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EFFECT OF ACID GAS CONTENT TO THE DEHYDRATION PROCESS EFFICIENCY

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Abstract: Natural gas in Republic of Croatia is being produced from three main regions: Sjeverni Jadran, Duboka Podravina and Medimurje. The natural gas produced from Medimurje region has been taken as an example for modelling the dehydration process because, compared to natural gas from Duboka Podravina region, it contains higher amount of acid gases. The associated gas with much smaller content of acid gases, currently being flared at region site called Istočna Hrvatska, has been taken as a second example. The comparison of these two cases has shown the effect of acid gases to the dehydration process efficiency. In both cases, absorption by triethylene glycol is chosen. Due to a large discrepancy in acid gas content, water content difference observation is much easier. Modelling of the dehydration process has been made in Aspen Hysys software.

KEYWORDS: NATURAL GAS, ACID GAS, DEHYDRATION, TRIETHYLENE GLYCOL, ASPEN HYSYS

1. Introduction

In general, natural gas is a mixture of hydrocarbons with minimum amount of inorganic compounds, such as water, carbon dioxide and hydrogen sulfide (Mokhatab and Poe, 2012.). Croatia’s natural gas is being produced from three regions. Gas from Sjeverni Jadran region is dry gas, while the gas from Duboka Podravina and Medimurje region is gas with high content of impurities and water (Kurešić, 2016.). Such gas needs to be treated so that it could meet the quality requirements for transportation.

In this paper, only the process of dehydration was considered. Two examples of gas were taken. The first one is gas with high amount of acid gases (gas from Medimurje region) and the second one is associated gas with much smaller amount of acid gases in its stream. The main idea was to show what effect do acid gases have on the dehydration process efficiency. Due to large difference in acid gas amount, it’s easier to observe water content difference.

2. Gas treatment

When the gas is produced, it needs to be treated so it could satisfy requirements for transportation. The two examples, shown in this paper, are natural gases with impurities. The first example is sour gas with high amount of acid gases (composition shown in Table 1.).

Table 1. Sour natural gas (modified from Kurešić, 2016.)

<table>
<thead>
<tr>
<th>Compound</th>
<th>Mol %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>26,10</td>
</tr>
<tr>
<td>Ethane</td>
<td>2,50</td>
</tr>
<tr>
<td>Propane</td>
<td>1,22</td>
</tr>
<tr>
<td>i-butane</td>
<td>0,78</td>
</tr>
<tr>
<td>n-butane</td>
<td>0,68</td>
</tr>
<tr>
<td>CO₂</td>
<td>68,70</td>
</tr>
<tr>
<td>H₂S (ppm)</td>
<td>200</td>
</tr>
</tbody>
</table>

Usually, when natural gas contains a higher amount of acid gases and doesn’t meet requirements for transportation, it has to be cleaned before entering the dehydration process. But for the purpose of this paper, sour gas directly enters the dehydration process. The second given example is associated gas with much smaller amount of acid gases in its stream. Composition of this gas is given in Table 2.

Table 2. Associated gas (modified from Preklushaj, 2019.)

<table>
<thead>
<tr>
<th>Compound</th>
<th>Mol %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>87,87</td>
</tr>
<tr>
<td>Ethane</td>
<td>3,58</td>
</tr>
<tr>
<td>Propane</td>
<td>4,05</td>
</tr>
<tr>
<td>i-butane</td>
<td>1,89</td>
</tr>
<tr>
<td>n-butane</td>
<td>1,85</td>
</tr>
<tr>
<td>CO₂</td>
<td>0,40</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0,36</td>
</tr>
<tr>
<td>H₂S (ppm)</td>
<td>11,79</td>
</tr>
</tbody>
</table>

The modelling of dehydration process has been conducted in Aspen Hysys process modelling software, and glycol used for the process is TEG (triethylene glycol).

The first step in process modelling is to define all components that will be included in dehydration process (such as TEG and water). After defining the components, the fluid package needs to be selected, and for this type of process, Glycol package is necessary (Figure 1. and Figure 2.).
The next step is to enter the simulation environment and to design the complete gas treatment process. Primarily, the gas and TEG streams compositions and conditions are defined. In first case – sour gas is directly saturated with water, when in second case, the Gas stream is mixed with pure H₂S stream, to get the pointed amount of H₂S in ppm. Then – associated gas stream (composition shown in table 2) is ultimately saturated with water (Figure 3 and Figure 4).

Obtained raw gases streams then enter the bottom stage of dehydration column, with TEG entering the top stage of the same column. Inside the column design window, all process conditions are defined so column can be converged. After the convergence, the dry gases exit the column on the top stage, and rich TEG on the bottom – which then circulates towards further treatment (Figure 5).

Regenerated TEG is precooled in heat exchanger and mixed with makeup TEG. Mixture is then pumped back to the beginning of process – dehydration column. Complete process scheme is shown in Figure 7.

### Table 1. Gas stream conditions

<table>
<thead>
<tr>
<th>Associated gas/ Sour gas</th>
<th>Temperature</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32,00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70,00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>250 000</td>
<td>m/d</td>
</tr>
</tbody>
</table>

As mentioned earlier, the difference between two gas inlets is the acid gas content, at the same TEG stream conditions (shown in table 4.) for dehydration process.

### Table 4. TEG stream conditions

<table>
<thead>
<tr>
<th>TEG</th>
<th>Temperature</th>
<th>°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35,00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70,00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 000</td>
<td>l/h</td>
</tr>
</tbody>
</table>

For the purpose of this paper, only dry gas streams (gas outlet from dehydration column) have been observed and compared. Two variables of interest have been water dew point and water content of dry gas stream. These variables are shown in table 5. and table 6.

### Table 5. Dry gas stream after dehydration of sour gas
Table 6. Dry gas stream after dehydration of associated gas

<table>
<thead>
<tr>
<th>Dry gas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>32.56 °C</td>
</tr>
<tr>
<td>Pressure</td>
<td>69.00 Bar</td>
</tr>
<tr>
<td>Molar flow</td>
<td>249 800 m³/d</td>
</tr>
<tr>
<td>Water content</td>
<td>32.30 mg/Nm³</td>
</tr>
<tr>
<td>Water dew point</td>
<td>0.1167 °C</td>
</tr>
</tbody>
</table>

As it can be seen, there is a rather big discrepancy of targeted values. Reason for this is better water saturation in sour gas due to higher amount of acid gases (Terrigeol et al., 2015.). Also, dehydration process of sour gas generate higher TEG solution losses than the dehydration process of associated gas. In the first case, the loss of TEG solution is 0.0748 l/h, and for the second case the loss is 0.0377 l/h, which is a significant difference.

4. Conclusion

After the dehydration process, dry gas streams have different water content and water dew points. It can be concluded that high amount of acid gases has a significant effect on these variables. Also, dehydration process of sour gas would result in more expenses regarding to requirement of more TEG makeup. Due to the higher water content in the dry gas stream after sour gas dehydration, the process itself is less efficient.

Another issue is of technical nature, since system corrosion velocity increases more in acid than in sweet environment. In addition, there is a problem with hydrate formation and acid gas content has a negative impact on the temperature of their formation.

5. References


Acknowledgment

Dissemination process is supported by the Development Fund of the Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb.
1. Introduction

In this study drainage waters generated during the bioleaching of a polymetallic sulphide ore were subjected to treatment by means of lab-scale permeable multibarriers. The multibarriers were plastic cylindrical columns 40 cm high, with an internal diameter of 10 cm. The columns were filled with a mixture of limestone (crushed to a particle size of minus 10 mm) and a biodegradable organic matter consisting of a mixture of spent mushroom compost, fresh leaf compost, animal manure and saw dust. The columns were inoculated with media (Sanz and Köchling, 2007; Escobar et al., 2008).

2. Materials and Methods

Data about the composition of the polluted waters before and after their treatment by means of sulphate-reducing bacteria, as well as by means of mixed populations of sulphate-reducing and iron (III)–reducing bacteria are shown in Table 1. The treatment by means of sulphate-reducing bacteria able to oxidize the organic substrates to CO₂ as a final product was the most efficient. These bacteria were related to the genera Desulfovibrio, Desulfobacter and Desulfofoccus. It must be noted that strains related to one and the same genus from their group can differ considerably from each other with respect to this ability. Another group of sulphate-reducing bacteria (related to the genera Desulfomonas, Desulfohalobus and Desulfovibrio) were able to oxidize the organic substrates only partially to CO₂ and acetate and usually reduced the sulphates at lower rates than the sulphatereducing bacteria related to the first group. However, some of the strains related to the species of this second group also differ considerably from each other with respect to their ability to oxidize the organic substrates.

The quality of the waters treated by means of the permeable reactive multibarriers and by the microbial fuel cells was monitored at the inlet and the outlet of these components of the system for the water cleaning and electricity generation. The parameters measured in situ included: pH, Eh, dissolved oxygen, chemical composition, and temperature. The isolation, identification and enumeration of microorganisms were carried out by the classical physiological and biochemical tests (Karavaiko et al., 1988) and by the molecular PCR methods (Sanz and Köchling, 2007; Escobar et al., 2008).

3. Results and Discussion

Data about the composition of the polluted waters before and after their treatment by means of sulphate-reducing bacteria, as well as by means of mixed populations of sulphate-reducing and iron (III)–reducing bacteria are shown in Table 1. The treatment by means of sulphate-reducing bacteria able to oxidize the organic substrates to CO₂ as a final product was the most efficient. These bacteria were related to the genera Desulfovibrio, Desulfobacter and Desulfofoccus. It must be noted that strains related to one and the same genus from their group can differ considerably from each other with respect to this ability. Another group of sulphate-reducing bacteria (related to the
The microbial sulphate reduction in the multibarriers was efficient due to the large amount not only of sulphates but also of soluble biodegradable organic substrates generated from the initial organic matter by the action of the anaerobic heterotrophic bacteria present in this system. The high residual concentrations of such soluble organic substrates and sulphates in the multibarrier effluents, together with the very low residual concentrations of toxic heavy metals, the negative electrochemical potential, the neutral pH and the practical absence of dissolved oxygen, made these effluents very suitable for electricity generation by the microbial fuel cells.

Conclusion

Some mixed cultures of sulphate-reducing and iron (III)-reducing bacteria are very efficient for generation electricity by means of microbial fuel cells. The best strains from these bacteria are characterized to and efficient degradation of the organic substrates at relatively low pH (about 3.5 – 4.0) which is usually quite low for these bacteria

Acknowledgements: The authors expressed their gratitude to the National Science Fund of Bulgaria for the financial support connected with this study (Project T02/2/2014).

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It is also essential to be mentioned that some microorganisms related to one the same taxonomic species can differ considerably from each other with respect to their ability to generate electricity even from one and the same organic substrate under one and the same experimental conditions.
GEOINFORMATION MODELING

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Abstract: Modeling can be defined in the context of geographic information systems (GIS) as occurring whenever operations of the GIS attempt to emulate processes in the real world, at one point in time or over an extended period. Models are useful and used in a vast array of GIS applications, from simple evaluation to the prediction of future landscapes. Modeling in GIS raises a number of important issues, including the question of validation, the roles of scale and accuracy, and the design of infrastructure to facilitate sharing of models.

Key words: GEOSPATIAL DATA-MODEL, GEOINFORMATION TECHNOLOGY, GEOGRAPHIC INFORMATION SYSTEM, DATA INTEROPERABILITY

1. Introduction
In recent years, information has become a growing and vital place in the development of society. Because of its growing importance, the XXI century is increasingly being called a century of information technology. This applies equally to the military field where the preparation and conduct of combat operations is impossible without reliable information.

In the process of development, the modern information society is increasingly experiencing new form and content conflicts and crises caused by different processes. The experience of recent years shows that crises are interdependent with the internal and external socio-economic and political environment and heavily dependent on the information linking of society.

2. The essence of geoinformation modeling.
In order to make a logical description of the subject area, a model of the data is required for its modeling. In an appended embodiment, the data model is such a data organization that, through the types and structures of data processed by a computer, allows logical and physical implementation of the database for any subject area.

Data modeling means a multitude of conceptual data organization solutions and the data structure is a detailed description of the data through lists, arrays, files and their storage in a computer [7].

The basis of most data processing methods in information systems and technologies lies in the concept of an information model representing a formalised representation of existing objects from reality. The information model serves to describe the relationships between real objects and phenomena and can be built for an object, a set of objects, complex systems, information systems, etc.

The information model of the object (process) provides a formalized representation of the studied elements of the system and their interrelations and contains different levels of descriptions: object, system and base [3].

Information modeling is the ability to build information models and their analysis needed to study real-world objects. Information modeling can be seen as a modern information technology. It includes skills for creating, interpreting and modeling different information models.

Modern information modeling requires skills to work with information to make a qualitative transition from descriptive models to resource and resource to intellectual. For this reason, it can be argued that information modeling is the basis for future intellectualization of education, linking the link between information and intellectual society.

To construct an optimal information model that meets the requirement to increase the efficiency and quality of the information system, it is necessary to define the basic concepts and constructions characteristic of the subject area.

The introduction to the spatial object modeling theory provides a basis for defining the information concept of the real world.

3. Information concept for the real world.
According to the information concept [5], space consists of separate objects. Each object is represented by:

• points;
• boundaries defined by lines;
• graphic attributes for the border elements;
• attribute data for the object;
• relationships (links) of one graphic object with the other objects.

At the same time, space consists of continuous areas. Each continuous area has:

• boundaries defined by points or by analytical function;
• graphic attributes for the border elements;
• attribute data for the area;
• relationships (relationships) of one area with other areas.

Objects and continuous areas make up the space without overlaps and without any omissions (no shortage).

Through the information concept, the following stages of modeling are distinguished:

• a conceptual model of space;
• modeling with data (data models);
• computer presentation, visualization, and model usage.

The sequence of modeling of the real world is presented in figure 1.

Informational modeling in general, regardless of the field of application, must correspond to a particular concept and be directed to presenting and studying the surrounding reality.

Figure 1. Information concept for the real world.

Similar trends are also observed in electronic intelligence systems. For example, by determining the location of an
The process of examining objects of real reality can simply be represented by the attitude:

\[ \text{object} \rightarrow \text{content} \rightarrow \text{presentation} \] (1)

Using information modeling, this process is interpreted as follows:

- essence → description of properties → referral of properties to a known class → description of relations between properties → abstract description of systems of properties and relations → functional description of properties and relations → selection of sets of information units → modification of input sets of information units → study of the change of the input data sets.

The basis of the data processing process is digital modeling. It allows for vector-topology modeling, object buffering, network analysis, building a digital model of the site, etc.

In the processing of information to create a database, the geo-data grouping units are geo-information models. They serve as the basis for the formation of geoscience for real objects and phenomena.

The data model presents static and dynamic properties of the surrounding world with the desired degree of precision. Modeling means abstraction of reality, and this is the core of any information system. Abstraction simplifies reality, but retains the relevant information for each user and the necessary detail. In geoinformation, modeling is a formalization or representation of reality through a variety of tools and approaches.

Geoinformation modeling is defined [9] as a graphical object modeling model interconnected with databases and includes five basic types of modeling:

1. Conversion of graphical information resulting in modification of graphical and tabular data;
2. Structuring of tabular data, resulting in alteration of graphical and tabular data;
3. Converting graphical objects from one type to another;
4. Building digital phenomena models;
5. Editing, editing or modifying graphical objects based on spatial object relationships (without the use of graphical editors).

The basis of geo-information modeling as a specialized technology are transformations based on the theoretical-multiple relationships, the laws of formal logic, image processing algorithms, computer graphics, DBMS technologies and others [9].

There is no ideal model that is claimed to represent 100% of reality. This is due to the existing stages of modeling and the accepted concepts, definitions and semantics used by different user groups.

Planning operations in military intelligence requires the creation of a well-known battlefield picture, which is basically geo-information modeling.

In geo-information modeling, real objects and phenomena are represented by a formalized description, which becomes the basis for the study of the objects and their interrelation. The following abstraction levels are applied (Figure 2):

- a logical model - is an application-oriented image of reality; is often represented as a diagram showing the selected objects and the relationship between them;
- a physical model - describes the files and tables used to store data; specific application.

The data model M consists of basic rules R and operators O [11]. The basic rules R are implemented by:

- the Rs structure, which includes the type and organization of model data;
- the Ro restrictions, which define boundaries of the model structure.

Operators O include operations and procedures for working with data, with their properties and relationships at any particular point in time.

For defining, formalizing, and solving a given task, a part of the real world, called a subject area, with clearly defined boundaries that can be described by a finite number of objects, actually existing or abstract, is used.

With the development of database theory (DB), various methodological approaches are being developed to design and physically store data. The external level is the initial stage of designing an AB [6], where each user declares his / her interests from the real world, which must be reflected in the DB. This process is accepted to be called the creation of external schemes or external models that are not associated with a particular operating system or computer configuration.

