UNIVERSITY OF MINING AND GEOLOGY “ST. IVAN RILSKI”

JOURNAL

OF

MINING AND GEOLOGICAL SCIENCES

Volume 61

PART IV: HUMANITARIAN SCIENCES AND ECONOMICS

Sofia, 2018

ISSN 2535-1206

Printig: Publishing House "St. Ivan Rilski"

C O N T E N T S

ECONOMICS AND MANAGEMENT

TRADITIONS AND INNOVATIONS IN EDUCATION

THE BULGARIAN MINING INDUSTRY IN 2017 – PERSPECTIVES AND FORECASTS

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ABSTRACT. The paper presents the trends in the key economic indicators generated by the global, American, European, Chinese, and Bulgarian economies in the period 2007 ÷ 2017. It gives forecasts for 2018 and 2019.
A brief outline of the external and internal business environment in Bulgaria in 2017 is offered. Analysis is made of the fluctuations of industrial production volumes and production prices in the industrial sector, in the mining and quarrying sub-branch of industry, in coal mining, in metal ore production, and in the extraction of non-metal minerals and raw materials for the period 2008 ÷ 2017. Consequently, the conditions and perspectives for the mining companies that deal with the production and processing of coal, metal ores and non-metal raw materials are outlined.

Keywords: mining and quarrying industry, economic activity, industrial production indices, producer price indices

БЪЛГАРСКАТА МИННА ИНДУСТРИЯ ПРЕЗ 2017 Г. – ПЕРСПЕКТИВИ И ПРОГНОЗИ

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РЕЗЮМЕ. В доклада са представени тенденциите в изменението на основните икономически показатели, реализирани от световната, американската, европейската, китайската и българската икономики за периода 2007 ÷ 2017 г. и прогноза за 2018 и 2019 г. Направена е кратка характеристика на външната и вътрешната икономическа среда на България през 2017 г.
Анализирано е изменението на обемите на промишленото производство и на цените на производител за сектор „Промишленост", за подотрасъл „Добивна промишленост", за добив на въглища, за добив на метални руди и за добив на неметални материали и суровини за периода 2008 ÷ 2017 г. В резултат на това са очертани условията и перспективите пред миннодобивните предприятия за добив и преработка на въглища, метални руди, неметални материали и суровини.

Ключови думи: минна индустрия, икономическа активност, индекси на промишленото производство, индекси на цени на производител

Introduction

According to the official information published by the National Statistical Institute (NSI) and considering the data of the INFOSAT information system of NSI, shown in Table 1, a large part of the Bulgarian mining enterprises currently achieve good production and economic results.

Table 1
Key indicators of the mining and quarrying industry

Indicators	2015	2016
Number of enterprises, num.	422	407
Number of persons employed, num.	24 862	23 963
Value of tangible fixed assets, BGN'000	2 434 401	2 550 039
Expenses for acquisition of tangible fixed assets, BGN'000	268 144	316 336
Operating income, BGN'000.	2 848 348	2 704 084
Operating expenses, BGN '000.	2 542 844	2 431 213
Financial result, BGN '000	305 504	272 871

According to the data in Table 1, in 2016, the mining industry witnessed bustling business activity on the part of 407 associations and organisations in the field of exploration, mining, and processing of underground minerals and related activities and services. The industry employed about 23,963 people who provided just over 5% of the country's gross domestic product (GDP). Another 120,000 jobs were available to serve the companies in this branch of industry. The value of fixed tangible assets exceeded BGN 2.5 billion and tangible assets acquisition costs amounted to BGN 316 million.

The financial result realised from the activity of the mining enterprises in 2016 was BGN 272.9 million, generated by BGN 2.7 billion in revenues and BGN 2.4 billion in operating expenses.

In recent years, the world, the European and much of the national economic systems have continued to recover from one of the deepest recessions in the modern history of the economy, namely the financial and economic crisis of 2008 ÷ 2009. The economic and financial crisis has adversely affected the activity of all mining companies. The situation was critical at the beginning of the crisis when the consumption and production of mining products obtained from various types of underground minerals contracted by between 35% and 70%.

Within the past nine years, increased world production and consumption of metal and energy raw materials has been a favourable factor, initially for the development of the extraction

and processing of energy, metal, and building materials, and then of some of the industrial minerals as well. Unfortunately, the sharp contraction in the consumption of building materials and of part of the industrial minerals in 2009 and 2010 is still a limitation to their production and subsequent processing (Митев, 2015). The decrease in the physical volume of the construction sector measured in terms of the index change in the construction output in 2016 was 16.2% as compared to 2015. This resulted in a decrease of the mining and processing of building and rock-lining materials in 2016.

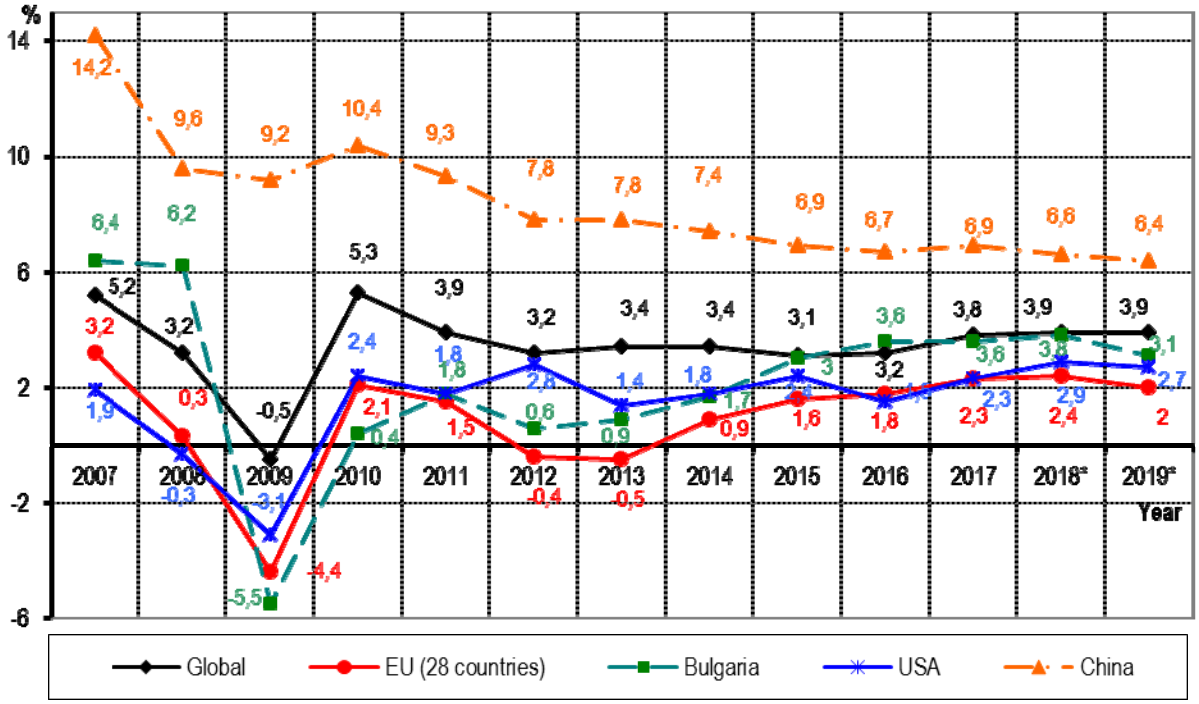
The aim of this report is to analyse selected statistical economic and market information and to outline the current state and the development trends of the Bulgarian mining enterprises under the conditions of increased mining of metal ores and concentrates due to: external demand for end metals, basically on the European and world markets; increased domestic consumption of power coal; and a contracted but growing domestic consumption of building materials, rock-lining materials, and industrial minerals.

Economic activity

In 2017, the economic activity increased but remained at a relatively low level. The main reasons for the slight improvement in economic activity indicators, namely the actual gross domestic products, were the result of continued fears about the financial health of part of the highly developed European Union (EU) economies and the forthcoming exit of the UK from the EU. The consequences of the global financial and economic crisis of 2009, the subsequent debt spiral, the forthcoming UK exit from the EU, the recorded weak growth of the major EU economies, the high budget deficits, and the increasing indebtedness of the public sector were not only impossible to overcome in a number of countries, but were aggravated. All of these were reflected in the growing yield of newly issued securities in the countries of the southern arc of the EU, to which Bulgaria belongs.

Figure 1 presents the dynamics of change in the real GDP in the global, American, European, Chinese, and Bulgarian economic systems for the period 2007 ÷ 2017 and the forecast for the development of the indicator for 2018 and 2019. The figure is based on data from the annual reports of the International Monetary Fund (IMF) for the period 2009 ÷ 2018 and on Eurostat data for the same period.

The graphical representation of the data in Fig. 1 reveals that in the past three years the rates of economic activity in Bulgaria were close to those worldwide as a whole and higher than those of the USA and the EU. The tangible difference from China's economic activity is fully explainable. This information might sound reassuring to many people, but keeping in mind the basis on economic activity is realised, Bulgaria's purchasing power remains extremely low. Moreover, the forecasts presented in Fig. 1 for the growth of the real GDP of the various world, European, and national financial institutions are not unequivocal and are characterised by high dynamics. However, they project the financial experts' expectations of for the future development of the individual economic systems and will subsequently be subjected to repeated revisions during the different periods.



*** - forecast data**

Fig. 1. Dynamics of change in the real GDP in the global, American, European, and Bulgarian economic systems for the period 2007 ÷ 2017 and forecasts for 2018 and 2019

The real GDP growth of Bulgaria for the year 2017 was 3.6%. The European Commission (EC) and the IMF forecast that in 2018 it will amount to 3.8%, whereas in 2019 it is going toll fall to 3.1%. The European Commission predicts that in 2018, the real GDP growth for the entire European Union will be 2.4% and 2.0% in 2019. According to the European Commission, the weak but continuing increase in demand on the intra-European market will still be the main driving force of the moderate economic EU growth to the end of 2019.

The World Bank predicts that in 2018, Bulgaria will enjoy stable economic growth, but in the next two years the growth is expected to slow down. In 2017, the country's economy grew by 3.6%, with expectations for 3.8% in 2018. In the following two years, 2019 and 2020, forecasts are for a return to the levels of 3.6%. This indicates to a slight downward correction in relation to the previous report from January, when the institution's expectations were for a growth of 3.9% and 4.0% for 2018 and 2019 respectively, and of 3.9% in 2020. The World Bank also notes that there is an increase in the inflation expectations for this country, as well as for some other states in Central and Eastern Europe.

External and internal business environment of the Republic of Bulgaria in 2017

In 2017, for another year in succession, Bulgaria's economic environment was characterised by high uncertainty, slightly increasing economic activity, political instability, and the consequences of the bankruptcy of one of the six largest banks in the first half of 2014. The factors that probably contributed most to this were the economic uncertainty and the continuing financial difficulties, particularly in Greece and to a lesser extent in Spain, Portugal, Italy, Cyprus, Slovenia, and Hungary, as well as the weak the economic growth in Europe in general.

In 2017, the economic growth across the globe accelerated by 0.6 basis points in relation to 2016. Against the background of uncertainty and increasing tension on the financial markets, the expectations of business and consumers were still moderately pessimistic. In a short-term period, the adverse effects were due to the significant structural confusions, especially in the developed European countries, as well as to the slowdown in the Chinese economy. As a result, the recovery of the global economy is expected to slow down, even in a medium-term period.

The uncertain and often incoherent policies and actions of the EU institutions to deal with the emigration wave and with the deepening debt crisis, mainly in Greece but also along the southern arc of Europe, are causing instability. Further pressure is exerted by the continued military conflict on the Arabian Peninsula and the political tension between the United States and Russia. These factors increase the feeling of insecurity, which is why a large part of the investors are extremely cautious and refrain from starting new projects in anticipation of more favourable times.

During most of 2017, the economic activity throughout the world maintained a relatively good level. This was influenced by the stabilisation and the slight price rise of the basic stock exchange commodities, incl. the prices of energy carriers in the energy sector, as well as by the continued high, though shrinking, growth of 6.9% of the Chinese economy, which is the largest resource user and exporter of end products. Global economic growth rose from 3.2% in 2016 to 3.8% in 2017. The largest contributors to this increase were most of the member countries of the Organisation for Economic Co-operation and Development (OECD), including the Euro zone countries, among them the major commercial partners to Bulgaria such as Germany, Spain, France, the Netherlands, Norway, and others.

On the national level, there have been no significant changes in the economic policy of Bulgaria. It is still more or less passive to what is happening in Europe and in the world. Ultimately, the financial year 2017 can be described as a year of moderate economic growth of 3.6% in the real GDP and of tight fiscal policy. Under these circumstances, the survival and preservation of assets remained the main task for the majority of private and state-owned companies and for the households as well. The main motive power of the economy, namely the domestic consumption in the country, remained low due to the still weak purchasing power of the population and the rising prices.

The average annual gross salary with the paid annual bonuses in the country in 2016 marked a growth on an annual basis of BGN 844 or 8.0%. However, against the background of the still high unemployment rate of 7.6% for the year, this led to a slight increase of household incomes and to the stimulation of domestic consumption. In 2017, incomes continued to grow by 11.6%, unemployment declined to 6.2%, but annual average inflation rose to 2.

According to data from NSI, in 2017, Bulgarian exports increased by 10.7% compared to 2016 and amounted to BGN 52.2 billion at FOB prices. Bulgaria's main commercial partners are still the EU countries which account for 69.1% of the country's exports. Bulgarian import increased by 15.5% in 2017 compared to the previous year and amounted to BGN 59.2 billion at CIF prices.

Bulgarian foreign trade balance (FOB export - import FOB) in 2017 was negative and was worth BGN 3.1 billion which is an increase by 292.7% compared to 2016. The largest volume in terms of value was that of goods imported from Russia, Germany, Italy, Romania, Greece, Turkey, Spain, Hungary and France (NSI, 2018).

Indices of the industrial production of Bulgaria

Figure 2 shows the industrial production indices of Bulgaria for the period between the first quarter of 2008 and the first quarter of 2018 for the "Industry" sector of the economy, for the "Mining and quarrying" sub-sector, for coal mining, for the metal ore production, and for the extraction of non-metal minerals and raw materials. The figure is based on data from the NSI, with monthly data recalculated on a quarterly basis.

Figure 2 shows that since the autumn of 2016, Bulgaria's industrial production has been characterised by a moderate

and steady weak growth with strongly manifested seasonal nature, most evident in 2013. This statement is also valid for the "Mining and quarrying" sub-sector.

In general, Bulgaria's industrial production has had weak but steady growth with a low seasonality and is already reaching pre-crisis levels.

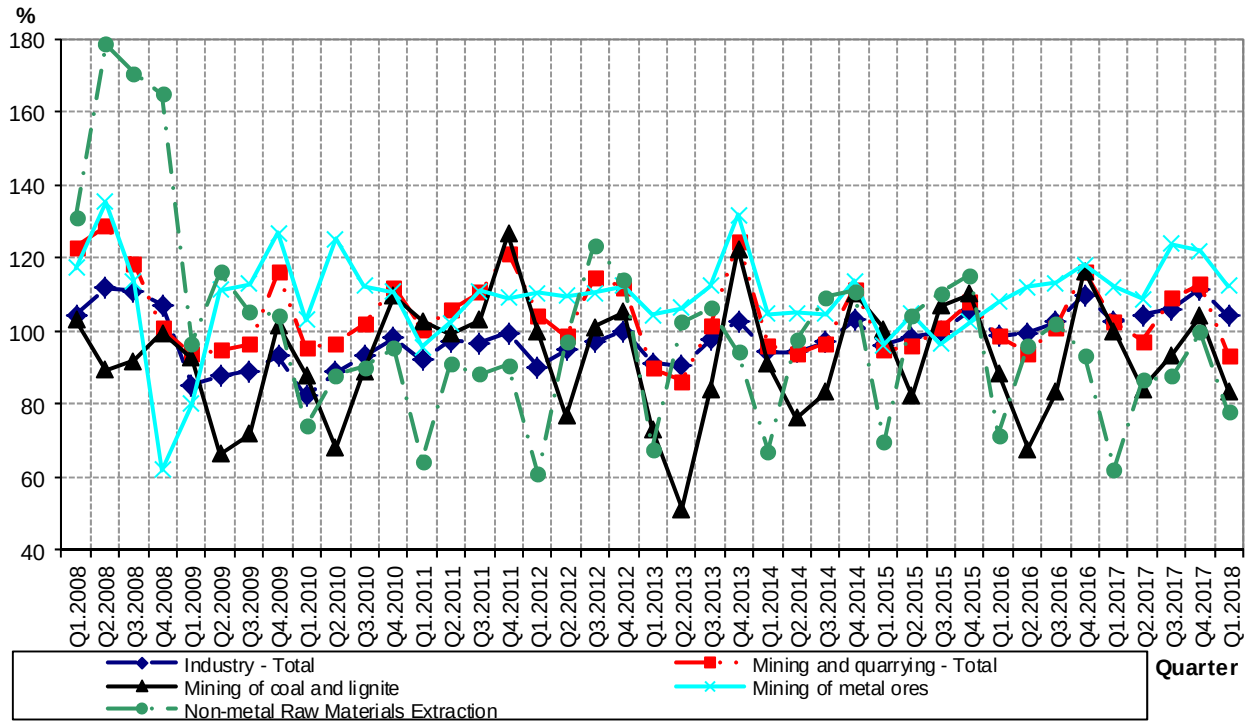


Fig. 2. The quarter industrial production indices in Bulgaria for the period between the first quarter of 2008 and the first quarter of 2018 for the "Industry" sector, for the "Mining and quarrying" sub-sector, for the production and processing of coal, metal ores, and non-metal raw materials (Seasonally unadjusted, 2015 = 100%)

Coal mining during the second quarter of 2013 reached the point of highest decline for the period 2008 ÷ 2017. From 2013 to 2017, coal mining manifested weak growth with a high seasonality. This can be attributed to the increase of the relative share of the coal generated electricity during the winter heating period when the growth was at about 55 basis points. The apparent strong trend of seasonality in the production and consumption of electricity from coal in Bulgaria has been preserved.

The mining of metal ores since the beginning of the financial and economic crisis has recovered most rapidly and since January 2009 it has recorded a moderate growth with a low fluctuation due to the high dynamics of the traded volumes on the commodity exchanges. Nevertheless, production volumes fluctuate between 60 and 90% of the pre-crisis ones. In 2017, metal ore mining grew compared to the previous 2016. The dynamics of the production and sales volumes of metal ores during the individual quarters of 2017 was not subject to a specific seasonality but was due to the varying consumption and production of metals worldwide.

The extraction of non-metal minerals and raw materials decreased slightly in 2017 compared to 2016. The mining of building and rock-lining materials registered the most significant decline in the period following the financial and economic crisis. The change in indices of the industrial production of non-metal minerals and raw materials also outlined the strong seasonal nature of the production and consumption of the above with sharp declines over the winter months and growth during the other periods.

