the development of which is held in Vitebsk Technological University. The use of such methods for manufacturing nonwoven materials is quite promising. Currently, quite acute problem of waste disposal. These methods give a second life to waste, light industry, and in particular of short-waste. Goals of nonwoven materials developed in this way are rather wide: to improve the quality of consumer goods, broadening the range of domestic interlining materials and temperature range overlaps.

For the production of nonwoven materials by hot and wet pressing as the main raw material component is proposed to use a hairstyle faux fur waste fibers with a length not exceeding 25 mm. These wastes are generated as a result of shearing carpets Production Joint Stock Company "Vitebsk Carpets" with fiber length of 10 mm. In the mixture of waste included nitron, polyester and wool and nylon fibers.

Research evidence that using a short fiber molding process improves. However this is due to reduction in the strength of the finished fabric, and, conversely, the use of longer fibers results in an increase of the material strength, but complicates the dispersion conditions [1].

Manufacture of non-woven material and a hot-wet compression technology includes the following steps:

- preparation waste;
- creation of the adhesive composition;
- the formation of the web;
- pressing (drying).

Preparation Phase is cutting textile waste, carried out with the help of special crushers. To optimize the cutting conditions are taken into account data on the processed material: linear density, stiffness fibers; data for the shredding: dimensional characteristic frequency ranges of rotation, the feed, the maximum thickness of the cutting, cutting power, the type of cutting tool, the geometrical parameters of the cutting edge.

Then the phase of the adhesive composition which is basic. The loosened shredded fibrous waste material is added to the adhesive composition, then the resulting mass is mixed thoroughly until smooth.

Then the resulting mass is moved to the area of formation of the web. Formation is a process of combining the fibers in sheet form with the creation of a certain volume of the capillary-porous structure. Production of rolled materials by wet-pressing is carried out in the papermaking equipment using a hot press type 2PG-500. As the main raw material component used button of shearing, as adhesive used dextrin glue.

The developed technologies allow to produce non-woven web materials on existing equipment using textile waste, and hence solve the environmental problem of accumulation.

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**Section 2. SOCIAL, HUMANITARIAN AND ECONOMIC PROBLEMS OF EDUCATION AND SCIENCE DEVELOPMENT IN THE 21TH CENTURY**

UDC 331.1; JEL Classification: M10, M21

**CONTROLLING INSTRUMENTS FOR LABOUR INCENTIVE IN THE INDUSTRY**

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*Key words: labour incentive, controlling, value added, incentive system, performance.*

*Abstract. The article is devoted to actual problem of labour incentive in the industry in order to improve the organization's performance. The author proves the necessity of the use of controlling instruments for the development and implementation of the labour incentive system. The proposed system of economic incentive focused both on improving the employee's individual results and on the achievement of the organization's performance (increasing of enterprise value added).*

The growth rate of real wages in Belarus in the period 2000-2015 was much higher than the rate of growth of labor productivity and GDP [1]. However, increasing wages in this period was not supported by the corresponding increase in productivity and labour efficiency. This led to a decrease in the efficiency of economic activities, washout of financial resources and investment sources. Moreover, such a policy in the area of wages led to a blurring of the incentive system and reduced motivation, rather than to its strengthening, as previously thought. The lack of correlation of results of work and its payment resulted in the fact that wages no longer influence the motivation, i.e. the most important instrument of economic incentive has ceased to work.

Although wages in the industry is slightly higher than the national average, there is still no clear link between the salary and the results of work of the employee and the company as a whole. The main problems in the incentive system, hindering the growth of labour productivity and production efficiency, is the absence of economically reasonable standards of labour costs, considering the modern level of development of the equipment and technology; low motivation to the development of new equipment and technologies; lack of individual approach to the assessment of the costs and benefits of different categories of employees, their individual and group (at division's level) contribute to the final results of the enterprise; a weak correlation between the results of the individual work and the earned reward.

Today there are objective conditions to change the situation in the sphere of labour motivation. External reserves of economic growth have been exhausted, and financial investments in the modernization of certain economic activities do not provide the expected efficiency gains due to the lack of motivation of employees to the

intensification of production and the development of new technology. It's not enough to strengthen the rewards of the managers to solve these problems, an integrated system of economic incentive for all employees of the organization is needed.

The currently used mechanisms of labour activity incentive are inefficient primarily due to poor working out of methodological approaches. In the papers of specialists in economic incentive mainly empirical approaches without a clear study of organizational issues of the interrelationship of various incentive elements are applied. As a result, there are contradictions in the economic interests between different departments; employees are often awarded for the results, which are weakly dependent on their activity or punished for failures that are not dependent on them. These issues require to use controlling mechanism in the system of economic incentive, which is regarded as a system of management actions to achieve the final results. To ensure a high motivation to obtaining the final results it's necessary to develop labour costs and results assessment system, as well as the methodology for evaluating the factors affecting the level of motivation. It's proposed to use the principles of controlling for these purposes.

Under the controlling in the system of economic incentive understood information, analytical support and monitoring of the process of motivation of employees in accordance with the achieved results of economic activities. This takes into account the efficiency of individual activities and outcomes of the organization.

The main tasks of controlling in this case are: establishing of indicators to measure employees' performance; planning of economic incentive fund size; working out of management accounting, which provides an incentive system with the information about individual results of work taking into account the savings of all types resources, created value-added products, the use of capital in the main proceedings; monitoring of external factors and restrictions that affect the parameters of economic incentives; formation of economic incentive funds depending on enterprise performance, taking into account enterprise's value-added created; analysis of registration data and calculation of Individual Performance Factors of workers and divisions; control of distribution of added value and economic incentives fund at an enterprise; evaluation of the effectiveness of the system of economic incentives and its improvement.

Economic labour incentive system includes: evaluation parameters of the enterprise's performance, the evaluation parameters of individual labour results of different categories of employees, methodology for assessing these results; method of calculating the amount of incentive payments of the company based on the assessment results; organizational and economic mechanism of the distribution of incentive payments between departments and employees. As the key parameters of evaluating the performance of the company it's proposed to use value added, as an indicator of the effect and at the same time the financial base for the organization; productivity; return on the use of the active part of the capital as the performance indicators.

Using the index of gross value added for the purpose of creating an incentive system allows to consider a salary not as a labour cost element but as a part of the



added value created by the company, which is to be divided between employees and owners of capital. At the same time the interests of labour and capital become unidirectional.

Implementation of the proposed system of economic incentive of work involves the collection and analysis of information on the results of the enterprise, of the individual results of work of employees needed to determine the size of incentive payments, on a regular basis. Since the traditional accounting does not allow to obtain this information, we propose to use controlling mechanism for this purpose.

Assessment parameters of individual results of work of the employee are being developed for each category of staff, depending on the goals of the organization, on the nature of work and ways of its separation, on the functions and tasks, on the existing labour standards, etc. These parameters should reflect the employee's individual contribution to the achievement of the key results of the organization and the structural unit and should be the basis for calculating the rate of labour participation.

As a basis for calculating the amount of incentive payments to the company proposed to use a regulatory ratio that shows the share of gross value added from operations (which is the financial source of economic incentive) to be distributed among the employees. The value of this ratio will be determined by taking into account the achieved growth rate of labour productivity, reduction of material, the rate of growth of the active part of the capital return, taking into account the average value for the previous period.

Organizational-economic mechanism of distribution of incentive payments between departments and employees of the company is based on the unit's labour participation rate reflecting their contribution to the development of added value in the company, as well as individual employee performance rates.

Economic incentive fund planning is carried out according to the norm from the expected added value of the company in the upcoming period. This norm can be established on the basis of industry-wide relationships payroll to created added value in the industry, adjusted for the specifics of labor standards in a particular enterprise. Planned distribution of the fund is carried out by division by the proportion of their wage fund in the general fund of payment, as well as the importance of each of the divisions in the achievement of organization's outcomes.

The controlling system is provided by the development of indicators for each of the units, taking into account the specifics of their activities. In addition, for production workshops focus on the performance of their direct activities and services, for the management - on the performance by the enterprise as a whole. Then these performance measurement indicators are informed to each unit, organized collection of information on the actual performance of these indicators.

The next step of controlling the incentive system is the actual calculation of the fund of economic incentives of the period on approved standards, as well as their distribution by divisions according to the actual performance.

Thus, the implementation of the proposed economic incentive system based on the use of controlling principles will increase the interest of employees in the results of their own activities, linked to the overall progress of the enterprise on the basis of created value added (financial base pay and bonuses for employees) of the period. Developing the economic incentive system should take into account the size of the living wage budget, minimum wage and average industry wages, productivity growth, and others. During the economic incentive fund distribution controlling it's necessary to assess the ratio of fixed and variable parts of salaries so that the payment or withdrawal of the award were real incentive to increase productivity, reduce materials consumption and increase the impact of fixed assets. The criteria for evaluating the effectiveness of the entire economic incentive system should be an increase in value of the overall performance of the enterprise both of quantitative and qualitative nature.

Economic incentive of labour is based on ensuring employees are interested in improving their own results for increasing the basic salary and bonus. But additional employee benefits are only possible in the presence of the necessary financial base in the form of increased product sales and additional revenue remaining at the organization's disposal. Thus, the system of economic incentive focused both on improving of individual results and on the increasing of enterprise value added, i.e. on the achievement of organization's performance.

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UDC 001.81-055.2(476)

## **HUMAN POTENTIAL OF SCIENCE IN THE REPUBLIC OF BELARUS: GENDER FEATURES**

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*Key words: scientific personnel, researchers, field of science, gender characteristics.*

*Abstract. Based on official statistics, analyzed is the gender features of the staff in the sphere of science of the Republic of Belarus in 2015. The comparative data on the distribution of researchers (including doctors, PhDs) by fields of science in 2005 and 2015. The conclusion is made, that despite the fact that there is no gender*

*discrimination in the field of science of the Republic of Belarus, along with the intensification of measures to create a new consciousness, based on the values of gender equality, at the present time the country needs more intensive transition from the principle of equality of rights between men and women in science, to the principle of equality of opportunities as gender equality in scientific research is not only essential for the fulfillment of full potential of the scientific community, but also the basic social and ethical requirement for human development.*

The main features of modern society are its intensive computerization, creation of new intellectual technologies, acceleration of the pace of technological development, transformation of information into an important global resource of mankind. The leading role in these processes is played by science, and the most important condition for the full potential of the scientific community realization is to ensure gender equality in scientific research. In this context, important is the analysis of state statistics data which allows to record and follow in the monitoring mode quantitative changes in the gender composition of research personnel, thus contributing to the optimization of human resources policy in the sphere of science.

The analysis of the statistical data about the staff of the Belarusian science has shown that since the 1990s, the total number of researchers in the country began to decrease, thus, changing the gender ratio - the proportion of men began to grow and that of women to fall. As a result, by the end of 2004 it was respectively 55.6% and 44.4%. The period from 2005 to 2010 show that the average percentage of women and men among the researchers practically did not change and was from 42.2% to 43.9% in different years of the period among women and from 56.1% to 57.8% among men. With regard to the various areas of science, social sciences showed that the proportion of women increased by 7.8% and in the field of medical sciences decreased by 4.6%. In the natural sciences the proportion of men in this period fell by 7.7%, women by 11.1%. A similar pattern was observed in the field of agricultural sciences, where with a total decrease in the number of researchers of both sexes, the proportion of men increased slightly, and that of women decreased (by 0.4%), while the average percentage of women and men were, respectively, 57.6% and 42.4%. In the humanities the overall reduction in the number of researchers as well was due to women, however, the percentage of women did not fall below 56.3% during this period, and men, respectively, did not rise above 43.7%. The total number of doctors and candidates of sciences among researchers in this period has decreased, while the proportion of women among highly qualified scientific specialists was increasing every year. So, in 2010 the figure was 17.0% among doctors and 36.8% of candidates (in 2005 - 15.1% and 35.9%, respectively), while the highest share among doctors of sciences women was observed in the field of humanitarian, medical and agricultural sciences (28.8%; 27.8% and 21.6%, respectively); among the candidates in the area of healthcare, humanities and natural sciences (57.6%: 48.1% and 42.8%, respectively). In addition, 2010 was the year with the highest number (both in absolute terms and as a percentage) of women doctors among the researchers.

From 2011 to 2015 the downward trend in the number of researchers in the country continued, with the decrease occurring in all areas of science with the exception of health care, where the total number of researchers has grown at the expense of women. As of 1 January 2016, the overall ratio of men and women in the composition of the researchers was 59.5% and 40.5%. In almost all areas of science the proportion of women exceeds that of men which suggests that the process of "feminization" of science in Belarus is well under way. Currently the most 'feminized' areas are agricultural science (62.7%) and humanities (62.3%), followed in the descending order by medical (60.7%), socio-economic and social (59.1%), natural (47.7%) sciences. Predominantly "male" is the area of technical sciences, the proportion of women among researchers is not only growing, but is gradually reducing. So, if in 2005 it was 34.4%, in 2015 it was 30.7%.

The area of technical sciences has the largest concentration of women researchers (44.6% of the total number in the scientific institutions of the country). However, the analysis of the qualification structure of the various fields of science shows that the lowest proportion of doctors and candidates of sciences is to be found exactly in the field of technical sciences. So, at the beginning of 2016 in the field of technical sciences the proportion of female researchers accounted for 8.8% of doctors and 16.3% of candidates of sciences, whereas in the humanities for 30.5% of doctors and 55.2% of candidates of sciences; in the field of agricultural sciences for 21.4% of doctors and 47.9% of the candidates; in the field of medical sciences for 23.9% of doctors and 60.2% of the candidates of sciences, and in natural sciences for 17.9% of doctors and 42.1% of candidates of sciences; in the field of socio-economic and social sciences for 12.2% of doctors and 46.2% of candidates of sciences. Thus, with the concentration of women researchers primarily in the field of technical sciences, the availability of highly qualified specialists there is one of the lowest.

Given that the state policy in the field of science is aimed at improving its personnel structure as evidenced by a number of regulatory and legislative acts adopted in different years as well as the fact that the country has a high number of women with higher education, master's degrees, and doing postgraduate studies, it can be assumed that the proportion of women among the researchers of the Republic of Belarus will not diminish in the coming years. The analysis of statistical data shows that the increase in the proportion of women in almost all fields of science does not yet substantially increase their proportion among researchers with higher academic qualifications. In general, according to the data for 2015, the proportion of women with a degree of a doctor of science is 17.7%, and a candidate of sciences is 40.1%. Thus, the increase in the proportion of women in science is currently poorly connected with the increase of their academic qualifications, which does not allow to view the process of feminization of science of Belarus as unequivocally positive phenomenon. However, the entry of women in science is considered by international analysts as their active involvement in the social production in the field of highly qualified labor. Thus, in the conditions of expansion of social production and the development of science and the availability and existence of sufficient manpower

requirements, including scientific personnel, this phenomenon can be considered as positive.