Space can be conceptualized in different ways for geospatial analysis purposes. The conceptual model can be created when external schemes are described with the concepts of a particular data model. It does not depend on the operating system of the computer and its parameters.

**CONCLUSION**

1. In geoinformatics, the extraction of knowledge about the surrounding world is accomplished by a maximum of sources compared to other sciences. Geoinformatics operates geo-information and geodata, integrating different types of information. This extends the scope for complex analysis to support decision-making and response forces management.

Modern trends in the development of geoinformation technologies that are relevant in terms of maximizing the rapid production and dissemination of geospatial information are an important element for achieving early warning system operability.

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NUMERICAL ANALYSIS OF REAL OPEN CYCLE GAS TURBINE

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Abstract: The paper presents a thermodynamic analysis of gas turbine with real open cycle. Gas turbine operates in combined heat and power (CHP) system. Analysis is provided by using measured operating parameters of operating mediums (air and combustion gases) in all required operating points. Cumulative real turbine developed power amounts 78611.63 kW. In the whole gas turbine process, the highest losses occur in combustion chambers during the heat supply process and amounts 13689.24 kW. Turbine power losses are equal to 7976.22 kW, while the turbo-compressor power losses amounts 4774.24 kW. While taking into account all analyzed gas turbine components, the highest efficiency of 90.79% has turbine, followed by combustion chambers which efficiency is equal to 89.01%. Turbo-compressor efficiency amounts 88.59% and the whole gas turbine cycle has efficiency equal to 33.15%.

KEYWORDS: GAS TURBINE, REAL OPEN CYCLE, NUMERICAL ANALYSIS, LOSSES, EFFICIENCY

1. Introduction

Gas turbines are today widely used in various power plants or cogeneration plants for simultaneous heat and power production [1], [2]. Investigation and analysis of many gas turbines and its processes are performed in a lot of scientific papers [3].

Energy and exergy analyses are usually used for the investigation of complete power plants or its components in order to obtain efficiencies and losses of the entire plant and each plant component [4], [5]. Such analyses are also very applicable for the gas turbines and all of its components [6].

This paper presents a thermodynamic analysis of gas turbine with real open cycle which operates in combined heat and power system. Real gas turbine cycles involve losses at each analyzed gas turbine component. Power distribution, distribution of delivered and released heat, losses and efficiencies of each constituent component and the entire gas turbine were calculated and discussed.

2. Real open cycle gas turbine process

Main scheme of a gas turbine with real open cycle is presented in Fig. 1, while the temperature-specific entropy diagram of this process is shown in Fig. 2.

Beginning of gas turbine operation from dead-state is ensured with starting electro-motor [7]. In the open gas turbine cycle turbo-compressor takes air from the atmosphere and increases its pressure. Air with increased pressure is then delivered to combustion chambers. In combustion chambers is injected a certain amount of high-quality fuel, fuel is mixed with air after which combustion occurred. Produced combustion gases leave combustion chambers and after expansion, they are released from the gas turbine cycle to the atmosphere by polytropic compression, which included compression losses if compared to ideal isentropic compression. Heat supply process in combustion chambers has several heat transfer losses and is characterized with a pressure drop. Real combustion gases expansion process on the turbine is polytropic which included expansion losses if compared to ideal isentropic expansion. Heat release from the real gas turbine process happens at the higher pressure in comparison with atmospheric pressure. For the analyzed gas turbine cycle, mentioned losses are included in measured operating parameters of air and combustion gases in all operating points.

![Fig. 1. Main scheme of the gas turbine with real open cycle (EM = Electro-Motor; TC = Turbo-Compressor; CC = Combustion Chambers; T = Turbine; PC = Power Consumer)](image1)

Real gas turbine cycle includes losses at each gas turbine component [8]. Turbo-compressor compresses air from the atmosphere by polytropic compression, which included compression losses if compared to ideal isentropic compression. Heat supply process in combustion chambers has several heat transfer losses and is characterized with a pressure drop. Real combustion gases expansion process on the turbine is polytropic which included expansion losses if compared to ideal isentropic expansion. Heat release from the real gas turbine process happens at the higher pressure in comparison with atmospheric pressure. For the analyzed gas turbine cycle, mentioned losses are included in measured operating parameters of air and combustion gases in all operating points.

![Fig. 2. T-s diagram of the real open gas turbine cycle with all losses included](image2)

3. Gas turbine with real open cycle numerical analysis – main equations

Most of the equations for the gas turbine with real open cycle analysis were found in [7] and [8]. For each operating point of real open gas turbine cycle, specific enthalpy of operating medium (air or combustion gases) can be calculated as:

\[ h = c_p \cdot T \]

where \( c_p \) is the specific heat capacity of operating medium at constant pressure and \( T \) is current operating medium temperature.

For real open cycle gas turbine, specific heat capacity at constant pressure \( c_p \) is a function of current operating medium temperature. Specific heat capacity at constant pressure of air is calculated according to [9] by using an equation:

\[ c_{p,air}(T) = 1.0484 \cdot 0.0003837 \cdot T + 9.45378 \cdot T^2 + 5.49031 \cdot T^3 + 7.92981 \cdot T^4 \]

while for combustion gases (eg), specific heat capacity at constant pressure is also calculated according to [9] by using an equation:
- Turbo-compressor real power:

\[ P_{TC} = \dot{m}_{\text{air}} \cdot (h_2 - h_1) = \dot{m}_{\text{air}} \cdot \left( T_2 \cdot c_{p,2} - T_1 \cdot c_{p,1} \right) \]  

(4)

Temperature of operating medium (air) after ideal (isentropic) compression is calculated by using an equation:

\[ T_A = T_1 \left( \frac{p_2}{p_1} \right)^{\frac{k_{\text{air}} - 1}{k_{\text{air}}}} \]  

(5)

where \( k_{\text{air}} \) is according to [10] equal to 1.4.

- Turbo-compressor ideal (isentropic) power:

\[ P_{TC,IS} = \dot{m}_{\text{air}} \cdot (h_A - h_1) = \dot{m}_{\text{air}} \cdot \left( T_A \cdot c_{p,A} - T_1 \cdot c_{p,1} \right) \]  

(6)

- Turbo-compressor power losses:

\[ P_{TC,PL} = P_{TC} - P_{TC,IS} = \dot{m}_{\text{air}} \cdot (h_2 - h_A) \]  

(7)

- Turbo-compressor efficiency:

\[ \eta_{TC} = \frac{P_{TC,IS}}{P_{TC}} = \frac{h_A - h_1}{h_2 - h_1} = \frac{T_A \cdot c_{p,A} - T_1 \cdot c_{p,1}}{T_2 \cdot c_{p,2} - T_1 \cdot c_{p,1}} \]  

(8)

- Compressed gases mass flow is the sum of air mass flow through a turbo-compressor and fuel mass flow (\( F \)) in combustion chambers:

\[ \dot{m}_{cg} = \dot{m}_{\text{air}} + \dot{m}_F \]  

(9)

- Turbine real cumulative power:

\[ P_t = \dot{m}_{cg} \cdot (h_3 - h_2) = \dot{m}_{cg} \cdot \left( T_3 \cdot c_{p,3} - T_2 \cdot c_{p,2} \right) \]  

(10)

Temperature of combustion gases after ideal (isentropic) expansion is calculated by using the following equation:

\[ T_B = T_3 \left( \frac{p_4}{p_3} \right)^{\frac{k_{cg}}{k_{cg}}} \]  

(11)

where \( k_{cg} \) is equal to 1.3 according to [10].

- Turbine ideal (isentropic) cumulative power:

\[ P_{T,IS} = \dot{m}_{cg} \cdot (h_3 - h_B) = \dot{m}_{cg} \cdot \left( T_3 \cdot c_{p,3} - T_B \cdot c_{p,B} \right) \]  

(12)

- Turbine power losses:

\[ P_{T,PL} = P_{T,IS} - P_t = \dot{m}_{cg} \cdot (h_4 - h_B) = \dot{m}_{cg} \cdot \left( T_4 \cdot c_{p,4} - T_B \cdot c_{p,B} \right) \]  

(13)

- Turbine efficiency:

\[ \eta_t = \frac{P_t}{P_{T,IS}} = \frac{h_3 - h_2}{h_3 - h_B} = \frac{\dot{m}_{cg}}{\dot{m}_{cg}} \cdot \left( T_3 \cdot c_{p,3} - T_B \cdot c_{p,B} \right) \]  

(14)

4. Measured operating parameters of the real open cycle gas turbine

The operating parameters of real open cycle gas turbine process were found in [9], Table 1. The operating points of the gas turbine process in Table 1 are presented in accordance to Fig. 1 and Fig. 2. The real gas turbine process is characterized with real (polytropic) compression and expansion processes with pressure drops during heat transferring in combustion chambers and during heat releasing from the process. Analyzed real open cycle gas turbine operates in combined heat and power (CHP) system, Turkey.
### Table 1. Operating parameters of real open cycle gas turbine [9]

<table>
<thead>
<tr>
<th>Operating point*</th>
<th>Temperature (K)</th>
<th>Pressure (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>298.15</td>
<td>1.0133</td>
</tr>
<tr>
<td>2</td>
<td>615.15</td>
<td>10.5030</td>
</tr>
<tr>
<td>3</td>
<td>1287.57</td>
<td>9.9779</td>
</tr>
<tr>
<td>4</td>
<td>827.15</td>
<td>1.1171</td>
</tr>
</tbody>
</table>

| Air mass flow    | 119.97 kg/s     |
| Used fuel        | Natural gas     |
| Fuel lower heating value (LHV) | 44661 kJ/kg |
| Fuel mass flow   | 2.79 kg/s       |
| Combustion gases mass flow** | 122.76 kg/s |

* According to Fig. 1 and Fig. 2  
** According to Eq. 9

### 5. Numerical analysis results of real open cycle gas turbine

After real (polytropic) compression on the turbo-compressor and after real (polytropic) expansion on the turbine, temperatures of operating medium (air or combustion gases) are higher in comparison with ideal (isentropic) processes, Fig. 3. The air temperature after real compression is 33.58 K higher, while combustion gases temperature after real expansion is 50.33 K higher when compared to air and combustion gases temperature after isentropic compression and expansion.

![Fig. 3. The change in real and isentropic temperatures after compression and expansion for the analyzed gas turbine](image)

A turbo-compressor is power consumer therefore in the real compression process it will use more power (due to losses) than in the ideal process. Real compression process will use 4772.24 kW more power in comparison with the ideal (isentropic) one, Fig. 4.

The turbine is a power producer - in the real expansion process turbine will produce 7976.23 kW less power (due to losses) than in the ideal (isentropic) process.

Real useful power produced by analyzed gas turbine amounts 36768.51 kW and will be used for any power consumer drive. Ideal (isentropic) useful power is calculated according to Eq. 16 and it assumes ideal compression and expansion processes. Isentropic useful power is equal to 49518.98 kW and represents the maximum theoretical power which can be in the ideal situation produced by analyzed gas turbine and delivered to power consumer, Fig. 4.

![Fig. 4. The change in real and isentropic power of gas turbine components and the entire gas turbine](image)

The most expensive element in the analyzed real open cycle gas turbine is used fuel. Chemical energy brought to combustion chambers by fuel represents the highest heat amount delivered in the gas turbine process. Due to several losses in the gas turbine combustion chambers - heat transferred from fuel to operating medium (combustion gases) will be lower in comparison with fuel chemical energy for 13689.24 kW, Fig. 5.

Cumulative heat released from the analyzed gas turbine process amounts 75119.53 kW. This heat amount will be divided on useful released heat (released combustion gases with temperature higher than 160 °C) and unused released heat (released combustion gases with temperature lower than 160 °C). In the analyzed gas turbine process useful released heat, which can be used for any heat consumer drive (or more of heat consumer’s drive) amounts 58216.59 kW.

![Fig. 5. Change in heat amounts of the analyzed gas turbine](image)

Turbo-compressor power losses which amounts 4774.24 kW are represented as a difference between real and ideal (isentropic) power required for turbo-compressor drive. Turbine power losses amounts 7976.22 kW and those turbine losses were calculated as a difference between the ideal (isentropic) and real turbine developed power, Fig. 6.

Heat supply losses are a difference between fuel chemical energy and heat amount transferred to operating medium (combustion gases) in combustion chambers - Eq. 19. Unused released heat from the analyzed gas turbine with real open cycle amounts 16902.94 kW and is calculated by using Eq. 23.

![Fig. 6. Losses of the analyzed gas turbine components](image)

For the analyzed gas turbine with real open cycle, the highest efficiency has a turbine (90.79%), Fig. 7. The heat supply process has efficiency equal to 89.01%, while the lowest efficiency of analyzed gas turbine components has a turbo-compressor and its efficiency is equal to 88.59%. Real open cycle gas turbine analyzed in this study has an overall efficiency equal to 33.15%, what is usual and expected efficiency for gas turbines used in power plants of any type.

![Fig. 7. Efficiencies of gas turbine components and the entire gas turbine](image)
In the presented analysis are obtained some additional important operating data of the analyzed real open cycle gas turbine. By using natural gas as a fuel for combustion in combustion chambers, specific fuel consumption, calculated according to Eq. 25, is equal to 273.17 g/kWh. Turbo-compressor power share in the cumulative power developed by the turbine is equal to 53.23%, which leads to a conclusion that a majority of developed cumulative turbine power is used for turbo-compressor drive; only 46.77% of cumulative developed power is used for power consumer driving. Share of unused heat in cumulative released heat is equal to 22.50% therefore the conclusion is that the majority of cumulative released heat from the analyzed gas turbine can be used for the drive of other heat consumers. In the real analyzed gas turbine process turbo-compressor uses 12.88% more power, while the turbine produces 10.15% lower power when compared to ideal (isentropic) compression and expansion processes. Real produced gas turbine useful power which will be used for power consumer drive will be 34.68% higher if the compression and expansion processes are the ideal (isentropic) ones.

6. Conclusions

This paper presents a thermodynamic analysis of gas turbine with real open cycle, which means that all the losses at every gas turbine component were taken into account during analysis. Analyzed gas turbine takes the air from the atmosphere and after expansion process combustion gases were released from the process directly to the atmosphere - two-way atmosphere connection defines gas turbines with open cycle. The main conclusions of the presented analysis are:

- After real compression and expansion processes operating medium temperatures were significantly higher in comparison with the operating medium temperatures after ideal (isentropic) compression or expansion.
- Turbine power losses amounts 7976.22 kW and its efficiency is equal to 90.79%.
- Heat supply process in combustion chambers resulted with heat losses equal to 13689.24 kW, while the heat supply efficiency (combustion chambers efficiency) is equal to 89.01%.
- Cumulative heat released from the gas turbine process amounts 751119.53 kW. This cumulative heat amount is divided in two parts - first part is useful heat, which can be used for any heat consumer drive and amounts 58216.59 kW, while the second part is unused heat which cannot be used in heat consumers and must be released to the atmosphere. Unused heat amounts 6902.94 kW.
- The whole analyzed gas turbine cycle has an overall efficiency equal to 33.15%.

7. Acknowledgment

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8. References

POSSIBILITIES FOR SOCIAL ENTREPRENEURSHIP IN WINE INDUSTRY: AN EXPLORATORY APPROACH

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Abstract: Social entrepreneurs cleverly combine business techniques and private sector approaches in order to develop solutions to social, cultural, or environmental problems, and do so in a variety of organizations. All European countries need to promote the entrepreneur spirit, to stabilize the institutional and cultural environment for innovations, and to increase the number of socially oriented small and medium sized enterprises (SMEs). This exploratory approach is focused on SMEs from wine industry, positioned in Plovdiv territorial unit, Bulgaria. It presents opportunities to enrich company's innovation strategies with a view to increase the share of social enterprises and the motivation of employees and owners to implement “good practices” for social entrepreneurship. This study offers different perspectives for observing the phenomenon social entrepreneurship, opportunities for financing and National policies that are focused on their encouragement.

Keywords: social entrepreneurship, innovation, wine industry, competitiveness

1. Introduction

In terms of content, the article deals with an extremely important economic problem, devoted to social entrepreneurship as a key element of the European and, in particular, the Bulgarian social market economy. As a whole the competitiveness of Bulgarian SMEs is still built basically by routine innovations and the profile of the innovative enterprises is low technological. The development of entrepreneur spirit in the contemporary community is a leading theme that meets a great science, media and public support. The theme significance takes a central position in discussions, researches and organizational activities connected with the process of creating social entrepreneurship. This takes an essential role in the Bulgarian economic environment as well as the national strategies for economic growth. In recent years, the European Commission began setting a policy framework for a social economy and social entrepreneurship, which found expression in a number of policy documents outlining the limits and opportunities for their development.

The Global Entrepreneurship Monitor (GEM) consortium has distinguished between ‘opportunity’ and ‘necessity’ entrepreneurship, based on the reasons given by entrepreneurs for starting a new business, with necessity entrepreneurship tending to dominate in transition and developing countries. As a result, many entrepreneurs in transition environments are well equipped to identify and exploit opportunities as they emerge over time, even if the initial reasons for becoming an entrepreneur in the first place can reasonably be described as ‘necessity’. It is also influenced by the learning experience of individuals, which can contribute over time, to changes in their motivation and behaviour with respect to social entrepreneurship.