As a whole, in 2017, mining industry recorded a slight increase over the previous year. This was the result of the rise in the mining of coal and metal raw materials. In the third and fourth quarters of 2017, the extraction of minerals recovered rapidly and at the end of the year it reached volumes that were lower yet close to those before the crisis.

Producer price indices in Bulgaria

Producer price indices reflect the dynamics of production and consumption on the mineral raw material market. With a sustained rate of change in producer prices within several consecutive periods, they can be considered as an early indicator of the trend of movement of a particular sector or of the entire economic system. As key short-term business indicators, they direct the trends in consumer inflation (or deflation).

Figure 3 shows the producer prices indices in Bulgaria on the domestic and the international market for the period between the first quarter of 2008 and the first quarter of 2018 for the sector of industry and the sub-sectors of: "Mining and quarrying"; coal mining; metal ore mining; and extraction of non-metal minerals and raw materials. The figure is based on data from the NSI with the monthly data recalculated on a quarterly basis.

It can be seen in Fig. 3 that the producer prices in industry recorded a slight increase of 1.3% over the period analysed. From 2013 onwards, there has been a slight growth of 11.3%. For the mining and quarrying sub-sector, there has been a significant drop of 24.0% since 2008, mainly due to the lowering prices of non-metal minerals and raw materials.

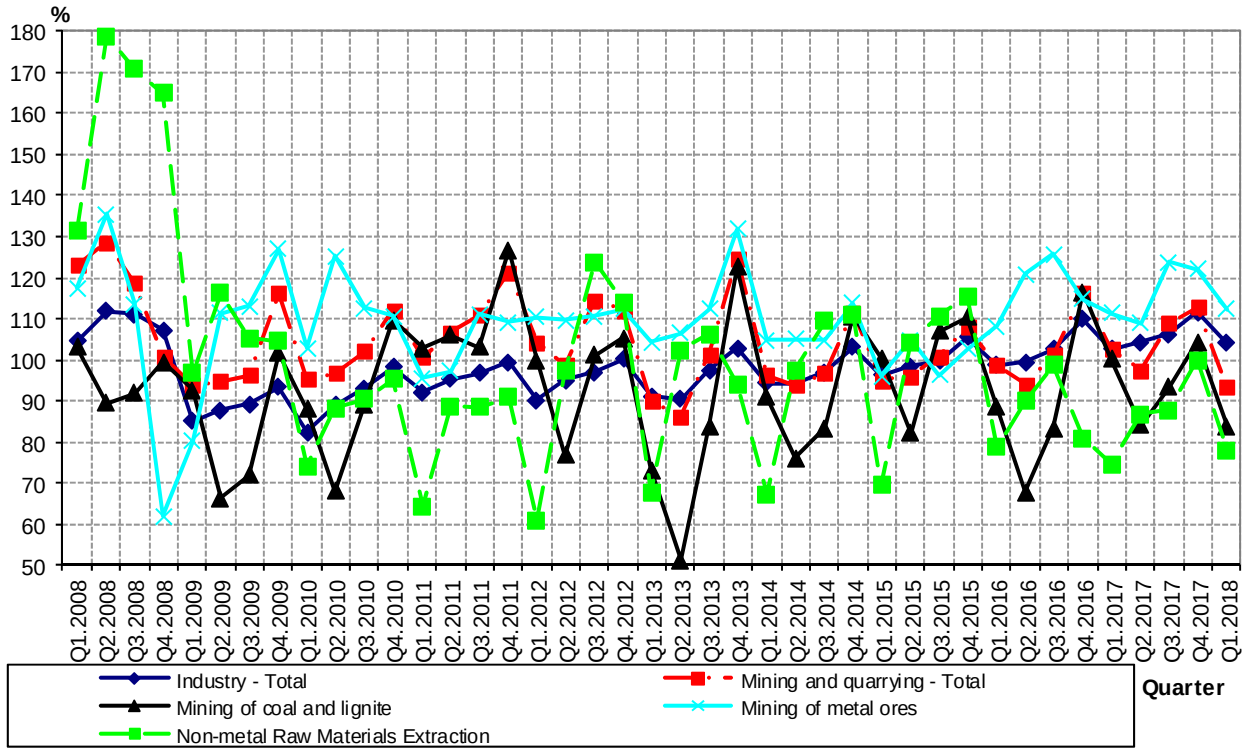


Fig. 3. The quarterly producer price indices in Bulgaria for the period first quarter of 2008 ÷ first quarter of 2018 for sector "Industry", for sub-sector "Mining and quarrying", and for the production and processing of coal, metal ores, and non-metal raw materials (Seasonally unadjusted, 2015 = 100%)

Producer prices for metal ore mining in 2017 saw a slight growth of 8.9% but this could not compensate for the declines in 2013, 2014, and 2015. Here, prices were characterised by a relatively lower fluctuation than those of the other types of underground natural resources.

Producer prices for coal mining in 2017 showed a slight increase of 4.2% compared to the previous year, due to the slight decline in prices of energy carriers in the course of the year, as well as to the still shrunk electricity consumption. Coal prices were influenced by the prices of the other sources of energy, the high level of state regulation, and the long-term contracting of the supplies from two of the three coal-fired power plants in the East Maritsa coal basin.

With the mining of non-metal minerals and raw materials, prices are lower than those prior to the economic crisis. In 2017, they were characterised by a slight increase of 6.7% and a strong seasonal nature.

Conclusion

Data released by the IMF, Eurostat, and the NSI clearly indicate that in 2017 the Bulgarian economy reported a real growth of 3.6% and the prospects for 2018 and 2019 are for a moderate growth of 3.8% and 3.1% respectively. In 2017, this country's national economy was in a state of moderate inflation (2.1%), declining unemployment rate (from 7.6% in 2016 to 6.2% in 2017) with an increase of the gross monthly salary of 11.0% (from 1012 BGN in 2016 to 1123 in 2017), and a still shrunk domestic consumption.

The main factors for the weak economic growth of the Bulgarian economy are still the following: low budget receipts and the reduction of budgetary expenditures; the shrunk but growing consumption of the households; the weak and uncertain growth of exports; the low level of foreign investment; the rising prices of energy carriers, raw materials, and metals in a period of limited domestic consumption; the weak growth of the industrial sector, tourism, agriculture and construction; the low yet slightly increasing investment activity.

The high dynamics of commodity markets and the ongoing economic instability determine the high levels of uncertainty about future developments, which is why investors are still restraining their economic activity.

Unemployment and wage levels limit the incomes of the population and aggravate the welfare expenditure of the state, as a result of which the expectations for a significant increase in domestic consumption are still pessimistic.

The commitment of the Bulgarian economy to the countries of Central and Southern Europe predetermines the high degree of dependence of our national economy on the development of investment activity in these regions of the EU.

The prospects for the Bulgarian mining enterprises that operate in the fields of extraction and processing of metallic minerals have remained favourable despite the weak growth of the production and prices of metals in 2017. Due to the predominant export nature of the produced concentrates and end metals, the long-term prospects for the volume of production are bound up with the expectations for the development of the European and world markets.

While prices for metals were characterised by high dynamics and growth in 2017, they have remained at such levels that favour the efficient production of metals.

The future mining of energy coal is predetermined by the coal share within the energy mix, by the still limited domestic consumption of electrical energy, and by the weak seasonal growth in export levels.

Although the prices of energy coal in 2017 declined, they have remained at such levels that favour their efficient open-cast mining. However, underground coal mining is significantly lower, which limits investment and results in the reduction of production volume.

The Bulgarian enterprises from the area of mining and processing of industrial minerals declined in 2017 and the prospects remain pessimistic due to the limited consumption of products for the chemical and food processing industries in Europe.

In 2017, the construction sector of the economy witnessed a slight increase of 4.5%in the building activity, compared to the drop of 16.2% in 2016 in relation to 2015. Construction activity is expected to maintain its slight growth in the coming years. The consumption of building and rock-lining materials has remained at such levels that are still way behind the volumes before 2008. In the long terms, however, it is expected to gradually rise. The first half of 2018 has seen an increase in the total number of permits issued for the construction of residential, administrative, and other buildings, as well as a rise in the already started construction of new buildings. This is an indicator of the expected growth of construction output in 2018 and of the consequent increase in the production and consumption of building and inert materials.

Considering the non-renewable nature of mineral resources, the sustainable development of the global, the European, and the Bulgarian economies is impossible without increasing their production and consumption. This sets high requirements to the individual companies in Bulgaria concerning the solving of the tasks for the long-term provision of the necessary energy, metal, industrial, and building materials, the demand of which will continue to rise in the future.

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OIL - STATE, TRENDS AND SUSTAINABLE DEVELOPMENT

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ABSTRACT. The previous decades have been characterised by the intensive use of fluid (liquid and gaseous) energy sources in all spheres of economic life. The studied, summarised and analysed quantified information about global reserves and production-consumer dynamics of energy raw materials has shown that, without being leading as a natural resource compared to other energy sources, fluids are dominant as global consumption. Although their relative share has declined in the energy mix, their overall consumption is growing. It is driven by the development of technologies based on fluid fuels and the increase in proven reserves as a result of the huge investments in prospecting and exploration operations. In general, after the 1970s, oil consumption has doubled, and the consumption of natural gas has risen almost 9 times. This shows a sustained tendency for global development to be largely dependent on fluid hydrocarbon energy resources, particularly oil, which is contrary to the principles of sustainable development of the planet. The established trends are alarming and require real changes in global, regional and national policies in the energy sector and in particular the oil sector.

Key words: fluid energy resources, reserves, production, consumption, development.

ПЕТРОЛЪТ - СЪСТОЯНИЕ, ТЕНДЕНЦИИ И УСТОЙЧИВО РАЗВИТИЕ

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РЕЗЮМЕ. Предходните няколко десетилетия се характеризират с интензивното използване на флуидните (течни и газообразни) енергийни суровини във всички сфери на стопанския живот. Проучената, обобщена и анализирана количествена информация, относно световните запасите и производствено–потребителската динамика на енергийните суровини показва, че без да са водещи като природна даденост спрямо другите енергийни източници, флуидните са доминиращи като световно потребление. Независимо, че в енергийния микс техният относителен дял намалява, общото им потребление расте. То е продиктувано от развитието на технологиите, базирани на флуидните горива и на увеличаване на доказаните от тях запаси в резултат инвестирането на огромни средства в търсещи и проучвателни работи. Като обобщаващ резултат за периода след 1970 година потреблението на петрол се е удвоило, а на природния газ увеличението е почти 9 пъти. Това показва устойчива тенденция за екстензивна зависимост на глобалното развитие от флуидните въглеводородни енергийни суровини, в частност от петрола, което е в противоречие с принципите за устойчиво развитие на планетата. Установените тенденции будят безпокойство и са сигнал за необходими реални промени в световната, регионалните и националните политики в енергийния сектор и в частност на петролния.

Ключови думи: флуидни енергийни ресурси, запаси, производство, потребление, развитие.

Introduction

The rapid growth of the economy, the population growth and the improved quality of life worldwide have led to an increase in energy consumption that has grown 2.7 times in only forty-five years. Historical review [1,2] showed three stages in the development of global primary energy consumption and the contribution of fossil fuels (coal, oil and natural gas) to energy generation. *The first stage* is characterised by the introduction of coal around 1860 into global primary energy consumption. Shortly before World War I, coal accounted for 80% of global energy consumption. *The second stage* began after 1913 with the penetration of oil and natural gas into the world's primary energy consumption. In the mid-1960s, they already had a significant share of energy consumption, about 40% and 20%, respectively. *The third stage* began in the 1970s and continues today, where oil occupies a leading position in global primary energy consumption.

In the current structure of global primary energy consumption, besides the fossil hydrocarbon energy resources (oil, natural gas, coal), other types such as uranium, hydro-renewable (water, wind, solar, geothermal, biofuel) and products from anthropogenic activities (biomass, waste) are also included. Table 1 presents the primary energy consumption by types of energy sources in the period 1970-2016 [3].

The data show that the contribution of oil to the generation of primary energy for the period has increased 2 times. At the same time, its share in the energy mix of primary energy has decreased from 46% to 33% [5]. There is a start of a new period of reallocation of energy sources in the primary energy mix, with an increase of the share of natural gas and a decrease of coal's share. Oil consumption will continue to increase, and by 2040 growth will be around 0.5-0.6% per year according to the estimations [3]. The hybrid and electric transport machines will increasingly affect the demand for petroleum derivatives. Oil will be mainly sought for the production of lubricants, bitumen and as a raw material for the petrochemical industry.

The current state of the global oil sector and in particular of individual regions and countries, as with other fossil-based hydrocarbon sources (coal and natural gas) [2], is characterised by other contradictory features:

Table 1.

Global Consumption of Primary Energy Sources 1970-2016

Year/Energy sources	1970		1980		1990		2000		2010		2016		2020**	
	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%	Mtoe	%
Oil	2253	45.9	2986	45.0	3153	38.7	3580	38.1	4021	33.0	4418	33.3	4564	32.0
Coal	1483	30.2	1813	27.3	2246	27.6	2385	25.4	3636	29.9	3732	28.1	3697	25.9
Natural gas	890	18.1	1291	19.4	1767	21.7	2182	23.2	2874	23.6	3204	24.1	3534	24.7
Hydro-	266	5.4	385	5.8	487	6.0	601	6.4	779	6.4	910	6.8	1015	7.1
Nuclear- (uranium)	18	0.4	161	2.4	453	5.6	584	6.3	626	5.2	592	4.5	674	4.7
Renewables*	2	0.0	7	0.1	35	0.4	59	0.6	234	1.9	420	3.2	794	5.6
Total	4912	100	6642	100	8141	100	9391	100	12170	100	13276	100	14278	100

*Renewables: wind, solar, geothermal, biomass, biofuel

** Estimates of BP, 2018

- ✓ uneven distribution of oil reserves in the various regions of the world;
- ✓ uneven production and consumption of petroleum energy raw materials in the different regions of the world;
- ✓ disproportion between the volumes of proven oil reserves worldwide and their share in the global energy production and consumption.

The current stage, the peculiarities in the development of the petroleum sector and its still high importance for the energy sector, require presenting and analysing the state of reserves, production and consumption of oil and its role in the global energy sector as a whole and in particular in individual regions, in the context of the Concept for sustainable development [6,7].

World oil reserves

The proven world reserves of fossil hydrocarbon energy sources are presented in Figure 1 [4,5] for 1995-1996, 2005-2006 and 2015-2016. Quantitative data show that oil reserves are significantly smaller than coal reserves and larger than those of natural gas.

The quantitative distribution of world oil reserves and the distribution of reserves by regions over the three ten-year periods from 1987 to 2016 are presented in Figure 2. The data show that the distribution of oil reserves by region is rather uneven over the period. For the thirty year period, there is a steady upward trend in world oil reserves. The increase in global oil reserves is 1.9 times, and the increase in the different regions is as follows: for North America 2.2 times, for South and Central America 4.8 times, for Europe and Eurasia 2.1 times, for the Middle East 1.4 times, for Africa 2.2 times and for Asia-Pacific 1.2 times.

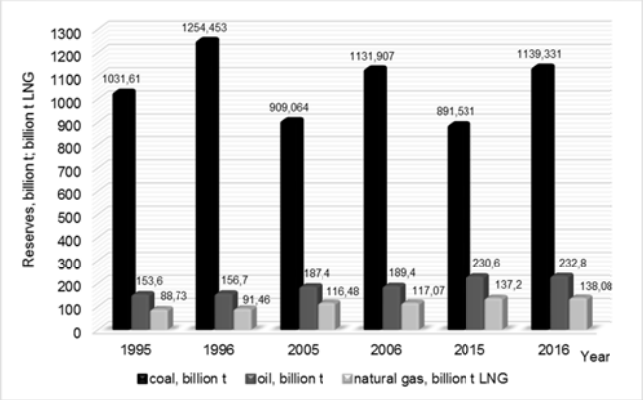

Fig.1. Proven World Reserves of Primary Hydrocarbon Energy Sources (1995-1996, 2005-2006, 2015-2016), billion t.

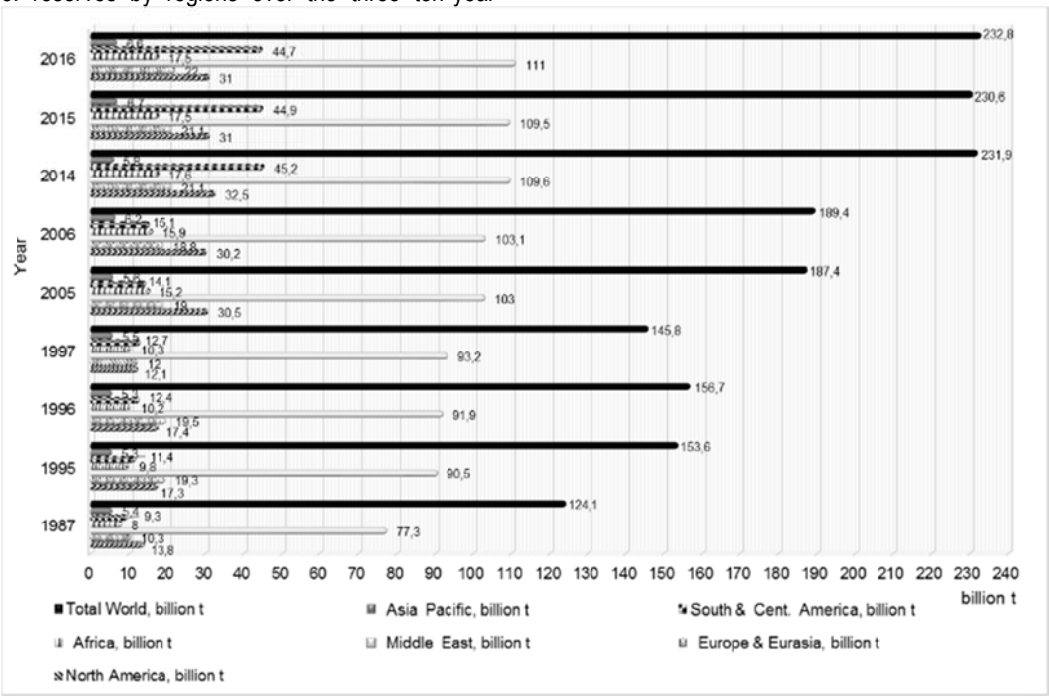

Fig.2. Proven World and Regional Oil Reserves for the period 1987 - 2016, billion t.

By sustaining oil production in the regions concerned at 2016 levels, the reserves will ensure the consumption in North America for 35 years, South and Central America for 116 years, Europe and Eurasia for 26 years, the Middle East for 74 years, Africa for 47 years and Asia-Pacific for 17 years.