In general, the dynamics of development of personnel potential of the Belarusian science from a gender perspective can be described as quite stable, with slight (about 1 to 2% per year) changes in the rates in both directions. In the scientific field of the country there is no gender discrimination. According to the survey in 2016, 72.2% of women and 80.4% of male researchers from the National Academy of Sciences of Belarus have never encountered any manifestations of gender inequality in their labor collectives. A positive trend is also a growing number of women, including doctors and candidates of sciences, in some fields of science and others. Nevertheless, the total number of women with scientific degrees as well as in senior positions in science is significantly inferior to those of men. Such a situation in the first place, can be explained by the traditional view of women's place in the Belarusian society, as well as the difficulties associated with the need to align service career of women with a wide range of family responsibilities. Since motherhood, caring for the family and home are translated as predominantly female responsibilities, as a result, women, have less as compared to men time resources and opportunities for scientific careers. However, with a total focus on an academic career at the beginning of their working life, most of the women after defending their doctoral dissertation change their intentions, and to a large extent this is happening due to currently high demands as to the quality of scientific publications and quite appreciable competition with men.

The essential role is also played by such factors as great responsibility and challenging stress and tension as well as a not too high remuneration of researchers, including candidates and doctors of sciences. Thus, according to the survey conducted by the Institute of Sociology of the National Academy of Sciences in 2016, the majority of women researchers of the Academy (62.5%) were not satisfied with the size of their salaries. Moreover, 62.2% of women consider low wages of scientists, primarily among young ones to be the most acute problem of its departments. However, although for 25.4% of those who intend to change the sphere of work, the main reason for this decision is low level of pay, the majority of women researchers (52.4%) do not plan to leave science in the near future. Among the factors that keep women in this sphere of employment is the desire to contribute to science (33.8%), the belief that the prestige of science and the social status of the scientist in society will increase (31.8%), and that there is a real opportunity for creative fulfillment (23.5%). Many of them are also attracted by the image of life of a scientist and the intellectual environment (41.6%); many are satisfied with the operation of their scientific institutions (27.6%).

In general, gender situation in the staffing of the Belarusian science can be regarded as quite positive. These studies show that the main condition for effective research work and professional development of scientists, regardless of gender, in the present conditions is to improve the material and technical base and improving the funding of basic science as well as the relevance of the results of applied science. In order to intensify the process of innovation, it is necessary, first of all, to ensure the



development of the experimental base, corresponding to world standards; develop a better mechanism of material incentives of all scientists who have successfully carried out the implementation of scientific research into practice and create more favorable conditions for the development of international cooperation in science, technology and innovation. In addition, the solution of material and domestic problems, in particular, the increase of the level of social protection and the remuneration of labor of scientists as well as addressing their housing problems would create equal opportunities for men and women to realize their scientific careers.

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JEL Classifications: M41

## HARMONIZATION OF BELARUS ACCOUNTING GAAP WITH IFRS AND US GAAP

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*Key words: accounting, financial reporting, IFRS, US GAAP, Belarus GAAP.*

*Abstract. The paper presents findings of the study conducted in Belarus. As early as 2008, some Belarus companies started to prepare consolidated financial reports in accordance with International Accounting Standards. This study presents the integration of internationally accepted accounting standards into Generally Accepted Accounting Standards in Belarus, capacity-building and technical implementation issues.*

*The main objectives of this study are to draw lessons learned from the experience of Belarus in implementing IFRS and to discuss the findings with a view to facilitating sharing of experience among countries that are either implementing IFRS or that intend to do so in the coming years.*

**The need for internationally accepted standards.** Belarus government had and has till present time an increased demand for money (capital). But financial



statements prepared according to Belarus GAAP were not accepted by foreign creditors. The first problem of acceptance arose mainly due to the fact that Belarus GAAP was not known outside of Belarus at all. Other reasons drove Belarus government to prepare financial reporting in IFRS format were to improve some governmental companies' image and Belarus presentation to investors as whole. It became obvious how much the international accounting systems differed from Belarus GAAP when financial statements were prepared in accordance with national GAAP and the figures were compared with those prepared under IFRS.

It were revealed substantial discrepancies in the given information and specific accounting positions.

There are the following features of Belarus GAAP in comparison with IFRS and US GAAP:

- Too tax-oriented and thus too much emphasis on the prudence principle;
- Tax accounting affects profit accounting and distorts the objectives of the commercial income statement and financial position statement;
- Distortion of results of operations (I mean some provisions for certain expenses permitted, including reserve for repairs etcetera).

**The way towards IFRS.** Belarus opened up its accounting system to internationally accepted accounting standards in 1992. Since 1992 several resolutions were adopted by the Council of Ministers of the Republic of Belarus: of 30.03.1992 No. 174 *"On the transition of the Republic of Belarus on internationally accepted accounting and statistics system"*, of 27.08.1992 No. 523 *"On the Republican program of transition of the Republic of Belarus accounting and statistics on internationally accepted system"*, of 09.06.1992 No. 347 *"About the organization of accounting in the national economy of the Republic of Belarus on the basis of principles of international practice."* The latter resolution stated that the accounting and financial reporting in Belarus based on internationally accepted accounting standards starting from January 1, 1993. However, these programs have not been implemented. As a consequence, in 1998 it was adopted by the Council of Ministers a resolution of 04.05.1998 No. 694 *"On the State program of transition to international accounting standards in the Republic of Belarus"*. The program is determined to bring the national accounting system in line with international financial reporting standards (IFRS) as the main goal of the Belarus accounting system reforming. The result of implementation of the program was to be the transition of organizations and individual entrepreneurs to IFRS on January 1, 2008. However, and this program has not been implemented. Therefore, the Law *"On Accounting and Reporting"* (revised 2013) has been narrowed range of businesses, which are required to apply IFRS. According to Article 17 of the Law so called socially important organizations and banks are required to prepare the annual consolidated financial statements in accordance with IFRS for 2016 and subsequent years. Public companies with subsidiaries, as well as banks and non-bank financial institutions, insurance companies are regarded as socially important organizations (Article 1 of the Law).

**Problems of further expansion of IFRS.** IFRS are only required for a small number of about 500 companies. Compare to the larger number of roughly 500 000 organizations and individual entrepreneurs, most of which prepare first of all tax reporting, and only small amount of them prepare both separate (consolidated) financial and tax statements. So, Belarus GAAP will be the predominant regulations at present and in the nearest future. Due to the number of functions a separate financial accounting with its separate financial statements has to fulfill (revenue recognition and profit distribution, serving as a base for tax accounting) IFRS are not applicable for these financial and tax statements at the moment.

The explicit objective of the legislator is to further develop Belarus GAAP towards an information oriented accounting system, harmonizing the requirements in accordance with IFRS. Besides, most companies do not yet see the benefits of converging Belarus GAAP to IFRS, because IFRS is perceived as a voluminous and much more complex set of accounting standards. Usually permit to attract foreign investments gives the government or the President of Belarus . So there are no major concerns – both for corporations and small and medium-sized enterprises (SMEs) – as to the applicability of these standards, which are intended to serve the purposes of capital market investors.

So far, both corporations and SMEs are not very supportive of a possible use of IFRS instead of or parallel to Belarus GAAP due to the additional benefits that separate financial statements prepared in accordance with national GAAP provide in a substantially larger net income , and hence the dividend payable.

The impact on the presented company profit represents not a one-time only effect. The value of net assets or the financial position of a company will constantly be lower compared to Belarus GAAP. Any impact of the accounting transition signifies only temporary changes.

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JEL Classifications: M41

**COMPARISON OF PROVISIONS  
AND CONTINGENCIES ACCOUNTING  
AND REPORTING UNDER IFRS, US GAAP  
AND BELARUS GAAP**

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*Key words: accounting, reporting, provisions, contingencies, IFRS, US GAAP, Belarus GAAP.*

*Abstract. In this paper we will discuss where the accounting of provisions and contingencies under IFRS, US GAAP and Belarus GAAP are similar and where differences exist. We want to underline the fact that the three sets of standards are generally more alike than different for commonly encountered provisions and contingencies transactions. This is connected with such fact that IFRS being largely, but not entirely, grounded in the same basic principles as US GAAP, and Belarus GAAP began to be largely grounded in the same basic principles as IFRS.*

Regulation on accounting *Provisions, Contingent Liabilities and Contingent Assets*, approved by the Ministry of Finance of the Republic of Belarus of 28.12.2005 No.168 is the regulation for recognition and measurement criteria of provisions and contingencies that are rather similar to those in IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*. The definition of probability in Regulation on accounting *Provisions, Contingent Liabilities and Contingent Assets* as well as the requirement of recognition of a loss based on the probability of occurrence are similar to those in IFRS.

Regulation on accounting *Provisions, Contingent Liabilities and Contingent Assets* prohibits the recognition of provisions for costs connected with operating activities in future and requires disclosures about a contingent liability the occurrence of which is more than remote. But it does not answer the recognition criteria that are close to those in US GAAP and IFRS. No significant development activities are planned in this area for the near term.

Under US GAAP and IFRS the general recognition criteria for provisions are very close. IAS 37, *Provisions, Contingent Liabilities and Contingent Assets*, provides the overall approach for recognition and measurement criteria of provisions and contingencies. Under US GAAP, ASC 450, *Contingencies*, and a number of other standards deal with specific types of provisions and contingencies (e.g., ASC 410, *Asset Retirement and Environmental Obligations*; ASC 420, *Exit or Disposal Cost Obligations*). Besides, the approach in two Concept Statements in US GAAP (CON

5, *Recognition and Measurement in Financial Statements of Business Enterprises*, and CON 6, *Elements of Financial Statements*) is similar to the specific recognition criteria provided in IAS 37. US GAAP and IFRS require recognition of a loss based on the probability of occurrence, at the same time the definition of probability is different under US GAAP and IFRS. US GAAP and IFRS prohibit the recognition of provisions for costs associated with future operating activities. After all, both US GAAP and IFRS insist on disclosures about a contingent liability whose occurrence is more than remote but does not meet the recognition criteria.

Table 1 – Significant differences in accounting of provisions and contingences

	Belarus GAAP	US GAAP	IFRS
Recognition threshold	In general, similar to IFRS.	A loss must be "probable" to be recognized.	A loss must be "probable" to be recognized.
Discounting provisions	In general, similar to IFRS.	Provisions may be discounted in case when the amount of the liability and the timing of the payments are fixed or reliably determinable, or when the obligation is a fair value obligation (e.g., an asset retirement obligation under ASC 410-20). The discount rate to be used is dependent upon the nature of the provision, and may vary from that used under IFRS. However, when a provision is measured at fair value, the time value of money and the risks specific to the liability should be considered.	Provisions should be recorded at the estimated amount to settle or transfer the obligation taking into consideration the time value of money. The discount rate to be used should be "a pre-tax rate (or rates) that reflect(s) current market assessments of the time value of money and the risks specific to the liability."

Table 1 – Significant differences in accounting of provisions and contingences:  
Continues

Measurement of provisions – range of possible outcomes	The best estimate of an obligation should be accrued. For a large amount of items being measured, such as warranty costs, the best estimate is the typically expected value, although the mid-point in the range may also be used when any point in a continuum is as likely as another. The best estimate for a single obligation may be the most likely outcome, although other possible outcomes should still be considered.	Most likely outcome within range should be accrued. When no one outcome is more likely than the others, the minimum amount in the range of outcomes should be accrued.	Best estimate of obligation should be accrued. For a large population of items being measured, such as warranty costs, best estimate is typically expected value, although midpoint in the range may also be used when any point in a continuous range is as likely as another. Best estimate for a single obligation may be the most likely outcome, although other possible outcomes should still be considered.
Restructuring costs	Regulation <i>Provisions, Contingent Liabilities and Contingent Assets</i> prescribes the conditions when provisions for restructuring should be booked. These conditions are generally nsimilar to IFRS requirements.	Involuntary employee termination costs under a one-time benefit arrangement are recognized over future service period, or immediately if there is no future service required. Other exit costs are expensed when incurred.	Costs typically are recognized earlier than under US GAAP because IAS 37 focuses on the exit plan as a whole, rather than individual cost components of the plan.

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JEL Classifications: M41

## **COMPARISON OF FINANCIAL STATEMENT PRESENTATION UNDER IFRS, US GAAP AND BELARUS GAAP**

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*Key words: accounting, financial reporting, IFRS, US GAAP, Belarus GAAP.*

*Abstract. We will analyze where the standards (IFRS, US GAAP and Belarus GAAP) are similar and where differences exist. There are many similarities in IFRS, US GAAP and Belarus GAAP approaches to financial statement presentation. Most Belarus GAAP are based in large part on IFRS and in some part on US GAAP. Some IFRS, however, have no comparable Belarus standard, and some of Belarus standards that are based on IFRS have not been updated for recent changes to the comparable IFRS. Therefore, the existing accounting system in Belarus continues to differ from IFRS as well as from US GAAP.*

There are many similarities in IFRS, US GAAP and Belarus GAAP approaches to financial statement presentation. Under mentioned sets of standards, the components of a complete set of financial statements include: a statement of financial position (in Belarus – balance sheet), a statement of profit and loss (i.e., income statement) and a statement of comprehensive income (either a single continuous statement or two consecutive statements; under Belarus GAAP - a single continuous statement of profit and losses), a statement of cash flows and accompanying notes to the financial statements. All three standards also require the changes in shareholders' equity to be presented. However, US GAAP allows the changes in shareholders' equity to be presented in the notes to the financial statements while IFRS and Belarus GAAP require the changes in shareholders' equity to be presented as a separate statement. Concepts of materiality and consistency employed in IFRS, US GAAP and Belarus GAAP are very close. Further, all three accounting systems require the financial



statements be prepared on the accrual basis of accounting (with the exception of the cash flow statement) with except for rare circumstances. IFRS, US GAAP and Belarus GAAP require in the absence of standards that specifically apply to a particular matter in formulating its accounting policies, the entity should work out an appropriate method on the basis of standards dealing with similar and related issues. Most Belarus GAAP is based in large part on IFRS and in some part on US GAAP. Some IFRS, however, have no comparable Belarus standard, and some of Belarus standards that are based on IFRS have not been updated for recent changes to the comparable IFRS. Therefore, the existing accounting system in Belarus continues to differ from IFRS as well as from US GAAP.