The object of this study is small and medium-sized enterprises from wine industry, positioned in the territorial unit of Plovdiv (according to the division of territorial units and wine regions in Bulgaria of the Executive Agency for Vine and Wine, EAVW).

The subject of this paper is the utilization of the opportunities with a view to increase the share of social enterprises and the motivation of employees and owners to implement “good practices” for social entrepreneurship.

The researcher’s thesis is that the proper use and implementation of specific socially-responsible activities, understanding the necessity for taking right decisions to achieve success in their actions focused on social causes and ideals, will lead to enhanced competitiveness of the wine sector as a whole.

This article aims to study the role of social entrepreneurship as an essential factor to increase the creativity and innovativeness of wine industry in Bulgaria and hence the competitiveness of this specific sector of the national economy.

The human relationships are the engine for the social enterprise. According the Bulgarian legal definition a “social enterprise” means an enterprise no matter of its registration form that is with a basic aim reaching of measurable positive social influence but not gathering profits for its owners, participants and stock holders. It also "provides services and/or stocks that generate social returns and/or uses a method for producing stocks and services that are implemented in its social aim" (Bulgarian trade law).

The following limitations have been introduced in the article: the purpose of this research is to present an exploratory approach of different possibilities for socially responsible activities that can be introduced in wine enterprises without transforming them into social enterprises as defined by the Bulgarian trade law. Many researchers investigate wine industry in Bulgaria (G. Dimitrova, 2018; Borisov and Radev, 2011, etc.) and present methods and techniques for increasing their competitiveness. They discuss the impact of several microeconomic and macroeconomic factors of this industry, key trends and reviews of the market for wine drinks in Bulgaria(F. Dimitrova, 2017). The focus of this article is not introducing the specifics and development of wine industry, but to present opportunities for innovative models diversification with social activities.

Wine production in Bulgaria has a rich long-term experience because of the favourable geographic location and soil - climatic conditions, which outline the subsector as one of the main subsectors for the Bulgarian economy. A significant part of Bulgarian wine producers are also focusing on differentiation and diversification strategies, seeking ways to promote their business, expanding their markets and increasing their sales, and offering uniqueness to achieve and develop competitive advantages. In this context, the opportunities for social entrepreneurship of companies can be part of their innovative strategies.

The article is structured as follows: following the introduction, in the first part, are described different theories, definitions and statements connected with commerce and social entrepreneurship. This analysis paves the way for the second part, in which is highlighted the development of social enterprises in Bulgaria. It is followed by the third part, which presents an analysis of specific socially responsible activities. The article closes with conclusions and recommendations for future research in the field of social entrepreneurship in wide industry.

2. Social enterprises in Bulgaria

2.1. Theoretical background

The ‘social’ nature of the motivation for social entrepreneurship makes the concept clearly distinguishable from commercial entrepreneurship. The question of why social entrepreneurship comes to be, in terms of motivation, can also raise the question of
how come' social entrepreneurship comes to be (Orhei et al., 2015). The European Commission was the first to explore a multidimensional framework for entrepreneurial competence.

Since definitions in different countries vary, social enterprise should be described on the basis of shared characteristics such as social objectives, reinvestment of profits, a variety of legal forms and ways of stakeholder participation. Priorities for social enterprises are providing better access to capital and tailored financial instruments.

Schumpeter (1976, p.132) pays attention to the exceptional qualities of entrepreneurs, who possess ‘aptitudes that are present in only a small fraction of the population’; in particular, imagination, confidence, and the resilience to overcome resistance to their vision. This view of social entrepreneurship focuses on the personal qualities of people who start new organizations, and it celebrates traits like boldness, accountability, resourcefulness, ambition, persistence, and unreasonableness.

Social enterprises are not charitable organizations or social agencies. They are private enterprises managed and developed under the business rules with a business focus on solving humane tasks, not simply profit. They are oriented towards encouraging active civic participation and unification of efforts and expertise with wide public participation to achieve social change in a given area (Bezruhakova, 2014).

Social entrepreneurship is the most promising form of addressing societal and/or environmental problems as it combines social and entrepreneurial thinking and there are different forms to address societal challenges (Spiess-Knaff and Scheck, 2017).

2.2. Necessity for social entrepreneurship

During the 1980s, public bodies, faced with high rates of unemployment and a crisis in public finances, stopped relying exclusively on passive labour market policies based on a system of allocation of cash benefits to the unemployed and developed active labour policies, which aimed to integrate the unemployed into the labour market through professional training programmes, job subsidy programmes, etc. Within this field of active labour market policies, we can spot a large ‘second labour market programme’ (Defourny and Nyssens, 2010), offering intermediate forms of employment, between employment policies and social policies. Such a programme was based on the observation that, on the one hand, a number of unsatisfied social needs existed and, on the other hand, a large number of people were unemployed. These programmes thus tried to encourage the creation of new jobs in areas where they could satisfy social needs, as a mean of both creating jobs for unemployed persons and curbing mainstream social spending. In a context of lasting collaboration between the state and non-profit organizations in the provision of social services, public bodies heavily relied on associations for the implementation of this ‘second labour market programme’. Indeed, some associations were pioneers in promoting the integration of unemployed persons through a productive activity. It could even be considered that these pioneering associations actually implemented active labour market policies before the latter came into institutional existence. With the institutionalisation of the second labour market programme, associations have increasingly constituted a tool for its implementation. This kind of public scheme fostered the trend toward a more productive role of and entrepreneurial dynamics within the non-profit sector.

Orhei et al. (2015) define social entrepreneurship in contrast to commercial entrepreneurship. Since 2006, the European Commission has also devoted much attention to the concept of entrepreneurship as competence. The European Qualifications Framework (EQF) defines entrepreneurship as a sense of initiative and the ability to turn ideas into action.

Scholars (Dana and Radamani 2015; Sinclaire et al., 2018; Kovacheva and Dimitrova 2017, etc.) of socio-ecological transition consider social enterprises not simply as a tool to alleviate social problems generated by market imperfections, but also as an organizational model that can support social innovations for transition to more sustainable consumption and production practices.

More specifically, by accessing a series of non-market resources (such as unpaid labor, affordable small loans, lower-than-market rent for premises, various sharing arrangements for the use of resources), social enterprises can provide an effective survival strategy for transition initiatives, which would otherwise not be able to survive in increasingly competitive markets focused on satisfying the short term expectations of shareholders (Dedeuwaerdere et al., 2017).

The research of Defourny and Nyssens (2010) emphasizes that in Europe, the concept of social enterprise made its first appearance in 1990, at the very heart of the third sector, following an impetus which was first an Italian one and was closely linked with the cooperative movement. In 1991, the Italian parliament adopted a law creating a specific legal form for ‘social co-operatives’ and the latter went on to experience an extraordinary growth.

Since this early period, the debate has expanded in various types of institutions. Major universities have developed research and training programmes. International research networks have been set up, like the EMES European Research Network (EMES - Emergence of Social Enterprises in Europe), which has gathered, since 1996, research centres from most countries of the EU-15, and the Social Enterprise Knowledge Network (SEKN), which was formed in 2001 by leading Latin-American business schools and the Harvard Business School (Defourny and Nyssens, 2010). Various foundations have set up training and support programmes for social enterprises or social entrepreneurs. Various European countries have passed new laws to promote social enterprises.

Although social enterprises have the potential for contributing to society’s wellbeing, the results of their work depend on external factors. In this sense, Sinclair et al. (2018) analyze the relationship between social innovation, social enterprise and social policy using data from Scotland. Their observation shows that the local authorities use social enterprises to contribute to some welfare activities, but the latter do not replace the role of the authorities. As the authors describe it, “the possibilities of partnership and co-production are limited by the self-interest and an instinct for self-preservation of key institutions”. It seems that the scope of social entrepreneurship to large extent depends not only on the legislations but also on attitudes towards it in the specific context.

This research focuses the attention to implementing social activities, social mission and social responsibility into innovation programs and strategies in wine industry enterprises. Studying the wine industry and the challenges it faces in Portugal, Figueiredo and Franco (2018) discuss the possibility wine cooperatives to serve as social enterprises. One of their conclusions is that “wine cooperatives are regarded as viable forms of alliance, principally in uncertain, complex and competitive markets, but it was also demonstrated that this type of rural cooperative is crucial for investment and social entrepreneurship”.

2.3. National programs focused in development of SEs

The European Union provides many opportunities for grants, loans and guarantees available for small and medium enterprises. The financing options often are not direct funding. Usually, various national and sub-national institutions are intermediaries in this process.

According to Bulgarian Association of Regional Development Agencies (BARD A) the opportunities for financing social enterprises are submitted in summary on figure 1.
Activities related to social responsiveness can be classified differently. Donnelly, Gibson and Ivancevic (Donali, Gibson, Ivancevic, 1997) point eight categories of social responsibility:

1. Socially responsible actions in connection with the production line, safe, reliable and high quality products. Such actions can be taken by any wine producer and it is absolutely applicable in the sector.

2. Socially responsible actions in marketing practices, i.e. plausible and full information in advertising. This one is also universal and can be applied in any sector, including the wine industry.

3. Social responsibility in employee training (retraining instead of exemption as a result of introducing new technology). According to various discussions on media in Bulgaria with employers’ organizations, most of them provide additional training for their employees. The same is valid for wine sector so the third category of actions also represent an option to be implemented in the wine industry.

4. With regard to environmental control, socially responsible behavior requires the introduction of a production technology that reduces the level of pollution. Such activity is really significant and it corresponds the topic of innovations in the wine sector. There is variety of new technologies, allowing wine producers to decrease the pollution levels.

5. Attitude towards employees, remuneration and job satisfaction, and providing additional benefits such as day care facilities in the enterprise and others. There is no limitation such measures to be implemented in the wine industry as well.

6. Hiring and/or raising women or minority persons. Wine production doesn’t require only men for the production. It is an industry, in which women can take part. Also there is a possibility for inclusion of more people from Roma minority.

7. Socially responsible actions in the field of health and safety of employees. This category of social responsibility can be fully applied to wine sector.

8. Corporate philanthropy - donations to universities, foundations, and other organizations in the arts and culture, aid to the poor, financing of municipal development projects, as well as other groups and causes in society. Companies are increasingly interested in making donations that ultimately contribute to greater profits. Recently popular is the causation-marketing, exploring the relationship between the organization's profits and the cost of implementing activities that are included in the notion of corporate philanthropy. Such kind of activity doesn’t depend on the sector at all. It can be done by companies from all industries, including the wine production.

Additional service benefits include pension funds, health and hospitalization insurance, accident insurance, etc. In some cases, this practice is in response to concerted pressures on the part of employees, usually through trade unions.

Other socially responsible activities are extensive employee training programs, mentoring, employee assistance programs, and various forms of childcare assistance and care for the elderly.

A good example is the IBM program to assist employees who care for elderly relatives (50% of employees have had such problems).

Activities that are undertaken in the interests of the employees of an organization actually benefit the organization itself. For example, day care centers for children increase employee productivity, improve discipline.
External specific beneficiaries are minority groups, ethnic groups, women, disabled people, elderly. They influence companies through political and public opinion. For example, women claim equal rights and pay. The social obligation is in response to anti-discrimination laws and regulations. Social reaction is the company's behavior outside the law, implementing positive programs.

In the case of socially responsive behavior, the company not only seeks solutions to current problems but tries to get to their point of view. For example, developing training programs for long-term unemployed, implementing programs to promote women's professional careers. The most important feature of these actions is that the economic, social and political situation of a particular group of people is improving as a result of the company's efforts.

4. Conclusion

The arguments presented support the author's thesis. The results corresponding to the thesis that exploring and identifying social entrepreneurship opportunities is a possible task only if a proper and sufficiently comprehensive range of National and European strategies, policies, funding programs to support the development and strengthening of the wine sector are used. There are many opportunities for financing and National policies that are focused on the encouragement of social entrepreneurship. Management can implement specific activities to increase the social value of the company. Social entrepreneurship presents an intriguing and fertile ground for organizational research. Entrepreneurial social attitude is an exciting phenomenon with broad implications on strategy, innovation, and workplace environment. Furthermore, all the socially responsible activities can be applied in the wine production sector. In fact the enterprises from this industry can contribute to the social entrepreneurship without being social enterprises as defined in the Bulgarian trade law. Besides, using the Portuguese experience Bulgarian wine cooperatives can also serve as social entrepreneurs.

It should be noted that a further exploration of the studied topic is needed and it will be done in future research.

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REFERENCES

BARRIERS AND CHALLENGES OF TRANSFERRING MODERN PROJECT MANAGEMENT PRINCIPLES IN WESTERN BALKAN REGION

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Abstract: Project management is an effective management approach that has proven to be a great value for development of the Western Balkan region. Successful project identification, preparation and implementation can help developing countries in their progress. This research focuses on Western Balkan countries and the most common project management barriers. They are analysed related to two groups of barriers, one linked to the human resource development, and other related to the government functioning. Later the barriers are connected to challenges identified by the PMBOK project management knowledge areas and how they are influencing the implementations in the analysed region.

Keywords: PROJECT MANAGEMENT, DEVELOPING COUNTRIES, BARRIERS, CHALLENGES, PMBOK KNOWLEDGE AREAS

1. Introduction

Projects are seen as a basic structural element of development of any organisation, no matter if it is a private or state-run organisation. Therefore, without clear project plan and scope, well defined and executed preparation phase and implementation, projects remain just a desire to do something rather than to represent a growth force for developing countries around the world. That is why Project management is so important for country’s development. United Nations state that, “Programs and projects are increasingly used in developing countries in the process of economic and social development” [13], that is why they are “privileged particles of the development process”. Also, projects are one of the primary tools for getting grants, credits and loans for the developing countries by international organisations, like World Bank, European commission, USAID, European Bank for Reconstruction and Development (EBRD) and others. All of them highlight the importance of well prepared and executed projects, where project will lead into actions that will stimulate social and economic change in the developing countries.

There are numerous cases of project fails where the elementary project management principles and methodologies were not applied properly. Developing countries are specific example where many challenges remain unanswered and represent real menace for implementing project management knowledge for successful project delivering. The developing countries in Western Balkan are faced with fluctuational economic development, dared by modernization and globalization. Here, the need for improvement of project management processes is required in variety of different industries, with deferent complexities and different challenges.

Here, in this research, we will make effort to show the existing barriers and challenges regarding the PMBOK practices in the developing countries in Western Balkans.

2. Western Balkan

Albania, Bosnia and Hercegovina, Kosovo, Macedonia, Montenegro and Serbia are part of the Western Balkans countries (Figure 1), that have strong economic potential, but face a major challenge in comparison to the countries in the European Union. “Encouraging progress has been made in the past two decades in terms of regional cooperation and advances towards eventual EU membership, and these trends are likely to continue, boosting growth and investment” [5].

The latest World Bank’s Doing Business reports show that “several east European countries feature prominently in the list of top reformers. The region is now second, only to the developed OECD, according to its average ease of doing business ranking” [15]. But all countries in the Western Balkans suffer from high levels of unemployment, especially among the youth, where constant emigration outflows and brain drain are making the situation hard. All of this is even deteriorated by the ageing population that represents a major challenge to long-term growth and development of the countries.

Additional problem related to the project management analysis in the region represents the level of education, where in the BEEPS 2013-14 survey, 34 per cent of the firms in the Western Balkans stated that an inadequately educated workforce is an obstacle to current operations, where 1/3 of them consider the problem to be major [3]. Where in different analysis of the situation in the region, related to the employees needed skills, major gaps were found in soft skills, especially communication, teamwork and collaborative problem solving [9], as skills that are key skills for successful project management practice.

![Fig. 1 Map of Western Balkan countries and their EU status](image)

At the same time, the need of manpower with developed project management skills and adapted project management tools represent an important challenge. The need for educated project management professionals is affecting the projects in the competitive market economies in each of the Western Balkans developing countries.

Other barriers are also present in the region and will be deliberated here related to the political and social system, as well as the financial aspect of bringing better project management practices in developing countries.

All of this is mitigated and stimulated for progression by the effective transfer of project management knowledge and expertise from the developed countries of the world that have foreign direct investments (FDI) in the analysed countries.

3. Project management and barriers

Commonly known and accepted definition is the definition by Project Management Body of knowledge, where project is a “temporary endeavour undertaken to create a unique product or service, temporary means that the project has a definite ending point, and unique means that the product or service differs in some distinguishing way from all similar products or services” [1]. Each project has limited activities with time and resources. In the same direction Project management is defined as “application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management is accomplished through
the use of the processes such as: initiating, planning, executing, controlling, and closing” [1]. As Mintzberg (1983) and Soderlund (2004) concluded, emerging industries around the world are project intensive and that is why scientific approach is needed so that each project endeavour will meet the defined objectives in defined time and budget [2].