In 2016, 80.3% of global oil reserves were concentrated in the following regions: the Middle East (47.7%), South and Central America (19.2%) and North America (13.4%). The other 19.7% of global reserves were distributed in Europe and Eurasia (9.4%), Africa (7.5%) and Asia-Pacific (2.8%). For the same year, 85% of the world's oil reserves were distributed in 10 countries - Venezuela (17.6%), Saudi Arabia (15.6%), Canada (10.0%), Iran (9.3%), Iraq (9.0%), Russian Federation (6.4%), Kuwait (5.9%), UAE (5.7%), the United States (2.8%) and Libya (2.8%).

The distribution of oil reserves in the countries of the regions concerned is also very uneven. For 2016, oil reserves in the regions concerned were distributed in the following countries as follows:

- for North America - 75.4% in Canada, 21.1% in the United States and 3.5% in Mexico,
- for South and Central America - in Venezuela 91.8%, Brazil 3.8%, Ecuador 2.4% and Argentina 0.7%;
- for Europe and Eurasia – in the Russian Federation 67.8%, Kazakhstan 18.6%, Norway 4.7% and Azerbaijan 4.3%;
- for the Middle East - in Saudi Arabia 32.8%, Iran 19.5%, Iraq 18.8%, Kuwait 12.5%, UAE 12.0% and Qatar 3.1%;
- for Africa - in Libya 37.8%, Nigeria 29.0%, Algeria 9.5%, Angola 9.1%, Egypt 2.7%, South Sudan 2.7%, Gabon 1.6%, R Congo 1.2%, Chad 1.2% and Sudan 1.2%;
- for Asia-Pacific - in China 53.1%, India 9.7%, Vietnam 9.1%, Australia 8.3%, Malaysia 7.4%, and Indonesia 6.8%.

World production and consumption of oil

Figure 3 presents quantitative data on the world production and consumption of primary energy sources in the period 1997-2016. After overcoming the price shock in the 1970s, until 2003, oil had a leading role in the production and consumption of primary energy raw materials, followed by coal and natural gas. From 2003 to 2016, coal production and consumption outpaced that of oil and natural gas. For the period under review, there is a steady trend towards increasing world production and consumption of primary energy raw materials. Oil production and consumption has increased 1.3 times, and coal and natural gas - 1.6 times.

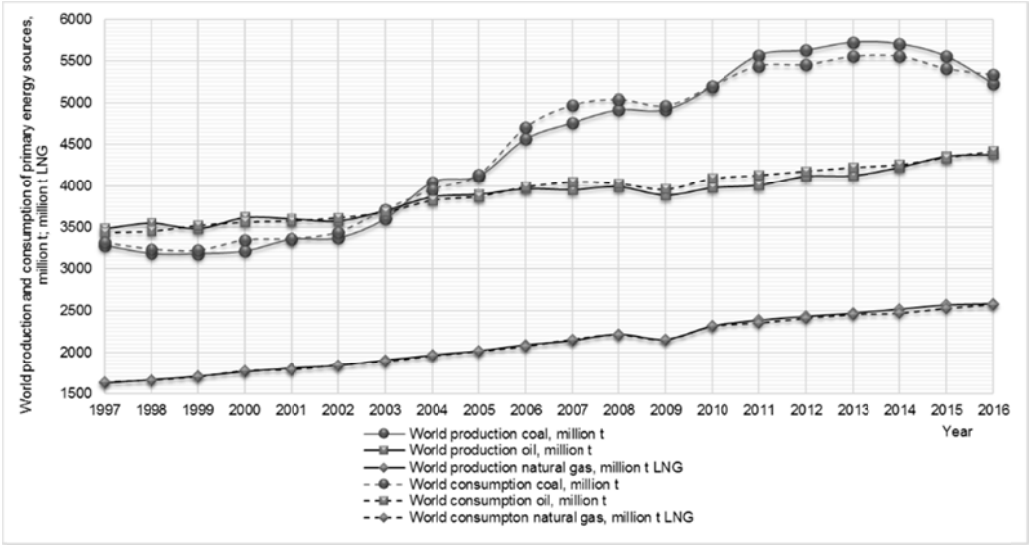

Fig.3. World Production and Consumption of Primary Energy Sources, 1997-2016

Comparative quantitative data on regional production and consumption of oil between 1997 and 2016 are given in Table 2. The share of regional production and consumption of oil in the world is also presented.

Table 2. *Regional Production and Consumption of Oil for 1997 and 2016*

Region	Production				Consumption			
	1997		2016		1997		2016	
	Million t	%	Million t	%	Million t	%	Million t	%
North America	670.4	**19.26**	882.6	**20.14**	1012.3	**29.49**	1046.9	**23.69**
S. & Cent. America	329.1	**9.46**	384.5	**8.77**	220	**6.41**	326.2	**7.38**
Europe & Eurasia	688.6	**19.79**	860.6	**19.64**	936.4	**27.27**	884.6	**20.02**
Middle East	1050.7	**30.19**	1496.9	**34.16**	211.7	**6.17**	417.8	**9.46**
Africa	370.3	**10.64**	374.8	**8.55**	108.9	**3.17**	185.4	**4.2**
Asia Pacific	370.8	**10.66**	383	**8.74**	943.9	**27.49**	1557.3	**35.25**
Total	3479.9	100	4382.4	100	3433.2	100	4418.2	100

The Middle East, North America and Europe and Eurasia have a leading role in oil production, accounting for 69.2% in 1997, and 74% of world oil production in 2016. For all regions, there is an increase in oil production in 2016 compared to 1997, which is 1.4 times for the Middle East, 1.3 times for North America, 1.2 for South and Central America, for Europe and Eurasia 1.2 times, for Africa 1.01 times and for Asia-Pacific 1.03 times. The leading region for oil consumption for 1997 was North America, followed by Asia-Pacific, and Europe and Eurasia, with the three regions accounting for 84.5% of world oil consumption. Data for 2016 show that there is a redistribution in oil consumption, with Asia-Pacific being the region with the highest consumption, followed by North America and Europe and Eurasiia. The three regions for the same year account for 79% of the world's oil consumption. For the twenty-year period, oil consumption has grown in most regions: the Middle East 2 times, Asia-Pacific 1.7 times, South and Central America 1.5 times, Africa 1.3 times and North America 1.03 times. In Europe and Eurasia, oil consumption has dropped 1.06 times.

Regional production and consumption of oil for the period from 1997 to 2016 is presented in Figure 4.

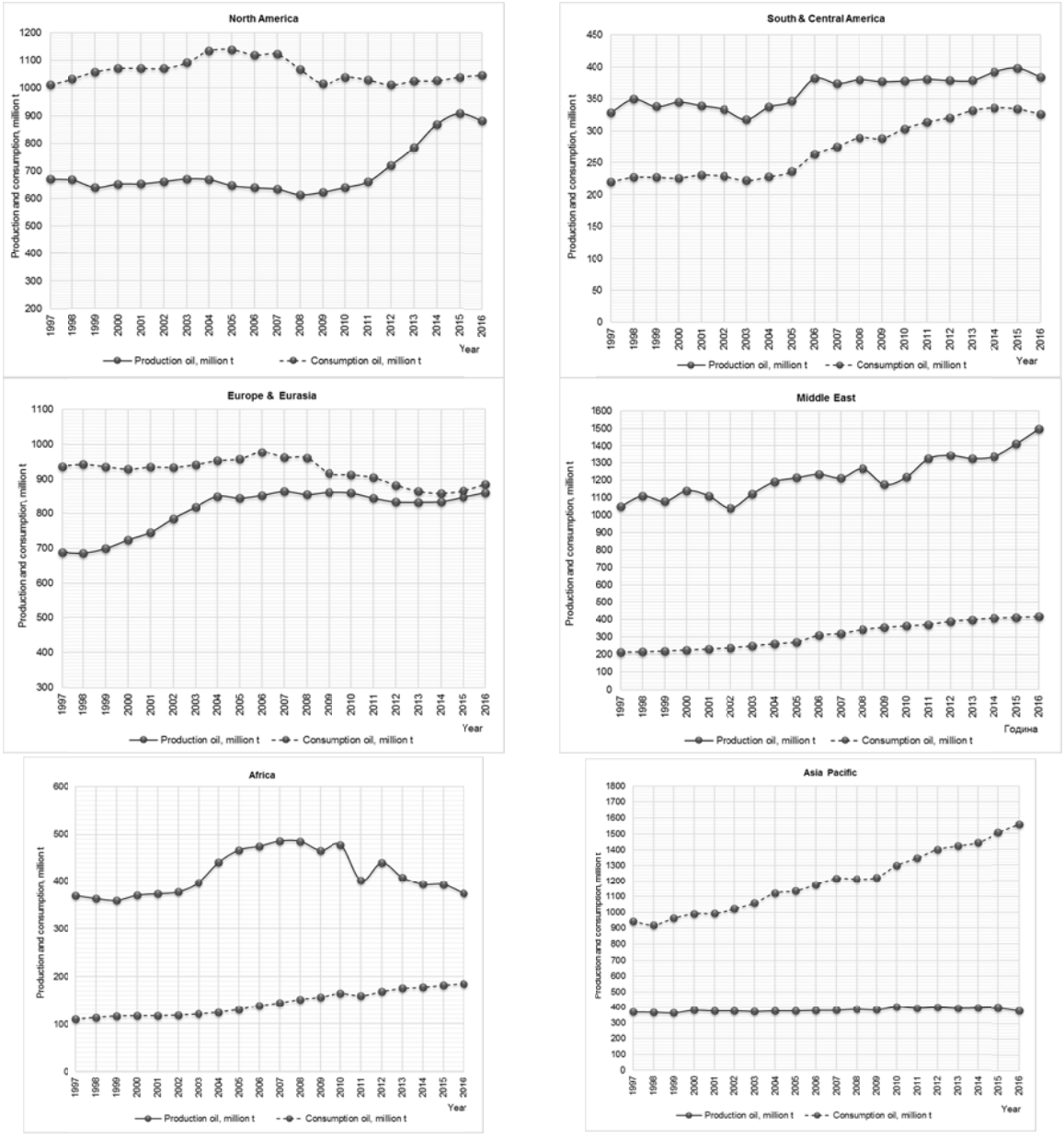

Fig.4. Production and Consumption of Oil by Region, 1997-2016

In ***North America***, from 1997 to 2013, coal is the leader in the production of primary energy raw materials, followed by oil and natural gas production. After 2014, there is redistribution in the production of primary raw materials – the oil production is in the lead, followed by natural gas and, finally, coal. The region occupies the 2nd place in world production and consumption of oil for 2016, respectively with a share of 20.1% and 23.7%. In the consumption of primary energy raw materials, oil has a leading role throughout the period presented. In North America, for the period, the United States occupies a leading position in both the production and consumption of primary energy raw materials. In 2016, oil production in the region was distributed in the following way: 61.5% in the USA, 24.7% in Canada and 13.8% in Mexico, and

consumption - 82.4% in the USA, 9.6% in Canada and 7.9% in Mexico. For the same year, the USA occupies the 3rd place with a share of the world oil production of 12.4% and the 1st place in oil consumption with 19.5 %. In ***South and Central America*** for the period both in the production and consumption of primary energy raw materials, the first place is occupied by oil, followed by natural gas and coal. In 2016, with a share of 8.8% of world oil production, 95.6% of its production in the region is divided between five countries - Brazil 35.5%, Venezuela 32.3%, Colombia 12.7% Ecuador 7.6% and Argentina 7.5%. For 2016 Brazil holds the 10th place in world oil production with 3.1%. With 7.4% of world oil consumption, the consumption in the region is mainly spread across eight countries, with Brazil in the lead (42.5%), followed by Argentina (9.8%), Venezuela (8.8%), Chile (5.5%), Colombia (4.9%), Peru (3.5%), Ecuador (3.4%) and Trinidad and Tobago (0.7%). In ***Europe and Eurasia*** for the period presented, the consumption of primary energy raw materials outpaces their production. In both production and consumption, oil has the leading role, followed by natural gas and coal. In 2016, Europe and Eurasia ranked third in global oil production and consumption with a share of 19.6% and 20.0%, respectively. 96.7% of oil production in the region is distributed in the following countries: 64.4% in the Russian Federation, 10.5% in Norway, 9.2% in Kazakhstan, 5.5% in the United Kingdom, 4.8% in Azerbaijan, 1.5% in Turkmenistan and 0.8% in Denmark. In terms of world oil production, the Russian Federation occupies 2nd place with 12.6%, while consumption is 6th with 3.3%. 86% of the oil consumption in the region are distributed as follows: 16.7% Russian Federation, 12.8% Germany, 8.6% France, 8.3% United Kingdom, 7.1% Spain, 6.6% Turkey, 4.5% Netherlands, 3.6% Belgium, 3.1% Poland, 1.7% Greece, 1.7% Sweden, 1.5% Kazakhstan, 1.4% Austria, 1.3% Portugal, 1.2% Norway and 1.1% Switzerland. *The **Middle East***, for the period, ranks 1st in world oil production. For 1997, the region has a share of 30.2% of world oil production, which in 2016 has grown to 34.2%. For 2016, oil production is 3.6 times larger than consumption. For 2016, 99.2% of regional oil production is distributed in the following countries: Saudi Arabia 39.1%, Iraq 14.6%, Iran 14.5%, UAE 12.2%, Kuwait 10.2% , Qatar 5.3% and Oman 3.3%. In terms of world oil production, Saudi Arabia ranks 1st with a 13.4% share, followed by Iraq ranked 4th with a 5.0% share, Iran 6th with a share of 4.9 %, UAE 8th with a share of 4.2% and Kuwait 9th with a share of 3.5%. For the same year, 81.6% of regional oil consumption is allocated to Saudi Arabia with 40.2%, Iran 20.1%, UAE 10.4%, Kuwait 5.3%, Qatar 2.8%, and Israel 2, 8%. In ***Africa*** for the period, the production of primary energy raw materials is significantly higher than their consumption. For example, for 2016, oil production is twice as much as its consumption, coal 1.6 times, and natural gas 1.5 times. Leading role in the production of primary energy raw materials has oil, followed by coal and natural gas. With a share of 8.6% of world oil production, its production in the region is mainly distributed in the following countries: Nigeria 26.4%, Angola 23.4%, Algeria 18.3%, Egypt 9.0%, Libya 5, 3%, Equatorial Guinea 3.5%, Republic of the Congo 3.2%, and Gabon 3.0%. With 4.2% of world oil consumption, the consumption in the region is mainly distributed in the following countries: Egypt 21.9%, South Africa 14.5% and Algeria 10.2%. ***Asia-Pacific*** account for 8.7% of world oil production. With a share of 4.6%, China ranks 7th in world oil production and 1st in the region with 52.1% of regional oil production. In regional oil production, Indonesia also has 11.2%, India 10.5%, Malaysia 8.5%, Thailand 4.6%, Vietnam 4.25%, Australia 4.1%. Oil consumption in the region is 4.1 times larger than its production. By oil consumption, the region ranks 1st in the world, accounting for 35.2% of world consumption. China is ranked 2nd in global oil consumption with a share of 13.1%, in the 3rd place is India with 4.8%, Japan - 4th place with 4.2% and the 8th place is for South Korea with 2.8%. 93% of regional oil consumption is distributed in the following countries: China 37.2%, India 13.7%, Japan 11.8%, South Korea 7.8%, Singapore 4.6%, Thailand 3.8% Australia 3.1%, Taiwan 3.0%, Malaysia 2.3%, Pakistan 1.8%, Vietnam 1.3%, Philippines 1.3%, and Hong Kong 1.2%.

Index of use of the world's oil reserves. World production and consumption of oil per capita

The data presented are undisputed evidence that during the period under review the global trends in oil production and consumption are steadily growing and there is about 30% growth. The increase is clearly inconsistent with the goals of resource saving and efficient use of natural resources as set out in the UN Secretary-General's Report [8] in 2014 and in the UN General Assembly Resolution [9] in 2015. Growth encompasses almost all mineral raw materials, and it is more than 80% over the last thirty years [10]. These tendencies have been formed and developed under the mutual influence of various factors - technological, economic, social, natural and others. The current state of the planet is most dependent on the growth of the world's population and the economic activity of some countries from the respective regions belonging to leading economic groups (China, India, Brazil, Russia, USA, etc.) which is measured by the produced GDP. These deepening processes from year to year are becoming more and more difficult to manage and are an indisputable argument that mankind, despite its vast technological advances, uses natural resources extensively. The problems were discussed at the Second World Resources Forum in Davos in 2011 [11] by EU Environment Commissioner Dr. Janek Potočnik, who said that "the world needs not economic growth but transformation of the economy" and "if we continue to use the available resources at the current rate, resources equivalent to two planets will be needed to sustain it."

The above is also confirmed by the data presented in Fig. 5 about the change in Global Reserves Utilization Index (GRUI) for oil and the oil production and consumption per capita. It can be seen that for twenty years the world has been producing and consuming almost the same quantities of oil. There is a tendency for development of the oil energy sector at a rate commensurate with the growth rates of the population, i.e. every newborn is a prerequisite for increasing the profits of the companies in the "oil reserves - end needs" technology chain, but unfortunately this is being done through the involvement of new and new petroleum raw materials. These arguments, which provide indirect evidence that the world is on the path of declining energy supply with oil, are also confirmed by the GRUI analysis. The GRUI, as an indicator reflecting the rate of depletion, has adopted and maintains values according to which oil reserves can be judged critical [12]. Similar conclusions can be made in the analysis of the indicator of supply with petroleum energy raw materials. The data in Figure

6 show that, at current consumption rates and proven quantities, the world is reliably secured with oil for up to 5 decades.

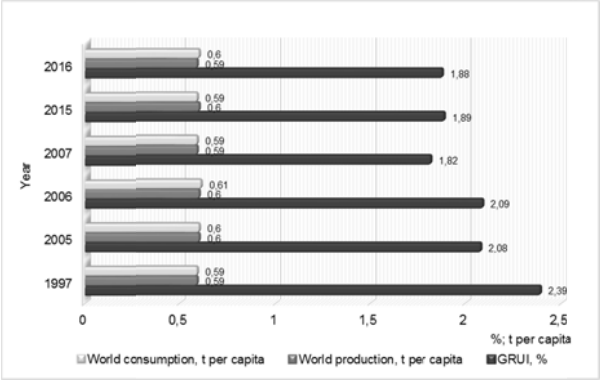

Fig.5. Global Reserves Utilization Index (GRUI), World Oil Production and Consumption per Capita, 1997-2016

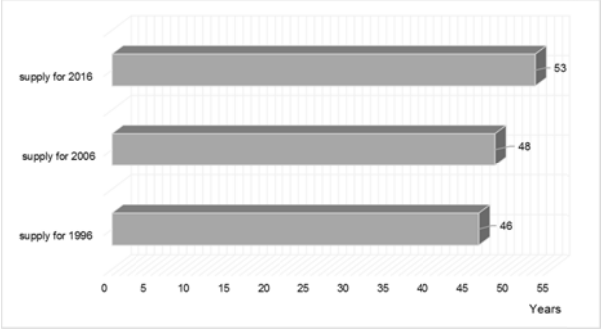

Fig.6. Global Supply with Petroleum Energy Raw Materials for 1996, 2006 and 2016

Conclusion

At the beginning of the third millennium, mankind has increased its strong energy dependence on petroleum raw materials and with a share of 33.3% they continue to have a leading place in the world primary energy consumption. The analysis of the processes over the previous decades has made it possible to outline an objective picture on the development and state of world oil reserves, production and consumption. Based on this, the following more important trends can be defined:

- There is a steady increase in world reserves, production and consumption of oil, which have almost doubled in three decades. Such a process is inherent in development of a *technogenic* type and is in contradiction with the requirements for increasing the efficiency of energy consumption as an important component of the green and the circular economy;
- There is an increasing disproportion between the amount of regional/country oil reserves and their share in regional/country production and consumption of oil;
- Over the past decades, the level of individual consumption (per capita) of oil has been maintained; i.e. the oil production and consumption is commensurate with the increase in the population. For the 1995 - 2016 period, the Earth's population has grown 1.3 times (30% growth as compared to 1995);
- Notwithstanding the exploration of new deposits, the tendency for decreasing the global oil supply is becoming more and more sustainable and deepening.