Table 1 – Differences between the three accounting systems

	Belarus GAAP	US GAAP	IFRS
Reporting period	Use calendar year as a reporting period	Do not use calendar year as a reporting period	Do not use calendar year as a reporting period
Financial periods required	Comparative information must be disclosed in respect of the two previous periods for the balance sheet, one previous period for the statements of financial results, changes in equity, cash flows and appendices to the financial statements.	Generally, comparative financial statements are presented; however, a single year may be presented in certain circumstances. Public companies must follow SEC rules, which typically require balance sheets for the two most recent years, while all other statements must cover the three-year period ended on the balance sheet date.	Comparative information must be disclosed with respect to the previous period for all amounts reported in the current period's financial statements.
Layout of balance sheet and income statement	Regulation No.111, <i>The Accounting Reports of an Organization</i> The <i>Accounting Reports of an Organization</i> prescribes a specific layout for the balance sheet and other statements.	No general requirement within US GAAP to prepare the balance sheet and income statement in accordance with a specific layout; however, public companies must follow the detailed requirements in some Regulation S-X.	IFRS does not prescribe a standard layout, but includes a list of minimum line items. These minimum line items are less prescriptive than the requirements in Regulation S-X.

Table 1 – Differences between the three accounting systems: Continues

<p>Balance sheet – presentation of debt as current versus non-current</p>	<p>Debt for which there has been a covenant violation may be presented as non-current if a lender agreement to waive the right to demand repayment for more than one year exists before the financial statements are issued or available to be issued.</p>	<p>Debt associated with a covenant violation must be presented as current unless the lender agreement was reached prior to the balance sheet date.</p>	<p>A long-term loan that is payable on demand following a covenant violation continues to be classified as noncurrent. The appendices to the financial statements should contain the disclosure of the terms of the loan agreement that has the covenant violation.</p>
<p>Balance sheet – classification of deferred tax assets and liabilities</p>	<p>All amounts are classified as current and non-current in the balance sheet.</p>	<p>Current or non-current classification, generally based on the nature of the related asset or liability, is required.</p>	<p>All amounts classified as non-current in the balance sheet.</p>
<p>Income statement – classification of expenses</p>	<p>Expenses should be classified with regard to function (cost of sales or production, commercial expenses, management expenses, other expenses) in the statement of financial results.</p>	<p>No general requirement within US GAAP to classify income statement items by function or nature. However, SEC registrants are generally required to present expenses based on function (e.g., cost of sales, administrative).</p>	<p>Entities may present expenses based on either function or nature (e.g., salaries, depreciation). However, if function is selected, certain disclosures about the nature of expenses must be included in the notes.</p>
<p>Income statement – extraordinary items criteria</p>	<p>Extraordinary items should be presented as part of other income or other expenses in the statement of financial results and may be disclosed if they are material in the appendices to the financial statements.</p>	<p>Restricted to items that are both unusual and infrequent.</p>	<p>Prohibited.</p>

Table 1 – Differences between the three accounting systems: Continues

<p>Income statement – discontinued operations criteria</p>	<p>Regulation No.111, <i>The Accounting Reports of an Organization</i> does not require separate classification on the balance sheet. It is recommended to disclose discontinued operations separately in the statement of financial results and cash flow statement. Information related to discontinued operations should be at least disclosed in the appendices to the financial statements.</p>	<p>Discontinued operations classification is for components held for sale or disposed of, provided that there will not be significant continuing cash flows or involvement with the disposed component.</p>	<p>Discontinued operations classification is for components held for sale or disposed of that are either a separate major line of business or geographical area or a subsidiary acquired exclusively with an intention to resell.</p>
<p>Disclosure of performance measures</p>	<p>According to Regulation No.111, <i>The Accounting Reports of an Organization</i> following subtotals should be presented on the face of the statement of financial results: gross profit, profit from sales and net profit before and after tax. Performance measures other than those required by this order should not be discussed at all.</p>	<p>No general requirements within US GAAP that address the presentation of specific performance measures. SEC regulations define certain key measures and require the presentation of certain headings and subtotals. Additionally, public companies are prohibited from disclosing non-GAAP measures in the financial statements and accompanying notes</p>	<p>Certain traditional concepts such as “operating profit” are not defined; therefore, diversity in practice exists regarding line items, headings and subtotals presented on the income statement. IFRS permits the presentation of additional line items, headings and subtotals in the statement of comprehensive income when such presentation is relevant to an understanding of the entity’s financial performance.</p>

Table 1 – Differences between the three accounting systems: Continues

Third balance sheet	Not required.	A third balance sheet is required as of the beginning of the earliest comparative period when there is a retrospective application of a new accounting policy, or a retrospective restatement or reclassifications that have a material effect on the balances of the third balance sheet. Related notes to the third balance sheet are not required.	Not required.
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Source: author’s research.

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JEL Classifications: M41

**COMPARISON OF FOREIGN CURRENCY MATTERS ACCOUNTING AND REPORTING UNDER IFRS, US GAAP AND BELARUS GAAP**

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*Key words: accounting, reporting, foreign exchange rate, IFRS, US GAAP, Belarus GAAP.*

*Abstract. In this paper we will discuss where the accounting standards (IFRS, US GAAP and Belarus GAAP comparison) are similar and where differences exist in connection with foreign currency exchange rate accounting and its presentation in financial reporting. We want to underline the fact that the three sets of standards are generally more alike than different for commonly encountered transactions in foreign currency. This is connected with such fact that IFRS being largely, but not entirely, grounded in the same basic principles as US GAAP, and Belarus GAAP began to be largely grounded in the same basic principles as IFRS.*

First of all we want to underline the fact that the three sets of standards are generally more alike than different for commonly encountered transactions. This is connected with such fact that IFRS being largely, but not entirely, grounded in the same basic principles as US GAAP, and Belarus GAAP began to be largely grounded in the same basic principles as IFRS. The general principles and conceptual framework are often the same or similar in all mentioned sets of standards, but not leading to similar accounting results in Belarus companies' financial reporting in comparison with the results under IFRS and US GAAP. The existence of such differences does not depend on the nature of the entity or the details of the transactions, but only on the interpretation version of the more general IFRS and US GAAP principles in Belarus GAAP by Ministry of finance.

There is no any concept of functional or presentation currency or hyperinflationary currency in Belarus GAAP. In accordance with National standards of accounting and reporting, "Effect of changes in foreign exchange rates", approved by the Ministry of Finance of the Republic of Belarus of 29.10.2014 No. 69, the reporting currency for all entities is the Belarus ruble. In accordance with Regulation No.69 "Effect of changes in foreign exchange rates" foreign currency transactions of an entity must be recalculation in Belarus rubles, with the amounts resulting from changes in the exchange rates being reported in profit or losses. All monetary assets and liabilities denominated in currencies other than the ruble should be recalculated in rubles using the official exchange rate of the National Bank of Belarus at the reporting date. Non-monetary assets (fixed assets, intangibles, inventory, prepayments and advances) and liabilities, as well as share capital, denominated in currencies other than the ruble should be accounted for in rubles, being recalculated by using the official exchange rate of the Bank of Belarus at the date of the transaction. When the law or agreement between the parties envisages another exchange rate for the recalculation of assets and liabilities denominated in foreign currencies and subject to settlement in rubles, that rate is used for recalculation. Consolidated financial statements prepared in accordance with Belarus GAAP should also be presented in Belarus rubles.

ASC 830, *Foreign Currency Matters*, and IAS 21, *The Effects of Changes in Foreign Exchange Rates*, are similar in their approach to foreign currency translation. By the way, the criteria to determine an entity's functional currency are different under US GAAP and IFRS. But both ASC 830 and IAS 21 generally result in the same determination. In addition, although there are differences in accounting for foreign currency translation in hyperinflationary economies under ASC 830 and IAS 29, *Financial Reporting in Hyperinflationary Economies*, both reporting systems require the identification of hyperinflationary economies and generally consider the same economies to be hyperinflationary.

US GAAP and IFRS require foreign currency transactions to be recalculated into an entity's functional currency with sums resulting from changes in exchange rates reported in income. The method used to translate financial statements from the functional currency to the reporting currency is the same under US GAAP and IFRS. Exception is the translation of financial statements in hyperinflationary economies.

Before executing the translation procedure into the reporting currency US GAAP and IFRS require recalculation into the functional currency. Assets and liabilities are translated at the period-end rate and income statement sums generally are translated at the average rate, with the exchange differences reported in equity. Certain foreign exchange effects related to net investments in foreign operations to be accumulated in shareholders' equity. These sums are reflected in income when there is a sale, complete liquidation or abandonment of the foreign operation.

Table 1 – Differences in accounting of foreign currency matters

	Belarus GAAP	US GAAP	IFRS
Translation/ functional currency of foreign operations in a hyperinflationary economy	There is no relevant regulation for a hyperinflationary economy in Belarus GAAP.	Local functional currency financial statements are recalculated as if the functional currency was the reporting currency (US dollar in the case of a US parent) with resulting exchange differences recognized in income (gains).	The functional currency must be maintained. But local functional currency financial statement amounts not already measured at the current rate at the end of the reporting period (current and prior period) are indexed using a general price index, and are then recalculated in the reporting currency at the current rate.
Consolidation of foreign operations	There is no relevant regulation in Belarus GAAP.	A "bottom-up" approach is used in order to reflect the appropriate foreign currency effects and hedges in place. An entity should be consolidated by the enterprise that controls the entity. In this case, it is used the "step-by-step" method of consolidation, whereby each entity is consolidated into its immediate parent until the ultimate parent has consolidated the financial statements of all the entities below it.	The consolidation method is not specified and, as a result, it is used either the "direct" or the "step-by-step" method of consolidation. Under the "direct" method, each entity within the consolidated group is directly translated into the functional currency of the ultimate parent and then consolidated into the ultimate parent without regard to any intermediate parent. The use of method of consolidation could affect the cumulative translation adjustments deferred within equity at intermediate levels, and therefore the recycling of such exchange rate differences upon disposal of an intermediate foreign operation.

Source: author's research.



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UDC 336.7

**METHODS OF RUSSIAN AUTHORS FOR  
ASSESSING THE FINANCIAL STABILITY OF  
COMMERCIAL BANKS: COMPARATIVE  
CHARACTERIZATION**

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*Key words: financial stability, commercial bank, liquid assets, statutory fund, equity, total liabilities.*

*Abstract. The article describes the most common methods for assessing the financial stability of commercial banks of the Russian authors. The article provides a comparative description of these methods, as well as indicates their advantages and disadvantages.*

The most common methods of assessing the financial stability of commercial banks are as follows:

**1. Analysis of the financial stability of a credit institution by the method of V. Kromonov.**

The initial information for calculation of stability is held in balance sheets of banks, which data are grouped into economically homogeneous groups: statutory fund, equity, demand liabilities, total liabilities, the required reserves fund, liquid assets, working assets, capital protection.

On the basis of these parameters the system of coefficients is made and the current index of reliability is calculated.

For the construction of the current index of reliability normalization system is applied to the resulting set of coefficients. Its essence lies in the fact that each bank's coefficients are divided into respective coefficients of a hypothetical bank, called optimally reliable. The term "optimally reliable bank" means a bank, a reliable

enough, but not overly so, having a reasonable allocation of assets and liabilities, including reasonable share of working assets.

Maximum value of the index of reliability is equal to 100. The higher the index, the more reliable and stable the bank is.

Final index of reliability is formed only for banks that have passed through the cutoff system. The point of this system - still at a preliminary stage to weed out the banks which do not represent the public interest (too small or highly specialized), or don't have enough stable balance sheet structure (eg. too young), or are known to the verge of bankruptcy.

The final ranking of the banks in the ranking list is carried out in descending order of values of the indices of banks that have passed cutoff system and not excluded on the grounds arising from subjective information of the preparers of the ranking. [1]

## **2. Method of assessing the financial stability of the bank of A. Muravyev.**

This method provides the calculation of sustainability indicators of commercial bank in groups of criteria: capital base of the bank, liquidity, profitability.

In addition, to evaluate the complex stability of the bank a number of additional parameters are used:

- the rate of stock capitalization of the profits - the ratio of equity capital to the statutory fund - characterizes the efficiency of the bank - the ability to increase equity by the earned income instead of additional issue of shares;

the rate of distribution, which is defined as the ratio of profits paid as dividends to the entire net profit;

- the number of years of presence in the banking market;
- the presence of external ratings, confirming the bank's external recognition as a strong member of the banking market;
- specialization of the bank.

It should be noted that the assessment of the complex stability for the financially unstable banks is not made due to the fact that the situation in these banks can be described as unsatisfactory, and it is a priori difficult for them to resist negative factors accompanying the banking business [2].

## **3. Method of assessing the financial stability of the bank of banking union "Orgbank" (Russia).**

This method consists of three s: a formal, mathematical and expertise. The first phase is the immediate verification of requirements that were set for banks. Orgbank refers to these criteria total balance, amount of capital, the level of profitability, the share of loans in total assets. In addition, banks are grouped in terms of activity. At the same time the banks with statutory fund in the amount not lower than the Central Bank of Russia are analyzed.

On stage the mathematical rating index is calculated. It is calculated on a set of standard parameters that cover almost all aspects of the analyzed bank. All parameters are conventionally divided into six major areas:

- the resulting financial measure;
- an indicator of the dynamics of financial management of bank funds;

- professionalism of employees;
- structure of the bank;
- history;
- image.

At the third stage of the analysis an expert evaluation of the rating index is carried out. As a result of evaluation each bank is assigned to a certain category.

**4. Method of assessing the financial stability of the bank of Analytical Center of financial information (Russia).**

The analysis estimated the bank's resistance to various fluctuations: economic, political, psychological, environmental, situational, and others. First of all, it is estimated how proficient is the bank, that is, the extent to which he is engaged in banking activities.

According to this method of Analytical Center on the first round the banks are divided into classes depending on the quantitative indicators. Each class is calculated as the sum of the bank's positions in the three lists drawn up in order of decreasing amounts: total bank balance, equity and profit. Bank's position in the worklist defined by decrease of the total amount of points. According to this principle, banks are divided into four classes.

Then, for each class is calculated ratio of the bank's financial stability - the main indicator of the method according to which the final list of banks is based. Depending on the value of this ratio the banks are grouped in four classes of the stability (high, medium, permissible, other).

The final rating of the bank stability is calculated as the sum of the ten indicators, such as financial indicator, expert indicator, the technical indicators, each of which is an interconnected system of influencing factors [3].

Comparative description of methods is presented in table 1.

Table 1 – Comparative description of methods for assessing the financial stability of commercial banks

The name of the method	Advantages of the method	Disadvantages of the method
The method of V. Kromonov	At the preliminary stage it allows to eliminate obviously troubled banks due to the existence of the system of cutoffs	<ol style="list-style-type: none"> <li>1. Lack of attention to the problem of assessing the quality of bank assets</li> <li>2. Subjectivism related to optimum coefficient values and their weights</li> <li>3. Insufficient attention to the factor of bank profitability</li> </ol>
The method of A. Muravyev	<ol style="list-style-type: none"> <li>1. It allows at the preliminary stage to exclude financially unstable banks</li> <li>2. It takes into account the relationship of stability, reliability and competitiveness of the bank</li> </ol>	Includes an analysis, based on expert judgment, so the quality of the final result depends on the professionalism of the experts.