Different kinds of projects are happening in each developing country and they differ in size and complexity, but those projects have potential to move the country from developing to developed country. This is very important for the analysed region of Western Balkan. The projects can be sponsored by the government or by other external organizations that were mentioned before.

Researchers have done analysis of the common causes for project failures in developing countries. For instance, Frimpong [6] and Long et al. (2004) identified 26 and 64 causes of project failure each in deferent research. Other researchers have defined in the project management literature other common ones as: expertise or knowledge of the human resources [12], economic and funding problems [4], proper project planning [11], resources [12], communication [10], scope change during project [8].

Overall, the defined problems can be divided into two groups, one is linked to the proper human resource development and another to government functioning.

**Human resource barrier**

This barrier is related to the knowledge in the area of project management and trained project management professionals. Professional project management trainings will produce properly educated managers for implementation of project management knowledge. There is a need for trained project management professionals since the number of official certified professionals, compared with the EU member countries is far than satisfying. Table 1 shows the number of professionals in each of the analysed countries. The data from Albania and Kosovo are combined due to mixture in data presented by the professionals. The data analysed satisfy the needs since more than 95% of those that have gained certificate are included in the Credential Registry.

**Table 1: Trained PM (project management) professionals in Western Balkans**

<table>
<thead>
<tr>
<th>Country</th>
<th>PM professionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania / Kosovo</td>
<td>42</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>49</td>
</tr>
<tr>
<td>Macedonia</td>
<td>72</td>
</tr>
<tr>
<td>Montenegro</td>
<td>6</td>
</tr>
<tr>
<td>Serbia</td>
<td>308</td>
</tr>
</tbody>
</table>

**Governamental barriers**

From our experience, field observation of selected projects and extensive literature review, we have observed some barriers for project management success in Western Balkan countries. They can be grouped as:

Economical barriers represent barriers related to freedom of the market, centralized government control and transition of the economy. EBRD defined six qualities of a sustainable market economy (competitive, well-governed, green, inclusive, resilient and integrated) and from the analyses of the region it is concluded that the “countries state must play an important growth-enabling role by providing the rule of law, a stable macroeconomic environment and clear rules of the game for businesses” [5].

Systematic barriers are related to the infrastructure, or more specifically this means to have energy, water, road, transportation etc. There are examples where power outages or voltage fluctuation have damaged the equipment, inadequate water affects the product quality, road infrastructure prolongs the project deadlines, etc.

Financial institutions and fiscal responsibility are related to the limited financial institution capacity, feeble accountability processes and procurement systems. Fiscal sustainability continues to be a priority for the Western Balkans because of the high public debt levels. Macroeconomic environment, particularly the challenging fiscal situation in the region, compared with the EU levels represents a big challenge. All Western Balkans countries have to “improve the quality of their fiscal policy by reallocating spending from a multitude of-targeted social benefits to productivity-enhancing investment. This would support growth and, during difficult times, help safeguard gains already achieved” [14].

**Governing** is related to lack of sustainable governance and misalignment between the ongoing politics and policies in the country. This can affect the region and bring disturbance in project delivering. Here we can have: justice delays and denials, lack of transparency in the system, lapses in internal security systems, level of public participation in political processes. The World Bank’s Worldwide Governance Indicators show distance between the Western Balkans and the EU member countries in the rule of law, or legislative institutions, control of corruption, effectiveness of the government and regulatory quality.

**Forms of authority** represent the barrier that comes from centralized or decentralized decision making in the country. The strong centralized decision-making systems have traditional functional organizational structures that does not support cross functional project management processes. In addition, the high corruption levels and authority delegation based on political connection complicates the true value of project management.

**Infrastructure** is related to better Wester region roads connectivity and IT infrastructure. There is a gap between the Western Balkans countries and EU-11 regarding all six sub-indices that The World Bank’s Logistic Performance Index ranks [7]. Improvements in this area will help better cross border trade and increase investments.

**Informal sector** is also part of the barriers affecting the application of modern approaches in project managing. This barrier is related to the limitations that come from the informal competitors. They are a particular burden for smaller businesses where, the smaller the company, the more likely it is to find informal competition to be a major problem [3]. This affects the development and improvement of any processes in the companies and also the plans for development and improvement of project management in the region.

4. Project management knowledge areas

Project Management Body of Knowledge (PMBOK) by Project Management Institute (PMI) compiles guidelines for project management through the introduction of knowledge areas. These groupings of knowledge bring together processes that have characteristics in common. All of the problems and barriers were analysed related to them.

**Project Integration Management** is knowledge area that is devoted to identifying and defining the work in the project. It ensures that the various elements of the project are properly coordinated. This knowledge area deals also with efficiently integrating changes into the project. Key project managers’ activity is to make compromises between project objectives and alternatives during the whole project and this has to be done in the expected scope and in line with the stakeholder needs. Doing this is challenging in developing countries, since the most effective way of working is top-down approach. This leads to the barrier of Forms of authority and the problems that were mentioned there, as not clear authority, responsibility and who is accountable for the activities, results and compromises made. This leads to unproductive project management work with unclear decision making and problem in delivering the projects in Wester Balkan.

Imperative in the region will be to have clear project planning and human resources allocation with transfer of decision making to
the project managers since the beginning of the project, with defined activities and expected trade-offs.

**Project Scope Management** is related to clarifying the project scope and work that will be done during the project, development of work breakdown structure, establishing the scope baselines and managing the scope of the project. This area is dedicated to managing the project between the defined project boundaries.

One of the challenges related to the scope management in Western Balkan region are related to the human resource barrier mentioned before. There are examples where project managers were the investors and they had no previous or little experience and basically non-project management training. They hardly use any modern project management techniques during their projects and from there they had no basic understanding of the scope management.

Another problem comes from the lack of knowledge of scope management by the stakeholders. This often leads to disarrangements between the partners when stakeholders are asking for changes or increasing in the scope. In addition, the before mentioned barrier related to bureaucracy brings extra load to any project, especially to engineering projects in the region.

Imperative related to this is to have trainings related to scope planning and control of the process where work breakdown structure will be defined and agreed before each project in the region.

**Project Time Management** is related to estimation of activities that will help timely to finish the project. The project manager has key part into this where he/she sequences the activities and defines resources needed to achieve the objectives of the project. Also, he/she is responsible for monitoring and adjusting the project plan so that the project is kept on track. This is nowadays eased with many different kinds of software that can be used to manage the project.

The analysis of the region showed that there are projects that have unrealistic activities time defined and unreeal time completion dates.

Key answer to this challenge can be related to the previous recommendations for proper training and decentralised managing of the project. This will enable project managers in the region to have clear control over the planning, scheduling, estimating and control over the whole project. An addition to this will be to have stakeholders and clients that understand the planning and scheduling, and how important is the time management for project delivering.

**Project Cost Management** is dedicated to estimation, budgeting and cost control so that the project can be delivered in the defined budget. This knowledge area is seen as the most important area in the developing countries. This is very much related to the realistic budget and scope approved before the project starts.

There are examples in the region where we have lack of knowledge in the area of cost management, cost estimating and control in the dynamic economical changes. This challenge is also connected to the systematic and bureaucratic barriers that were mentioned before. They worsen the situation with cost control because of the lack of transparency.

Answer to this challenge in the West Balkan region is connected to the human resource barrier mentioned before, where professional training is needed in the area of project management and with clear learning goals related to cost management.

**Project Quality Management**, is the knowledge area where the quality requirements for the project results are planned and followed. The quality issues are monitored and fixed in order to provide final results of the project that will meet clients’ requirements and expectations.

In the West Balkan region there are examples where quality control is seen as a stakeholders needs analysis done during the scope definition. Beside this there are some unnecessary rigid governmental documents that declare quality management, but are doing the opposite and result in poor quality projects in the end.

The real quality management has to start from the requirements of the client and end with their evaluation of the project results in the end in comparison to the starting requirements. This can be done with proper training that will concentrate on modern methods, tools and techniques of quality management. This will help to give a proper answer to the customer needs and satisfy the defined project expectations.

**Project Human Resources Management** basically is the HR management of the project. It helps to utilized, develop, acquire and manage project human resources.

West Balkan is still lacking the ability to organize effective, structural project teams to meet the projects objectives. Project managers have very little knowledge of human resources management and lot of constrains in forming the project team. Those constrains come from the before mentioned barriers related to the governmental work. Clear authority, responsibility and accountability in the project organization are often unclear that leads to inefficient implementation of modern project management techniques.

Imperative in the region has to be on the concept of forming functional project teams that will have clear authority, responsibility and accountability will help the development of the region.

**Project Communications Management** is related to the communications within the project. Here the project manager develops communication plan, ensures the plan is followed and controls information flow within the project.

In the region, the inappropriate procedures for communication, audits, rewire and monitoring of the project contribute to ineffective project communication within the project and with the customers and stakeholders. This is connected to the previous area of unclear authority, responsibility and accountability of the human resources.

Proper knowledge of formal (meetings, reviews, audits) and informal (inter-personal contacts) communication techniques will ease the situation. The information shared throughout project resources should be project related that will help to clear project related unclaritys and help projects delivering in the defined scope, cost and time.

**Project Risk Management** involves identification of risks, planning risk management, conducting risk assessments, and controlling risks. Management of risks is fairly new to the region and before it was mostly related to definition of reasons for technical systems failures and not managerial issues related to project delivering, scope, budget and time.

In the region there are projects that have not included risk defining as part of the project management processes and this has leaded to even bigger project risks and setbacks. Defining and managing risk problems in the region have been neglected because of the high level of corruption and bureaucracy problems. They contribute to have big number of failure projects that are harming the cooperation with donor organisation.

Proper risk management training is needed of the key project management resources and stakeholders that will educate them for proper approaches, methods and tools for risk assessment and management. This will help to understand the importance of timely risk definition and planning of risk assessment.

**Project Procurement Management** deals with the processes for acquiring the required products or services needed from outside the project team, for the successful completion of the project.

This is connected to the before mentioned barriers of governing and structure in the region. Some examples showed that procurement is done throughout centralised planning processes and with suspicious established channels and partners.

Clear procurement principles are needed that will show that importance of moving the development of the country is greater
than the having unclear and shady established project. Rigorous personnel education and training is need to be carried out in the region so that efficient implementation of projects will meet the donors requirements.

5. Conclusion

There have been positive improvements in the economic development in the region, mainly due to economic growth and implementation of some reforms for the economic policies, public institutions services. This is stimulated by the West Balkan countries determination for EU integration. All the countries have started some processes for decentralisation, improvements in public administration work and stimulation for business and cooperation. Also, regional cooperation has been improved and is influencing a lot on the strengths the region. The stability of the region is a mutual goal and will help the development of the West Balkan region.

All of this has to be supported with modern techniques for project management implementation. All international organizations on development as well as donors’ organisations highlight the importance of well prepared and executed project as a way of developing the countries. Project management is proven to be an effective and stimulating management method, which can be a great value to all developing countries in Western Balkan. Inability to recognise, formulate, prepare and execute projects is a major obstacle in the moment and is stopping or challenging the inflow of capital into the underdeveloped region of Western Balkan.

This research structured the common project management barriers by nature and challenges were analysed by the knowledge areas defined in the PMBOK. Selected ongoing projects and successfully finished projects and extensive literature reviews was done to do the analysis. The reality check showed that many projects do not start on time or never, are stopped in middle, have problems with quality assurance, are behind with time and are not in line with the knowledge areas defined in PMBOK.

Success in meeting the challenges of implementing modern project management knowledge can only be achieved if the common above-mentioned challenges and barriers can be overcome. The recommendation given for each barrier and challenge represent a good starting point for overcoming the situation and moving the developing countries into the group of developed countries in EU.

References


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Abstract: The article presents how the ISO 9001:2015 standard indicates the directions of action for organizations that have implemented a quality management system in the context of knowledge management and employee competence.

Keywords: ENSURING KNOWLEDGE SECURITY, ISO STANDARD REQUIREMENTS, MANAGEMENT RISK, KNOWLEDGE MANAGEMENT, COMPETENCE AND AWARENESS

1. Introduction

Knowledge management is derived from ancient times, but the very terms “knowledge management” appeared in 1997 and only from that moment can be regarded as functioning as a form of separate approach in modern management. Among many definitions that describe this area, it is worth mentioning the one developed by K. Steward, which says that it is: “Possessing knowledge about what we know, its acquisition and organization, and use in a manner that brings benefits” [1].

However, regardless of what concept or definition we want to use in our organization, all activities related to knowledge management focus on common elements, which include: cyclicity and regularity, analysing processes related to the location of knowledge and its acquisition, linking processes with business objectives implemented through the organization, support of acquired and owned knowledge with IT tools and modern technologies, deriving benefits resulting from this activity and, perhaps above all, ensuring the security of acquired and owned knowledge. Among the concepts of knowledge management, there are three approaches: Japanese, resource and process. The process approach probably captures the concept in the most transparent way, the main parts of which are: acquiring knowledge, sharing it and converting it into decisions. Taking into account the elements of the process approach mentioned above, it can be seen that each of them is closely related to the next key trend of management, i.e. human capital management. Acquiring knowledge or creating it is, after all, nothing but using the intellectual potential of your employees or using external sources in the form of knowledge that you can buy, there but is always the danger that it will not have a unique character. In turn, sharing knowledge is closely related to its dissemination not only within the organization, but also outside. It also requires the creation of appropriate incentive solutions for employees, codification of knowledge and finding recipients who actually use such knowledge. At this stage of the organization’s operation, there is a problem related to ensuring a secure flow of information, which should only reach the indicated recipient. The stage of knowledge processing in managerial decisions requires the involvement of the most competent managers, responsible and decisive, who, acting with appropriate commitment and equipped with appropriate tools, not only are responsible for the decisions made, but also can assess the value of innovative ideas of their most competent employees in the right way.

2. Benefits and barriers related to knowledge management in the organization

Contemporary organizations require their employees to be highly committed and identify with the objectives set and adopted for implementation. In such conditions, the ability to use owned knowledge comes to the fore. Certainly the fact that knowledge management is the subject of interest for employees in most departments of a given organization is a very beneficial phenomenon. This results from the increase of awareness, understanding, perception of clear benefits resulting from the fact of having and using the codified knowledge of the organization in order to achieve a higher level of development and appreciating such solutions. The level of organizational culture is certainly important in the development and consolidation of this type of approach. It is widely believed that the higher the level, the easier it is to manage knowledge and consolidate positive employee behaviour. Howe to one should also take into account such possibility that the high organizational culture cultivated for many years may cause unwillingness to new solutions, learning and changing the way of acting or patterns of behaviour perpetuated over a long period of time. Changing the type of procedure is, after all, nothing but the implementation of new methods, tools, programs that are carriers of all kinds of knowledge. And here the human appears as the biggest barrier on the way to striving for changes in the organization. Hence the fear that the high level of organizational culture perpetuates solidified patterns of behaviour so conscientiously introduced and strengthened as the only just and right ones. Taking into account the above, the most frequent changes concern the implementation of new IT programs supporting such areas of functioning as: accounting, finance, HR, marketing, technology, etc. Most employees often appreciate moving around the beaten path and are afraid of putting more effort into new ventures. The lack of trust in colleagues is a common barrier resulting from fears of their own position in the organization, lack of cooperation between the various departments of the organization, resulting from the phenomenon of mutual combating, which in turn is caused by the sense of superiority of own department over others or superiority of one manager over others. Hence the need for integration between employees and creating a sense of belonging to a given task group and identifying each individual goal with the goals of the group and organization. Hence, there is a great challenge ahead of the leadership of the contemporary organizations, who are responsible for triggering positive manifestations of solidarity, cooperation and integration. An important benefit resulting from knowledge management is certainly raising the level of organization’s competitiveness, access or possession of unique knowledge, which is the basis for the development of any organization. It is worth ensuring that knowledge is maintained, stored and its uncontrolled leak cannot be allowed, which could lead to strengthening of our competitor. An important element beneficial for each organization is the possibility to reduce operating costs resulting from the fact that duplication of knowledge does not occur and the funds saved in this way can be allocated to other areas of activity. The need to adapt knowledge management to different goals depending on the area of management and the place of activity in the organization remains problematic. It is about the fragmentation of knowledge and the emergence of narrow specializations, rather than solving needs in the global scope of the organization. However, on the other hand, it can be assumed that each area of the organization requires different strategies. In the area of competence management, and this is about the competences of employees in the organization, which we can treat as qualifications, including: knowledge, skills, experience, education, personality traits, we are talking here about the added...
value of the organization. Valuation of the value of each organization is now perceived as the value of the intellectual potential of each employed member of the organization. An important aspect is to keep an employee in the organization of knowledge not only in connection with retirement, but also in the case of transition to another organization. Knowledge management affects employees’ learning and skills development resulting from the need to become more competitive and results from the willingness generated by healthy competition. It also has a significant impact on the development of innovation and reduction of excess information and saving time.