The outlined trends show that the world is currently governed by its *extensive* attitude to oil resources. Unfortunately, all reported data and trends point to emerging and deepening problems which have current and long-term manifestations. Their solution is a task of fundamental importance to the economic, social and environmental future of the world.

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VALUE ADDED DYNAMICS OF THE BULGARIAN MINING INDUSTRY

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ABSTRACT. This study is dedicated to the value added of the Bulgarian mining industry for the period 2000-2016. Using statistical methods, an analysis of this important macro indicator is made and some main trends are derived. On this methodological basis, by comparing the achieved status and dynamics, the value added is studied on a national and European level. The critical review of the results is a base for conclusions about the progress, potential and importance of the mining sector for the Bulgarian economy.

Key words: value added, mining industry, macroeconomic analysis, macroeconomic indicator

ДИНАМИКА НА ДОБАВЕНАТА СТОЙНОСТ НА БЪЛГАРСКАТА ДОБИВНА ПРОМИШЛЕНОСТ

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РЕЗЮМЕ. Настоящото изследване е посветено на добавената стойност на българската добивна промишленост за периода 2000-2016 г. Чрез използване на статистически методи е направен анализ на този значим макроикономически показател и са изведени водещи тенденции. На тази методическа основа е извършена съпоставка на състоянието и постигнатата динамика на добавената стойност в национален и европейски контекст. Критичният анализ на резултатите дава основание за обобщения за напредъка и значимостта на сектора за икономиката на страната.

Ключови думи: добавена стойност, добивна промишленост, макроикономически анализ, макроикономически показател

Introduction

The latest data on the index of total mineral extraction, published by the Bulgarian Chamber of Mining and Geology, show that for Bulgaria it is 11 tons/person (Ministry of Economy, Energy and Tourism, 2012), which is above the average globally. This gives grounds to define Bulgaria as a "mining state". In recent years, the country ranks third in the mining of copper, fourth in the mining of gold and fifth in lignite mining in Europe (Bulgarian Chamber of Mining and Geology, 2017). With these key positions on the continent, Bulgaria is confirming as an important and promising market player. Indeed, the mining industry is of strategic importance for the development of the Bulgarian economy. Many other industries are directly or indirectly linked to the extraction of mineral resources, including metallurgy, chemical industry, electrical engineering, construction, transport, information and telecommunication technologies. The sector's contribution to the development of the economy should be sought in three directions: its added value, its role in providing basic resources for other sectors and in increasing value added along the supply chain. From a macroeconomic point of view, Bulgarian mining industry provides an average of 4-5% of GDP, which confirms its important role for the economy and the welfare of individual municipalities (Bulgarian Chamber of Mining and Geology, 2014). The sector occupies an important place in the export list of the country. Its products account for about 2.4 billion EUR of export revenue at national level, which justifies the substantial contribution to the country's total exports. In recent years, it provides direct employment to more than 23 000 people and induces employment to another 120 000 people in the sectors servicing the branch, forming 0.8% of national employment. According to the National Statistical Institute (NSI) data for 2015, 386 companies and organizations are engaged in prospecting, extracting and processing of mineral resources and related activities and services. Mining enterprises, in comparison to other industrial plants, are determined by the object of their activity – the mineral resources and the related requirements for organizing and realizing the production activity (Velev, 2011). An actual analysis of the Branch Chamber shows that compared to the European ones, they are predominantly profitable and competitive, providing quality and production convertible on the international markets (Bulgarian Chamber of Mining and Geology, 2017).

At the same time, the Bulgarian mining industry brings a number of social benefits for various groups of stakeholders – state, local communities, employees, customers and suppliers. Mineral resources found in Bulgaria have great production importance, and consequently economic one, as raw materials from which end products are produced. By 2017, 1383 deposits of mineral resources have been identified. 218 of them are of metallic minerals, 225 – of industrial minerals, 21 – of oil and gas, 45 – of solid fuels, 688 – of building materials, 186 – of rock-lining materials [5]. As of 2017, a total of 520 concessions for extraction of mineral resources are active: 18 – of metallic minerals, 73 – of industrial minerals, 18 – of oil and gas, 16 – of solid fuels, 328 – of building materials, 69 – of rock-lining materials, and 1 – of mining waste (Bulgarian Chamber of Mining and Geology, 2017). Lignite, lead-zinc, copper and polymetallic ores, gypsum, limestone, bentonite, kaolin, quartz sands, refractory clay and marble are among the main raw materials extracted. As a result, according to the data of the NSI, total mineral extraction in 2016 was 97.68 million tons, and operating revenues were 1.3 billion EUR. In recent years, extraction of metallic minerals has the biggest contribution to the total value of production (53% of total extraction). There are permanent trends in the distribution of mineral extraction from 2010 to 2016: solid fuels and metallic minerals have a relatively constant production increase and the biggest share in mineral extraction. The companies with activities in ore mining continue to lead, with an income of 326 million EUR. The companies with activities in coal mining follow with 195 million EUR. Together they account for nearly 70% of the total revenues of the mining industry (Bulgarian Chamber of Mining and Geology, 2017).

Status and Dynamics of Value Added of the Mining and Quarrying Sector in Bulgaria

No indicator can give a complete picture of the state of the economy, at best, it can give a general idea of the conditions of a particular sector of the economy at a specified time (Маринов, 2013). Gross value added is a good measure of the contribution of a sector to the total production. It reflects the value of goods and services produced on a certain territory over a given period, and it represents the difference between the end value of the production and the value of the goods and services spent for its producing (i.e. intermediate consumption). It is believed that this indicator in a pure form characterizes the outcome of the economic activity and then measures it by the value added created during the production of goods and services by the resident units within the economic territory of the country (Стойкова-Къналиева и др., 2016). The dynamics of the value added of the Mining and Quarrying[1] sector during the period 2000-2016, which is a subject of research interest, is graphically presented on Figure 1.

As Figure 1 shows, at the beginning of the studied period – from 2000 to 2002, the sector's value added in absolute terms is around 200 million EUR per year (at current prices). With slight cyclical fluctuations of nearly seven years, it increases steadily in the next years. At the end of the period, it reached its highest values around 900 million EUR per year. The data presented here testify to a steady increase in value added, with positive trends. During the studied 17-year period, the highest value added is recorded in the last three years – 2014 (972.9 million EUR), 2015 (963.8 million EUR) and 2016 (952.9 million EUR). The prognoses are for even greater dynamics related to its gradual increase in perspective as a result of the significant potential of the sector.

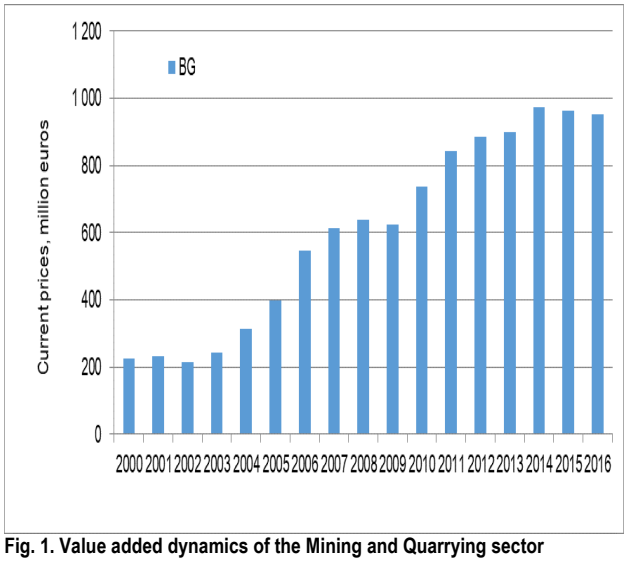

Fig. 1. Value added dynamics of the Mining and Quarrying sector
Source: Eurostat data.

To evaluate the benefits of the industry's functioning for the country's economy, it is necessary to present the value added in relative terms. Tracking the dynamics as share gives a realistic picture of the sector's contribution on the basis of a comparison. Such an approach reflects the importance of the sector in the overall economic picture at national level. The value added in a relative dimension of the Mining and Quarrying sector is presented on Figure 2.

Figure 2 shows that during the studied period the sector forms between 1.4% (2002) and 2.6% (2014) of the total value added in the Bulgarian economy. It is noteworthy that in the period 2009-2014 the share is growing steadily, and from 2014 slightly decreases. In 2016, this share is still significant (2.29%) despite the small number of companies and employees in the industry.

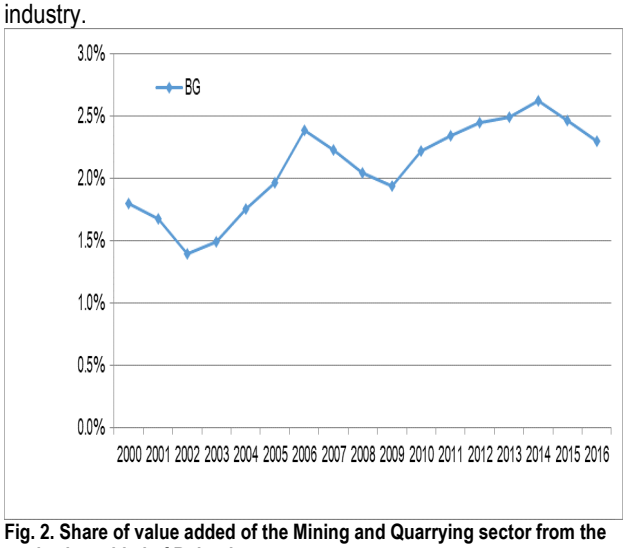

Fig. 2. Share of value added of the Mining and Quarrying sector from the total value added of Bulgaria
Source: Eurostat data.

[1] Mining and Quarrying refers to Sector B of NACE (KID2008 for Bulgaria).

The objectivity of the analysis requires tracking also the dynamics of the share of Mining and Quarrying industry in the whole Bulgarian industry, which is presented on Figure 3.

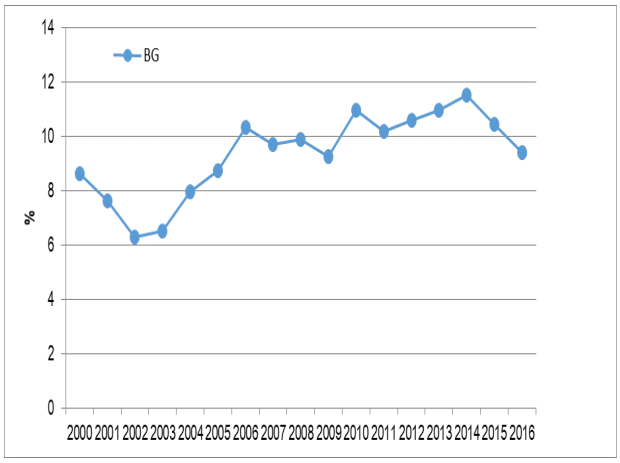

Fig. 3. Share of value added of the Mining and Quarrying sector in the total value added of the entire Bulgarian industry
Source: Eurostat data.

As Figure 3 shows, the share of value added of the extracting sector in the value added of the entire Bulgarian industry in the period 2000-2016 fluctuates between 6 and 12%. Value added should be considered together with the dynamics of the employees in the sector.

The number of employed people in the Mining and Quarrying sector is shown on Figure 4.

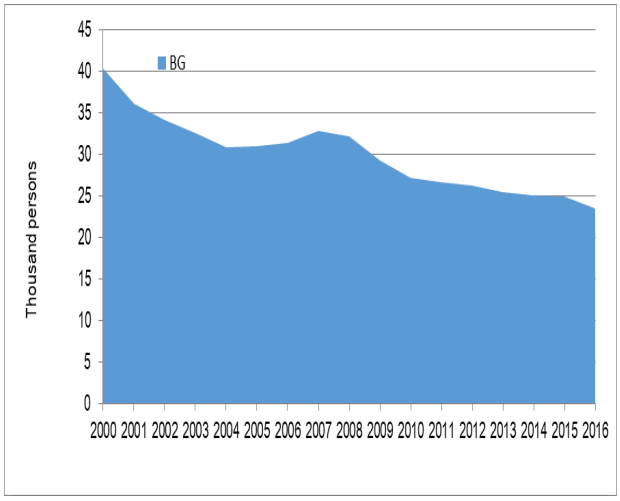

Fig. 4. Employed people in the Mining and Quarrying sector in Bulgaria
Source: Eurostat data.

In 2000, more than 40 300 people were employed in the sector. A serious decline started after 2007. Gradually, the number of employed people declined, and in 2016 it reached 23 400 people, or almost 40% reduction was registered. This decline can be explained by two significant circumstances. First, the release of workers in the coal mining sub-sector, given the bankruptcy of "Mina Cherno More" and the closure of "Babino" mine of "Vagledobiv Bobov Dol", is one of the reasons for the reported decrease. Second, it can be argued that the significant dynamics of the number of employees reflects the ongoing processes of mechanization and automation related to the introduction of modern technologies. As a direct consequence, the number of employed people, especially in low-skilled labor activities, is limited. Employment trends in the sector show a long and sustained decline. However, the Bulgarian Mining and Quarrying industry remains one of the largest employers at national level, an with annual salary of employees higher than the average. According to NSI data, in 2016 it was 8 454 EUR, compared to the average of 5 900 EUR.

Despite the decrease of the number of employed people in recent years, during the studied period there is an exceptional increase in the value added per employee, as shown on Figure 5.

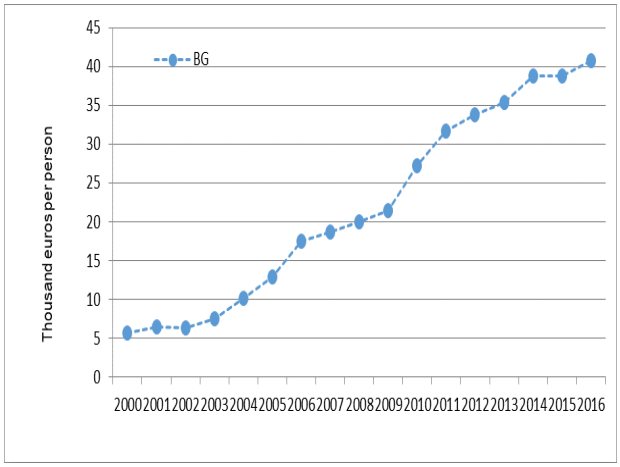

Fig. 5. Value added per employee in Mining and Quarrying sector
Source: Eurostat data.

Contemporary economics is characterized by new techniques and technology, permanent changes in normative basis, worsening labor market, negative demographic trend and fast growing old knowledge and skills of job applicants (Trifonova, 2017). While the number of employees in the Mining and Quarrying sector decreases steadily, the value added per employee rises sharply. For the whole studied period, the value added per employee has increased from nearly 5000 EUR to over 40 000 EUR, or almost 8 times in 17 years. The values obtained show a significant contribution to the value added per employee compared with the contribution of the employed people in other sectors of the economy. At the same time, the production per employee increases, with labor productivity in the sector continuing to be more than 2.5 times higher than the industry average. This is due to the introduction of a number of innovations. The achieved high results are related to the significant capital investments in modern technologies and the investments in increasing the employees' qualification. These findings support the hypothesis of the Branch Chamber that the sector is characterized by a favorable environment for innovation and unused capacity for the introduction of high-tech productions, as well as relatively high efficiency of the used resources. The data confirm that Mining and Quarrying industry accounts for one of the highest labor productivity, exceeding the other sub-sectors in the industry sector and twice as high as the average for the

country. It is defined as a long-term activity, given that the full potential hasnot been completely used. It is therefore important to thoroughly analyze the value added from the mining activity and to determine the place of the Bulgarian Mining industry in the country's economy and the comparison with the other countries in Europe.

Bulgaria and Other Countries in 2015

Figure 6 shows the share of value added of the Extracting sector as part of the total value added in the EU countries in 2015.

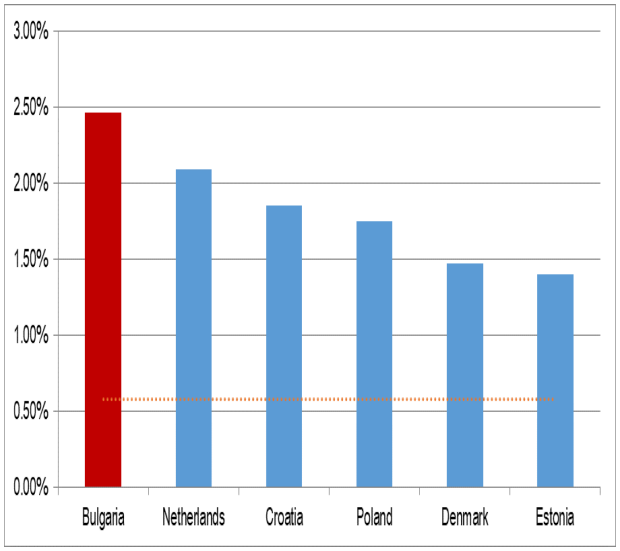

Fig. 6. Share of value added of Mining and Quarrying sector in EU countries
Source: Eurostat data.

It is clear that Bulgaria ranks first in the European Union in terms of the value added share of the Extracting sector in the total value added of the country – 2.5%, which confirms the importance of the sector. The next places are held by the Netherlands (2.10%), Croatia (1.85%), Poland (1.75%), Denmark (1.48%) and Estonia (1.40%). It is noteworthy to mention that Bulgaria has a 5 times higher share of the value added of the Mining and Quarrying sector compared to the average for the EU countries (0.58%).

At the same time, the country ranks third in the share of the value added of the Mining and Quarrying sector from all European countries, observed by Eurostat[2] (see Figure 7).