Table 1 – Comparative description of methods for assessing the financial stability of commercial banks: Continues

The method of banking union "Orgbank" (Russia)	It takes into account both quantitative and qualitative indicators of the bank's activities	Stage based on expert judgment is subjective
The method of Analytical Center of financial information (Russia)	It assumes a formalized approach that improves the accuracy of the assessing	It does not take into account quality indicators of the bank's activities: market reputation, professionalism of employees and others

Source: compiled by the author.

Each method of assessing the financial stability of the bank has its advantages and disadvantages. The choice of method depends largely on the available information and the objectives pursued by analysts.

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UDC 338.22.01

### IMPLEMENTATION AND IMPROVEMENT OF INTERNAL INNOVATIVE IDEAS OF SYSTEMATIC MANAGEMENT OF COMPANY

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*Key words: corporate culture, employees' innovative potential, innovation and employee motivation, innovative proposals recognition and rewards system.*

*Abstract. The company's development is closely linked to the innovative development. In order to develop innovation, the company has set up a proper corporate culture, made up of qualified staff, who is motivated to think and act innovatively. There are analyzed the company's innovative environment and the*

*factors of employee motivation opportunities, and provided practical examples in the article.*

The company's development is not possible without innovation policy development. Generating process of new products and services occurs rapidly, the most successful examples have already taken over by competitors in a few months. Over the time from idea to launch of the product on the market is a critical factor. The successful development of innovations require appropriate corporate culture made up of motivated and trained employees, who contributes to innovative thinking and actions, as well as the necessary tools and techniques for effective implementation of innovative ideas.

Each company has its own unique culture. It is often unintentionally created on the basis of the company's founders or senior management beliefs and values. The existing corporate culture influences the decision-making processes, management style, as well as cooperation and communication styles of company [1].

Internal innovative proposals motivation is needed for the company's top management support. As employees of innovative thinking and action, to a greater or lesser extent, based on a voluntary basis, knowledge and experience is employee's personal characteristics, the organization must have an established culture of motivation, creating a sense of belonging, trust and respect, as well as providing opportunities for growth [1].

The company's management should focus on a working environment establishment and maintenance, which is characterized by the following factors:

1. Employee innovative potential and realization of self-esteem (employees who do not have higher education and who occupy a lower position, are interested and able to do their work more efficiently and creatively).
2. Motivation for time and resources investing to the realization of innovative potential.
3. The desire to invest in employees training and competence development.
4. Free access to information sources, e.g., the Internet and databases, internal enterprise knowledge resources - site meetings and informal meetings, thus facilitating the exchange of knowledge and facilitating their transfer.
5. Open communication culture and involvement in organization development problems.
6. Performance and behavior of the analytical culture - errors and action are examined, analyzed and evaluated.
7. Innovative proposals registration, evaluation and feedback are necessary tools to guarantee the implementation of the idea after a positive evaluation.
8. Rewards system.

The first three factors are mainly determined by the company's management thinking and take organizational measures, particularly in a systematic employees' development of professional competence. The next three factors refer to knowledge management methods and tools. Seventh element needs the necessary tools. The time needed to respond to an employee's proposal is an extremely important factor. Ideas

for the assessment must take into account the composition and number of assessors and assessors must have appropriate professional (and social) competence. It is necessary to adopt estimation very carefully in order not to destroy the creative environment at an early stage and avoid disappointment among employees. The eighth factor is the company's management responsibility, which includes innovative organizational culture creation and maintenance. Although there are general recommendations, it is necessary to establish employees' views and expectations on this matter. Employees are afraid that their idea might be preposterous, they fear to damage relations with colleagues or put forward a proposal which would point to mismanagement. Therefore, the motives must be stronger than the counter-arguments [2].

Bayer (2003) has conducted a research on innovation and employee motivation. There are identified three main themes from the analysis on the internal management of innovative proposals carried out in small and medium-sized enterprises:

- motivation and satisfaction resulting from studying problem to be solved;
- motivation and satisfaction resulting from solving the problem;
- motivation, resulting from the successful experience and obtained recognition of the cooperation in creative colleagues group.

These results are perfectly corresponded with the above mentioned individual motives. Colleagues and department employees recognition is more motivating than the publicly expressed appreciation. Financial and personal recognition is equally important. The analysis shows that the main reason for the improvement is exploring the opportunities for improvement and dissatisfaction with situation or failure [2]. Financial compensation is very important, just like any other expression of appreciation. Non-financial reward can be as effective as financial compensation.

Employees motivating program:

- the company shall determine which initiative will be rewarded: product improvement, better organized the production process, cost reductions, improving communication with customers, increase customer satisfaction, etc. .;
- the company's objectives are related to its strategy, making sure that they are definitely reasonable and achievable in employees sense;
- there is used a safe and consistent evaluation criteria at the company;
- the company is systematically carried out innovative proposals recognition;
- the company offers different types of remuneration, corresponding to different values and motives [2].

Immediate compensation can be a single event, e.g., a gift card, a restaurant visit, a paid trip or any other gift, certifying the employee's personal contribution. Career-related reward is a more efficient method of remuneration because of its long-term impact.

All the tools, methods and practices must be selected and adapted to the market situation, the specific nature of the work, employee profiles, the company's industry, as well as pursuant to another company characteristics.



"Bankinter" - the fifth-largest Spanish bank - is recognized as one of the most innovative banks in Spain, emphasizing the importance of technology innovation process. In order to accelerate the innovation process, "Bankinter" has a system in which each of the 4200 employees can submit ideas for new products and services, cost reduction or improvement of internal processes. These ideas contributed to a number of successful product development and efficient operations of the bank.

"Bankinter" has applied currently on semantic technology-based system that helps the human resources department in ideas management. When an employee submits a new idea, the system performs analysis of the text and identifies similar concepts in accordance with the financial perspective. It takes a particular point in time, enabling the author of the idea to look at other ideas with a similar concept (not words!). Such an approach offers the employee a simple tool which can be used to check whether the idea really is completely new.

Concepts are defined and entered into the special financial idea database. Employees can search for the ideas in the same way, which contain a similar concept, and they are highlighted in a specific period of time to provide feedback to the author of the ideas. The system also offers an explanation about why the certain ideas are similar, showing the semantic relationships between new ideas and existing concepts [2].

Semantic web sites technology application allows talent management performing, improving the management of the innovation process, contributing faster product entering into market, permit to distance from the competition. The system uses its internal intellectual capital to improve the company's business, as well as the company's employees provide great satisfaction with their work and the work process improvement.

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UDC 336.7

### **BELARUSIAN BANKING SYSTEM: THE RESULTS OF THE Q2, 2016**

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*Key words: banking system, commercial banks, non-bank financial institutions, profit, assets, banks rating.*

*Abstract. Banking sector depends on macroeconomic trends in a country. Assets of the banking system at the end of the II quarter of 2016 amounted to Br628,7 trillion, in dollar terms –\$31,35 billion. Since the beginning of year assets grew by 1,07 %,*

*dollar equivalent – decreased by 6,41 %. Net profit for the 2nd quarter of the entire system was Br3,224 trillion, but three banks were unprofitable. Commercial Bank Capital («TC Bank») showed the best dynamic of assets and the highest profit for the 2nd quarter.*

In banking field, the main legal act is the Banking Code of the Republic of Belarus. According to the provisions of the Code, the Banking system of Belarus consists of:

- the National Bank of the Republic of Belarus (it is the central bank of the Republic of Belarus, which regulates credit relations and currency, develop the Republic of Belarus Monetary Policy Guidelines, determines the procedure of payments and has the exclusive right of money emission, establish banking operations rules and procedures);
- other banks;
- non-banking credit and financial institutions.

In performing its activities, the National Bank shall be guided by the Constitution of the Republic of Belarus, the Banking Code of the Republic of Belarus, laws of the Republic of Belarus, regulatory legal acts of the President of the Republic of Belarus, and the Statute of the National Bank of the Republic of Belarus and shall be independent in its activities [1].

Non-banking credit and financial institutions unlike the banks do not have the right to exercise the following banking operations:

- funds raising from legal entities and (or) individuals to the accounts and (or) to the deposits;
- placement of attracted funds on their own behalf and for their accounts on the terms of repayment and maturity;
- opening and maintaining of bank accounts of individuals and (or) legal entities [2].

There are 25 banks and 3 non-bank financial institutions operate on the banking market of the Republic of Belarus (September, 2016).

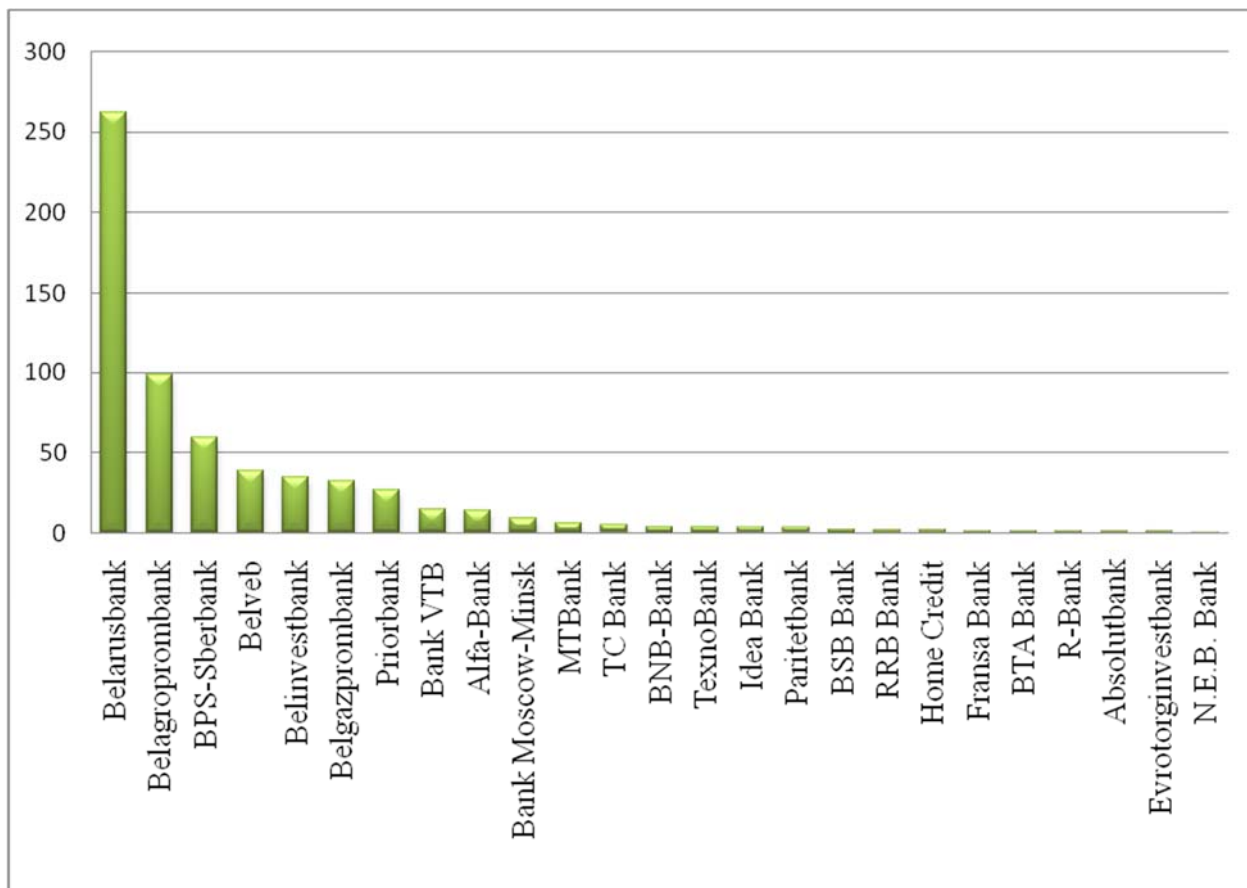
Total assets in BYR–terms increased by 1,07% at the end of the 2nd quarter 2016 amounted to Br641,7 trillion; in dollar terms decreased by 6,41 %.

Only one bank – Joint Stock Company «Savings Bank «Belarusbank» – has assets more than Br100 trillion. Br10 to Br100 trillion – 8 banks, Br1 to Br10 trillion – 12 banks and 1 non-banking credit and financial institution (a former bank), with assets of less than Br1 trillion – 4 banks and 2 non-banking credit and financial institutions (picture 1).

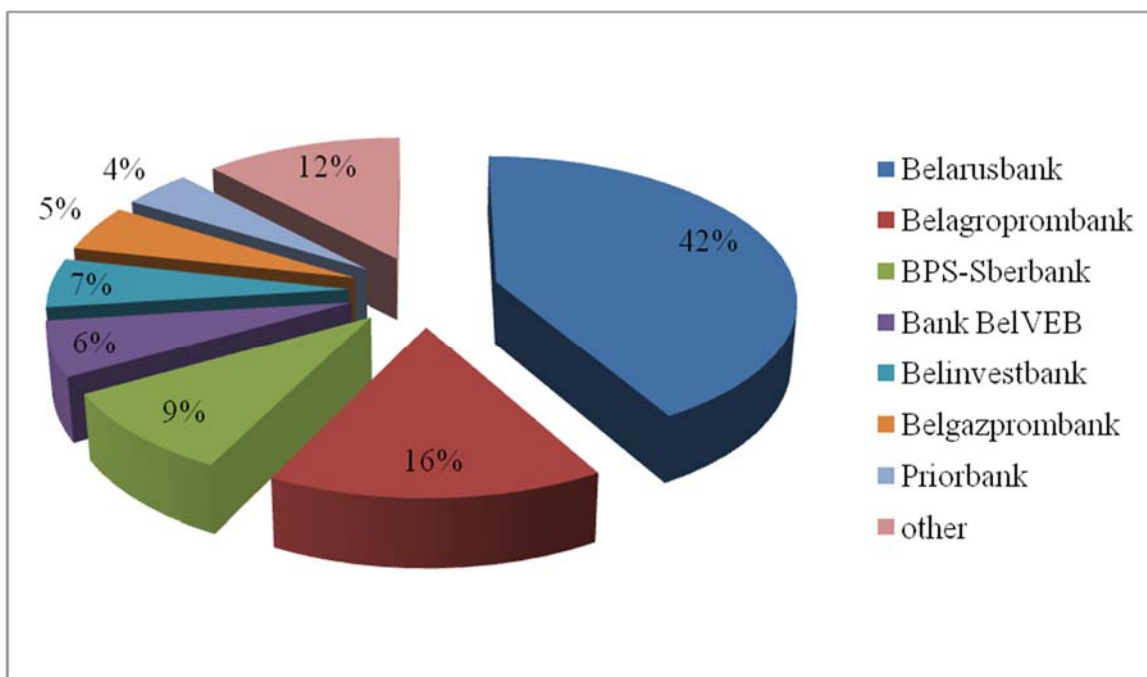
In dollar terms the assets of the banking system (including non-banking credit and financial institutions) now stands at \$ 31,34 billion.