3. Qualitative approach resulting from international ISO 9000 standards

The pedigree of quality standards dates back to the 50s when the US defence industry began to demand equipment of adequate quality from its suppliers. Such an approach prompted the manufacturers to develop new solutions of a qualitative nature, having regard to the quality covering the entire process from the customer’s order up to the moment the finished product is made. The effect of adopting this type of solutions was to create a systemic approach that often required (in addition to carrying out) new organizational activities, at the expense of a great joint organizational effort. However, this effort was not only noticed, but also appreciated, which caused the willingness to use good managerial practices in the economy. The standardization of quality systems was a way to popularize the pro-quality approach. At the end of the 1950s, the first NATO-AQAP standard was issued. Great Britain decided to adopt ready-made solutions adopted and tested in military sectors, and with the consent of the British government, the BS 5750 standard was developed, which marked a breakthrough in pro-quality solutions on the international arena and allowed them to be adopted to the “civil” sectors. As a result, in 1987, the first series of ISO 9000 standards was issues, which included model solutions for the certification of quality management systems. Subsequent improvements to these standards made in stages were carried out in 1994, followed by a major amendment in 2000 – a change in the philosophy of standards, less ground-breaking in 2008, and the last in 2015. Thanks to these standards, there has been a significant change in the process of matching quality not only with the product, service, but above all with the quality of processes and the manner of their management. The introduction of the ISO 9001:2000 standard in 2000 was a particularly breakthrough moment, i.e. eight TQM (Total Quality Management) management principles, often referred to as TQM foundations. These are: customer orientation, leadership, people involvement, process approach, system approach to management, continuous improvement, decision-making based on facts, mutually beneficial relationships with suppliers. Until 2000, the ISO 9000 standards were considered as “dry” requirements without life, which concerned the manufacturing capacities. The TQM principles saturated them with life and allowed for the use of soft elements related to human behaviour [2]. Total Quality Management – is an organization’s philosophy equipped with a set of guiding rules that assume its continuous improvement. In quality management, all effective methods that improve the products and services provided by the organization, improve the efficiency of all processes in the organization, improve the level of meeting the customers’ requirements, both now and in the future. Traditional methods of social sciences and qualitative methods are equally used here [3].

4. The concept regarding the organization’s knowledge and protection of its security resulting from the ISO 9001:2015 standard

Point 7.1.6 of the International Standard EN ISO 9001:2015 takes into account the need to define and manage knowledge maintained by the organization mainly to ensure the functioning of processes and to achieve compliance of products and services. A rather dry and enigmatic normative clause does not develop a topic related to the entire process of keeping knowledge in the organization in a way that allows it to be used and made available in a secure way to both internal and external clients of any organization. Notes to this point only speak about sources of knowledge that can be based on internal and external sources. Annex A (informative) in point A.7 the organization’s knowledge approximates the purpose for which the provision concerning the organization’s knowledge has been introduced and it speaks about securing the organization against its loss in the event of staff turnover or incorrect accumulation and distribution of information. To better understand the essence of the problem related to securing the organization’s knowledge, please refer to Annex A.4 risk-based approach. The concept regarding this approach was indirectly included in the previous edition of this International Standard. Currently, the requirements for understanding the organization’s context and identifying risks as a basis for planning have been specified. The use of a risk-based approach under point 6.1 of this International Standard imposes on each organization the responsibility for applying the risk-based approach and for the actions that are taken to account for the risk. And on the other hand, it allows the organization to have a flexible approach to this topic, especially since not all quality management system processes present the same level of risk. It is worth considering the level of risk associated with the possibility of losing knowledge at the planning stage of projects in the organization concerning the areas of operation defined as opportunities, such as: introducing new products to the market (products are treated in a normative approach equally with the service), implementing new practices, acquiring new clients, opening new markets, building partner relations with other entities, using new technologies, exchanging information with the environment of the organization and all other activities related to taking into account the organization’s needs or the needs of its customers [4]. As can be seen from the cited points of the standard and the Notes, there are instruments that allow the protection of the possessed and documented knowledge in the organization, although the standard itself only indicates the directions of action, while it leaves each organization with the freedom in terms of developing specific procedures and all solutions in this respect. One of these methods may be to develop a table of risks that make up the entire area related to the knowledge of the organization. The implementation of this extremely risky undertaking requires all members of the organization to be strongly involved at every level of its management, particularly from the managerial staff. A lot depends on how the system of formal and informal relationships functions, how individual employees perceive responsibility for common goals and implementation of undertakings, if everyone is equally motivated for joint activities ensuring success in the organization. A lot depends on the way of thinking, and this in turn results from the level of organizational culture. It is possible to condition all areas of organization with various prohibitions and orders, but without the implementation of procedures and other documents in the form of instructions or procedures in force, but the redundancy of this type of formalized rules may prove as harmful as the lack thereof. Returning to the sources of knowledge indicated in the Notes to point 7.1.6 of the EN ISO 9001:2015 standard, the authors focused only on their specification, but without indicating how to protect them. Intellectual property is best protected due to statutory regulations in force in each country, but if you do not specify what constitutes an intellectual property of an organization, it will be difficult to prove the right to it. This applies in particular to documents, such as projects, technologies, research results, procedures related to the implementation of processes, IT programs – it is worth ensuring that they are the property of the organization, development, training topics and documentation related to them, and a whole range of this type of documented knowledge. Therefore, it seems that the internal knowledge of the organization can be more easily protected, but how to ensure that it is protected against its loss. This type of security will not be described by even the most perfect standard. Everything depends on the people employed and their level of loyalty. The leakage of the organization’s knowledge can take place at the level of a regular employee, but also at the level of the top manager. There are known cases of selling a competitive
organization’s database in exchange for the opportunity to obtain a lucrative job or other material benefits. Less serious cases concern the possibility of using another computer station in the company under the pretext of failure of own equipment, then the data may be lost through the irresponsible behaviour of the colleague, and still the burden of this type of leak or theft will affect the owner of the computer, on whose access password the operations were carried out. We often also deal with such a situation that someone is employed in a competitive organization in a position that would seem insignificant from the point of view of the organization and after acclimatization and gaining the trust of the environment steals data from the boss’s computer (a known case of a person cleaning executive offices, who in fact turned out to be an IT specialist). It may happen that a person feeling unjustly dismissed from the position, when moving away, steals the company’s data or deletes it on his/her workplace, thus preventing the possibility of their quick reconstruction. Similarly, if a dissatisfied employee retires. Considering the above cases, one should bear in mind situations that may occur at any time. Most organizations put more and more effort into protecting their intellectual assets from external attacks, and unfortunately less attention is devoted to the threats described above, and resulting from the actions of their own employees. Therefore, it is worth to perform a risk analysis and take into account even the most unlikely possibilities of occurrence of individual events. Another important aspect of knowledge management is the implementation of the standard for storing documented knowledge in the organization. This is related to the need to store payrolls, personnel and other documents related to the employee, which in turn results from the Labour Code. The period of storage of this type of documents was 50 years in Poland. Only the last amendment to the Labour Code introduced on January 1, 2019, shortened this period to 10 years. It is a serious challenge for any organization, not every one of them can afford to maintain a properly secured archive, and it is not only about theft, but also damage, destruction through flooding, incineration and other random events. A solution for this type of problem is the emergence of companies specializing in archiving the storing documents on the market. The question is, how reliable and responsible they are in the case of many years of using their services. Such companies are also exposed to random events and may also be subject to the same threats as any other company. As it can be seen, the requirements of the EN ISO 9001:2015 standard are a universal structure, but the “dry” statements of the requirements conceal the huge amount of activities to be performed. The flexibility of this type of approach lies in the fact that organizations leave a large area of freedom in this respect, but this cannot be associated in any way with the release from liability. Each company that has implemented a quality management system must develop its own solutions. A good example of this is the question of who needs knowledge and who has it, and how to use it. Most employees who do not necessarily have a managerial position have a desire to prove that their own position is superior to strategic goals, which leads to stiffening of the existing organizational structures and prevents the flow of information and thus knowledge sharing between cells, departments or branches. Separation of individual functional divisions known as the silos effect is not conducive to cooperation and, unfortunately, undermines the mutual trust of employees. A big problem to be solved is the question of who needs knowledge and who has it, and to what extent it can be made available. Another challenge is learning, which, as a process in itself, is not devoid of errors, and the leader of a given organization has a desire to prove that their own position is superior to strategic goals, which leads to stiffening of the existing organizational structures and prevents the flow of information and thus knowledge sharing between cells, departments or branches. Even the best implemented quality management system is a signpost, but it will not solve the problems of the organization and will not replace loyal and competent employees.


Currently, we are functioning in times known as the era of knowledge management, which according to many researchers is the basic element on which the value of each organization is currently being built. Modern organizations base their competitiveness on it. Acquiring knowledge and competence of employees is the basis of every contemporary organization. Employees are the most valuable capital based on their qualifications, knowledge, skills, experience and personality. That is why human capital occupies the leading position among all capitals being the most important part of intellectual capital. The modern economy is mainly based on knowledge, and people who constitute the main assets of the organization are its most valuable asset. The organization’s knowledge is inextricably linked to the competencies of employees, which include such elements as: general, theoretical and practical knowledge, that is everything that employees must develop its own solutions. A good example of this is the question of who needs knowledge and who has it, and how to use it. Most employees who do not necessarily have a managerial position have a desire to prove that their own position is superior to strategic goals, which leads to stiffening of the existing organizational structures and prevents the flow of information and thus knowledge sharing between cells, departments or branches. Separation of individual functional divisions known as the silos effect is not conducive to cooperation and, unfortunately, undermines the mutual trust of employees. A big problem to be solved is the question of who needs knowledge and who has it, and to what extent it can be made available. Another challenge is learning, which, as a process in itself, is not devoid of errors, and the leader of a given organization has a desire to prove that their own position is superior to strategic goals, which leads to stiffening of the existing organizational structures and prevents the flow of information and thus knowledge sharing between cells, departments or branches. Even the best implemented quality management system is a signpost, but it will not solve the problems of the organization and will not replace loyal and competent employees.
the employee has learned in the education process and within the
framework of self-education. This type of knowledge is confirmed
by credentials, certificates and diplomas and is often referred to as
qualifications. This kind of knowledge should be distinguished from
practical skills, that is, what the employee can actually do. This kind
of knowledge, in turn, is identified with the concept of experience.
Controversies are raised the inclusion of personality traits into the
competence, which, however, have a significant impact on the
professional performance. The ISO 9001:2015 standard deals with
the issue of competence of point 7.2, in which the organization is
required to determine the necessary competences of persons
performing work affecting the effects of the activity and the
effectiveness of the quality management system. In practice, this
means the same as creating the so-called competence profiles of
each employee or job description cards. Documents of this type
make it easier to assess employees in the intervals required by the
organization, as well as to keep track of whether an employee
actually meets the requirements specified in his/her job. The
standard, of course, does not impose any method of fulfilling this
requirement, leaving free choice to every organization. Frequent
practices related to the implementation of this requirement include
the creation of a set of important competences desired at a given
position and the minimum desirable at a given position. The
difference resulting from actual skills in combination with the
minimum is a competence gap, which should be filled by improving
qualifications within training. It may also happen that the employee
surpasses the position within one of the traits and does not grow up
to others. The adoption of such solutions is aimed at smoothing out
differences and striving to achieve a state of harmony. Only in
situations similar to ideal, job and employee profiles will be
identical This kind of approach allows to achieve better selection of
employees and to effectively use the potential of knowledge related
to a given position and to make a better selection of personnel and
development. The standard requires that each organization
should store the properly documented information as evidence of its
competence. Thus, the valuation of jobs is also the knowledge of
the organization, which, collected systematically over the years of
the organization existence, allows for a very effective use of
employees’ knowledge described meticulously in job cards or
competence profiles. Knowledge of competency profiles by
employees is an element of motivation and indicates the direction of
development of each employees based on an established career
path. An important element accompanying this type of activity is
the adjustment of job profiles to the changing environment of the
organization on an ongoing basis and the constant provision of
information flowing from them to indicate development
opportunities. Point 7.3 of the ISO 9001:2015 standard specifies the
concept of awareness that should characterize every employee of
the organization. Awareness understood as knowledge of the
current activity of an employee in understanding the goals that each
organization has and encouraging participation in co-creating the
added value of each organization and the ability to draw
conclusions in situations that required learning from mistakes as
part of improving the effects.

7. Summary
The International Standard ISO 9001:2015 uses a process approach
and a risk-based approach. The measurable benefits of using a
process approach are undoubtedly enabling the organization to plan
processes and relationships between them aimed at continually
increasing customer satisfaction by providing products and services
that meet their requirements, and applying various forms of
improvement, such as innovation and reorganization. The risk-
based approach allows for the maximum minimization of the
negative effects of the action and the maximum use of emerging
opportunities, while often indicating the possibility of risk in certain
areas of the organization’s activity may initiate many positive
actions in its functioning. The qualitative approach allows for
solving organizational problems in a holistic manner [6]. Each
process has an impact on the overall activities carried out in the
organization. All areas are interrelated in relations that serve
superior purposes, such as effectiveness and continuous
improvement. The requirements of the standard in a comprehensive
way show all the areas of the organization’s operation, constituting
a kind of user’s manual, at the same time indicating the most
important elements of the organization’s functioning.

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METHODOLOGICAL APPROACH FOR SAFETY ASSESSMENT IN BREEDING AND SELECTION OF SHEEP RAISED FOR MEAT

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Summary: An analysis of the state, technology and technique of the pastoral system of sheep breeding, which is best suited to the specifics of the meat sector in sheep breeding, is made. The main types of hazards are classified for the main types of works and the conditions under which a methodological approach based on the methods of expert assessment is established to determine the significance of the different types of hazards for working in breeding sheep for meat and in breeding activities on farms.

KEY WORDS: RISK, DANGER, SHEEP, TRACTORS, AGRICULTURAL MACHINES, EXPERT, RANK

Agricultural production is characterized by extremely varied working conditions due to the structure of production in plant growing, livestock breeding and maintenance of used equipment. The diversity of technologies and equipment, the working environment, demography and the workforce related to the work on the sheep farm and the breeding activity create unique risks at the workplace and implies the application of different approaches to its assessment.

The specificity of meat sheep farming is no exception. All three main systems of cultivation are applied: on pasture, in barn and on pasture and barn only. The barn & pasture with the use of cultural pastureland in our country is the preferred system and is best suited for the specifics of the meat-bearing sector in sheep breeding. Animals in this direction are of high live weight (female 75-85kg, male 115-135kg), temperamental and in a number of farms tight lambing is used, so it is not appropriate for the sheep to make long daily transitions.

In the farms under selection control and during the selection events, the mother sheep, the rams, the repairing lambs and the lambs for fattening are grown in massive enclosed spaces with non-removable bedding. In them there are individual and group boxes/pens. The cleaning of the bedding is done mechanically once or twice a year after the preliminary disassembly of the pens. Before reassembling and straightening the pens, the fencing elements will be disinfectated. The distribution of roughage is done mechanically, and concentrated feeds - both manually and mechanically depending on the technology of the selection process and the number of separate breeding groups.

In general, sheep for meat farming technology includes the following mechanized tasks: primary and secondary processing of feed; distribution of feed; loading and distribution of silages; cleaning of the premises; loading and removal of the loose litter; transport work; mowing meadows and alfalfa; baling of hay and alfalfa; shearing; selection events and the use of specialized equipment for making them / reversers, locks, automatic rollers and scales /.

For the mechanized works most often used: 80-110 hp wheeled tractor, feed trailer, front loader, transport trailer, lawnmower, straw press, fodder grinder for grain feed, fodder grinder for roughage, concentrate feed mixer and clippers, as well as equipment and devices: an electric fence; reversers, locks, automatic rollers and scales.

The used machinery is predominantly physically and morally obsolete. The base of the tractor park are machines made in the 90s, which have been manufactured with outdated technology and with low level and reliability. The technologies used in the manufacture of these machines do not allow for the diagnosis of individual units, aggregates and systems and machines as a whole with modern technical means, computer diagnostics and resource assessment of their components.

Due to the slow pace of its renovation, no significant change in the age structure and technological level of the machine-tractor park can be expected in the near future. In this aspect, the risk assessment is particularly relevant. Given the wide variety of operations involved, the safety requirements for each operation consists of a set of many norms. They have been adopted or should be adopted at national, enterprise or manufacturing level.

At national level
Bulgarian State Standards with requirements to be met by buildings, machinery, equipment, raw materials, materials, production environment, technologies and workplaces to ensure healthy and safe working conditions.

At Industry level
Uniform rules on occupational safety - apply to all sectors and activities. They include mandatory requirements that equipment must meet in order to prevent the risks of external traumatic impact on the participants in the work process.

Sectoral Safety Regulations - Specify the requirements that machines and equipment must meet in order to prevent the risk of accidents and damage to the health of employees.