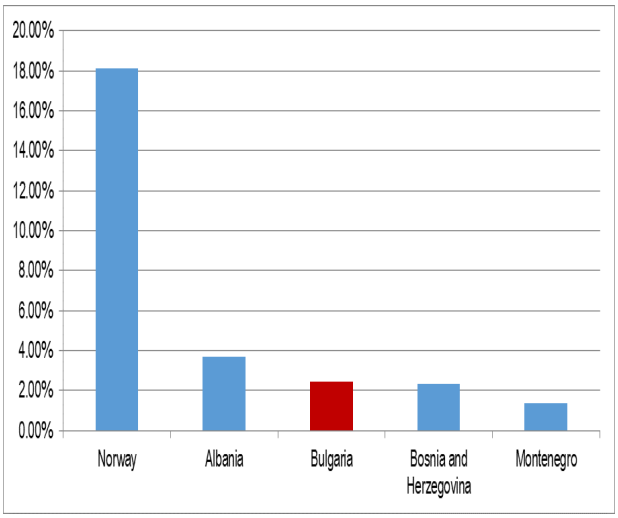

Fig. 7. Share of value added of Mining and Quarrying sector in European countries
Source: Eurostat data.

Only Norway (18.15%) and Albania (3.71%) are before Bulgaria. It is followed by Bosnia and Herzegovina (2.33%) and Montenegro (1.37%).

Conclusion

The presented data show that over the past 17 years the value added of the Mining and Quarrying industry has steadily increased: from 200 million EUR (2000) to 900 million EUR (2016). In relative terms, in 2016 the sector formed 2.29% of the total value added of the Bulgarian economy. The share of the value added of the Mining and Quarrying industry from the total value added of the Bulgarian industry was 9.4%. in 2016 Though the number of employed people in the sector has slowly decreased over the studied period, there is significantly higher labor productivity and higher value added. In 2016, the sector provided 2% of the production and 2.29% of the value added, accounting for only 0.8% of all employees nationwide. At European level, the comparison with the other EU member states shows that Bulgaria is the leader concerning the share of the value added of the Mining and Quarrying sector. Bulgaria occupies also top positions compared to all European countries. Thus, the analyzed data show the great importance and the confirmed role of the Bulgarian Mining and Quarrying industry as a sector with a significant contribution to the economy. It confirms the hypothesis, raised by the Chamber, that the sector could be characterized by innovation potential and investment attractiveness.

[2] Data include EU-28 countries and Iceland, Liechtenstein, Norway, Switzerland, Montenegro, Albania, Serbia, Turkey, Bosnia and Herzegovina.

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WORK MOTIVATION FACTORS AT THE BEGINNING OF EMPLOYMENT IN THE MINING COMPANIES

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ABSTRACT. Motivation for work is among the most studied factors in human resources management and management psychology. In modern socio-economic conditions, the role of human resources is essential for organisational success. The sustainable development of the sector depends on the investments in technology and personnel. The aim of the report is to summarize some factors connected with the work attitudes and the worries of the professionals at the beginning of employment in this sector. The study of work motivation in the mining industry supports the management of these companies to explore the potential of job candidates, their motives, habits and the characteristics of team interaction.

Keywords: work motivation**,** mining companies, human resources management, beginning of employment

ФАКТОРИ НА МОТИВАЦИЯТА ЗА ТРУД ПРИ ЗАПОЧВАНЕ НА РАБОТА В МИННО-ДОБИВНИТЕ ПРЕДПРИЯТИЯ

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РЕЗЮМЕ. Мотивацията за труд е сред най-изследваните фактори в управлението на човешките ресурси и управленската психология. В съвременните обществено-икономически условия ролята на човешките ресурси е определяща за организационния успех. Устойчивото развитие на бранша е свързано с технологични и кадрови инвестиции. Целта на доклада е обобщаване на факторите, предопределящи нагласите за работа и притесненията на кадрите при започване на работа, в този важен за икономиката ни подотрасъл. Изследването на мотивацията за труд в минно-добивната промишленост подпомага ръководствата на тези предприятия в изучаването на потенциала на кандидатите за работа, техните мотиви, навици и особености на екипното взаимодействие.

Ключови думи: мотивация за труд, миннодобивни предприятия, управление на човешките ресурси, започване на работа

Introduction

Work motivation as any other process is a dynamic system. It is a reflection of changing attitude of every person to habitat and the level of society development. Company activities become far more various and require different knowledge and skills. Employers search for more flexible and adaptive employees who could meet the new requirements of work. Employees, on the other hand, also have higher expectations from the work they are offered. Therefore, proper motivation factors should be used in modern socio-economic conditions.

The mining sector has strategic importance for the economic stability and energy independence of the country. At the same time the current state of the Bulgarian mining industry is an important part of the economic development both at regional and national level. (Гълъбова, Несторов, 2016, p. 118). But this industry also entails major risk for health safety and work efficiency of employees despite serious technical and technological renovation during last years. A guarantee for sustainable development of the sector are the innovations and investments in technologies and human resources. The aim of this report is to summarize all the factors that predetermine the work attitudes and the worries of the professionals at the beginning of employment in the mining industry, which is so important for our economy.

Main factors of motivation at the beginning of employment in modern companies

Nowadays, motivation cannot be isolated from the organisational culture in the company. That means, managers' influence, based on organisational values, should consider individual values, expectations and attitudes of employees. (Каменов, Захариев, 1998, p. 156) Motivation is understood as variety between people in the company. Therefore, different point of views about the methods for motivation should be recognized.

In specialized literature there are many explanations for a „motivation process ". Without naming authors, this is a process of cooperation between individuals which aim is to achieve goals. At the same time, influences could be external and internal. Content theories of motivation pay special attention to internal factors which provoke action. Motivation factors are related to the lack of something according to socio-culture environment and individual needs. On the other hand,

process theories consider that motivation is provoked by external factors. These are the circumstances that create a feeling, willing to compare, analyze and expect that something might happen, if another action is taken. These factors are topics for managers' influences and research.

Analyzing different approaches to motivation, a conclusion can be made that they do not give answers but help asking the right questions. Employee's willingness to work depends on too many **factors**. Historically, using **money as a reward and stimulus is an example for the main motivation factor for work.** Money as a means for remuneration is the obvious reward form. Nevertheless, money could help achieving different goals. They are mighty power because they are directly and indirectly bound with satisfying many needs. Most of the people are interested mainly in money. There are only few exceptions– when inner devotion to work overbears financial considerations. The efficiency of money as a means for improving the quality of work and increasing productivity depends on their relative assurance for achieving goals.

An important motivation factor is **increasing of empathy and identification with the organisation**. The aim is to integrate the company's needs with the individual's ones. Thereby, the employee could believe that when the organization gets profit with his/her help, he/she could also prosper personally. People would work harder, if they believe in the mission of the company and could identify with its values, goals and activities. But they would work even harder, if they know that achieving goals of the company will give them a bonus. (Steers, 2003, p.171)

There is motivation through **the work itself**. Offering fair and competitive salaries that give efficient financial impulses could increase identification and could provide long-term motivation through development of an inner system of stimulation. Inner impulses are in the essence of work and let people feel satisfied, express and use their abilities and exercise their power to take decisions.

Another factor is **the reward and recognition of achievements.** The system of salaries should make connection between rewards and achievements. On the other hand, we should give people more responsibilities (inner reward) and also more opportunities to increase their statute (external reward). Achieved rewards are good when they are deserved and then people appreciate them. The reward for well-handled work is an important motivator when it's real.

Establishing a united team attracts all its members. In this case there are two possible situations. The first one – the manager's enthusiasm is so catching that the team perceives it. But there is a second possible situation- the team works against the manager. Many systems for stimulation are destroyed by employees with low salaries. They join together against managers because they are afraid of failure. Activities for establishing a team aim at good connections and negotiation of negative influences of groups. (Mitchell, 1977, p.61). Even before starting work in a company, an employee can recognize a good team by its calm atmosphere, verbal and non-verbal communication, pleasant environment.

Programs for systematic education and development give people the opportunity to improve their knowledge and skills and to reach positions with bigger responsibilities. Different forms of training for increasing the qualification could be a way of showing that the company appraises the employee and reposes trust in him/her. Company education programs and especially local ones can support improving the identification of members with the organization. (Porter, 2003, p.191) The stable system of career growth is a very strong motivation factor for people in the beginning of their jobs.

Labour motivation factors are at the base of building the mechanism of motivation. One of the difficulties in this process is that every person has his/her own individual motivation structure. According to social state, needs, status, priorities in life, values, psychological and ethical characteristics of the person there are different motivation factors and forms of motivation. All of these marks should be taken into account during the process of creating a motivation mechanism.

In modern conditions the mechanism of motivation reports the influence of motivation factors, which further the development of work potential and lead to increase of work efficiency. The good match between material and ethical motivation allows managers to bring out top motivation factors when starting a new job at a certain company. Investments in cadres help teams to achieve maximum results.

Analysis of research among students of MGU „St. Ivan Rilski"

One of the main problems with recruitment in mine industry is the low motivation to pursue a professional career in industrial companies. In big companies in this sector the motivation factors are: high salaries, better work conditions, periodic development of methods and habits of work, human and environmental care. However, these circumstances are not well known, because media permanently focuses on problematic situations. This creates the impression of permanent risk to health, work efficiency and environment, along with low salaries and bad working conditions in mine companies. No attention is paid to the young people's basic impulses for work, such as the opportunities to grow and use new technologies and innovations. The study of work motivation in the mining industry supports the managements of these companies to explore the potential of job applicants, their motives, habits and the characteristics of team interaction.

In 2016/2017 a survey was made among second and third-year students from all courses of studies at the UMG „St. Ivan Rilski" (51 questionnaires). Positive answers (70% to 30%) to the question "Are you willing to work in a mining company?" prevail (Trifonova, 2017, p.24).The motives of those willing to work in this industry range from: useful, interesting, profitable, good conditions and prospects, chance to grow, to a dream job or because mining is the main source of income in the student's birthplace. Motives for negative answers are mainly because of the high levels of health risk, dirty air and physical difficulty. Based on the analysis of the additional information from the questionnaires, there are five main motivation factors in the beginning of employment in a mining company:

1. Good working conditions, including: safe work place, not physically demanding work, benefits like transport,

food, residence, team work, respect from management;
2. High salary, above the average;
3. Big companies with experience, modern technologies and engineering, integrated innovations, approved standards;
4. Development opportunity, professional realisation;
5. Environmental protection, decrease harmful effects.

In 2017/2018 all these factors were discussed at a meeting with IInd, IIIrd and и IVth year students from all courses of studies (114 students). 86% with full-time jobs and 14% not working or seasonal workers. The results, based on the discussion and voting for each factor, are shown on Fig. 1.

Most of the answers – 42% refer to the good working conditions, including: safe work place, not physically demanding work, benefits like transport, food, residence, team work, respect from management, while 21% selected the answer "high salaries". The reason is that all these answers are from already working students who have realized that the working conditions are more important than the salary. The students, who haven't started their jobs yet, are not aware of this need. They prefer big companies with experience, because of the bigger opportunities for application of new technologies and techniques. Environmental protection is also important to them. A small part of the students, 11%, chose the answer "development opportunity", mostly because young people do not understand this option. Students are not aware of the system for career growth in detail. Therefore, they could not estimate this factor with its real significance.

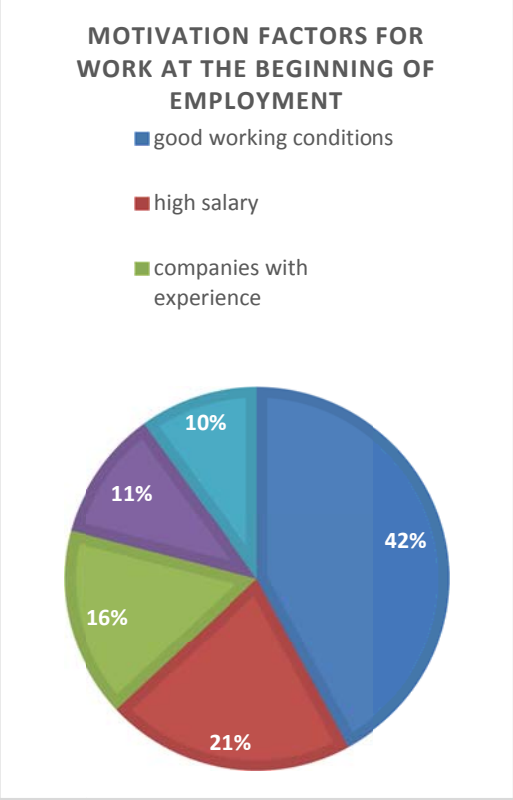

Fig. 1. Results from the survey

Conclusion

Work motivation factors are at the base of building the mechanism of motivation. In modern conditions a good match between material and ethical motivation allows managers to bring out top motivation factors in the beginning of work in a certain company and certain situation. In the process of hiring employees in the mining industry, the main factors are the good working conditions, even ahead of high salaries. Attention is paid to the high salaries (above the average for the country), preference for work in companies with experience, development opportunities and environmental protection, all of them important for the candidates.

There are good practices of using all these work motivation factors in the mining companies. The stable investment process with regard to the economical, ecological and social responsibility should be encouraged as it creates preconditions for the future development of the sector.

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INNOVATIVE PRACTICES IN THE MANAGEMENT OF A MINING COMPANY

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ABSTRACT. The report presents some innovative practices of three mining companies which have successfully applied the principles of the Open door policy. The application of this policy helps to improve and facilitate the human resources management and the process of communication with stakeholders, the receiving and reporting of feedback and conducting discussions. Generally, it establishes good working atmosphere, especially in terms of the modern need for constant changes at all corporate levels. The policy could also contribute to the improvement of the economic performance. In this sense, based on a critical analysis of current practices, the opportunities for its application in the management process of the mining company are summarized. Open Door Policy is a modern management tool that affects different key aspects. On this basis some guidelines for increasing the effectiveness of this process and for acquisition of strategic advantages are justified.

Keywords: Open door policy, mining company, innovative management practice, economic efficiency, mining industry

ИНОВАТИВНИ ПРАКТИКИ ПРИ УПРАВЛЕНИЕ НА МИННО-ДОБИВНОТО ПРЕДПРИЯТИЕ

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РЕЗЮМЕ. В доклада са представени иновативни практики на три минно-добивни предприятия, които прилагат успешно принципите на Политиката на отворени врати. Използването на тази политика спомага за подобряването и улесняването на процеса на комуникация със заинтересованите страни, получаването и отразяването на обратна връзка и провеждането на дискусии на широка основа. По този начин се установява добра работна атмосфера, особено в условията на необходимост от постоянни промени на всички нива, и се изгражда позитивен корпоративен имидж, който допринася за подобряване на икономическите резултати. Чрез критичен анализ на практиките са представени възможностите за нейното приложение в управленския процес на минно-добивното предприятие. Обоснована е постановката, че Политиката на отворени врати е съвременен и работещ инструмент при управление на предприятията, тъй като влияе благоприятно на различни негови ключови аспекти. На тази база са набелязани някои насоки за повишаване ефективността в управлението и придобиване на стратегически предимства.

Ключови думи: Политика на отворените врати, минно-добивно предприятие, иновативни управленски практики, икономическа ефективност, добивна промишленост

Introduction

One of the most important resources for the business organizations are the human resources. In the current economic conditions their impact on economic performance is critical. Constant adjustment of human resources management to the new realities and challenges is needed at the present stage of development. For this purpose, innovative methods and practices that are adequate to the requirements of the environmental dynamics should be applied. Such an innovative management practice is the Open Door Policy, which has found a place in the international and the big Bulgarian companies in the last decade. However, it is still rarely used in medium and smaller in size companies, despite its proven advantages.

A good example in the field of innovative practices are the mining companies in Bulgaria, which started to use this management approach long ago. The achieved economic results indicate that it is applicable in different conditions, because it increases the efficiency and the competitiveness of the company and helps the acquisition of strategic advantages over its competitors.

Open Door Policy- theoretical and applied aspects

The Open Door Policy was applied for the first time by the Republican President William McKenzie and the Secretary of State John Milton Hay. It referred to the foreign policy orientation of the country and was determined by the direction of US-China relations from the late nineteenth and early twentieth century. The effects achieved by its implementation were a precondition for its transition in the sphere of the international economic relations. Today, it's widely used in the business organizational management.

The Open Door Policy is a kind of communication policy, aimed at establishing mutual cooperation and respect between the senior management and employees. Its focus is oriented towards the communication process. The policy is based on the principles of openness and transparency. According to

them, the manager, the president or the head should be open to his/her subordinates. He/she should discuss with colleagues every topic related to the work process. The manager's door has to be open to suggestions, complaints and ideas of the subordinates and he/she has to be ready to hear all opinions without prejudice. The gathered information should be subjected to critical evaluation and analysis and, if deemed necessary, appropriate changes for organizational effectiveness should be made. Employees are free to share their ideas, discuss current problems and offer possible solutions. They can share ideas and suggestions and analyse them, ask and address different work topics to the middle and the senior management. This effectively promotes openness and transparency in the relationship between all team members, regardless of their position, responsibilities and obligations. The expected results are focused on improvement of the organizational environment, systems, processes, operations and products, leading to greater economic efficiency and competitive advantages for the company.

The policy includes expressing opinions and taking a clear position on a given subject by the employees. This activity should lead to favourable changes in the business organization, which, in turn, has to prompt growth and business development. The focus of the Open Door Policy is to create an attitude of constant and constructive dialogue between employees on different hierarchical levels through the exchange of experience and knowledge. By imposing such an active communication policy, the company aims at sustainable and adequate external and internal innovations. It relies on establishment and maintenance of a team spirit and desire for equal partnership and cooperation between the team members. So, every team player becomes an active participant in the workflow. By introducing such a policy, the employee's role is regarded as key to the overall development and the future prospects. The basis of the Open Door Policy concept is an acknowledgment of the team's role for achieving results from the overall business activity. The expected effects are associated with an environment of cooperation and trust between employees on all hierarchical levels and the management. This could be achieved by recognition and respect for the role of each of them as a person and as a specialist in a particular field whose ideas and experience could be useful. Moreover, because of its application, every employee should be committed to the workflow.

This management approach is successful because it is based on the view that the best problem's solution most often comes from the workplace itself. An adequate use of the Open Door Policy contributes to improving the communication process, receiving and recording of feedback and conducting discussions on a broad basis. If it is applied in an appropriate and adapted to the specific company's conditions way, it should lead to greater trust between employees and managers. As a result, problems and possible solutions are subject to an open and inclusive debate, which increases the transparency of the company itself. This is particularly important in the context of a continuing need to improve every process. The open communication between the team members is a real opportunity. Thus, the company's activity is taken as a personal responsibility, which reflects positively on the final performance.