The largest bank in Belarus – Belarusbank, whose assets – 41,7 % of the assets of the entire banking system. 7 banks form a group with assets in excess of \$ 1 billion, occupy 87,9 % of the banking sector. The remaining 18 banks and 3 non-banking credit and financial institutions only 12,1 % share (picture 2).

Since the beginning of 2016 assets of the banking system increased by Br- rubles only 1,1 %, despite the fact that consumer price inflation over the 6 months was 7,4%, while assets decreased 8 institutions.



*Picture 1 – Assets of banks, 2nd quarter of 2016, Br trillion not denominated*



*Picture 2 – The share of banks in the banking system assets*

The largest increase of assets showed BTA Bank – from the group of small banks. Among medium-sized banks the best dynamics of assets – from TC Bank («Trade Capital Bank»), and of the major banks – BelVEB («Belvnesheconombank»).

In dollar terms of assets growth for the 2nd quarter showed only 8 banks. Across the banking system (including non-banking credit and financial institutions) \$ - equivalent assets decreased from the end of December 2015 till the end of June 2016 by 6,4 %.

During the period from January to June 2016, 22 banks and 2 non-banking credit and financial institutions showed a profit and losses recorded 1 bank and 1 non-banking credit and financial institution. The total profit of the banking system for the 2nd quarter 2016 – Br3,268 trillion.

Priorbank showed the best profitability from the group of large banks, Evrotorginvestbank – from small banks, and from non-banking credit and financial institutions – the newly created institution «SSIS».

The dollar equivalent profit of the Belarusian banking system (including non-banking credit and financial institutions) for the 2nd quarter of 2016 amounted to \$ 163 million, assets profitability – 0,52 %.

Economists expect only moderate growth for the Belarusian banking sector in the following years, influenced by a slowdown in economic growth. Further credit growth is likely to be limited, due to the weakening ability of state support to the real economy and the banking sector.

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UDC 658.15

#### THE ASSESSMENT OF SOLVENCY OF THE ORGANIZATION

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*Key words: calculation of indicators, evaluation of the financial state, determination of solvency.*

*Abstract. The article demonstrates the calculation of the indicators for assessing the financial condition of the company, such as the current ratio; factor of security of own working capital; the ratio of financial liabilities assets and the calculation of indicators of financial stability such as the ratio of financial independence. On their basis it will be possible to identify the solvency of this organization.*

The main goal of this work is the development of automatic spreadsheets for financial analysis, similar to the MS Excel table (xls), using which it is possible to calculate the financial indicators of the company and its financial stability over a certain time period and calculation of economic-mathematical regression models describing the relationship of the considered factors and their influence on effective results.

As indicators for the assessment of the solvency of the organization used factors of solvency, established item 1 of the resolution of Council of Ministers of the Republic of Belarus dated 12.12.2011 No. 1672 "About determination of criteria of an estimation of solvency of business entities":

- current liquidity ratio, which characterizes the overall security of the organization own circulating assets for conducting economic activities and timely repayment of urgent obligations

$$R_1 = \frac{\text{short term assets}}{\text{short term liabilities}} \quad (1)$$

- ratio of own working capital (2), characterized by the presence of the organization own circulating assets necessary for its financial stability

$$R_2 = \frac{\text{own capital} + \text{long term liabilities} - \text{long term assets}}{\text{short term assets}}; \quad (2)$$

- the ratio of financial liabilities / assets that characterize the organization's ability to pay its financial obligations after the sale of assets

$$R_3 = \frac{\text{short term liabilities} + \text{long term liabilities}}{\text{balance sheet total}}; \quad (3)$$

- the fourth indicator of financial stability of the enterprise, is the ratio of financial independence

$$R_{fi} = \frac{\text{own capital}}{\text{balance sheet total}} \quad (4)$$

Financial analysis was based on data from the private production unitary enterprise "Polymerconstruction". Is a diversified manufacturing and engineering company, the main activity is the development, production and introduction of modern technologies and equipment on objects of water supply and sanitation of cities, settlements and industrial enterprises. For a comparable assessment of creditworthiness in the dynamics of unitary enterprise "Polymerconstruction" were taken as indicators of quarterly financial statements, starting from 1st quarter 2012 to 4th quarter 2015.

The characteristic values of the solvency ratios are differentiated by type of economic activity. In accordance with the national classifier of the Republic of Belarus OKRB 005-2011 "Kinds of economic activities" approved by the decree of the State Committee for standardization of the Republic of Belarus dated 05.12.2011 No. 85, unitary enterprise "Polymerconstruction" carries out the economic activity, classified code 29242 "manufacture of apparatus for filtering and purifying water." In accordance with this code selected normative values for the organization, as approved

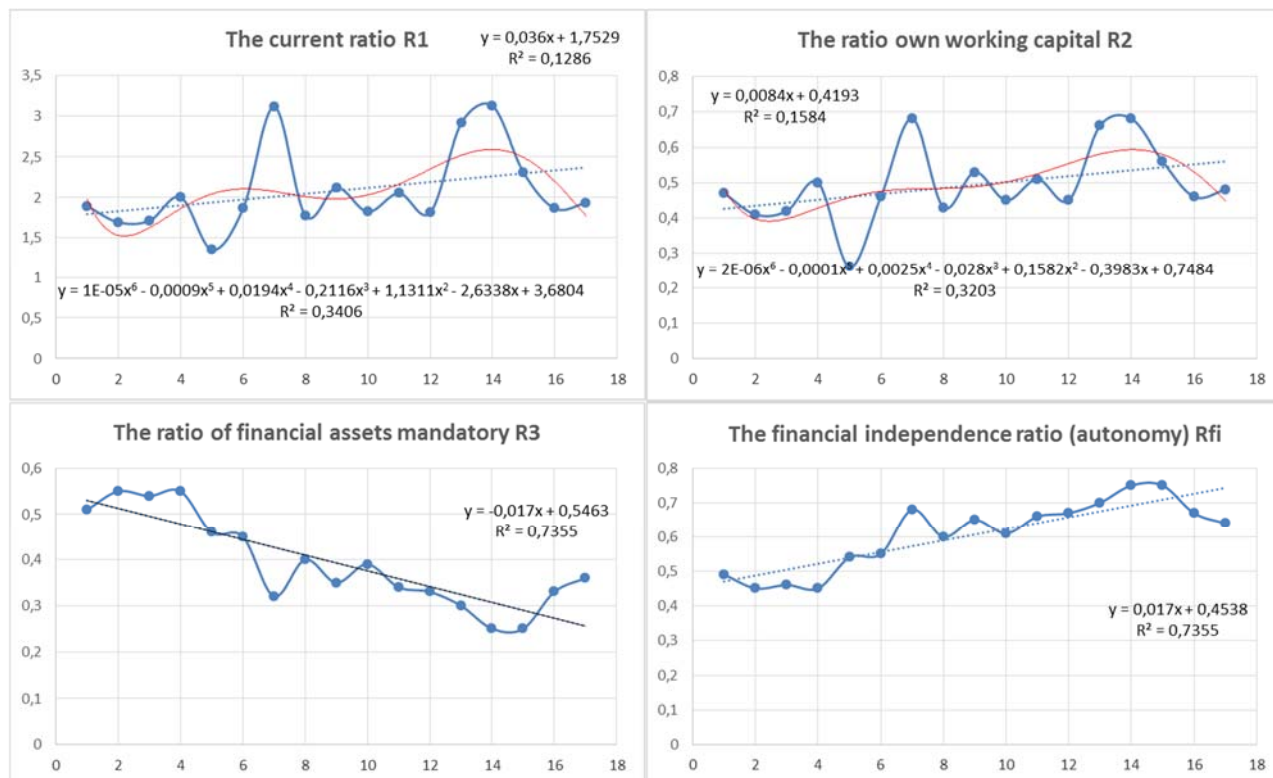


by decree of the Council of Ministers of the Republic of Belarus from 12.12.2011 № 1672 (see table 1).

Table 1 – Normative values of coefficients of solvency

Figure	The normative value of the coefficient
1. The current ratio ( $R1 = \frac{AB \text{ line } 290}{AB \text{ line } 690}$ ) insert shapes in rows	$\geq 1,3$
2. The ratio of own working capital ( $R2 = \frac{AB \text{ line } 490 + AB \text{ line } 590 - AB \text{ line } 190}{AB \text{ line } 290}$ )	$\geq 0,2$
3. The ratio of financial liabilities assets ( $R3 = \frac{AB \text{ line } 690 + AB \text{ line } 590}{AB \text{ line } 300}$ )	$\leq 0,85$
4. The financial independence ratio (autonomy) $Rfi = \frac{AB \text{ line } 490}{AB \text{ line } 700}$	$\geq 0,4 - 0,6$

Next, we calculated the coefficients of unitary enterprise "Polymerconstruction". The next stage of the study was the identification and analysis of the dependence of the calculated coefficients from the various figures of financial-economic activities of the organization. Was calculated the regression equation (1, p. 46-65), showing the change in each coefficient in time, i.e. dependencies of the form  $R1=f(t)$ , ....  $Rfi=f(t)$ , where  $t$  is the time period from 31.12.2011 to 31.12.2015, on the basis of a linear relationship (see figure 1).





The regression model for the first two coefficients R1 and R2 are inadequate (mismatched expectations), The coefficient of determination R2 is very low which means that the change in the effective index is not the result of a temporary period and, therefore, the regression equations cannot be used for analyzing and forecasting activities of the enterprise. However, on R3 and Rfi coefficients, it is possible to predict the operation of a business by time periods. Also on the first two models, which proved unsuccessful, were calculated for other types of dependencies (polynomial, exponential, power), however, this did not improve the situation: the equations were too cumbersome, and the coefficients R2 are still too small.

The significance of the work lies in the fact that, in order to carry out the analysis of any other company or to analyze data for a different period, you only need to fill out an input form, and everything else will make use of software application, because all information is linked through references.

Based on the assessment of the financial condition of the company can be stated that the unitary enterprise "Polymerconstruction" is a profitable and rapidly-growing company with real opportunities to timely and fully fulfill its obligations. Held at the enterprise the program of technical re-equipment and modernization of existing production will allow the plant to increase the competitiveness and quality of products, to strengthen its position in the markets of countries near and far abroad, to increase profits.

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UDC 65.011

## **ASSESSMENT OF BUSINESS PERFORMANCE OF "GREEN" ECONOMY**

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*Key words: eco-efficiency, indicators of environmental performance evaluation, integrated indicator of eco-efficiency, "green" economy, sustainable development.*

*Abstract. The article prompted the author's definition of eco-efficiency. The method of environmental performance evaluation, environmental assessment synthesizing activity of the organization and assessment of the environment, held its testing, conclusions are made.*

Currently, most countries in the world have stepped up their environmental policies and are moving to a model of "green" economy. Developed countries have gradually increased investment in alternative and "green" energy technologies, actively introducing modern environmental standards. The Republic of Belarus is also considering a "green" model of the economy as an important instrument for sustainable development and environmental security.

A universally accepted definition of "green economy" does not exist. Experts of the United Nations Environment Programme (UNEP) offer the widest understanding of this concept. They consider the "green" economy as an economic activity, "which increases the welfare of the people and ensure social equity while significantly reducing environmental risks"[1].

Obtaining a "green" economy includes those aspects and results of operations, which along with the modernization as well as increase in production efficiency contribute to improving the quality of life and living environment.

In connection with production efficiency is the ability of companies to make products, provide services with less environmental impact and more rational use of natural resources. Therefore, in the current operating conditions of businesses they more easily recognize that given the environmental sphere, it subsequently can bring significant economic effect. Evaluation of eco-efficiency is becoming a necessity in order to achieve sustainable development of any organization.

World Business Council defines eco-efficiency as "an increase in the production of useful goods and services at the same time a continuous reduction in the use of national resources, namely, raw materials and energy" [2].

In our opinion, eco-efficiency is the ability of business units achieving specific environmental targets at the lowest cost for environmental protection measures.

There are a large number of different indicators to assess eco-efficiency. To develop your own method of assessing the environmental effectiveness an important step is the selection of indicators; the number of which will reflect the profile and scope of activities.

Indicators to assess the eco-efficiency can be divided into two categories:

- environmental Performance Index (EPI);
- environmental indicators (EI).

In turn, the environmental performance index includes into 2 types:

- governance indicators (GI);
- performance score (PS).

In terms of the completeness of the account of industrial and environmental factors, assessment of the environmental effectiveness of proposed to consider using the following parameters (Table 1).

Table 1 – Indicators of environmental performance evaluation

Indicator of environmental performance evaluation	Indicators
Governance indicators (GI)	<ol style="list-style-type: none"> <li>1. The number of accidents associated with significant environmental impacts;</li> <li>2. Share implementation of measures on prevention of pollution;</li> <li>3. The number of achieved targets and environmental targets;</li> <li>4. Share on ecology training costs per year;</li> <li>5. The amount of the environmental tax;</li> <li>6. The volume of output to the amount of the environmental tax.</li> </ol>
Performance score (PS)	<ol style="list-style-type: none"> <li>1. The amount of waste production per unit of production;</li> <li>2. The energy intensity of production;</li> <li>3. Toplivoemkost products;</li> <li>4. Emissions of production per unit of production;</li> <li>5. The amount of hazardous, recyclable waste.</li> </ol>
Environmental indicators (EI)	<ol style="list-style-type: none"> <li>1. The level of sewage pollution;</li> <li>2. The level of consumption of natural resources per 1 ruble of output;</li> <li>3. The proportion of used substances from stationary sources of air pollutants;</li> <li>4. Summary measure of environmental pollution.</li> </ol>

Compiled by the author.

In order to assess the dynamics of ecological efficiency, it was developed integral index, based on a growth rate of (Formula 1).

$$I_{ee} = \sqrt[3]{\frac{\prod_{i=1}^n J_i}{\prod_{j=1}^m J_j}} \quad (1)$$

where  $I_{ee}$  – integrated indicator of eco-efficiency;  
 $J_i$  – indicators, which should have a positive trend;  
 $J_j$  – indicators, which should have a negative trend.

All of these indicators ( $J_i, J_j$ ) reflect the results that the organization has achieved in the environmental field. At the same time with an increase in one of the index, which is in the denominator of the formula, the combined integral indicator  $I_{ee}$  reduced and vice versa. And with an increase in the index in the numerator, the combined integral index increases, and vice versa. The value of the integral index is in the range greater than 1, the higher the value  $I_{ee}$ , the higher the level of environmental efficiency of the organization.