At Farm level
Rules for specific machines, equipment and jobs in the organization - mandatory conditions and job requirements guaranteeing the health and safety of workers and employees. Developed and approved by the employer, it is unacceptable to be in conflict with uniform and sectoral rules.

The safety assessment in agriculture is carried out on a commonly accepted approach to the possible consequences of non-compliance with safety rules to the extent that there is some regulation for them. The advantages of this approach are the high degree of applicability, simplicity and accessibility in its application.

The disadvantages are the lack of differentiation of the hazards and the likelihood of their occurrence depending on the type, the degree of complexity and the conditions for carrying out the different types of activities. Given the complex mechanized and manual work, the occurrence of a safety risk is a random event that needs to be assessed, analyzed and the reasons for its occurrence established. This implies developing and implementing a consistent methodological approach to assessing the safety risk in this area.

The purpose of this study is to develop a methodical approach to assessing the safety of breeding sheep for meat.

Risk identification - all hazards must be identified as major and additional types.

Major types of hazards
1. Mechanical hazards involving: danger of crushing; danger of injury; the risk of cutting or slashing; danger of confusion; trapping; danger of impact; danger of stinging or punching; abrasion hazard; Danger of splashing with liquids.
2. Electric current hazards involving: danger of direct current contact parts; danger of current-carrying parts in a malfunction but
under voltage (indirect contact); Danger of falling parts of the body under high voltage; Static electricity hazard.

3. Thermal hazards involving: the risk of burning from contact with objects of high temperature or heat radiation; danger of health problems due to too low or high temperatures around the workplace.

4. Dangers of high noise levels, including: hearing loss or other physiological disorders such as loss of balance and weakening of attention; dangers of deterioration of speech, sound signals, etc.

5. Dangers of vibration, including: the danger of using hand tools leading to nervous and vascular problems; the risk of vibration of the entire body at work.

6. Radiation hazards, including: hazard of low frequency broadcasts; - danger of infrared, visible and ultraviolet radiation; danger of radioactive radiation; Laser danger.

7. Hazards from materials and substances released during machine operation including: danger of inhalation of harmful vapors, dust, smoke, etc.; danger of ignition and explosion; Virus and bacteria risk.

8. Hazards due to non-conformance of the machine construction with ergonomic requirements, including: Danger to work in dangerous positions, posing body tension above the permissible; work danger if the anatomical abilities of a person are inconsistent; danger of restrictions caused by the need to use individual protective equipment; danger of inadequacy of local lighting; the risk of mental stress; the risk of mistakes in people's work; risk of inconsistency between the structure and the controls with the physical capabilities of the person; risk of inconsistency of control and information sources with the physical capabilities of the person.

9. Dangers of unexpected start, turn, stop, etc. including: danger of damage to the control system; the risk of energy recovery after a break; danger of external impact of electrical equipment; the risk of other external influences, wind, rain, etc.; the risk of gaps and errors in software provision; risk of operator errors due to inadequacy of the degree of complexity of the machinery and its preparation.

10. Unavailability to stop the machine or stop in the desired position.

11. Inconsistencies in the operation of hand tools.


13. Failures or errors in the control system.

14. Installation or disassembly errors.

15. Breakdown in the work process.

16. Falling or throwing out of objects or liquids.

17. Loss of stability and slip of a machine or person.

Additional hazards, dangerous states and events

1. Movement hazards involving: the danger of jumping on departure; danger of movement without human intervention; Danger of movement when all parts of the machine are not in a safe position; the danger of increasing the speed of the machine when the operator walks alongside it; Danger of strong vibration when moving; Danger of stopping of the braking system.

2. Occupational and driver-related hazards involving: the risk of falling from the workstation; Danger of dust or gasing at work; fire hazards and lack of extinguishing means; Danger of mechanical damage - contact with rotating wheels, winding, falling, breaking of swivels, contact with tools or machine parts; danger of limited visibility from the workplace; danger due to insufficient illumination; danger of an uncomfortable seat; danger of very high noise; danger of excessive vibration level; danger of preventing the possibility of leaving the workplace quickly if necessary / lack of emergency exit.

3. Hazards related to control systems, including: the risk of inappropriate and inconvenient positioning of controls; danger of inadequate control location.


5. Hazards related to energy sources and transmission, including: danger of engines and rechargeable batteries; danger of energy transmission between machines; the risk of disconnecting cables.

6. Hazards related to outside persons, including: danger of accidental engagement or use; danger of moving nodes out of bounds; danger of absence or malfunction of light or sound signal devices; danger of omissions in the operating instructions.

Assessing the level of significance of identified hazards

Thus identified hazards should be assessed by level of significance (to be ranked) for the types of works concerned and the conditions under which they are carried out [1,2,3]. Expert methods are best suited for this purpose: simplicity, accessibility and applicability at a very low labor intensity, speed in obtaining the final results and ability to take into account the specificity of the process are used to determine the significance of the risk factors.

Ranking experts assessments are made on the basis of experts' preferences, and they do not have numerical value but express only a line of preferences. Many ranking methods are known, for example, rank 10 receives the most preferred object, 9th in preference, 8, etc. With equal importance, according to the expert, two or more objects are assigned a rank corresponding to the arithmetic value of successive ranks. When each expert classifies the factors, the general opinion is taken. Processing the results in the easiest way is to sum up the ranks for each factor. The smallest amount received is ranked 1, the next - rank 2, and so on. An example of rankings is the assessment of the impact of the main factors on the safety risk, excluding the one with negligible level of significance.

The significant ones are ordered by species in the following order:

F1. Mechanical hazards;
F2. Electric currents;
F3. Termic hazards;
F4. Dangers of high levels of noise and dust;
F5. Materials and substances released during machine operation;
F6. Dangers due to inconsistency of machine construction with ergonomic requirements;
F7. Unexpected start, turn, stop, etc;
F8. Biological hazards;
F9. Training or disposal of objects or liquids .;
F10. Loss of drag and sliding of a machine or person.

Eleven experts were interviewed. Everyone has assigned the rank factor according to the meaning he gives it. / Table 1 /.
Table 1: Assessment of the impact of the main factors on the risk of breeding and selection of sheep meat

<table>
<thead>
<tr>
<th>Experts</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>F1 F2 F3 F4 F5 F6 F7 F8 F9 F10</td>
</tr>
<tr>
<td>E2</td>
<td>6  7  5  1  2  8  3  9  4  10</td>
</tr>
<tr>
<td>E3</td>
<td>9  5  7  4  1  2  8  3  9  10</td>
</tr>
<tr>
<td>E4</td>
<td>8  4  6  4  2  1  2  5  1  9</td>
</tr>
<tr>
<td>E5</td>
<td>8  4  6  4  2  1  2  5  1  9</td>
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<tr>
<td>E6</td>
<td>8  4  6  4  2  1  2  5  1  9</td>
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<tr>
<td>E7</td>
<td>9  5  7  4  1  2  8  3  9  10</td>
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<tr>
<td>E8</td>
<td>8  4  6  4  2  1  2  5  1  9</td>
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<tr>
<td>E9</td>
<td>9  5  7  4  1  2  8  3  9  10</td>
</tr>
<tr>
<td>E10</td>
<td>10 6  4  3  1  2  7  4  1  9</td>
</tr>
<tr>
<td>E11</td>
<td>10 6  4  3  1  2  7  4  1  9</td>
</tr>
<tr>
<td>R*</td>
<td>98 65 63 33 32 48 26 66 72 102</td>
</tr>
<tr>
<td>R</td>
<td>9  6  5  3  2  4  1  7  8  10</td>
</tr>
</tbody>
</table>

By getting the scale of ranks, we can determine the significance of the "relative weight" of each factor. The most significant factor is notes as "10", and the factor with the least significance "1".

The indicative consistency of expert opinions may be determined by the coefficient of variation of opinion of the whole expert panel:

$$\vartheta_j = \sqrt{D_j / M_j}$$

If the value of the coefficient is small ($\vartheta < 0.3$), the degree of consistency of the opinions can be considered sufficient. It is correct that the consistency of expert opinions is determined by the co-ordinating factor / consistency of opinions. The presence of "heretics" or "schools" is counted with the odds correlation coefficient.

The co-ordinating factor ($W$) is determined as follows:

$$W = \frac{12, \sum_{j=1}^{m} \left( R^* - \frac{1}{2} m(n + 1) \right)^2 m^2 (n^3 - 1) - \sum_{i=1}^{n} T_i}{m}$$

where: $R^*$ is the rank obtained after summing the ranks given by the experts for each indicator;

$m$ - the number of factors;

$n$ - the number of factors to be assessed;

$T_i$ - Takes into account the matching ranks.

The degree of coordination of expert opinions in the range $[0 \div 1]$ can be characterized as follows (Table 2).

<table>
<thead>
<tr>
<th>Coefficient $W_i$</th>
<th>Level of consultation of experts’ opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,00...0,02</td>
<td>There is no consistency of opinions</td>
</tr>
<tr>
<td>0,02...0,10</td>
<td>A low degree of coordination of opinions</td>
</tr>
<tr>
<td>0,10...0,20</td>
<td>Average degree of coordination of opinions</td>
</tr>
<tr>
<td>0,20...0,60</td>
<td>A high degree of coordination of opinions</td>
</tr>
<tr>
<td>0,60...1,00</td>
<td>Opinions are unanimous</td>
</tr>
</tbody>
</table>

To determine the degree of consistency of expert opinions, the difference in ranks and squares for each expert is calculated. The results obtained are recorded in Table 3.

Table 3:  

<table>
<thead>
<tr>
<th>Expert</th>
<th>Factor</th>
<th>Sum of ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>F1 F2 F3 F4 F5 F6 F7 F8 F9 F10</td>
<td>55</td>
</tr>
<tr>
<td>E2</td>
<td>6  7  5  1  2  8  3  9  4  10</td>
<td>55</td>
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<tr>
<td>E3</td>
<td>9  5  7  4  1  2  8  3  9  10</td>
<td>55</td>
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<tr>
<td>E4</td>
<td>8  4  6  4  2  1  7  3  9  10</td>
<td>55</td>
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<tr>
<td>E5</td>
<td>8  4  6  4  2  1  7  3  9  10</td>
<td>55</td>
</tr>
<tr>
<td>E6</td>
<td>9  4  7  6  4  2  1  5  3  8</td>
<td></td>
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<tr>
<td>E7</td>
<td>9  5  7  6  4  2  1  6  4  2</td>
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<tr>
<td>E8</td>
<td>9  5  7  6  4  2  1  6  4  2</td>
<td></td>
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<tr>
<td>E9</td>
<td>10 8  5  6  4  2  3  1  10 8</td>
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<tr>
<td>E10</td>
<td>10 6  4  4  2  3  1  2  5  7</td>
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</tr>
<tr>
<td>E11</td>
<td>10 5  6  4  2  3  1  2  5  7</td>
<td></td>
</tr>
<tr>
<td>R*</td>
<td>98 65 63 33 32 48 26 66 72 102</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>9  6  5  3  2  4  1  7  8  10</td>
<td></td>
</tr>
</tbody>
</table>

$$R^* - \frac{1}{2} m(n + 1)$$  

$$\left( R^* - \frac{1}{2} m(n + 1) \right)^2$$
The calculation of the co-ordinating factor takes place according to the above formula:

\[ W = \frac{12.6232.5}{11^2(11^3 - 1)} = 0.47 \]  - we have a good consistency in the opinions of the experts.

If the degree of consensus of experts' opinions is low or inconsistent, a new assessment of the risk factors is carried out, leaving out the low-competence experts. Simultaneously, new experts may be involved.

Given the specificity of production due to the extremely high degree of variety of operations carried out and the lack of statistical information, the application of expert approaches to risk assessment has become a practice.

On the basis of the results obtained, the necessary actions should be taken to improve working conditions, minimize or eliminate hazards, including:

- risk elimination or risk mitigation with constructive actions or substitution of less dangerous materials as well as use of remedies;
- Selection of protective devices and devices of a type that has been shown to provide the necessary degree of protection. The type of protective device selected is appropriate for use in view of the probability of its exclusion or ignorance, the magnitude of the damage and the absence of disruption of the work process;
- the information about the mechanized and manual works performed is sufficiently clear;
- the work done to correspond to the qualifications and capabilities of the staff who may be exposed to danger;
- the recommended safety measures should be applied to the specific equipment and described specifically;
- Workers are adequately informed about the risks involved in carrying out various types of mechanized or manual work;
- workers are adequately informed about the risks associated with the temperament and physical data of the animals.

Conclusions:
1. An analysis of the state, technology, machinery and mechanized works for breeding and selection of sheep for meat has been made.
2. The hazards of the main types of works and the conditions under which they are carried out are classified.
3. On the basis of the methods of expert evaluation, a methodological approach is proposed for determining the significance of the individual types of hazards for the safety of workers in breeding and selecting activities of sheep raised for meat.

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THE GROWTH OF THE ROLE OF INSTITUTIONS OF CULTURE AND VALUES IN THE INFORMATION SOCIETY AND ECONOMY KNOWLEDGE

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Annotation The concept of a society of information is considered in the article. It is proved that the knowledge economy, the core of which is the creative economy, provides the formation of a knowledge society. The cultural industry, or creative economy, is considered as a new type of industry. The essence and peculiarities of the creative potential of a specialist are determined. Scientist's philosophers in their observance allow to build the foundations of modern accolade system of the information society. Universal values as they develop and change in the history of mankind, created the basis for the survival of civilization. Values are concepts or beliefs, are ordered by relative probability. A feature of economic value is the combination, integration in the form of a complex subconscious judgments of aesthetic, moral, legal, political, religious, and existential values. Economic mentality must be considered as a significant element of the informal subsystem of the institutional structure of the national economy.

KEYWORDS: INFORMATION SOCIETY, KNOWLEDGE ECONOMY, CULTURAL INDUSTRY, MODERN ACCOLADE SYSTEM, VALUES, ECONOMIC MENTALITY.

1. Introduction

Information nature of the present stage of civilization evolution determines the situation when no country without an effective entry into the world information space cannot successfully compete in the sectors of high and medium technology not only on external but also on the domestic market. Today it is not enough to link the development of the information society only with the solution of problems transmission, access, processing and storage of information or information products. Strategic planning processes of producing information in the form of new knowledge and the mass production of information technologies, which determine the modern condition of the productive apparatus and social-economic development of the country [1].

Information society is defined as a society in which economic development, social change, quality and way of life depend on the knowledge and methods of operation of information and expression of which can be characterized by the following criteria:

- **technological** - a key factor - information technology, widely used in all areas of society;
- **social** - information serves as an important stimulator of changes in quality of life, in which "information awareness" in free access to information is formed and states;
- **economic** - information is a key factor in the economy (as a resource, product, source of value added and employment);
- **political** - free access to information provides the political process with increasing participation and consensus between different classes and social strata of population;
- **cultural** - recognition of the cultural value of information as a means for promoting information values in the interests of the individuals and society as a whole [2].

Technologies not only give a lot for a person, but also force them to serve themselves, they pretend to be the universal values. However, culture rests not on technology, but on the semantics of the values. Because of technological practice may in the short term to bring significant harm due to the destruction of traditional values that we can observe today. Technologies are not neutral, an immense interest in it can lead to human loss of the meaning of his life. So today is important and timely to study the anthropological impact megatechnology in the information society.

In the early twenty-first century have seen, on the one hand, the process of active development of national identity, which is becoming a priority for policymakers in many States and with other democratic principles governing the necessity of determination of the structure of the state, the presence of the full panorama of historical and cultural mosaic that must be considered in the socio-political and educational policy. In the context of these two vectors are implemented by the core values of the state of society.

So, in the information society is radically changing the attitude of technogenic to the culture. The introduction of research directly into various forms of public action changes the structure and content of the actions, and the transformation of the research function for the production or management – creates a query on the formation of a new type of culture that becomes an integral part of social progress.

2. Axiological component of economic-theoretical knowledge

Today, the cultural industry (creative economy) is recognized as a new type of industry. J. O'Connor writes that people who work in the cultural industry make a more significant contribution to the social changes in our era, which he called “an epoch of post-deficiency,” when “cultural hierarchies are much fragmented and numerous” [3]. Cultural works are becoming commercial in the economy through a process that involves many people in marketing, advertising and public relations.

In the economic theory of the information society, the category of "intellectual activity" is called to play a key role, similar to that which was played by the category "commodity - labor" for the creation of economic science by Marx, since creative work in the form of intellectual activity is the main source of value creation and a special factor in production in the information society, as well as the final stage in the development of human evolution in economic life [4].

Rooting of economic science into a new reality causes paradigmatic shifts in its subject field, activating the issues of human values, trust and fairness. In conditions, when the vector of moral choice becomes existential in nature, axiological component
of economic-theoretical knowledge acquires new shades and dimensions. We are talking about strengthening professional integrity, enhancing the quality of the results of scientific studies designed to meet not only practical- but also new ideas, which are offered to the society.