The focus of the Open Door Policy is on improving the communication process and introducing changes at all company's levels - operations, processes, systems and structures. Therefore, its implementation should lead to greater openness, transparency, flexibility and adaptability, and hence, higher efficiency. The main policy objective is to promote cooperation between employees from various business areas and different hierarchical levels. The Open Door Policy is a valuable tool because it offers a clear flowchart of communication with formal rules and a mechanism for its good implementation. However, it does not provide ready-made models and recipes for achieving results. For this purpose, the policy should be adapted and oriented to the specific conditions and needs and should comply with the factors influencing the organization. The critical review of its implementation in business organizations allows the summary of benefits of application. Its main advantages are the transparency, the creation of a work environment based on trust and respect between employees and managers, the relevant conditions conductive to change and improvement of the change management process, the balanced communicational process and the good feedback mechanism. In addition, the application of the policy promotes high economic efficiency and labour motivation.

Under certain circumstances, the Open Door Policy may have some shortcomings when it's used improperly or incorrectly. For example, such defects are the formation of informal groups within the formal organizational structure that can affect negatively the overall organization and to worsen the outcomes of the labour process. In addition, a shortcoming can be a conflict of interest between the employees, the middle and senior management. It may appear in case of jumping on some hierarchical level when the subordinates express opinions, ideas or proposals. If the application of the policy is not accompanied by clear rules, it some others deficits may occur. The employees could hesitate or feel uncomfortable to express their true opinion to the superiors, because they fear of criticism and censorship. In addition, the permanent going from office to office can reduce the efficiency of the workflow.

Another application of the Open Door Policy in the companies refers to the active communication with all stakeholders. The openness to investors, local communities, society and state authorities is connected with the social commitment to the sustainable business development activities. Working in collaboration with national and local communities leads to understanding the managers' aspiration for improvement of the workflow and for creating a favourable business image. The involvement of citizens as active participants in joint projects in the fields of education, sport, culture, health and environment overlaps the corporate interest with the public interest. The business activities' transparency influences the company's sustainable growth and the acquisition of strategic advantages over their competitors.

The objectivity of the analysis requires to underline that there are various applications of the Open Door Policy in the company's management. Despite its innovativeness and effectiveness, it cannot be regarded as a panacea for every problem in the human resources management process. However, its application leads to a number of positive effects

for the company. It's an opportunity for development based on innovative contemporary practices. The Open Door Policy establishes a good working atmosphere, especially in terms of the need for constant change at all levels. If we proceed from the fact that the growth and the development of a company in today's economic conditions are directly related to innovation, the policy is a suitable method for this purpose.

Best practices in some Bulgarian mining enterprises

There are various examples for application of the Open Door Policy in present business practice. It is applied in many mining enterprises and has significant results. Different variations are potentially possible when it is adapted to the conditions in the company and its specific needs and goals. The advantages of its adequate and timely implementation lead to visible and measurable positive effects. Some of the best business industrial practices are associated with the increased attention to all stakeholders – personnel, investors, local community, society and state authorities.

Openness to the personnel

The big companies in the mining industry recognize the human resources as key element to the sustained success in an environment of increased competition in the modern technological society. Investments in education, fair remuneration, health and safety, protection of civil and labour rights are among the priorities in corporate governance. The companies have elaborated and implemented mechanisms for complaints against unacceptable workplace practices and human rights violations. They facilitate the process of giving proposals, improving the organizational environment and overcoming conflicts. The signals may be submitted in writing in special mailboxes and verbally by telephone. In addition, anonymous complaints about disturbing situations in accounting, internal control and ethical issues are accepted.

Supervisory bodies exist in different companies to examine the presented signals. They have to check and take a decision on them in due time. The management policy of the big mining companies is built upon a minimum tolerance of discrimination, harassment and retaliation against the employees that have expressed concerns about certain business practices.

One of the leading Bulgarian mining companies has developed and operates a special internal communication channel that has various opportunities. It provides updated information on organizational life and assists in making presentations on different activities.

This channel promotes social communication between employees who not only are acquainted with the company's news but can also post personal ads. The advantage of this information channel is the ability to conduct inquiries and votes among the employees. The integration of the personnel into the decision-making process enables everyone to feel significant. This kind of openness is among the competitive advantages of any enterprise facing new economic and social challenges.

Openness to the investors

Annual reports with achievements are prepared in order to increase the degree of transparency and the stakeholders' certainty of the company's activities for sustainable development. The commitments to investors in the mining companies include regular reports, visits, action plans and personal meetings with officials. All big companies draw up plans for openness to stakeholders that are based on strategies and objectives for continual improvement of the activities in this sphere. In the most common case these plans were initiated by investors who require updated information on the progress every three months through conference calls.

Openness to the local communities

A good practice associated with the use of the Open Door Policy in the big mining companies is the realization of a wide range of social projects at regional level. The purpose of this practice is the regional development in the sphere of education, sport, culture, health and safety. In this respect citizens' information centres in several Bulgarian cities have been established. Their activities involve informing the local population on all issues related to the company's activities. Such issues are the different environmental aspects, the opportunities for opening new jobs and the corporate social responsibility. The centres are a meeting point for the local community with the company's managers and specialists where they can discuss every topic and social problem. Thus, an efficient partnership is established between the municipality, the society and the mining companies.

Openness to the society and the state authority

The application of the Open Door Policy in the mining companies contributes to greater involvement of the corporate management in the cooperation with the authorities at all levels. Every company prepares a report on sustainable development by taking into account the interests of external stakeholders and their contribution. The compliance with the environmental standards, the efficient use of raw materials, energy consumption, water use, biodiversity, emissions, effluents and waste investments are part of the commitments, made by enterprises to the society and state. Various topics are discussed at regular meetings with the Government - concession fees, environmental regulations, health and safety, wage levels and career opportunities in the mining industry. The Open Door days, which are held annually, are also a good practice for the mining companies. Thus, the citizens are acquainted with the working process and its technological features as well as the embedded innovations.

Conclusion

The studied best examples in the implementation of the Open Door Policy in the mining industry prove that this management tool has a place in the modern Bulgarian business practice. Its big advantage is the establishment and maintenance of team spirit, equal partnership and good cooperation between team members, who are recognized as active participants in the workflow. It is essential to show attention to all stakeholders – personnel, investors, local community, society and state authorities. The openness is among the biggest competitive advantages of each company.

Because of the implementation of the Open Door Policy, all society members are fully engaged with what is happening in the company. Thus, it influences positively on the economic results and the competiveness, providing new opportunities for development and growth.

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IMPLEMENTATION OF CERTIFIED MANAGEMENT SYSTEMS IN MINING COMPANIES

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ABSTRACT. The article presents the results of an empirical research conducted among 65 companies in the mining sector in all sub-sectors – Production of metal minerals, Production of non-metal minerals, Production of oil and gas, Coal mining, Production of inert and construction materials, Production of tiling materials, Geology, Construction and Logistics. The study focuses on reflecting quality management in the Bulgarian mining industry and identifies how ISO 9001, ISO 14001 and OHSAS 18001 certification affects safe working conditions and the environment. The new ISO 45001:2018 Occupational Health and Safety Management System, which will replace the existing OHSAS 18001, is also presented.

Keywords: certified management systems; ISO 9001; ISO 14001; OHSAS 18001; ISO 45001; mining companies.

ПРИЛАГАНЕ НА СЕРТИФИЦИРАНИТЕ СИСТЕМИ ЗА УПРАВЛЕНИЕ В МИННИТЕ КОМПАНИИ

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РЕЗЮМЕ. Статията представя резултатите от емпирично изследване, проведено сред 65 компании от минерално-суровинния отрасъл, включително всички подотрасли – добив на метални полезни изкопаеми, добив на неметални полезни изкопаеми, добив на нефт и газ, въгледобив, добив на инертни и строителни материали, добив на скалооблицовъчни материали, геология, строителство и логистика. Проучването е насочено към изучаване влиянието на сертифициращите системи за управление в българската минна промишленост и установяване как сертифицирането по ISO 9001, ISO 14001 и OHSAS 18001 влияе върху безопасните условия на труд и околната среда. Представен е и новият стандарт ISO 45001:2018 "Системи за управление на здравето и безопасността при работа“, който ще замени досегашния OHSAS 18001.

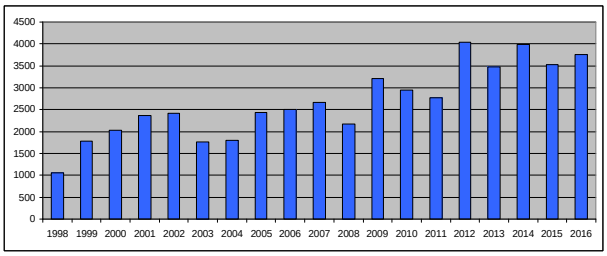
Ключови думи: сертифицирани системи за управление; ISO 9001; ISO 14001; OHSAS 18001; ISO 45001; минни компании.

Introduction

The specificity of the mining industry requires significant investments in the production activity in order to implement strategic programs for development and implementation of high-efficiency technologies and innovations. Corporate programs of mining companies to improve the quality and productivity and reduce the cost of the final product are an expression of their drive for sustainable development. Implementation of modern integrated information systems for business process management, new dispatching systems for management of mining activities and ensuring continuity of processes, etc. are in line with the current requirements for an optimal financial, economic and management model for the company. All this, and the continuous search for ways to satisfy all stakeholders - from employees in enterprises, through local communities, to the environment - are a prerequisite for quality management strategies, which is already a business practice in favor of a gradual positive impact on organizations. A growing trend is the ever-increasing expectations of stakeholders.

Quality management systems, environment and occupational health and safety working conditions

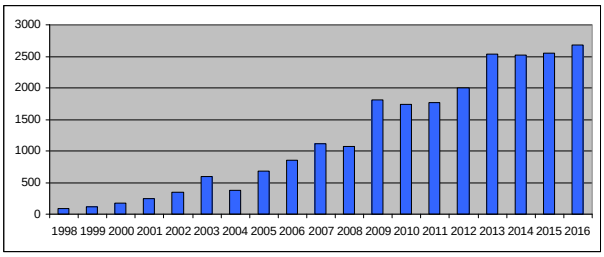
The concern of mining companies for stakeholders is also driven by the growing number of certificates in the quality management system. ISO 9001 is the most widely used international standard for management systems. It defines the requirements when an organization has to demonstrate its ability to deliver a product consistent with the requirements of the customer and the requirements of the applicable regulations and seeks to increase the satisfaction of stakeholders through efficient application of the system. Worldwide, in the past few years, the mining industry has ranked 11th in ISO 9001 certification, according to the reports of the International Organization for Standardization. The trend shows that globally, the number of mining companies certified by ISO 9001 is growing (Graph 1).



Graph 1. Worldwide mine companies certified under ISO 9001 "Quality Management Systems", according to the International Organization for Standardization.

At the same time, socially responsible mining companies are implementing large-scale environmental projects to increase environmental safety and quality of life by introducing new techniques and technologies for environmental protection and

its components. Soil, water and air protection activities, treatment plants and permanent monitoring on the territory of the ecological field, etc. in the framework of Environmental Programs require annual investments due to the impact of this industry on the environment. The latter are present in the annual financial statements of the companies concerned. ISO 14001 certification "Environmental Management Systems" is even more impressive than ISO 9001. The standard is recognized by organizations that seek to manage their environmental responsibilities in a systematic way, contributing to the environmental pillar of sustainability. Over the past 20 years, more and more mining organizations have been opened up to the environmental management system, although the trend has continued in recent years (Graph 2).



Graph 2. World Mining Companies certified by ISO 14001 "Environmental Management Systems", according to the International Organization for Standardization.

Bulgarian mining companies are not far from this trend - most of them deploy more than one management system, namely the “System of environmental management” ISO 14001, as well as “Occupational Health and Safety Assessment Series” OHSAS 18001. It is designed to meet the industry's need for a recognized standard for a health and safety management system that can be assessed and certified externally. Investments in health and safety, voluntary group health insurance, personal protective equipment, reducing dust and emissions in the work environment, preventing accidents and damage of the workers’ health, training on health and safety at work, systematic risk assessment and application of standards, etc. are of utmost importance to these businesses and are well-placed in the Safe and Healthy Workplace Safeguards Programs.

On March 12, 2018 ISO 45001 “Occupational health and safety" was published, which supersedes OHSAS 18001, and turns into ISO standard for management systems in health and safety at work. This is a new, globally agreed standard, using an established structure based on an effective management model and designed to be used as part of a business management system. Moreover, the new ISO 45001 structure will be extremely easy to integrate with the new versions of ISO 9001 and ISO 14001. The migration period for transition planning of this new standard is three years. “Dundee Precious Metals” JSC is already working successfully on ISO 45001.

Methodology of empirical research

The purpose of the empirical study is to determine the extent to which mining companies apply management systems. The collection of the most comprehensive information on the extent to which mining practices are perceived and applied by the respective enterprises in the country necessitates clarification of some specificities related to the geographic scope, the sample size, the respondents and the timing of the survey.

Table 1.
Technical records of the conducted survey

Characteristics	Survey
Population	Mining organizations
Geographic scope	Bulgaria
Sample size	65 enterprises from the mining industry
Timing of field work	1 April – 31 May 2018 г.
Respondent	Department /Manager Quality Management

The survey was conducted among 65 enterprises, which are characterized by Production of metal minerals, Production of non-metal minerals, Production of oil and gas, Coal mining, Production of inert and construction materials, Production of tiling materials, Geology, Construction and Logistics. The companies have a national status and actively work in the mining industry on the territory of the Republic of Bulgaria.

Results obtained from the conducted survey

Out of the surveyed 65 enterprises, four refused to join the survey or created some barriers to providing information.

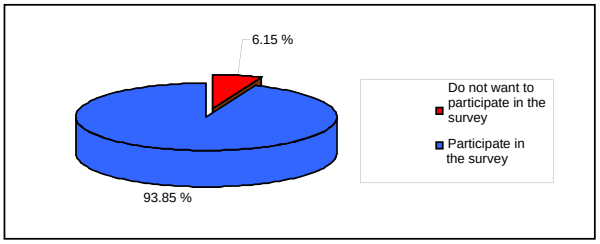


Table 2. Number of certificates in the surveyed companies

Certificates	Number of companies	%
ISO 9001	12	18.45
ISO 14001	4	6.15
ISO 9001 + 14001	5	7.70
ISO 9001 + 18001	2	3.07
ISO 9001 + 14001 + 18001	24	37.00
Without certificate	14	21.50

Table 2 shows the percentage of certified and non-certified companies in the sub-sectors of the mining industry. There are still organizations that do not use certifications because "it is not required by the state". 21.5% of all mining companies surveyed do not implement any certificate.

Largely, the sample shows a positive attitude by the companies towards the quality of processes management and certification of the different quality management systems, environment and health and safety conditions. Most of the mining companies surveyed initially overlapped the ISO 9001 requirements, and most of them continue to improve their ISO standards on environment and health and safety at work.

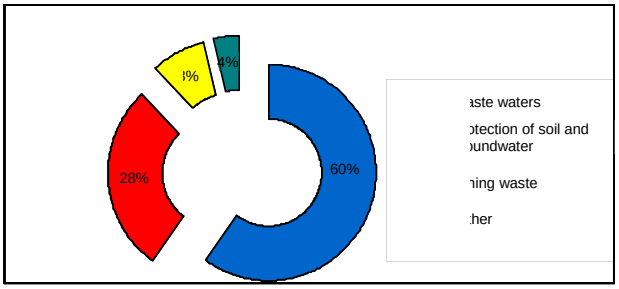
Table 3 illustrates the companies surveyed by sub-sector. Sub-sector "Production of metal minerals" has the largest number of enterprises surveyed, almost all certified. In sub-sector "Geology" most companies work without certificates (50%).

Table. 3
Empirical survey conducted by sub-sector

	Production of metal minerals	Production of non-metal minerals	Production of oil and gas	Coal mining	Production of inert and construction materials	Production of tiling materials	Geology	Construction companies	Logistics
Studied	18	7	3	5	7	5	10	6	4
Did not participate in the survey	0	2	0	1	0	1	0	0	0
ISO 9001	4	0	0	0	1	0	1	4	2
ISO 14001	2	0	0	2	0	0	0	0	0
ISO 9001 + 14001	1	1	0	0	1	1	1	0	0
ISO 9001 + 18001	1	0	1	0	0	0	0	0	0
ISO 9001 + 14001 + 18001	8	3	1	1	4	1	3	2	1
Without certificate	2	1	1	1	1	2	5	0	1

Environmental Management System

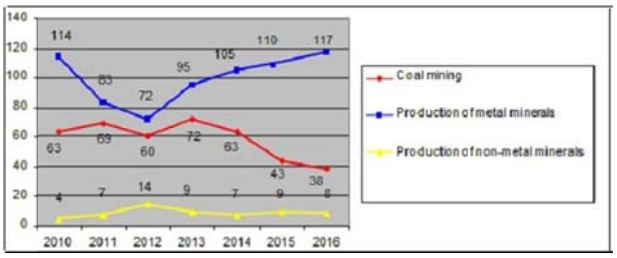
Over the last decade, environmental protection and restoration costs are relatively constant. In their structure, wastewater costs account for the largest share, followed by protection of soil and groundwater and waste. Other costs related to air, noise, forests, etc. occupy a very small share.
Serious attitude of the enterprises in the industry could be considered as a reference to ISO 14001 certification. Out of the 65 companies surveyed, more than half cover the Environmental Management System, four of which have implemented only this system in their work.



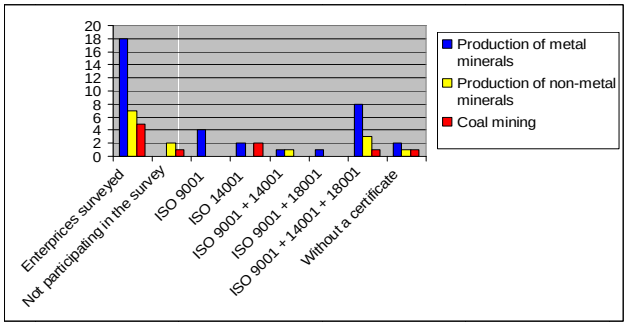
Graph 3. Distribution of environmental costs, according to a sample of the National Statistical Institute (2008-2017).

System for safe working and health conditions

The mineral-raw material industry is associated with significant risks to the safety and health of workers in the sector, despite the serious technical and technological renewal in recent years of the hazardous and labor-intensive processes in the industry. The data of the Bulgarian Chamber of Mining and Geology (BCMG) show a tendency towards a sharp reduction in the number of fatal accidents in the industry. According to a study of BCMG, labor accidents in the sub-sector "Production of metal minerals" predominate, as the years gone by even increase. In the "Coal mining" sub-sector, the trend is for permanent reduction of the number of accidents. In "Production of non-metal minerals", labor accidents are significantly less, and the tendency has remained stable over the years (Graph 4).



Graph 4. Number of accidents on an annual basis, according to the National Statistical Institute in sub-sectors "Coal mining", "Production of metal minerals" and "Production of non-metal minerals".