At this stage of the entire system observable indicators for statistical reporting enterprise are data to calculate indicators such as the volume of emissions per unit of production in real terms, the volume of emissions per unit of production value terms of products, the volume of output to the amount of the environmental tax.

Monitoring environmental effectiveness of a particular business entity to determine ways to improve the environmental safety of business and consistent with the principles of "green economy."

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UDC 658.15: 336.64

### SPECIFICS OF FUNCTIONING OF CONDOMINIUMS IN BELARUS AND ABROAD: COMPARATIVE CHARACTERIZATION

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*Key words: condominium, efficiency, efficiency assessment, solvency.*

*Abstract. This article describes the major differences in the development of condominiums in the Republic of Belarus and abroad. Based on the identified differences it suggests ways of improving management of condominiums in Belarus.*

Provision of housing and communal services is the international issue that unites the majority of civilized countries. At the same time in each country quite similar concepts are used.

To obtain high-quality housing and public utility services homeowners abroad unite in a non-profit consumer organization. This organization unites the owners of real property or the shareholders. The organization creates for the purpose of control the real estate sector, ensures the exploitation of the complex, possession, use and disposition of property [5].

Association of homeowners has become a generalizing term of the various legal forms of housing co-operatives. For example, the territorial community of residents (Planning Unit Developments - PUD), condominiums (Condominium Association),

housing co-operatives (Housing Cooperatives) in the United States and Canada; syndicates in France; incorporated societies of apartments in Finland; associations of condominiums in Ukraine; Homeowners Association and housing cooperatives in Russia.

Thus, from a perspective of slant to provision of housing and communal services of Belarus does not build its own unique model. Our country receives international experience, which is verified by decades. But it should be noted that our country has some history of their condominiums.

In 1998, our country was one of the first in the Commonwealth of Independent States to adopt a law of apartment houses. This law allowed citizens to create a Condominium and take housing service into their own hands. This had to lead to improving the quality of housing and public utility services.

The new edition of Housing Code of the Republic of Belarus became operative in March 2, 2013. In accordance with the Housing Code of the Republic of Belarus, a condominium (hereinafter referred to as the «Condominium») defined as an organization created by the owners of residential and (or) non-residential premises for the conservation and maintenance of the common property, possession and use them for other purposes, provided by the Housing Code and the Charter of the Condominium [1].

Association of owners is a non-profit organization. Therefore, profit making is not the main purpose of the condominium [2].

There were 832 condominiums in Belarus in early 2011. The number of active condominiums for 2011-2015 has increased by 2.4 times.

There are 2,000 condominiums in Belarus today. It means that only about 12% of multi-family housing condominiums are served. There is more than 90% of housing of apartment buildings in the form of private property [3].

The program of development of housing and communal services of the Republic of Belarus until 2015 notes that self-management of common property of the joint housing in the existing housing stock has not received sufficient development and support of the population. However, all prerequisites have been created in legal relations [2].

The first condominium's law passed in the United States was in the Commonwealth of Puerto Rico in 1958. The first condominium in the Continental United States was built in Salt Lake City, Utah in 1960 [4].

A condominium (or «condo») is a form of housing ownership and other real property where the part of real estate is individually owned. Access to land for public facilities, such as hallways, heating system, elevators, and exterior areas are executed under legal rights associated with the individual property. These rights are controlled by the owners association. This association is jointly entitled to the entire piece of property [2].

The housing cooperative or «cooperative» is a legal entity. As a rule, the corporation, which owns real estate consisting of one or more residential buildings is one type of housing tenure. Housing cooperatives are the forms of homeownership,

which have many characteristics that differ from other residential arrangements such as single-family home ownership, condominiums and renting [3].

The housing management is considered as a separate type of business activity in most foreign countries (such as France, Netherlands, USA, Canada, Poland, Slovakia, Czech Republic, Mexico, Singapore, Malaysia and others). For this activity the managing organization receives a fee from the owners of the premises, and the responsibility to them for building maintenance carries the union (association, company) of homeowners.

The condominium's leading bodies make all major managerial decisions. First of all there are questions about the order of finance and contracting for goods and services. The manager prepares and justifies the recommendation for the Board of the condominium.

The market of housing and communal services generates requirements for management companies. Non-conforming managers of condominiums become noncompetitive. Liability Insurance for managers in the event of property owner's damage as a result of wrong actions of managers is developed in most countries of Europe and America.

In addition, the competitiveness of the managing company increase by the presence of the certificates confirming its professionalism, experience, financial stability, and constant follow the standards in the sphere of housing and communal services [5].

Training of specialists for housing management is important. In the West many of the Polytechnic Universities and special colleges provide basic education that enables graduates to start manager's work. Unfortunately, there are only special retraining courses in Belarus now [4].

Thus, appropriate to consider the implementation of the following measures in Belarus in view of foreign experience:

- to increase the role of the Board and the manager of condominium in Belarus;
- to introduce the insurance of management company (manager) and his civil liability in the event of property owners damage as a result of wrong actions of manager;
- to organize the learning process and turn-out of specialists with higher or vocational secondary education, who ready to perform the functions of manager of the condominium;
- to approve a mandatory training manager at specified intervals (it can be an educational courses, basic and raising qualifications).

The introduction of these measures to domestic legislation following the example of Western European countries will radically change the quality of housing and communal services.

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UDC 65.011

## **DIRECTIONS AND PROBLEMS OF EVALUATING COMMERCIAL EFFECTIVENESS OF BUSINESS**

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*Key words: commercial efficiency, stability, methods for evaluating the commercial effectiveness, logistics efficiency, marketing effectiveness.*

*Abstract. The article sets out the basic approaches to the definition of commercial efficiency, the author formulated his own definition, studied the existing methods of evaluation of the commercial effectiveness, the author developed a method for assessment - based on general indicators of efficiency, indicators of marketing and logistics, held its approbation, conclusions are made.*

Issues of the theory and methodology for assessing the effectiveness of the commercial operation of the business have been and are currently the subject of investigation by both foreign and national scientists. However, they still carry the concept of commercial efficiency mainly to trading or buying and selling process. Therefore, the aim of this work is to review current approaches to the definition of commercial effectiveness and its assessment in relation to manufacturing organizations.

Efficiency problem occupies a central place among the totality of the problems facing the individual, organization or society as a whole. Especially urgent this problem is at the present stage of economic development due to increased competition, globalization, informatization, intellectualization of business, increasing business risks.

Despite the different points of view on the types of "efficiency", all the authors agree that the effectiveness - is the effectiveness of the test process or phenomenon, which is determined by the ratio of the effect and the resources (costs). And it is the object of the study that will depend on the type of effect and composition of resources (inputs) used to determine the effectiveness.

The study examined the concept of commercial efficiency. Commerce is a kind of trade or business enterprise, but noble, of the business of business, which is the foundation of any truly civilized market economy.

However, at the present time commerce has gone beyond trade concepts or simply purchases process, i.e. sales. There were commercial organizations, business, commercial sustainability, commercial calculation, commercial efficiency, etc.

Many authors identify the concept of "business efficiency" and "business sustainability". It is worth noting that this figure is relatively new for the economy and almost never used in commercial activities. Also, at the moment there is no uniform methodology for determining the level of commercial sustainability. Commercial sustainability of the scientific literature referred to, along with other indicators of stability and as an independent one, does not stand out.

Most scientists agree that the commercial sustainability of the organization is determined by such factors as: the level of business activity, the reliability of economic relations, the competitive potential of the company, its share in the sales roar. The disadvantage of this definition is that the commercial sustainability is not seen as a symbiosis of the stability of the market and marketing.

Nowadays the commercial activity is related to the economic activities of the organization, procurement, production and marketing. The effectiveness of these areas in the organization is achieved, in turn, including through effective implementation of marketing and logistics activities. In a narrow sense, marketing defines sets of products used by individual entrepreneurs in specific circumstances, and enables the use of existing company resources to meet a variety of needs for the benefit of both sides. With the logistics solved tasks such as:

1. The choice of the type of vehicle,
2. The definition of the routes,
3. Optimal packing of goods in containers,
4. The determination of the optimal placement in the warehouse areas,
5. The labeling,
6. Prefabricated orders formation.

Based on the foregoing the author suggested definition of commercial efficiency. Commercial efficiency is a comprehensive measure of the comparison of the results of activities undertaken in the organization of the sales, marketing and logistics activities with the costs of their implementation.

Method of evaluating the effectiveness of the commercial organization has been developed on the basis of this study. Initially we identified the key areas of commercial activity of industrial organization:

- A comprehensive study of the market of goods and services (this process enables to collect the information needed for the study of demand, market conditions and product selection for implementation);
- Market segmentation and marketing planning;
- Analysis of marketing effectiveness;
- Selection of the optimal group of suppliers;
- Timely delivery of raw materials and finished products;
- The level and quality of service;
- Analysis of the logistics efficiency.

On this basis, indicators reflecting commercial effectiveness were divided into the following groups:

1. Summarizing performance indicators;
2. Indicators of the effectiveness of marketing activities;
3. Indicators of the effectiveness of logistical activities.

These groups of indicators are represented in table below:

Table 1 – Indicators of commercial business efficiency

Groups	Indicators
Summarizing performance indicators	<ol style="list-style-type: none"> <li>1. Turnover ratio of current assets;</li> <li>2. Implementation coefficient;</li> <li>3. Profitability of sales based on profit on realization;</li> <li>4. Profitability of sales based on net profit.</li> </ol>
Indicators of the effectiveness of marketing activities	<ol style="list-style-type: none"> <li>1. The rate of growth of the market;</li> <li>2. Market share;</li> <li>3. The potential market demand;</li> <li>4. The relative quality of products and services;</li> <li>5. The relative price;</li> <li>6. Customer satisfaction;</li> <li>7. Save the client;</li> <li>8. The costs of marketing;</li> <li>9. Marketing profitability;</li> <li>10. Earnings per new customer;</li> <li>11. Product range update.</li> </ol>
Indicators of the effectiveness of logistical activities	<ol style="list-style-type: none"> <li>1. The reliability of suppliers;</li> <li>2. Distance of suppliers;</li> <li>3. Control of stocks and finding opportunities to reduce them;</li> <li>4. The level of customer service and product readiness for shipment;</li> <li>5. Constant maintenance of logistics services costs;</li> <li>6. The share of all kinds of transportation costs;</li> <li>7. Reduction of the various damage to goods during loading and unloading;</li> <li>8. The level of logistics service.</li> </ol>

Source: compiled by the author.

Calculation of the set of indicators allows for a comprehensive evaluation of the commercial activities of the organization and its effectiveness. Indicators are selected

based on the analysis of the main areas of business of industrial organization and timely accounting of them will identify strengths and weaknesses in the commercial activities of the organization, from the procurement stage to marketing. After receiving reliable information under the guidance of the research directions basic ways of improvement of commercial effectiveness can be determined. The advantage of this technique is its complexity while the disadvantage is the complexity of the calculation.

Approbation of the proposed methodology for assessing the effectiveness of the commercial business is hampered by the lack of performance indicators of logistics and marketing activities. Most production companies do not expect these groups of indicators, which does not allow to comprehensively assess the commercial activity and efficiency. Further research involves the collection of information on all the blocks of indicators evaluating business efficiency on a real example of a business entity. This will allow for the full approbation of the developed method.

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UDC 338

### CONCEPTUAL APPROACH TO THE DEVELOPMENT OF ENTERPRISES OF ANY OWNERSHIP IN MODERN CONDITIONS OF ECONOMIC DEVELOPMENT

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*Key words: social production, problems, market, economic mechanism, restructuring.*

*Abstract. At the present stage of development of economy of Republic of Belarus restructuring of social production is the main condition of creation of the market relations which provides functioning of highly effective productions. The restructuring purpose is the production of competitive products by entities of various*

*forms of ownership in the conditions of formation of market economy. The article outlines a conceptual view of the authors on the development of enterprises of all forms of ownership in the current conditions of the economy development.*

The central problem of social production at the present stage of development of economy of the Republic of Belarus is the formation of a new socio-economic system that determines the solution to the problem of production efficiency increase. This unusual market prospects are defined by the theoretical and practical relevance of research in this area. The market system does not arise from scratch, it does not deny public administration of the enterprise and its operational units in general, it is built taking into account the existing practices of management, which is the most important factor hindering the development of the enterprise, it will improve it.

When building a market economy it is necessary to reorganize the work of the company in accordance with customer requests, with the aim of creating an economic mechanism to ensure the functioning and development of the enterprise in the conditions of the market and competition.

Practical implementation of the status of the structural divisions of the enterprise is the level of their commercial independence, which requires the strengthening of the economic rights, including the financial responsibility and the system of material incentives for division employees. Strengthening the commercial independence of structural divisions of the enterprise requires working out a system of relations between the operational units and the enterprise as a whole, between the specific performer and labor collective in which he works. The relationship must be based on a "goods - money - goods" scheme, for which each unit should (conditionally) "sell" the product to its labor subcontractors on the established internal production (transfer) prices and "buy" the product of their labor. The specified scheme is implemented by forming transfer prices relationship for products (services rendered, work performed) of internal production departments, which currently are not used at this level.

It is necessary to estimate a real contribution of divisions and individuals to the company income as the prevailing practice is based solely on the subjective-administrative approach, the possibility of structural subdivisions independence, which is characterized by the existence of the account, obtaining credit, the decision making about the distribution of income received by them. Administrative system of internal production relations is a source of subjective distribution of the income, gained by the divisions. Market enterprise orientation involves economic income distribution tool, taking into account the objective contribution of each division to receiving this income. In this regard, considerable attention must be paid to the formation of pricing systems and distribution of profit for internal production units, as the existing pricing tools and profit used at their level very slightly. A particular problem is the question of establishing the share of income for most small units, such as the site, the team, the employees directly involved in the manufacturing of products.

Ensuring the financial rights and responsibility of internal production divisions associated with a number of organizational measures of industrial relations, i.e. with



the restructuring. Economic actions aimed to enterprises restructuring requires improvement of their organizational structure.

Currently, scientists in Economics define restructuring as the structural (legal), organizational, managerial and financial adaptation of companies to market economy conditions, i.e. - an essential change in business strategy, and (or) the financial structure of the enterprise. All restructuring processes are generally classified into two groups: the current (short-term) and strategic (long-term) ones.

The aim of the restructuring is to create business entities of different ownership, capable to turn out competitive products and to operate effectively in a market economy. Therefore, the process of restructuring of production can be defined as a set of measures aimed at restoring a sustainable technical, economic and financial life of enterprises using the most interesting foreign concepts of "minimalist" and "perfect enterprise" based on human capital for the domestic enterprises.