The methodological position based on the values of the various actors, scientists philosophers in their observance allow to build the foundations of modern accolade system of the information society. With regard to spiritual and intellectual spheres of the modern world, then the ethical aspect of scientific research appears to be the most important component of the process of their growing anthropologists. In this context, the attention of researchers is increasingly attracting luminous aspects of economic processes and phenomena embodied in the formation and development of human processes of work, socio-labor relations and employment structure, in particular the following provisions [5]:

- a fundamental change in working conditions and implementation of the fundamental spiritual needs of human cognition and creativity under the influence of so-called NBICS-revolution, associated with the convergent development of nano-, bio-, info-, cognitive and socio-humanitarian technologies [6]. It's not just about the latest achievements in the field of science and technology, the formation of new industries and production methods, but also about the forms of sociality, values, new understanding of the essence and nature of man. In this context, "humanitarian" economic science aims at knowledge of a human with all his feelings, faults and virtues, the underlying economic relations, events and processes [7];

- the formation of the economic foundations of the humanization of economic processes on the basis of the accumulation and expansion of alternatives to use of human potential;

- distribution cross-border distribution and use of labor resources, the growth of integrated workforce and increasing demands for financing its playback;

Through the system of values formed the mentality of society and the individual. Various scholars argue that the intellectual processes of life the individual most actively implemented in the system of value orientations, manifesting itself in motivation, interests, tastes, preferences, cognitive-search activities.

The system of values are [8]:
- the sphere of vital (life) values and benefits: housing, food, clothing, hygiene, comfort, etc;
- separate the spiritual values of: science, arts, management, Economics, politics, etc;
- moral values, reflecting the attitude of the subject, on his behalf and on the basis of feelings that he experiences. They are manifested in human actions but is characterized by its inner impulse, its spiritual work;
- respect for human rights.

Universal values as they develop and change in the history of mankind, created the basis for the survival of civilization, have provided a convergence of different groups of people, provided taking into account mutual interests and primacy's on the world forums was included in the documents as rules, principles, this important for everyone.

Meanwhile, the weight of national values is built, first, a powerful national spiritual roots of the country; second, the fact that at the beginning of every human life should be values of respect and love in the family, identity, cultural traditions, language, country of residence. It is a spiritual source that nourishes human life. In upbringing (family, social) of the national values should begin, not forgetting about the value of universal.

3. The Institute values the information society

In the information society and, above all, the people who produce different kind of intellectual-spiritual products: ideas, knowledge, images that flow into the spiritual-ideological information flows. They contain educational values of the state ideology, scientific, ethical, religious and aesthetic values. The society is a source that gives impulse to the development of material values by the very fact of its real existence and its direct effects on humans, which is important in her life. To the material values include the condition of being subjects, including those intended for creative play, sports activities.

So, values are concepts or beliefs, are ordered by relative probability. They are aimed at meeting three needs: greetings; social interaction; the development of social groups. These needs are met in the implementation of the 10 motivational types:

- tradition – respect and maintenance practices, recognition of ideas, culture and religion;
- power – social status and prestige, dominance over people;
- hedonism – the enjoyment of life, pleasure;
- achievement – personal success through competence;
- stimulation – the fullness of life feelings;
- security – stability, harmony;
- conformance – limitation of actions harmful to others;
- self – regulation – is choice, creativity, research;
- attachment – support the well-being of people;
- universalism – understanding, appreciation, tolerance and the maintenance of well-being.

Pay attention to one of the institutional forms of values – tradition. Tradition is symbolically reproduced by future generations, and, accordingly, is considered to be cultural persistence. In turn, A.Makintire argues that a living tradition is "materialized dispute that has historical duration, of those virtues which constitute a tradition" [9].

However, Nobel prize winner F. Hayek believes that the market, and traditions arise spontaneously and serves as a way of adapting to the unknown: "the whole structure of activities tends to adapt by means of partial and fragmentary signals to unpredictable and unknown signals." In his own words of Hayek, "despite the fact that in our conduct we are guided by the acquired knowledge, we don't usually know why we do what we do" [10].

The authors [11] believe that the radical opposition between traditional and modern society definitely implies that traditions have no place in the present. The result is a historical myth about the backwardness of tradition, but they exist in all societies.

However values have inherent contradictions (belonging to the floor, openness-closedness, win-lose...). So, values of conservation (security, conformity, tradition), the opposite values of the change (stimulation, self-regulation). Values of self-determination (universalism, benevolence), the opposite values of self-exalation (power, achievement, hedonism). Values and norms are complementary and, therefore, are equally important regulators of human behavior – internal and external. The fundamental difference in the standard of value is that it is a formal, rational regulator of human behavior. In its most General form the norm-the institution can be represented as a system of actions and value as a spiritual unit, which determines the direction and intensity of the activities of the individual.

Registration of legal relations that define the rights and responsibilities of individuals and social groups, marked the beginning of legal values. These include public order, law, compliance with the law. After all, the value system affects the operation of the rules, the entire legal system. In this matter, as adopted normative and legal acts conform to the value system of a particular society. If there is a conflict, consciously or unconsciously, the behavior of the individual in the first place, will be determined by internal regulators, inherent in the values, and their conflict becomes a source of legal nihilism.

Political values arise from the socio-psychological level of social consciousness. At the level of the socio-economic structure they find their concrete expression in the views of the individual about the optimal public order, the degree of freedom, stability and discipline, equality and social justice, tolerance for reformism, radicalism or conservatism. On the level of regulation of socio-economic relations political values determine the attitude of the individual to the problems of exploitation, competition, ownership, approaches to understanding the problem of justice rewards ability and effort.
A feature of economic value is the combination, integration in the form of a complex subconscious judgments of aesthetic, moral, legal, political, religious, and existential values. The wider the circle of values to which they are associated, the more complex the economic value. Economic value is manifested as reality is interpreted in a dialogical form, in the internal and interpersonal dialogue, from the point of view of the whole complex of the types of value attitude of a subject, with the involvement of his emotional activity.

4. The increasing role of mentality and national consciousness in society

Today, the involvement of scientific knowledge of the category of mentality relevant again, and not only in the historical paradigm. Due to its complexity, interdisciplinarity mentality becomes a convenient "tool" through which you can follow and practically implement integration processes in humanitarian sphere.

The mentality is the process of reflection of the world picture in particular, inherent in a particular culture, language, symbolic signs and forms that affect the quality of individual and collective consciousness, system of values, and regulating the behavior and development of the environment mentality – quality result, content generated ideas about the world. Relatively speaking mentality is a process mentality – the result of this process.

The manifestation of economic values in the economic sphere is related to labor, property, wealth, knowledge, a penchant for competition, innovation and entrepreneurship. A kind of expression in the information society is the integration of economic values in virtualized relationships, formation and distribution of symbolic values as a motive for human behavior.

Economic mentality must be considered as a significant element of the informal subsystem of the institutional structure of the national economy (table. 1). Together with other informal institutions, it determines the institutional environment, and historical time interval is the basis for the formation of a subsystem of formal institutions. Peculiarities of national economic mentality is determined not only by the balance of forces of support and opposition, but also the adaptation period.

**Table 1 The economic mentality in the national economy**

<table>
<thead>
<tr>
<th>Level</th>
<th>Use the features of the national economic mentality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mega level</td>
<td>A positive image of the country is taken into account during strong mental traits: teamwork and statehood (when structuring negotiation processes), tolerance (in the implementation of foreign trade operations and production activities with foreign capital)</td>
</tr>
<tr>
<td>Macro level</td>
<td>The study of national mentality. The goal is to identify the ratio of strong and weak mental features of population in the country, as well as modeling on the basis of their specific management systems at all levels</td>
</tr>
<tr>
<td>Mezolevel</td>
<td>Development of regional socio-psychological services councils to account for the relationship to work, wealth, propensity to savings, to economic paternalism, the desire for economic independence, the interest in the implementation of socio-economic reforms, the credibility of political institutions, the degree of perception of foreign experience and other population</td>
</tr>
<tr>
<td>Micro level</td>
<td>Formation of corporate culture of organization by combination of elements of economic mentality. Updating professional knowledge, transformation of social and economic priorities, bridging the gap values with actual economic behavior</td>
</tr>
</tbody>
</table>

The person is approved for the real socio-cultural mechanisms, among which occupies an important place in the spiritual education of the national consciousness. Based on it arises and operates a national idea. Today, despite the long practice of "internationalization", all thinking people there is no doubt that spiritual experience is personal only then, when he becomes a private. And this is possible only when it will be put into the context of their own culture – the national. It is in the national consciousness concentrated ideas about interests and values of the people, their ideals, socio-cultural perceptions about national priorities [12].

Modern discourse defines not only the nation's ethnic unity, but also the historical memory and cultural space with which it is associated. "The nation is qua-rasite community" [13]. National consciousness is connected with the formation of the "I" as an integral part of the particular community using the correlation with representatives of other groups and associations. "I" determines national identity, which differs from ethnic active state direction. According to this, every nation seeks to constitute itself in the culture, history, civilization achievements, to justify its existence and development as a specific ethno-national education in the history of society in the spiritual space and social time [14].

5. Opposition to a new industrial culture in the global economic space

The formation of the knowledge economy means a change in the institutional framework of the functioning of an economic system, since a change in the rules and norms of economic behavior of people, their priorities and values. Activities related to the production and preservation of knowledge, separated from material production, remains subordinate. Institute for conservation of knowledge is important in ensuring the sustainability of society. Knowledge becomes a factor of production through its embodiment in the means of production appear specialized institutions aimed at the reproduction and transfer of new knowledge [15].

In the new Millennium, the relationship of leadership and opposition of the countries-leaders and countries-outsiders is based not only on quantitative indicators of economic development. The new world order is based on new relations emerging between the countries-producers of new scientific knowledge and the countries with insufficient human capital development. This means that the new supranational civilization force which accelerates the processes of globalization is cultural power in the sense that its nature is determined by the cultural factors in the modern understanding of culture, which aims at the development of intelligence, skills, abilities, qualities.

This confrontation is purely technological is cultural confrontation. This contradiction is universal, global civilization, a new cultural power that is associated with the promotion of internal markets, new technologies, transnational corporations, and national cultural forms of production and consumption. This confrontation of the new industrial culture of the new world order and the existing cultures as a form of survival [16]. The cultural background of technological confrontation imperceptible that we are talking about countries with a fairly high level of technological development.

The uncertainty of humanitarian values gives a new universal culture, which is formed in the process of globalization, some inhuman, and sometimes inhumane nature weakens its cultural functions (this is one of the main reasons why on the surface you can see only a technological development, not the development of culture). This new culture (yet) capable of becoming the basis of the world values and to perform the functions of the generation of meaning and giving meaning to substantive forms of human existence and its activities [17]. Existing within the national borders, national culture are out of the competition. This means the inevitability of contradictions between the objective process of globalization, which is accompanied by the process of the birth of the new world of the third Millennium, and cultures, with their deep religious and spiritual foundations.

Principles of cultural approach to the formation of knowledge economy and information society can be formulated in the following way.

- The principle of coexistence, interpenetration and dialogue of cultures as a reflection of the openness and dynamism of global culture.
- The principle of the axiological expansion of personal meanings of cultural phenomena.
The principle of actualization of spiritual culture as the basis of identity in society.

Thus, the culturological approach in the beginning of the third Millennium should be considered on the basis of the unity of the broad fundamental and deeply systematic special knowledge. It needs to ensure mastery of the foundations of legal, political, professional culture, vision for the future development of various branches of knowledge, skills of the scientific organization of studies and implementing them in their professional and creative activities, where the main should be the expediency, justice, harmony, beauty and perfection.

6. Conclusion

Aborted scientific-methodological and socio-political framework of institutional support for cultural development of the state at the present stage, determines the uncertainty of the national interests of Ukraine in the geo-cultural environment. It can be argued that the national idea and the formation of a "Ukrainian nation" is a necessary means to maintain national security in the geo-cultural and geopolitical space. In this case, government policies at different levels of the system hierarchy needs to consider possible threats to the "culture wars", and not only them, and consequently, to provide for the development and implementation of institutional mechanisms to counter their negative impact on national security.

However, the priority values for Ukraine were historically and remain values: humanism, human dignity, patriotism, social responsibility, national consciousness, with its center – a national idea, without which to build the information society and to form a knowledge economy is impossible.

Although the skeleton of the institutions are moral and spiritual, mental and psychological dominance of the titular nation or the largest number of nationalities, ethnic groups, and only later – legislation-legal norms contained in laws, regulations and internal regulatory and administrative documents, but they are important for institutional changes in the information society.

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THE SPECIFICITY OF THE POST-INFORMATION AGE

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Abstract: What makes us call a new age a post-information one? New age is created by dominating technologies. These include DNA manipulation, also human. The ability to cut and paste parts of the DNA string has created new, previously unknown possibilities to interfere in the natural processes at the cell structure level.

The next main factor shaping the social change is holographic technology. Due to the miniaturisation of these devices phone calls will be replaced by devices for holographic transmission and reconstruction. The change in mass communication will be significant. Information in the text form will be replaced by fully sensory, spatial images. These technologies obscure the differences between the real and artificial world and prepare new forms of human life institutionalisation.

The third element creating a new age is micro, mezo and macro robotics. The technology of learning in action and obtaining information independently by robots creates new forms of work and social interactions for man as well as areas of man’s responsibility.

In my presentation I will focus on four main trends, certain agents and organisational structures of the post-information society.

KEYWORDS: AGE CHANGE, FEATURES OF THE POST-INFORMATION AGE, SOCIAL FORCES OF CHANGE, NEW TECHNOLOGIES

Introduction

In sociological literature the liquefaction of reality is widely discussed, hence I assume this understanding of reality. Current social reality is liquid not only due to its ontological processuality but also due to the dynamics of change which I understand as both changeability in time and the depth of impact, as well as the variability of the agents of change. Since the information age has exhausted its mechanisms and agents of change, we have to start speaking already about the clearly forming trends of the next age, temporarily called the post-information age. Some try to call it post-human but I consider it a mistake. This does not mean that IT technologies disappear, however, they become only a typical tool used in most activities of the society. The implementation of the IT technology went through the process of assimilation just like mechanical technology. It is still being used and developed but it is not the main factor of social change any more. It was tamed, institutionalised and standardised, it is commonly used but it is no longer a new developmental challenge to which the society has to create a specific answer in its actions. In my article I will talk about four main directions of change which justify my claim about the creation of a new age.

1. The main feature of the post-information society is non-linearity of time in which the phenomena and processes occur. This feature has serious consequences for the actions of individuals and organisations. The multiplied time means that the phenomena and processes which before, due to historical knowledge had to occur in a linear way, now occur in parallel. In science the Enlightenment method analyses based on the linear cause and effect relationships today are not enough. This is enabled by integrated IT systems of the new generation computers. 5G is only a small step and these new conditions of information flow will soon be inefficient for the holographic and sensory reality. At the same time with the more common than today transfer of information the world’s demand for knowledge about human communication has to be restructured, just like the transmission systems consequently.

The era of limited human rationality in science is upon us. Computer or rather an IT partner already today sets the borders of cognition as well as human and social agency. Translators not only for communication between people of science but also between machines and people and between the machines have to be created. It will lead to the unification of language.

2. Nanotechnology will develop and become more common. In the realm of devices robotics will dominate the area of creativity and work, including micro robots, nano robots and mega robots. That is why manufacturers of subassemblies for their production and programming will become even stronger in global economy. Material laboratories will become equally important as the IT and biotechnological ones. Production will depend on recycling. Biological standardisation will become fully applicable in medicine and agriculture, which due to the smaller food demand will be able to change to less intensive methods and biological protection. The balance of ecosystems is already the leading criterion for the functioning of agriculture and food production. This will lead to the improvement in quality of nutrition and thus human health. Mass production of medicinal foods will develop.

3. Individuals and small groups will limit their spatial mobility. The organisation of consumption will take place at the recipient’s home or local distribution centres. This will greatly limit the demand for individual and collective transportation of people while the demand for transport of things and services will increase. The 5G technology introduces the Internet of things thus the information about individual or group needs will be taken directly from them into the system, there it will be classified, stored and addressed to producers, without any participation of the consumer and most likely man at all. The meaning of consumer will be reduced significantly since consumption will be based on algorithms, optimised by standards and monitored.

The contact with people in services will be maintained however work therein will be faster, more effective and more customised but also complex and interdisciplinary. This will lead to significant changes in vocational training. Workers will use the ends of highly centralised systems, highly standardised and optimised. The IT knowledge of each employee will be as important as their sector knowledge.

Customised services will develop thus necessitating multi-professionalism. Urban centres will improve their highly specialised service centres. Since numerous procedures will be assigned to robots man will be diagnosed and treated in a faster and more precise way. Robots will take over from people in many procedures. Customised tissue production will develop. In surgeries recreation procedures with the use of own tissue will dominate. Due to the possession of personalised genetic passport many diseases will be treated at prenatal level or right after birth.