Graph 5. Number of certified and non-certified companies in the sub-sectors "Coal mining", "Production of metal minerals" and "Production of non-metal minerals".

In the study, the enterprises of the subsector "Production of metal minerals", which is also characterized by many labor accidents, have been most thoroughly studied. The impression is that the sub-sector is aware of the problem and almost all enterprises are certified. Out of the 18 companies surveyed, 8 have all three quality certificates, 8 recognize one or two systems, and only 2 of them are not certified under any of the management systems. There is a lack of statistics on the reduction of occupational accidents in companies following the implementation of these standards.

Conclusion

The analysis of the factual information from the survey shows the conscious readiness of most mining companies in Bulgaria to be certified in quality management, environment and safety and health at work. The introduction of certified systems harmonises all manufacturing activity, makes services more efficient and confers confidence to stakeholders that its operation is safe and environmentally friendly. Business executives are increasingly convinced that continuous improvement in quality is the most vital strategy for the company's success.

The study focuses mainly on quality management systems, environment and occupational health and safety. In the process of gathering information from the companies, some of them have reported that they are in certification procedures including ISO 50001 "Energy Management Systems", which is the most importance for the mining industry.

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THE INVESTMENT IN CRYPTOCURRENCIES: A QUEST FOR EARNINGS LOST

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ABSTRACT. The bitcoin, as well as many other digital currencies, are known as "cryptocurrencies". The bitcoin and other cryptocurrencies provide the ability to make fast, secure and low-cost payments between users without the need of bank intervention or other centralised payment systems.
Cryptocurrencies are volatile assets with daily price changes of often up to 10%. Of course, as investors know, high awards are the result of taking a high risk. However, there is no need to invest more money in cryptocurrencies than what one can afford to lose.

Key words: bitcoin, cryptocurrencies, investments

ИНВЕСТИЦИИТЕ В КРИПТОВАЛУТИ – В ТЪРСЕНЕ НА ИЗГУБЕНАТА ДОХОДНОСТ

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РЕЗЮМЕ. Биткойнът, както и множеството други дигитални валути, са известни като „криптовалути". Биткойнът и останалите криптовалути предлагат възможността да се правят бързи, сигурни и нискоразходни разплащания между потребителите без нужда от намесата на банката или друга централизирана система за разплащане.
Криптовалутите са волатилен актив, като дневни ценови изменения в рамките на 10% не са редки явления. Разбира се, както инвеститорите знаят, високите награди са резултат от поемането на висок риск. Не бива обаче да се инвестират в криптовалутите повече средства, отколкото можем да си позволим да загубим.

Ключови думи: биткойн, криптовалути, инвестиции

Introduction

It is believed that the Bitcoin was created by Satoshi Nakamoto who presented his invention on 31st October 2008 in a document called "The Bitcoin: User-to-Consumer Electronic Cash System". What is more interesting is that the name is most likely an alias behind which an unknown person or people who originally created a bitcoin are hiding. In 2016, the Australian entrepreneur Craig Wright identified himself as "Mr. Bitcoin" which was widely accepted by members of the Bitcoin community.

The financial history of the Bitcoin dates back to 22nd May 2010 when someone first made a purchase by using a bitcoin to buy a pizza. What is more interesting is that it cost 10,000 bitcoins and this is the first public transaction with the virtual currency for something in the real world. This day is known as "Bitcoin pizza day." Since then, the use of the bitcoin and its worth has grown steadily and to date, those $ 10,000 would cost more than $ 80 million. Last year, for the first time ever, the bitcoin rose above the price of gold and since then, it has continued to go up [1]. The bitcoin has now reached a stable value on the financial scene, ranging from $ 8,000 per bitcoin. Competition in the world of cryptocurrencies is now between the so-called "Altcoin", like "lightcoin", "bitcoin gold", "bitcoin cash", etc. (the total number of cryptocurrencies is currently over 1650, which are traded on more than 12,000 exchanges). However, it is quite controversial to say that Bitcoin does not hold a monopoly position on the crypto-market. So far, it has over 47% market share.

The Bitcoin / BTC /

The Bitcoin is a digital currency, also known as the "cryptocurrency", which is based on the fact that cryptography is used to secure payments - a distribution database or a so-called "block chain". The abbreviation of the bitcoin is simply BTC. The same principle is used in the US dollar abbreviation, where USD is abbreviated from US Dollar and EUR is abbreviated for Euro. The bitcoin can also be linked to other currencies. In this case, CFD contracts on the bitcoin, in dollars, may have the abbreviation BTC/USD. The Bitcoin offers the ability to make fast, secure and low cost user-to-consumer payments without the need for bank intervention or other centralised payment systems. Systematic transactions occur directly between users' digital wallets and are verified in block chain. Transactions are digitally signed with a unique "personal key" which is proof that the orders come from the digital wallet's owner.

The maximum number of bitcoins that exist is 21 million. There are no prices for their storage because digital resources do not occupy physical space, regardless of quantity. They call it a "pocket Swiss bank account".

There are already many things you can buy in bitcoin - apart from pizza! For example: general consumer goods, video games, gift cards, travel, food, cars. You can make donations and be involved in charity, as well as buy from online and offline stores. There are more places where the virtual currency is being used as a means of payment. According to data at www.coindesk.com, in 2015, the number of traders taking bitcoins exploded. Many of them are online marketers, but the number of traditional chains that are beginning to accept payments with bitcoin increases. The list of organisations hosting bitcoins continues to grow [1].

The bitcoin is a volatile asset, with daily price changes of up to 10% not uncommon. Of course, as investors know, high awards are the result of taking a high risk. However, we should not invest in a bitcoin that we cannot afford to lose [1].

Block chain and bitcoin mining

Block chain is a decentralised public registry for all the bitcoin transactions that have ever been made. A number of transactions form a database unit called a "block." Each block contains information about the previous block, as well as each transaction - information about the previous transaction, thus the chain (block chain) allows for complete transparency of payments. The block chain of bitcoins presents a revolutionary infrastructure for storing financial data that is accessible to everyone, completely transparent and developed using open source that does not belong to any organisation or person. Instead, block chain technology and its support are done by millions of computers that verify transactions and add them to blocks. Collectively verified transactions cannot be altered or deleted so that bitcoins are final and undisputed [1].

When a new block is created in the block chain, it is rewarded with 12.5 bitcoins, which happens every 10 minutes. This is a reward for the so-called "bitcoin digging process." The prize is to use electrical and computer power to support the network, and many people and specialised companies all over the world are included in the bitcoin mining. The system generates new bitcoins automatically, self-regulating the speed of process so that there is no danger of circumventing the rules and speeding up the process of creating new bitcoins with greater investment in mining hardware and more for electricity bills. The remuneration for block creating will slowdown in 2020, with a slowdown every four years, until the number of bitcoins generated reaches 21 million, which means that the bitcoin has a fundamental reason to increase its value - its limited number.

Scepticism of banking systems around the world

Sceptical views prevail in countries and global banking systems on the stability of the bitcoin and on the issue of national cryptography issued by the country's central bank. Negative views on this issue are expressed by Russia, Japan, India, England, Switzerland, and others. According to an online survey conducted by the analytical company D-CYFOR, almost two-thirds of UK residents do not support the idea of a national cryptocurrency issued by the central bank. People are still cautious and generally pessimistic about the future of the digital currency. More than 60% of respondents believe that within half a year the bitcoin will either lose value or lose its full value [3]. In an official statement, the Central Bank of Japan said it would not create a national cryptocurrency because it sees a threat to the traditional financial system. According to Massayoshi Amaya, the bank's deputy director, the digital currency backed by the Central Bank will change the system, but it will not necessarily maintain its financial stability [5]. The CBDC may pose a threat to financial stability and its release does not imply tangible benefits. This was stated by the Member of the Board of the Swiss National Bank (BNS) Andrea Mehler, CoinDesk wrote. Mehler emphasizes that the BNS is opposed to the concept of CBDC, which is being studied by a number of central banks around the world. "To ensure an effective system of retail cashless payments, a central bank's digital currency is unnecessary, which will hardly give any advantage but will cause countless risks to financial stability," she said, adding that cryptocurrencies are not comparable to money [4].

The Bitcoin - Current and Future Financial and Economic Problem

Every single currency can collapse and the world has witnessed this over and over again. Due to hyperinflation, currencies lose their value in a very short period of time, and we can give an example with Bulgaria and the hyperinflation in 1997. The same happened with the German mark in 1920 or with the Zimbabwean dollar in 2008. In theory, problems and constraints of a technical nature, as well as political events and decisions, can have a strong negative impact on the bitcoin. However, there are no serious threats to the devaluation of digital currencies at this time, and the good thing is that the battleship is "immune" to inflation because of its limited amount [6].

There is a limit of deals which can be processed for a definite period of time as increasing the transaction limit would mean a delay in payments. For years, there have been disputes over capacity among the developers of the Bitcoin and the problem has not yet been resolved. Transactions are currently being executed via “blocks” and the maximum size which can be processed for one block is one megabyte. Some of the developers insist on the enlargement of this size because of the increasing capacity of the network. [7].

Not all countries accept the bitcoin trade with the lust. The governments all over the world do not prove the fact that virtual currency’s consumers are anonymous ant it causes fears of criminal activity and money laundering [7].

Opinions on the currency are opposite. According to some, it will continue to go up, while others say it is a balloon that will burst. The situation is very reminiscent of the "technology bubble" since 2000. There are a large number of block-related

technology projects, with new ICO (Primary Block Deals) coming out every day. This is a type of IPO but connected to block chain technology. These projects are funded by the investment community through tokens that are bought with bitcoin and other key cryptocurrencies [1]. Of course, like any industry, 90% of projects will fail in the performance of working products, probably not after a very long time. We may witness a serious number of bankruptcies in the sector. It is quite possible that the value of the bitcoin is currently "too hot" due to the serious investments related to the ICO, so if there is a balloon in the bitcoin or not, we will only understand if it bursts [1].

The trade with the cryptocurrencies has shaken so much that more than half of the world-known exchanges have closed their doors for new consumers! According to the message left by each of them, the closure of new registrations is the only way to solve the problem and allow people who have registered so far to trade without having any difficulty or delayed work on the site.

Many people who have been trading stocks, gold, oil for many years have started trading with cryptocurrencies.

Can they be monitored and can it be avoided when taking a big risk for an investment? It is hard to say, but definitely nothing in the world of the crypt is safe and risk is taken! It's true that with an investment of $ 100, while the currency is 5 cents, we can buy (dig) 2000, wait for it to be 1, 5, even 10 dollars a share and make a big amount of money; but the chance to lose must always be calculated, same as the amount invested that is not a problem to be lost.

There are world-class analysts involved in reporting to crypto-dealers. There are people using methods such as "Pump and Dump" which, with the large audience of followers they hold, easily obtain artificial pumping of a certain cryptocurrency, then naturally follows a sharp decline and a correction in its price.

The information provided gives grounds for the following conclusions

1. Bitcoin is a virtual currency artificially created not so much for speculative purposes, but to make fast, secure and low-cost consumer-to-consumer payments, without the intervention of banks or any centralised payment system. Its market value is subjective because it is not secured by any assets.
2. The use of Bitcoin in financial and economic activity has no positive effects, while negative ones such as tax evasion, circumvention of the SWIFT banking system, money laundering, and others are present and can cause serious damage to the economy.
3. The lack of collateral agreements determines the temporary nature of the Bitcoin. The real problems for the financial world will come with its devaluation. As a result, global financial shocks are expected, accompanied by economic crises similar to those of the 1920s and of 2008.
4. The macroeconomic approach teaches that the market price of each good (and variations) is determined by the ratio between supply and demand. The limited supply of cryptocurrencies, and in particular the bitcoin, on the one hand, and the increasing demand for the same (for the reasons set out below) predetermine their high cost. The total market capitalisation of cryptocurrencies is about $ 300 billion.

The reason for the high demand for cryptocurrencies is the lost profitability from the trading of securities and other traditional assets. The profitability of these markets has sharply declined over the past decade. If during the last century and the beginning of the new millennium even small investors could rely on a good return (from dividends and rising share prices and asset prices - gold, oil, etc.), as a result of the global financial and economic crisis of ten years ago, and the transient domination of the US dollar as a world currency, instability has permanently settled on this type of market (and in the global economy as a whole). That is why more and more investors are turning their eyes on new assets in the face of cryptocurrencies.

Conclusion

Whether the bitcoin and the other cryptocurrencies are a balloon, we will only understand if it bursts; It cannot be predicted if it is a financial pyramid whose collapse is ahead or if it is the future world currency. In the past few years and at the moment, this is a developing risk process in which to invest and win. Expectations are for lasting price stability in the bitcoin as well as for treating it as a true investment asset. The fact that regulators are still trying to introduce rules in this market is also a red signal. It is still unclear to what extent prices are influenced by manipulative practices.

In the next decade, two development scenarios are expected. In the one case, cryptocurrencies will collapse and this will seriously impact humanity and the global economy. The optimistic option, which is rather utopian, is that the bitcoin and the cryptocurrencies will continue to develop and the price and scale of the cryptocurrency will continue to grow. Cryptocurrencies remain a financial and economic mystery of the present and will continue to be such in the near future.

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METHODOLOGY FOR THE ASSESSMENT OF THE COMPETITIVENESS OF A MINING COMPANY

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ABSTRACT. The issue of evaluating the competitiveness of mining enterprises and revealing the opportunities for how to increase it continues to be more and more relevant. This paper suggests the elements and stages of the developed methodology for determining the level and dynamics of the change of the competitiveness of the mining enterprises with specific indicators. Assessing the competitiveness of the mining enterprises helps to highlight the opportunities for its increase.

Key words: competition; competitiveness; mining industry

МЕТОДИКА ЗА ОЦЕНКА НА КОНКУРЕНТОСПОСОБНОСТТА НА МИННОДОБИВНАТА ФИРМА

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РЕЗЮМЕ. Проблемът за оценяване на конкурентоспособността на миннодобивните предприятия и разкриването на възможностите за нейното повишаването продължава да е все по-актуален. В доклада се предлагат елементите и етапите на разработената методика за определяне на равнището и динамиката на изменение на конкурентоспособността на миннодобивните предприятия с конкретни индикатори. Оценката на конкурентоспособността на миннодобивните предприятия спомага да се открояят потенциалните възможности за нейното повишаване.

Ключови думи: конкуренция; конкурентност; минна индустрия

Introduction

The proposed methodology for assessing the competitiveness of the mining company is based on the understanding that competitiveness is a complex and multi-dimensional category that can not be characterised by only one indicator or measured with a single indicator. Assessment should be done using a system of indicators that reflects the objectives, strategy, and specific features of the research object.

The methodology is a quantitative characterisation of the competitiveness of the mining company which includes the following components:

- ✓ Assessment of the company's external environment;
- ✓ Assessment of the current stage of competitiveness;
- ✓ Assessment of the potential for competitiveness of the mining company;
- ✓ Discovering and evaluating opportunities for promotion.

The methodology in the study considers the set of methods for its implementation in order to reveal the possibilities for increasing the competitiveness of the mining company.

Elements of the methodology

The level of competitiveness of the mining company shall be assessed by appropriate methods. At the same time, it should be noted that the application of a set of methods is a difficult and responsible task, especially when it passes through several major stages, and which allow the final value of the evaluated parameter - the company's competitiveness. The elements of the methodology for assessing the competitiveness of the mining company are presented in Fig. 1.

The figure presents the logic underlying such a study in general. As can be seen from Fig. 1, the disclosure of the opportunities to increase competitiveness is a process that is not separated and which logically precedes the assessment of the competitiveness of the company and the disclosure of the competitive potential in the conditions in which it operates. Competitiveness assessment is a complex process that requires a clear and precise definition of the stages in which it will be carried out.

Steps of the methodology

The methodology for assessing the competitiveness of the mining company includes the following main stages (steps) that can be completed and specified in the process of their implementation according to the specifics of the business activity.

Figure 2 presents the sequence of the study stages and the logical relationships between them.

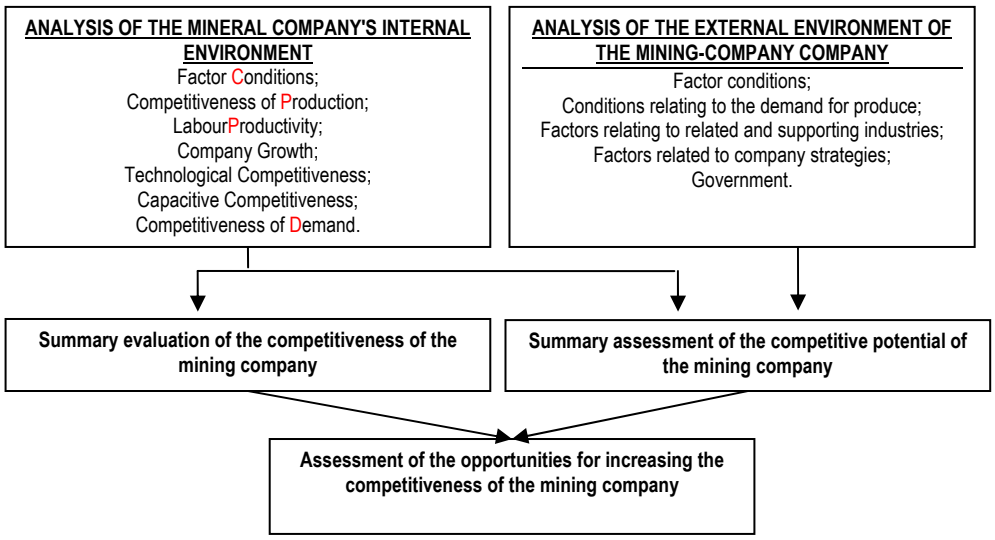

Fig. 1. Elements of the methodology for assessing the competitiveness of the mining company

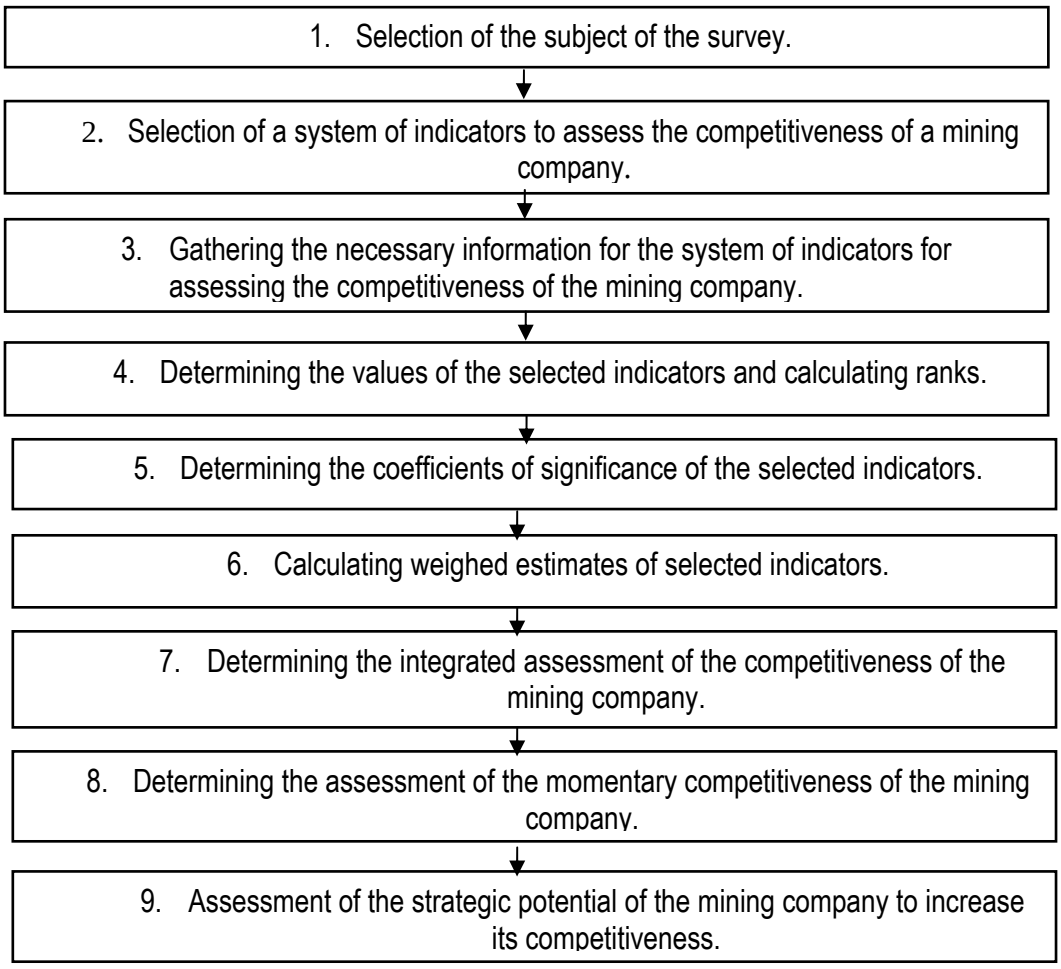

Fig. 2. Stages of exploration of the competitiveness of a mining company

Figure 2 shows the sequence of the stages of the study and the logical links between them. It shows not only the individual stages of exploration of the mining company's competitiveness but also emphasises the two main stages, namely: assessing the company's current competitiveness and assessing the competitive (strategic) potential of the company that precedes the discovery of opportunities. The choice of these components is dictated by the need to find opportunities (reserves) that will lead to increased competitiveness. This choice is too complex. Each of the factors of the external and internal environment influences the activity of the company. Each of them can also be an opportunity, but the presented methodology is based on those that are most crucial to achieving sustainable competitiveness.