The main activities for the restructuring of industrial enterprises in the Republic of Belarus currently include: definition of the main areas of production and economic activities of enterprises, their eligibility; the liquidation of the structural units which don't create value added, exit of divisions from the enterprises; the creation of affiliates; implementation of innovation processes; development of new products; creating profit centers; assignment of personnel and responsible persons for each division; sale or lease of fixed assets and their commercial use and others.

Belarusian companies are going through a difficult stage of its development. In the conditions of economic changes the experience of the marketplace accumulated, privatization, restructuring and searching for new market niches and efficient production management mechanisms are processing. In these conditions experience of the countries which development happens within so-called model of social market economy is of great importance.

Studying of foreign experience of restructuring of the enterprises gives the grounds for stage-by-stage adaptation of the most priority ways of improvement of the domestic production management. Including: the introduction of net-like structure of the enterprise management; business process engineering and reengineering; the use of flexible manufacturing systems; application of total quality management (TQM); implementing the concept of "mobile" and "virtual" enterprises using GALS-technologies; the use of leasing relations, controlling, logistics, "just in time" system (JIT), budget management method, advanced cost accounting methods: standard-costing, direct-costing, target-costing, activity-based costing (ABC), strategic cost analysis (SCA), transfer pricing; employee engagement in management and profit sharing, the creation of common information space (CIS)), etc.

The set of theoretical and practical recommendations presented allows to create a mechanism of industrial relations of enterprises of different ownership, featuring by innovative character in accordance with the existing in the country and abroad theory and practice of the studied problem.



UDC 65.0:061.43(100)

**EVENT MANAGEMENT OF THE INTERNATIONAL EXHIBITIONS**

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*Key words: event management, special events, exhibition services, international exhibition, specialized exhibition.*

*Abstract. The article deals with the research findings of the event management stages of the International Specialized Exhibition “HouseExpo: Architecture. Design. Construction-2016” (16–19 March 2016, Minsk): from generation of the exhibition idea to evaluation of the effectiveness of the exhibition management strategies and tactics used on the international level.*

The importance of event management is undeniable in today’s fast-changing business world. Managed appropriately, events produce economic, social and cultural benefits [1, p. 257]. Such events as international exhibitions require thorough planning and effective execution to ensure participants, visitors and guests derive the maximum possible advantages from the exhibition on the international level.

*The objective of the research is to determine the main stages of managing exhibitions after analysing the case of the International Specialized Exhibition “HouseExpo: Architecture. Design. Construction-2016” organized by the Exhibition Company “Belinterexpo” of the Belarusian Chamber of Commerce and Industry.*

*The results of case analysis can be summarized in the Table.*

Table – Stages of managing the International Specialized Exhibition “HouseExpo-2016”

Stage	Stage Description	Stage Application
Stage 1. Event Idea and Approval	Idea generation.	Generation of the idea to organise the exhibition for designers, architects and construction companies.
	Approval of the top management.	Approval of the Director of the Exhibition Company “Belinterexpo” and the Chairman of the Belarusian Chamber of Commerce and Industry.
Stage 2. Setting Date, Venue and Budget	Dates setting.	16–19 March 2016.
	Negotiation with platforms for the exhibition.	Negotiation with Sports Palace, Minsk.
	Formulation of the realistic cost analysis.	Financial planning.

Table – Stages of managing the International Specialized Exhibition “HouseExpo-2016”: Continues

Stage 3. Program Planning and Speakers Selection	Planning of the intensive business program.	Seminars, workshops, B2B meetings.
	Endorsement of the keynote speakers.	E.g. Alexander Samoilov, business coach in business communication, corporate psychology and time management.
	Endorsement of subject-matter experts.	E.g. Ufox-media (Social media marketing).
Stage 4. Participants and Visitors Lists	Creation of the database of both participants and visitors.	E-mail distribution, fax distribution, cold calling.
Stage 5. Event Promotion	Finding the media to cover the event.	Proposition of “Partnership Packs” for web-sites, field-related magazines and newspapers to publish press releases and the exhibition updates.
	Production of printed collateral materials.	Production of exhibition brochures, posters.
Stage 6. Event Execution	Monitoring of the situation.	Conducting personal interviews.
	Conducting surveys.	Distribution of feedback questionnaire.
Stage 7. Event Reconciliation	Evaluation of the event effectiveness.	Calculation of return on investment; processing of the questionnaire survey responses – approx. 80 % of the companies plan to participate in the exhibition “HouseExpo-2017”.
	Communicating the event results to the leadership.	Reports to the top management of the Exhibition Company “Belinterexpo” and the Belarusian Chamber of Commerce and Industry.
	Sharing the event results with the participants, visitors and guests.	Publishing of post releases on web-sites and in field-related magazines and newspapers.

*The area of practical application:* the research findings can be considered by the specialists of the exhibition companies to manage events on the international level.

*The perspective of the research* is to create a handbook on the event management of the international exhibitions.

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UDC 004.942

**COMPUTER TECHNOLOGIES STATISTICAL  
DATA ANALYSIS**

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*Key words: statistical analysis, software packages, statistical functions, statistical functions, information processing methods.*

*Abstract. The most popular of the specialized statistical packages are considered basic operations that can be performed with quantitative data in their statistical analysis, as well as the principal benefits that accrue to the specialist performs statistical processing of information, for each of the packages.*

In view of the rapid scientific and technical progress and a considerable increase in information activities there is an urgent need for analysis of quantitative data. For qualitative performance of various types of statistics data analysis was developed by applied statistical packages, which have capabilities to make the process less time consuming. Statistical packages adapted for use in a variety of modern operating systems have capabilities for data visualization and analysis. Currently, all of the statistical systems are classified into two groups:

1. standard software packages;
2. specialized software packages.

The best known and most widely used specialized packages are the following: STATISTICA, SPSS, STADIA, which has a much larger functions compared to the standard packages and allow you to apply the most modern methods of mathematical statistics for data processing.

Integrated system STATISTICA includes a large number of methods of statistical analysis (more than 250 built-in functions) among which the most often implemented are: basic statistics and tables, nonparametric statistics, analysis of variance, multiple regression, nonlinear estimation, time series analysis and forecasting, cluster analysis, factor analysis, discriminant function analysis, analysis of the duration of life, canonical correlation, multidimensional scaling, structural equation modeling etc. Due to its versatility and simple interface, the system has found application in research in various fields, engineering, business, the educational process.

The package of applied programs of statistical data processing STADIA presents the user with a comprehensive set of the most modern and efficient methods of analysis: descriptive statistics, criteria differences, categorical analysis, analysis of variance, correlational and spectral analysis, smoothing, filtering, prediction, simple, multiple, and step-by-step non-linear regression, discriminant, cluster and factor analyses, scaling, quality control methods, calculation and agreement of the distributions, the analysis and replacement of missing values, etc. This program is ideal for adoption of any scientific, financial, administrative, industrial and even household solutions, as well as to highlight patterns of contingencies, projections of the development process, detecting relationships and differences of a set of objects.

The package of applied programs of statistical data processing SPSS is one of the most powerful, versatile and user-friendly statistical packages abroad. SPSS is able to perform approximately 100 procedures of statistical processing in the base module, and a collection of additional modules is in fact the whole statistical tools; to access data stored in virtually any location, including the ability to easily and quickly connect to multiple databases.

For the solving of statistical tasks in environments Windows, Macintosh, or Unix, designed to specialists involved in scientific research, applied integrated software package STATA. A wide range of STATA statistical capabilities suggested hundreds of advanced statistical tools such as regression for dynamic panel data (DPD), generalized estimating equations (GEE); multilevel mixed models, models of conditional heteroscedasticity, ARCH, and estimation with complex survey samples; standard methods, such as linear and generalized linear models (GLM), ANOVA / MANOVA, ARIMA, cluster analysis, and basic tables and summary statistics. Obtained with the help of this application solution package can be used for VAT in the economy, politics and other social sciences (a wide range of models for panel data) and in biostatistics, epidemiology and other fields of medicine.

Important statistical system, which acts as a world leader among computer systems of symbol mathematics for the PC, provides not only the possibility of performing complex numerical calculations with the output of their results in the most elegant graphics, but also carrying out particularly time-consuming analytical transformations and calculations is the computer algebra system Mathematica. Version Windows systems have a modern user interface and enable you to prepare documents in the form of Notebooks (notebooks). They combine baseline data, descriptions of algorithms for solving problems, programs, and results of the decision in much different form (mathematical formulas, numbers, vectors, matrices, tables and graphs). Mathematica has found its application in such scientific fields as physics, finance, web development.

Computer algebra system Maple provides a comfortable environment for computer experiments, during which they try different approaches to the task, analyzes individual decisions, and if necessary programming are selected requiring special speed fragments. The package allows you to create an integrated environment with other systems and universal programming language of high level. The work is

interactive — the user enters commands and immediately sees the result of their execution on the screen. The package Maple is not similar to traditional programming environment where is a need for strict formalization of all the variables and actions with them. Here, automatically provided by selection of the appropriate types of variables and checks the correctness of operations, so in General, do not require descriptions of variables and a strict formalization of the record.

Mathematical package MathCAD is used to solve problems in various sectors of science and technology, finance and economics, physics and astronomy, engineering and architecture, mathematics, and statistics, organization of production and management. System MathCad has a wide range of instrumental, informational, and graphic media. It is in great demand among students, engineers, economists, managers, researchers and all those who are involved with quantitative methods of calculation.

Well known for the vast majority of people is the program Microsoft Excel. Feature of the program is that it allows you to make complex calculations. That is, in the calculation process you can simultaneously use data that are located in different areas of the spreadsheet and linked on a certain bridge. The implementation of such calculations is due to the possibility of introducing different formulas in table cells. The function is evaluated and the result will be displayed in the cell with the formula. Available in a range of formulas are different functions, from addition and subtraction to calculations related to finance or statistics.

The software package "Olymp" implements almost all the areas of analyzing data using mathematical-statistical methods. The possibility of obtaining good results with minimum effort due to automation of the computational process makes the program suitable for a wide range of analysts. As practice shows the use of the program, it is an effective tool for solving many of the challenges facing auditors, employees of analytical departments of banks, financial, investment, petroleum, etc. companies, financial managers of enterprises, working on the market of goods and services.

Last but not least, system features which are considered as spreadsheet Lotus 1-2-3, a professional spreadsheet. Wide graphic capabilities and a convenient interface pack allow you to quickly navigate it. It can be used to create any financial document, a report for accounting, budget, and then place all these documents in databases. Lotus1-2-3 includes strong enough data analysis and data processing.

In conclusion of all mentioned above, it is necessary to say that in the process of treatment and subsequent analysis of quantitative data, the experts should apply the considered statistical system, as this will allow them to conduct statistics data processing of different directions, to carry out particularly laborious analytical transformations and calculations to do it with minimal cost and time to obtain high-quality results and models that can be used to implement the predictions and identify patterns of development of the various processes.

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UDC 502.3:62

## PROFESSIONAL DEVELOPMENT OF TEACHERS FOR PERFECTING OF ECOLOGICAL EDUCATION

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*Absrtract. Basic condition of overcoming environmental problems of global and regional character is formirovakny future experts capable to find and to competently realize paths of optimization of environmental management on the basis of the principles of sustainable development which demands particular training of teachers. For perfecting of ecological education at universities of Belarus, Russia and Ukraine since 2014 the TEMPUS joint project supported by partner universities from the countries of the European Union is carried out. Within the project training programs are developed, distant training courses, professional development in the field of ecological education of teachers and teachers of UVO, USSO, UPTO are created and successfully approved.*



The composite ecological situation which developed in the world and low level of ecological consciousness of the population dictate need of more persistent perfecting of ecological education and education. In this regard an urgent problem of education is the organization of such pedagogical process which not only formed a basis of expansion of system of knowledge of the world around, but also promoted outlook correction, reorganization of consciousness through cultural development of the person of an ecocentric orientation.

Basic condition of overcoming environmental problems of global and regional character is formirovaky future experts capable to find and to competently realize paths of optimization of environmental management on the basis of the principles of sustainable development. Greening of education demands particular training of teachers.

For perfecting of ecological education at universities of Belarus, Russia and Ukraine since 2014 the TEMPUS joint project supported by partner universities from the countries of the European Union is carried out. The Vitebsk state technological university is a participant of the international draft of the TEMPUS EcoBRU "Ecological Education for Belarus, Russia and Ukraine" program.

General purposes of the project are:

- development, distribution and use of effective scientifically based knowledge of ecological interrelations and environmental protection in Belarus, Russia, Ukraine;
- support by the national governments of Belarus, Russia, Ukraine of integration and realization of the modern ecological education in the context of a multilevel education system;
- support of system of the continuous education in Belarus, Russia, Ukraine;
- increase in ecological literacy and formation of the behavior which is not causing damage to a surrounding medium in Belarus, Russia, Ukraine.

Within the project training programs of professional development in the area of ecological education of teachers and teachers of institutions of higher education, institutions of secondary vocational education and institutions of vocational training are developed. On their basis distant training courses which allow tutoring not to depend on time and the place are created.

Within the first year of exercise of the project the analysis of the existing curricula in the sphere of general and professional education was carried out. The analysis showed what in teaching ecological disciplines is focused on theoretical training of pupils. The considered curricula contain extremely small quantity of a practical training. Their quantity reaches only 5-12% of the common volume of clocks. It confirmed weak praktiko-orientation of professional education in the field.

For definition of the main priorities of activity by university Bremen the questionnaire was developed for teachers and students concerning ecological education. 17 teachers and 20 students participated in VSTU in questioning. Besides, questioning was carried out to "Vitebsk State Industrial Teacher Training College" among students of pedagogical specialties. Respondents in answers to questions of

the questionnaire noted the interest in studying of questions of environmental protection.

On the basis of the conducted researches and the received results partner universities on the TEMPUS EcoBRU project developed concepts of advanced training courses for teachers, teachers of institutions of higher education, institutions of secondary vocational education and institutions of vocational training, their purposes and tasks, contents, a technique, volume, duration and forms of monitoring of knowledge are designated. As the priority direction formation of the praktiko-focused competence of future experts of the sphere of interaction of their professional activity with a surrounding medium is accepted.

The group of partner universities from Belarus as a part of the Vitebsk State Technological University, the Gomel State University of F. Skorina and the Polesky State University under the leadership of teachers of VSTU developed training programs of courses of increase in qualification in the following directions:

- *environmental education as a foundation of biosphere compatible activities of technosphere workers;*
- *improving of environmental education of engineering students on the basis of a practice-oriented approach.*

In 2015 the developed programs underwent process of coordination with the customer in the person of "Vitebsk Regional Educational and Methodical Center of Professional Education" and "Vitebsk State University of P. M. Masherov".

In a basis of programs for distant form of education the modular principle was underlain. The maintenance of each module meets in a varying degree requirements of separate categories of listeners. In this regard each listener can study self-contained (in whole or in part) according to the target individualized program.