School education in current class-lesson form will disappear. Human world will be so complex that a child will have to adapt from the very beginning of its life. Education will become also an
obligatory activity for adults irrespective of their age since common technical surroundings will be constantly revised. Education for all will lead to its centralisation and computerisation. Teacher specialists will be replaced by teacher guides and advisors. Large agglomerations will be dominated by collective transport based on clean energy. Many cities will choose transport in cableway gondolas even in flat areas. Industrial long-distance transportation will be based on different forms of railway, container ships and air transport. Car transport will function only locally. Collective transport organisation for things and people will be centralised and optimised by IT systems. “Empty runs” will be eliminated and thus reduce the transportation costs but will secondarily reduce human spatial mobility. Individual transport will have two dominant forms: small size small-range electric cars and individual aviation. Local security systems will be homogenised which will be possible and necessary with the homogenous technological base. Despite disturbances in integration of these systems into a global mega system, they will continue to cross-link and the meaning of the disposers of new technologies and devices responsible for the location of data bases and software will increase to such an extent that wars will become impossible.

4. Biological knowledge will be in the centre of many disciplines deciding not only about the human condition in the post-information age but also about the man’s social position. The biological standard will define man’s quality and social standing. Thus new social differences will occur based on genetic and biological criteria. One of the tools will still be in vitro fertilisation as well as extracorporeal embryo production. The optimisation of human life will become new ideology. Knowledge will make it possible to satisfy basic needs of decreasing human population thus the agent’s fight for power will focus on gaining symbolic dominance. The demand for creators of ideology-religion will increase. Cultural integration will lead to such a symbolic mixture that people will completely lose contact with religions of the earlier periods and will want to have guides and ideologists for new realities and the future.

I do not agree with the concepts of the end of man, the end of history and other forecasts regarding the end of life on Earth. What will the man of the future be like? The discussion is dominated by three scenarios. The first one: merger with the machines called cyborgisation. The second: hybridisation as adaptation to different, new, local conditions on Earth and the third being the result of the species evolution which is taking place faster and faster now. All of them point to a radical change of Homo sapiens. The fourth scenario that emerges is based on the optimisation and standardisation of human genome. Which of these is the most likely? The correct answer is, all to the same extent. The selection of human change scenario will be dictated by immediate needs.

Conclusions

We have reached another barrier of growth, growth of creativity. After the raw material limitations characteristic for the previous industrial age this barrier sets the borders of the information age. The post-information age has to exceed the time and conditions of individual and social activity. This is a challenge that is only emerging. Without new assumptions regarding man we will not be able to set ourselves free from constant returns even though these would only be intellectual ones (time loop?). What will the main mechanisms of post-information age change into another one be, since it will not be a long one? The main mechanism will be the rebellion of new generation. The society of super men will not be easy to steer by the global government. That is why my assumption of generation rebellion is highly likely. I suggest assuming the time horizon for the new post-information age at three generations. Collective memory with the image of the present creates an explosive mix stimulating the behaviour of young generations. Then they start experimenting with new solutions, which contain both the continuity and innovation.

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GOOD PRACTICES USING INNOVATIVE LEARNING METHODS

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Abstract: The present article aims to present to a wider audience selected in-depth examples of practice that have been addressed and applied in contemporary education. Using experience as an exchange of ideas for good practice from other countries gives a clear idea of training and the learner development plan. The factors contributing to success in students' theory and practice are emphasized. All these factors and elements of good practice are interlinked to achieve sustainability and sustainability in all areas of education / leadership, vision and incentives are key at all levels. The main problems faced by students during their transition to the transition are finding the right balance between their theoretical and practical training. The effectiveness of the entire educational and educational system depends on it.

The analysis of the results obtained from the mentioned examples of good practice in education shows that the use of one type of method is not sufficient for the correct perception of the curriculum by the students.

KEYWORDS: GOOD PRACTICES, EDUCATION, INFORMATION TECHNOLOGIES

1. Introduction

New information technologies lead to rapid changes in lifestyle. The adaptation of education to the information age is not a simple act of updating the learning space but necessitates a complete change of the content, methods and objectives of the educational system. It is expressed in a comprehensive educational reform, including a change in human thinking.

Changes in computer-based learning standards and information technologies [10] refer not only to the learning content but also to the nature of the organization of learning and realization in a practical environment.

In response to the need to modernize and harmonize our educational system with global contractors and European standards were adopted by Decree No 81 - National Strategy and Action Plan for the introduction of information and communication technologies in Bulgarian in Chile. It has been pointed out that education must be structured and organized so that students, learning the material they teach, understand what they will need for their future career. Learning in universities should rather focus on applying the acquired knowledge in practice. [10].

The aim of the new modern teaching methods to create built specializes of relevant specialties that after graduation to protect your informed opinion. Provided opportunity to freely implement their professional experience and knowledge.

The analysis of the essential characteristics of teaching methods shows that the method of training is a system of regulatory principles and rules for purposeful activity of the trainer and trainees, which is realized through a combination of methodological practices for resolution of a range of teaching tasks” [3]. As a novelty, it can be noted that specific learning practice and a modern digital form of education determine the type of curriculum. This assumption serves as a starting point for conducting a survey.

Our goal is Our aim is to offer an integrated approach the basis of the analysis of the results of the comparative study on best practices in education that can also train disadvantaged students. So, learning with new information technologies creates confidence in students at different levels. They acquire organizational and communication skills, enabling them to be more competitive when applying for management positions in the future.

“In line with the general trends, in our country there is a process of gradual increase of the volume of those methods, which extend the possibility of continuous feedback between the trainer and the trainees, i.e. the opportunity to put the process of training under immediate control, active regulation and management” - again there [3].

The subject of the research is the innovative approaches acquired as a consequence of the content and organizational changes in the training of technologies of good practices of other universities. We assume that the innovativeness of the approaches is determined by the idea of achieving unity between the teaching and management of the cognitive and practical activities of the students - on the one hand and on the other - the realization of the trained teaching and practical activity. Innovative approaches should complement traditional approaches and at the same time be equally beneficial for both faculty and students.

2. Prerequisites and means for solving the problem.

2.1. Solution of the examined problem

A crucial condition for achieving quality in education, which is the basis for sustainable growth of the state are building specialized personnel, their training and qualified tubs and related policies corresponding to the dynamically changing social and eco nomic conditions [5] - incorrect reference design

We are faced with the tasks of raising motivation and shaping skills for lifelong learning. Many tasks can not be solved through traditional methods of learning and learning, so we need to use and introduce digital learning methods. They are proven in emergency methods in their students actively participate in joint or separate activities to create or fact-finding and dependencies. Such methods can be used in problem-based learning, website training, mass education for all different physical disabilities, the method of study projects, research methods (learning through discovery, learning by doing) through the use of information and communication technologies or Combe iniranemethods in training.

The development and implementation of modern educational models, including interactive learning and learning methods, respond to the current needs of improving the quality of education.

“In interactive learning, high quality learning, increased activity and fast feedback are achieved due to the following results:

- Accumulation of knowledge;
- developing relationships;
- the formation of skills - intellectual and practical” - there again.

The experimental results obtained from the sample survey show that students recognize the most commonly used by their teaching methods:


After the analysis of the research, the data show that:

1. The lecture is the most commonly used teaching method by teachers. It is particularly suited to a quick way of presenting facts and by which the educational content of majors studied by specialists is abundantly fulfilled. This fact is not a surprise in itself, as it is a verbal and verbal method. The lecture is a method that allows a clear and systematic presentation of the
curriculum content and is highly praised by the group of learners' theories [1].

Strengths - systematic presentation of the content, activity of the students only, good contact of the lecturer with the students, mechanical perception of the students are the basis for using the lecture for the students' training.

Weaknesses - the lecture does not allow good contact with the teacher and the audience, especially if it is made up of more students. Its ability to mobilize students is also limited.

2. Second place by frequency of use is occupied by the exercise. It is a practical method and allows active involvement of students in the learning process. But this theoretical possibility is questioned at least to the extent that the curriculum remains theoretically and filled with many new facts and concepts with which students only for the first time. There remains a doubt as to the extent to which the students surveyed distinguished the method of exercise from a seminar - an organizational form of learning that is perceived as a synonym for the method.

3. Symptoms are reinforced by third-place monitoring. In fact, it is a basic method of training in hospice, but the form itself is not among the most preferred. There are strong reasons to assume that the researchers do not clearly distinguish methods and forms of study. We concentrate on the end product and the learning process is over. Together with the low social incentive for high learning achievements, this type of control creates an environment for circumventing it through the parallel network of "links" or "payment" of exams.

It runs from theory to practice, which is burdened with unrealistic expectations of improving the quality of education. At the same time, a systematically integrating and differentiating function of the theory itself is missed, its dialectical relation to practice is not fully understood. The opportunities for personal expressions of the studied students in the training process are limited, as well as the opportunities for activity-value cooperation between the trainees and their teachers.

The question arises: whether the weaknesses analyzed in the functioning of the training methods are due to subjective factors or have a systemic origin. If they are accidental, why are these weaknesses persistently repetitive and in the forms of training? If they are not systemic, why do they also manifest themselves at the level of subjective-subjective system? If they are the result of subjective factors why they also appear in the preparation of students from other specialties [4].

In any case, today's students expect to do the education process interesting and effective, they hope for immediacy, engagement, teamwork, and visualization in your training. The digital generation differs from previous generations and that is why educational transformation is needed. Undoubtedly, overall, interactive technologies place the student at the center of the educational process, enrich the traditional learning environment, and make this process more dynamic, developing and interesting. The new environment involves various forms of interaction between learners in virtual teams on working projects, equal learning between learners and learners based on dialogue and negotiation. Throughout the world, a number of universities are striving to introduce innovative teaching strategies and technologies to make the learning process a pleasant time for students to prepare and increase the rigor of their knowledge in the chaotic system. [2].

4. Results.

Analyses have shown that 24% of participating students demonstrate a high level of skill development to detect, select and organize the required information; 67% - demonstrate a very good level; 9% of students need assistance from colleagues or trainers; (Babanski, U.K. 1985. Methods of training in contemporary public education schools).

- At the level of the students' development skills for finding, selecting and arranging the necessary information - 88% of the students under study demonstrate a high level of skills for logical arrangement of theoretical material and selection of tasks and only 12% do not demonstrate such skills;

- Degree of development of skills for the logical arrangement of theoretical material and selection of tasks and the two web-based applications developed by the students fully meet the requirements for volume, structure and technical layout:

  72% of students demonstrate a high degree of logical consistency and style of presentation when presenting project outcomes, 17% - medium and 11% do not.

- Ability of students for logical consistency when presenting the results to the audience 91% of students show a high degree of development of skills for drawing drawings to geometric tasks using specialized mathematical software and the remaining 9% are difficult. Students have studied the possibilities of using MathType, GeoGebra, Maple, MathLab and Mathematics;

It can be said that in the selection of the training methods, the personal presence of the trainees, their participation in the realization of the immanent essence / the intrinsic philosophy / of the learning process is also projected. Against this background, the choice of methods fulfills the quality of training criteria. The choice of learning methods is determined by the type of learning content, the time spent on learning certain units, the abilities of the teacher and the learner, as well as the external conditions of the class [1].

Information and communication technologies (ICT) provide a variety of methods and tools that reveal new learning opportunities. They definitely help to support the educational process by organizing it in a way that also takes into account the students' individual needs. P ozvolyat also build their important digital competencies needed for "Mr. and knowledge-based." Information and communication technologies are developing extremely rapidly and the problems associated with their use in education are increasing and complicating. If new technology tools become effective and inherent in education, they will become irreplaceable for monitoring and valuation [8], [9].

In some countries, the use of information technology is recommended or supported in order to achieve several different goals. In the Czech Republic, Germany, Greece, France, Austria and Iceland, the goal is to support disabled learners. In Estonia and Slovakia goals they to promote information technology as a means of promoting equality are supporting students with disabilities and disadvantaged. Not least in Belgium, Denmark, Ireland, Spain, Italy, Hungary, Malta, Poland, Slovenia, Finland and the United Kingdom (England, Wales and Northern Ireland) the use of information and communication technologies in general education is encouraged the problems of three target groups: learners with disabilities and disadvantaged learners socially proposal [9]. With the advancement of new technologies, the incredible opportunity - learning from home - is born. This technology is extremely beneficial for people who want to train, but are disabled and disadvantaged.

Modern information technologies offer many ways to enrich the learning experience of students at all levels of their education. Based on this example, the use of information technology in the education process can help to significantly improve the performance compared to traditional non-assisted teaching methods.

At the same time improves the ability of students to creativity and abstract way to solve problems they do not. In Bulgaria, emphasis is still on dry theory.

In solving different projects, more emphasis is placed on the practical work in groups (consisting of different students) and less emphasis is placed on memorizing theory.

Individual study is also part of education. It helps to build individual and unique business skills [7]: One of the successful training practices and experiences is:


Danish education is problematic-oriented learning-based on projects, practice and practical understanding. That is why specific tasks and practices have been taken instead of abstract theory as the starting point.
Practice shows that this approach is perceived by students. At the same time, it improves their ability to think in an abstract way and to solve a problem case. Here the exercises and practice in a group are the basis of education. Thus, the theory is also being mastered much better. That is why the teaching approach is aimed at achieving the educational goals. The direction is achieved through the educational environment, which is presented as a whole. Study cases are built up of complex problem situations that are related to the professional practice and prepare the students for real life in their future professional environment.

The education system in Denmark is structured and organized in a way that helps students understand what skills they need to acquire in order to continue to develop successfully in their chosen specialty. The aim is to create such capable professionals who, after graduating, working in a team on a given problem, can express themselves competently and assert their views in the analysis and implementation of the relevant project. Students, during their training, acquire organizational and communication skills that increase their competitiveness when applying for jobs in future companies.

Self-employment and teamwork give learners confidence, organizational and communication skills that will help them further in their careers.

Danish universities use a progressive informal approach to teaching. There is no emphasis on the hierarchy in society. You can speak to "you" with your professor. Outside lectures, students and professors organize general events such as a "Friday bar" where everyone can enjoy a cup of tea in the student community. (https://www.scanandinavianstudy.com/bg/what-data)

In our study after and assessed on the results of best practices in education and presented a model of problem-oriented training in Denmark came to the conclusion that it is necessary to create "a complex system of methods", to be regulated and used by students with different physical disabilities.

This model should be a modern interactive form of training in modern universities, the main idea being for the student to self-organize and self-manage. The trainer will be able to express his or her opinion, opinion, decision, ie to express his / her personal position. The new innovative approach to technology education will enable the student to express his or her personal position. The discussion of ideas, search for solutions on the basis of analogy, consultation - Mr. discussion and idea so with the teacher to select the perception of content development.

The main objective is to draw attention to the accessible and qualitative perception of the teaching material.

We propose this to be achieved through the acquisition of knowledge and skills to maximize the benefit of all students. In this, we can be provided resources and training of people / students with physical disabilities, their projected useful website that has characteristics to provide maximum access to users with all different types of physical disabilities. We concede that the innovativeness of approaches is determined by the idea of achieving unity between teaching and managing cognitive and practical activities - from one side on the other hand - carried out by the trainees on the local educational and labor activities. Innovative approaches should complement traditional approaches and at the same time be equally beneficial to both parties.

Referring to the strategy we offer to develop easily accessible digital resources for the basis of training of students with physical disabilities, we follow the general principles outlined: [11].

- Understand the needs of students' access to electronic sites; - Following practices to avoid obstacles to success;
- Adding features to facilitate the use of assistive technologies;
- Choosing the right content;

The form of implementation of the learning practice is the team interaction approach. The one used in Danish universities. Team work and team interaction are not identical, and their relevance to achieving the learning objectives is specific. Exercise students and professors can engage in joint events, such as "Friday designer circle" or "club of IT specialist", where everyone can enjoy a cup of tea in the student society. So each student with physical disabilities can more - easy to learn the practical skills of the specialty.

This innovative approach implies not only competition but also cooperation. Team work provides motivation for work and leads to the pursuit of success.

The model we offer offers a level playing field between students and self-organization in learning. Once built this quality, it helps them to set their own goals and to take adequate action to accomplish them, to evaluate themselves and, if necessary, to take corrective action themselves.

5. Conclusion

In conclusion, these examples do not exhaust the list of possible approaches. With interactive diversity, we create an opportunity for students with physical disabilities to integrate them into the learning process. This balance between their theoretical and practical training leads to an increase in the quality of education.

By building a "Unified Complex System of Methods", students will have the opportunity to touch on a modern, interactive form of learning in modern universities. To organize and skills to solve problems, call ishavane motivation for learning, developing responsibility, commitment only organization, communication, developing communications razitelnost and logical thinking, personal qualities, skills development for developing drawings using magazine enthusiasm and developing mathematical software.

form and developing computer and information, social and personal competencies.

Education is transformed from a process of learning and reproducing information with the help of new information technologies.

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