In March, 2016 after development of maintenance of courses and placement them on the UO "VGTU" educational portal two groups of listeners in number of 34 people were gathered. As a part of groups there were teachers and employees of VSTU and VSU of P. M. Masherov. Within two weeks they mastered theoretical material of courses, performed practical tasks. With students a constant feed-back was carried out by the modern means of distance learning. All listeners successfully coped with test tasks and finished tutoring, having received the certificate on professional development of the state exemplar.

The first experiment of the organization of courses on distant form of education showed that for successful realization of distance learning listeners have to be experienced users of the computer, own skills of work in electronic networks and have the free access in the Internet.

In the course of discussion of contents and the organization of courses listeners expressed the satisfaction with the obtained information and a form of its giving. They noted a wide range of questions, lit in courses by ecological education, and a possibility of the choice of the most interesting and necessary information, the respective sphere of their professional activity. Development of theoretical materials of educational programs of professional development helped listeners to estimate the

prospects of development of education in the modern conditions and to find the new ideas for inclusion of an ecological component in the disciplines taught by them. In too time distant form of education allowed participants of courses to define self-contained tutoring time, proceeding from the daily load.



Co-funded by the  
Tempus Programme  
of the European Union

Work is carried out within the project  
543707-TEMPUS-1-2013-1-DE-TEMPUS-  
JPHEs “Ecological Education for Belarus,  
Russia and Ukraina (EcoBRU)”  
(Экологическое образование для Беларуси,  
России и Украины)

UDC 331.5

## **LABOUR MARKET INFORMATION SYSTEM IN BELARUS: MICRO LEVEL**

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*Key words: labour market information system, jobs anticipation.*

*Abstract. The article discusses features of labour market information system (LMIS) development in Belarus at the micro level. The article analyzes available information resources to determine the future needs for staff, which are based on the request data from enterprises. Their bottlenecks are shown. The ways of improving the system of information collection about future staff needs of enterprises are determined.*

Labour market information system (LMIS) is characterized by ILO's professionals as the following: "Any information concerning the size and composition of the labour market (labour supply and demand and their interaction), or an part of the labour market, the way it or any part of it functions, its problems (in terms of entering the market and maintaining a balance between supply and demand in the market), the opportunities with may be available to it, and employment-related intentions or aspirations of those are part of it" (ILO Study). An important role in LMIS development belongs to the micro level (businesses and organizations which create demand for labour force, educational institutions which are in charge of training demanded quantities of labour force). It is data on vacancies provided by businesses that make up information about prospective demand for personnel.

Currently LMIS is being developed in Belarus. The key role in development of LMIS in Belarus belongs to three major ministries – the Ministry of Economy, the Ministry of Labour and Social Protection, and the Ministry of Education, where each of them conducts its own survey:

1. The Ministry of Economy makes prognosis on the number of employed according to the types of economic activities (based on queries to sectoral ministries

on anticipated number of employed according to the types of economic activities which they supervise). Sectoral ministries make up their data based on the reports of businesses.

2. The Ministry of Labour and Social Protection accumulates data on vacancies which businesses shall submit to agencies of labour, employment and social security in their territories within the period of 2 weeks according to the Law of the Republic of Belarus "On Employment". The databank is updated continuously. It is available online at the website of the Ministry of Labour and Social Protection of Belarus. In 2015 it was addressed by 2 million users via the website of the Ministry of Labour and Social Protection. However, on 05.01.2015 wages for 91.8% vacancies were lower than average level in the Republic, where a third of them offered wages 50% of their level (in some regions the number of these vacancies was about 50% – Brest, Vitebsk, Gomel and Mogilev Oblasts are among these regions). Thus, a significant part of vacancies reported to agencies of labour, employment and social security are of poor quality in Belarus.

The comparison of the structure of vacancies with the data from one of the largest portals for employment assistance "rabota.tut.by" vividly illustrates the difference between the real demand for personnel and the database made up by the Ministry of Labour and Social Protection. The website offers 1,138 million resumes, over 40 thousand companies, and over 11 thousand actual vacancies (according to the portal statistics it is visited by 1.2 million users monthly).

Table – Benchmark analysis of Applicants and Vacancies databases of state employment agencies and those of the portal RABOTA.TUT.BY

	RABOTA.TUT.BY	Ministry of Labour and Social Protection (January-September, 2015)
1	2	3
Structure of vacancies	7.83% - working personnel	60.3% for workers 39.7% for specialists
Level of wages	"Sales" – 7-14 million rubles, "Marketing, Advertising, and PR" – 4-5 million rubles IT – 640-1100\$ "Accounting" – 5.5-10 million rubles	37.7% vacancies – 2-3 million rubles; 25% vacancies – 3-4 million rubles;
Structure of users	By resume structure: 32% – specialists 11% – top managers 9% – workers	By structure of the registered unemployed: 78.2% workers 15.5% office employees

Table – Benchmark analysis of Applicants and Vacancies databases of state employment agencies and those of the portal RABOTA.TUT.BY: Continues

1	2	3
with higher education	37.7% (university degree, Bachelor Degree) 22.65% – undergraduates 18.5% – university degree (Master Degree)	11.1%
with vocational secondary education	7.4%	13.1%
with vocational technical education	...	30.4%
with secondary general and basic education	13.6%	33.3%+12.1%
Graduates	10% (students and pupils)	2.3%

*Source: annual Statistics of the Republic of Belarus, 2015. – Minsk, National Statistical Committee of the Republic of Belarus. 2015. pp 103-106, data of the Ministry of Labour and Social Protection of Belarus, data of the Research Center of RABOTA.TUT.BY.*

3. In compliance with the Decree of the Council of Ministers of the Republic of Belarus dated 19.07.2011 № 972 "On some issues of making the order for training of personnel" the Ministry of Education of the Republic of Belarus made Computer-Aided System for making the order for training of personnel for all economic sectors in Belarus (AS "Goszakaz & Priyom"). About 5% of the total number of businesses operating in Belarus are signed up to the System, most of which are state-owned businesses (80% of total users). They submit data on prospective demand for personnel for next 5-10 years. These data are used to make agreements on training of personnel and to make up enrollment plans for educational institutions.

In compliance with the above mentioned decree businesses report annually to executive committees of towns on additional demand for labour resources considering the development trends in terms of: 1) level of education, 2) qualification of specialists (profession, position) – rank, class, category, 3) reasons of additional demand (expansion of production, replacement of natural retirement and filling of vacancies).

Thus, information in all three databases is based on data provided by businesses, where each of these bases does not show an entire and trustworthy trend of prospective demand for personnel in order to make decisions by all participants of economic system. A shortcoming of this approach is a lack of certainty in methodological question – What criteria do businesses use to determine additional



demand for personnel and to claim their training. Businesses experience both excess and shortage of personnel simultaneously (2, pp. 46-47), and additional demand is determined by personnel departments based on managers' claims considering mainly natural flow of personnel. The following things shall be taken into account:

- a) according to businesses, additional demand for personnel is chiefly caused by replacement of natural retirement and filling of vacancies,
- b) it's difficult to forecast prospective demand for personnel considering structural changes in economy, especially demand for future skills and qualifications,
- c) insufficient methodological support of personnel departments and paperwork management as their main function.

Probably, regular surveys conducted among employers can be a solution to these problems. In such case this entails development of a survey form, creation of electronic platform for its regular performance, and creation of statutory and regulatory basis. Businesses need a methodology for determining additional demand for personnel and improvement of potential of their personnel departments. To achieve this the following tasks should be solved:

- refinement of questionnaire for employers, determination of representative selection of businesses, training of employment department specialist to conduct the survey,
- prognostic modeling from a perspective of economic activity and major professional qualification groups and publication of models.

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UDC 331.5.024.5

### **THE INFLUENCE OF FLEXICURITY ON DECENT WORK INDICATORS**

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*Key words: flexicurity, decent work, labor market flexibility, employment.*

*Abstract. The article discusses aspects of flexicurity concept implementing, proposed by the European community and intended to enable simultaneous increase of labour market flexibility and social protection of workers. Author analyzed of the relationship between implementation of the flexicurity concept and the indicators of labour market efficiency on example of the EU-28 and concluded about the influence of flexicurity on indicators of the labor market efficiency.*



Increasing labor market flexibility in many countries has led to realization of the need to take measures to reduce the negative effects of this phenomenon (in particular, employment precarization) in form of the proclamation of the flexicurity concept.

The concept of flexicurity is an integrated strategy to simultaneously enhance flexibility of the labor market and social protection of workers. Flexicurity is designed and implemented across four policy components: 1) flexible and reliable contractual arrangements; 2) comprehensive lifelong learning strategies; 3) effective active labour market policies; and 4) modern social security systems providing adequate income support during employment transitions [1, p.12].

However, modern researchers claim that flexicurity needs to be updated, because it does not always fulfill its tasks.

In order to understand how effective the flexicurity concept and whether it provides the balance, which is expected, we selected the indicators characterizing the degree of realization of this concept (percentage of the adult population between 25 and 64 participating in education and training, educational attainment of age cohort 45-54, educational attainment of age cohort 25-34, aggregate replacement ratio, unemployment trap, expenditure on active and passive labour market policies as a percentage of GDP, expenditure on active and passive labour market policies per unemployed person) in order to understand how effective the flexicurity concept and whether it provides the balance, which is expected to, we selected the indicators characterizing the degree of realization of this concept and the labour markets efficiency for EU-28, including indicators reflecting the degree of implementation of the concept of Decent work. These include the following:

1. Employment rate, total;
2. Employment rate, for women;
3. Employment rate, for older workers;
4. Youth unemployment ratio (15-24 years);
5. Long-term unemployment rate, in % of active population;
6. Growth in labour productivity.

The dynamics of these indicators by country is shown in table 1.

Table 1 – Dynamics of indicators characterizing the labour markets efficiency in the EU-28 countries (2005-2014)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Employment rate, total	67.9	68.9	69.8	70.3	69.0	68.6	68.6	68.4	68.4	69.2
Employment rate, for women	60.0	61.1	62.1	62.8	62.3	62.1	62.2	62.4	62.6	63.5
Employment rate, for older workers	42.2	43.3	44.5	45.5	45.9	46.2	47.2	48.7	50.1	51.8

Table 1 – Dynamics of indicators characterizing the labour markets efficiency in the EU-28 countries (2005-2014): Continues

Youth unemployment ratio (15-24 years)	14.6	18.4	26.3	26.1	30.6	36.5	32.9	42.2	38.1	30.2
Long-term unemployment rate, in % of active population	4.1	3.7	3.1	2.6	3.0	3.8	4.1	4.7	5.1	5.1
Labour productivity*	1.0	1.6	1.2	-0.6	-2.7	2.8	1.6	-0.1	0.6	0.4

\*percentage change over previous period.

Source: author's elaborations on [2].

Table 2 – Dynamics of indicators characterizing the implementation of flexicurity in the EU-28 countries (2005-2014)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Percentage of the adult population between 25 and 64 participating in education and training	9.6	9.5	9.3	9.3	9.3	9.1	8.9	9.0	10.5	10.7
Educational attainment of age cohort 45-54	67.1	67.8	68.6	69.5	70.2	71.0	71.7	72.4	73.3	74.0
Educational attainment of age cohort 25-34	78.5	78.9	79.4	80.0	80.3	80.9	81.2	81.7	82.4	83.1
Expenditure on active and passive labour market policies as a percentage of GDP	1.94	1.75	1.54	1.55	2.07	2.06	1.82	:	:	:

Table 2 – Dynamics of indicators characterizing the implementation of flexicurity in the EU-28 countries (2005-2014 ): Continues

Expenditure on active and passive labour market policies per unemployed person	:	:	5845	6028	6684	6639	5924	:	:	:
Aggregate replacement ratio	:	:	:	:	:	0.52	0.53	0.54	0.56	0.56
Unemployment trap (euro per inhabitant)	:	:	:	326.8	420.1	421.1	407.1	411.9	:	:

Source: author’s elaborations on [2].

As dependent variables we selected indicators of the labour market efficiency. The results of correlation are presented in Table 3.

Table 3 – The results of correlation between labour market efficiency and indicators of flexicurity implementation

Dependable variable (y)	Linear coefficient of Pearson correlation under independent variables – indicators of flexicurity (x)						
	Percentage of the adult population between 25 and 64 participating in education and training	Educational attainment of age cohort 45-54	Educational attainment of age cohort 25-34	Aggregate replacement ratio	Unemployment trap (tax rate on low wage earners)	Expenditure on active and passive labour market policies as a percentage of GDP	Expenditure on active and passive labour market policies per unemployed person
Employment rate, for women	0.301	0.800	0.804	0.571	0.780	-0.207	0.164
Employment rate, for older workers	0.539	0.983	0.991	0.899	0.815	0.065	-0.009

Table 3 – The results of correlation between labour market efficiency and indicators of flexicurity implementation: Continues

Youth unemployment ratio (15-24 years)	-0.046	0.821	0.783	0.505	0.704	0.199	0.307
Long-term unemployment rate, in % of active population	0.583	0.670	0.686	0.852	0.338	0.259	-0.344
Labour productivity*	-0.066	-0.087	-0.077	-0.044	-0.326	-0.067	-0.274

Source: author's elaborations.

The calculation of the coefficients of pair correlations between the efficiency indicators of the labour market and indicators of implementing the concept of flexicurity, it can be noted that among the indicators of the implementation of the concept of flexicurity, there are those that have a significant impact on all the chosen indicators relevant to the effectiveness of the labour market. Among these indicators: educational attainment of age cohort 45-54, educational attainment of age cohort 25-34, aggregate replacement ratio, unemployment trap (tax rate on low wage earners). Changes in other indicators have little effect on the labour markets efficiency. Among the least deterministic of the performance indicators of the labor market is labor productivity, which suggests that there is virtually no relationship between the flexicurity and increase labour productivity. The most determined was the level of employment among the elderly, women and youth unemployment, which leads to the conclusion that the implementation of the flexicurity concept helps to cope with some problems of socially vulnerable groups of the population.

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Scientific edition

**EDUCATION AND SCIENCE IN THE 21st CENTURY**

Articles of the International Scientific and Practical Conference

*October 27, 2016*

Corrector: *Stepanov D.*

Computer imposition: *Paharelskaya S.*

Cover design: *Paharelskaya S.*

Responsible for issue: *Aliakseyeva A.*

Подписано в печать 21.01.2017. Печать ризографическая. Гарнитура «Times».

Усл. печ. л. 3.2. Уч.-изд. л. 8.9. Формат 60x90 1/16. Тираж 40 экз.

Заказ № 28.

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Выпущено издательским отделом ЦИТ

Витебского государственного технологического университета

210035, Республика Беларусь, г. Витебск, Московский пр-т, 72.

Свидетельство о государственной регистрации издателя, изготовителя,  
распространителя печатных изданий № 1/172 от 12 февраля 2014 г.