The components involved, arising from the factors and potential opportunities, should be presented in a system to reduce subjectivity in assessing and achieving greater clarity in highlighting opportunities to enhance competitiveness. Focus is on components that in theory and practice have proved to be important for achieving sustainable competitiveness. On this basis, a model is developed to reveal opportunities for increasing the competitiveness of the mining company.

Indicators for the assessment of the external environment of the mining company

The development and success of enterprises depends, to a large extent, on the environment in which they operate. The effectiveness of their activities is directly related to the knowledge of the external environment factors. They are essential and have a lasting and significant impact on the enterprise's lifecycle and competitiveness.

In the context of the external environment factors, an adaptation methodology was developed based on the classification by Michael Porter of the factors for international competitiveness (Porter, 1998). The determinants of the national advantage are presented in the following four main groups in the following order:

1. Factor conditions that are relevant to the assurance and type of production factors that include the following five groups of indicators:

- Human Resources:
  - ✓ the availability of the skilled workforce needed by the industry;
  - ✓ level of expenses for staff costs.
- Physical resources:
  - ✓ the presence in the country of the natural resources necessary for the sector;
  - ✓ proximity to foreign suppliers;
  - ✓ level of costs for material resources;
  - ✓ proximity to markets;
  - ✓ level of staff costs.
- Knowledge:
  - ✓ the availability of institutes that carry out research-relevant work;
  - ✓ collaborating with universities to carry out research and applied research;
  - ✓ availability of a base of applied research results;
  - ✓ access to information on developments in the industry and market trends;
  - ✓ availability of the necessary resources for accelerated innovation activity, incl. European funds;
  - ✓ access to reliable statistical information.
- Capital resources:
  - ✓ access to capital needed to finance the industry;
  - ✓ a well-developed stock exchange that facilitates the industry's access to capital;
  - ✓ presence of foreign investments;
  - ✓ opportunities for EU funding;
  - ✓ costs for the acquisition of capital.
- Infrastructure:
  - ✓ availability of the necessary quality, basic facilities - transport system, postal supplies, health care system, housing, cultural institutions, etc.;
  - ✓ availability of the necessary quality, modern infrastructure - communication system, logistic systems, payment and fund transfer system, e-commerce system etc.;
  - ✓ Costs for the use of facilities.

2. Demand conditions that characterise the nature of the domestic demand for the product offered by the industry with the following indicators:

- ✓ demand of the domestics market;
- ✓ growth of the demand on the domestic market;
- ✓ quality of demand on the domestic market - the requirements of buyers and the extent to which their demands are in line with global requirements;
- ✓ demand of the foreign markets;
- ✓ growth on the demand;
- ✓ quality of demand - the requirements of buyers and the extent to which their demands are consistent with the global ones.

3. Factors related to supporting industries - Explore the presence or absence of industry-related suppliers and related industries that are competitive. The indicators for this determinant are three, with relevant indicators:

- Suppliers with indicators:
  - ✓ availability of indigenous suppliers for the development of the industry;
  - ✓ level of competitiveness of local suppliers.
- Sales agents and distribution quantified by means of:
  - ✓ the presence of specialised commercial intermediaries and distributors necessary for the development of the sector;
  - ✓ the level of competitiveness of specialised commercial intermediaries and distributors.
- Supporting industries with a quantification of:
  - ✓ the presence of indigenous enterprises needed by the assisting industries for the development of the sector;
  - ✓ level of competitiveness of local enterprises by the assisting industries.

4. Company strategy, structure, and rivalry which focuses on the way companies are created and managed, the company's internal organisation, and the peculiarities of rivalry within an industry are assessed through:

- ✓ the presence of high entrepreneurial activity;
- ✓ the easy access to a new business in the industry;
- ✓ the qualification of management personnel;
- ✓ the quality of company strategies;
- ✓ the availability of a common industry leadership and development strategy;
- ✓ the intensity of competition in the industry;
- ✓ the opportunity for new competitors.

Based on the state of the external environment factors and their influence on the competitiveness of the company, conclusions can be drawn about the power of influence during the analysed period of each individual factor of the external environment. Those variables and determinants of the external environment that act favorably as well as those that hinder the rise of competitiveness are revealed. The simultaneous tracking of the competitiveness levels of the companies in the industry and the estimates of the levels of the external environment factors over a number of years allows the analysis to be

deepened. The results are the basis for choosing priorities in policy and strategy development.

Indicators for assessing the domestic factors of competitiveness of a mining company

Determining of the current competitiveness of the company is carried out through the indicators for: **competitiveness of production, labor productivity and growth of the company**.

- Competitiveness of output is determined by the following indicators:
- ✓ a relatively perceived quality, by determining the impurities in each metal defined as a requirement on the London Metal Exchange;
- ✓ product price defined as a comparison of the average price of the finished product (metal) over a given period with the average metal price of the London Metal Exchange for the same period.
- Labor productivity that characterises the efficiency of labor input and its ability to produce a certain volume of output per unit of time;
- Growth of the company by quantifying:
- ✓ sales volume;
- ✓ relative market shares;
- ✓ the value of the long-term assets;
- ✓ the number of employees.

The proposed indicators are adapted to assess the current competitiveness of the mining company. For the various periods of time, they have different levels of development in companies and their use must be complex. The level of internal factors determines the company's potential to take advantage of the external environment and to protect itself from potential threats. Therefore, these factors determine the level and the main parameters of competitiveness.

More indicators could be added to the system of the indicators associated with the current competitiveness of the mining company. However, this will lead to difficulties in their practical use to clarify the stage of the company's competitiveness because it will strengthen their interdependence, which will thus affect the accuracy of the obtained results.

Determining the company's potential for increasing competitiveness

The current competitiveness of the mining company is only the final result at a given moment. It is in combination with the set of external and internal factors. It is the result of the current situation and the impact of these factors.

In determining the potential of the mining company and to increase the competitiveness, three groups of factors are considered relating to the current condition, namely:

1) Stage of the environment in which the company is developing;

2) Level of development of the internal factors of competitiveness of the enterprise, namely: level of: technological competitiveness; capacity competitiveness; cost (price) competitiveness; competitiveness of demand;

3) The potential for knowledge diffusion - this reflects the extent to which the company could benefit from the knowledge (technical, technological, organizational, market, etc.) amassed in other countries.

Based on the indicator of the company's competitive potential, it is possible to analyse the impact of each individual factor so as to facilitate the company's management and the mining industry and to identify the priority impacts to achieve maximum competitiveness growth.

Assessment of the potential to increase the competitiveness of the mining company and determining the organisational priorities

Forming such priorities is essential for companies, given their limited resources and time.

The evaluation of the possibilities to increase the competitiveness of the mining company and the determining the organisational priorities is carried out in the following sequence:

1) Developing a list of opportunities to increase competitiveness based on the analysed results by the company competitiveness. In the list, the opportunities are divided into two main groups:

а) external – result of the favorable changes of the external environment for the company;

б) internal - related to the improvement of internal factors.

2) Determining the priority of the opportunities to improve the competitiveness of the mining company.

Conclusion

In economic literature, there are different methods that reveal the competitiveness of a company. This shows the absence of a uniform opinion regarding the assessment of the company's competitiveness and approaches to achieving it. An individual scientific approach is needed to assess the competitiveness of the particular mining company. Assessment should also be made using a system of indicators that reflects the objectives, strategy, and specific features of the researched object.

The proposed methodology makes it possible to quantify the competitiveness of each mining company by reflecting the specifics of the objective, the strategy, and by characterising the specifics of the activity.

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POSTGRADUATE STUDIES AT NSA "V. LEVSKI" AS AN OPPORTUNITY FOR VOCATIONAL QUALIFICATION AND CARREER DEVELOPMENT

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ABSTRACT. Postgraduate studies at the NSA "Vassil Levski" is an essential element of the system for education and qualification of personnel in the field of physical education, sport and related activities. In this sense, the report examines in detail the types and forms of postgraduate training provided by the Academy's Postgraduate Studies Center, including the types of studies for acquiring vocational qualifications, other specializations and short-term courses, courses for acquiring qualification credits by physical education teachers with their thematic directions, etc. Essential elements of the technology, the curricula and programs of these specializations and courses are shown, including the requirements for participation in them. The problem is discussed not only from an educational but also from a legislative, labor and professional point of view. The way the text is being presented is not only informative, but it has also an educational and motivational character. This is why some statistics are included in it. Some options provided by the postgraduate studies for career development in perspective are also presented.

Keywords: postgraduate studies, vocational qualification, specializations, courses, career development, curricula and programs

СЛЕДДИПЛОМНОТО ОБУЧЕНИЕ В НСА "В. ЛЕВСКИ" КАТО ВЪЗМОЖНОСТ ЗА ПРОФЕСИОНАЛНА КВАЛИФИКАЦИЯ И КАРИЕРНО РАЗВИТИЕ

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РЕЗЮМЕ. Следдипломното обучение в НСА „Васил Левски" е съществен елемент от системата за подготовка и квалификация на кадри в областта на физическото възпитание, спорта и на свързаните с тях дейности. В този смисъл докладът разглежда подробно видовете и формите на следдипломно обучение, които предоставя Центърът за следдипломна квалификация в Академията. В т. ч. са включени видовете обучения за придобиване на професионални квалификации, други специализации и краткосрочни курсове, курсове за придобиване на квалификационни кредити от учители по физическо възпитание с техните тематични направления и пр. Посочват се съществени елементи от технологията и от учебните планове и програми на тези специализации и курсове, включително изискванията за участие в тях. Проблемът е разгледан не само от образователна, но и от законово-нормативна и трудово-професионална гледна точка. Стилът на поднасяне на текста не носи само информативен характер, но има и образователно-мотивационен характер. Ето защо в него са включени и някои статистически данни. Посочени са също някои възможности, които предоставя следдипломното обучение за кариерно развитие в перспектива.

Ключови думи: следдипломно обучение, професионална квалификация, специализации, курсове, кариерно развитие, учебни планове и програми

Introduction

Postgraduate training at the NSA "Vassil Levski" is an essential element of the system for training and qualification of personnel in the field of physical education, sports, kinesitherapy and related activities. This is due to both the legal framework and the fact that the Sports Academy has accreditation for training in the following professional fields: 1.3 "Pedagogy training in ... (physical education)", 7.6 "Sport", 7.4 "Public health" 7.5 "Health Care". The Postgraduate Studies Center (PSC) is an educational-scientific unit at the NSA "V. Levski". It was created on the basis of a decision of the Academic Council of 18.09.1992. It is managed by a person, elected by the Academic Council (AC) and appointed by the Rector. The Center has established a Scientific-Academic Council of qualified teachers, which discusses and adopts curricula and programs, teaching aids, themes of educational and scientific works and other materials, decides on the specific conditions and the technology of the postgraduate training. By a decision of the AC of April 2, 2015, a new Regulation on the Structure and Activity of the PSC was adopted, which allows it to better relate to the legislative changes and the increasing competitiveness of the sports-educational market in the country. In previous publications (Tzolov and Tzolova, 2016; Tzolov, Gavrilov and Tzolova, 2017; Tzolova, 2017) we looked at the opportunities for obtaining Bachelor's and post-graduate degrees in sports, focusing more on teacher's qualification in physical education. Due to the importance of the problem, its social and educational significance, we have made it a priority to explore the analysis by examining in detail the types and forms of post-graduate training provided by the PSC at the Academy, including the types of training for acquiring professional qualifications, other specializations and short-term courses, courses for acquiring qualification credits from physical education teachers with their thematic directions, etc. The problem is addressed not only from the educational but also by the labor-professional and legal-normative point of view through the prism of several basic normative documents that have a direct relation to the qualification in sports - Higher Education Act (HEA), Vocational Education Act and Law on

Pre-school and School Education, Law on Physical Education and Sports, National Classifier of Occupations and Positions in Bulgaria and Ordinance No. 2 on Professional Qualification and Qualification of Sport-ppedagogical Personnel [2-8].

The training for acquiring coach qualification has the largest share in the activity of the PSC, which can be more than 60 types of sports. The specialized normative act, which regulates it, is Ordinance No. 2 on the professional qualification and qualification of sports pedagogical staff [5]. There are five levels categorized in it, respectively instructor, assistant coach, coach, senior coach and head coach. The first two are for people with high school diploma, and the next three are for people with Bachelor's degree, and a Master's degree is required for senior coach.

According to the HEA and in accordance with Ordinance № 2, the coaching qualification at the Center can be acquired by people holding a Bachelor's degree or those who will acquire a Bachelor's degree in the course of the specialization. The training for acquisition of this qualification for the various sports is 18 months (3 semesters) and is completed on a specialized curriculum with a course of 60 ETCS (1,800 academic hours). The curriculum includes 19 disciplines, of which 2 are electives (Figure 1).

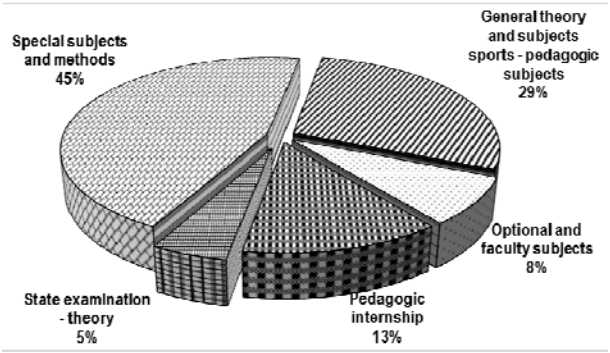

Fig. 1 Structure of the curriculum in PSC for acquiring coaching qualification (in %), a total of 60 ECTS

They provide an opportunity for learners to master knowledge of the type of sport and a number of aspects of socio-pedagogical and psychological, medical-biological, biomechanical and managerial sport knowledge.

Among the most preferred coaching qualifications are those related to yoga, karate, boxing and kickboxing, basketball, swimming, tennis, etc.

Qualified coaches can work in the system of physical education and sport as coaches, whose functions are clearly reflected in the above-mentioned Ordinance No. 2 (Art. 11), namely:

1. planning, organizing and conducting training in sports clubs;
2. participate in the organization of competitions of the athletes;
3. conduct the training process with athletes from national teams under the control of a senior or chief coach;
4. raise the level of knowledge and decision-making skills necessary for self-fulfillment of his/her professional activity;
5. participate in the selection of athletes for the national teams;
6. organize the timely passage of competitors through periodic and pre-competitive medical examinations, monitors and is responsible for compliance with the Ordinance on Doping Control in Training and Competitive Activities;
7. apply safety measures to athletes during training sessions, sports events and sporting activities;
8. encourage compliance with the rules of sportsmanship and fair play ("fair play");
9. assist and encourage assistant coaches and instructors to improve their knowledge and skills.

However, it is a problem that coaching qualifications (this also applies to other qualifications) cannot be acquired by people with high school diplomas as they receive it under another law [2]. This has led to the paradox that the PSC cannot qualify students with high school diplomas, although the Academy has much better opportunities, resources and lecturers than a Vocational Training Center for example. That is why people with high school diplomas also have the opportunity to improve their knowledge of sports in short-term courses or long-term specializations with the graduates, but without the corresponding coaching qualifications. These persons are trained in two specialized curricula, complying with Ordinance No. 2 (Art. 4 and Art. 5), and they are not qualified, but only have the capacity to work respectively as instructor and assistant coach.

Another good opportunity, which provides the PSC for acquiring professional qualification and respectively for work-professional realization, is related to the sport management profession. The education and qualification activity of sports management in the PSC with students who graduated with other majors started in 1990. The graduate school for sports managers was then set up at the Center. Subsequently, it ceased its activity and, in accordance with the regulations in the post-graduate training conditions, sports management acquires long-term specialization status for obtaining the "Sports Manager" qualification. Specialization is taught for three semesters in a specialized curriculum and is primarily intended for people who have acquired (or who will acquire) in the course of their studies a higher education degree as a "Sports coach", "Teacher of Physical Education", "Kinesitherapist" or another sports qualification. The curriculum includes the study of specialized and general theoretical disciplines plus management practice. The training includes 60 ETCS (750 hours of audience work and 1050 hours of self-employment) and ends with a state examination in the specialty or defense of a diploma thesis. The ratio of the specialized management disciplines to the general theoretical ones is shown in Figure 2

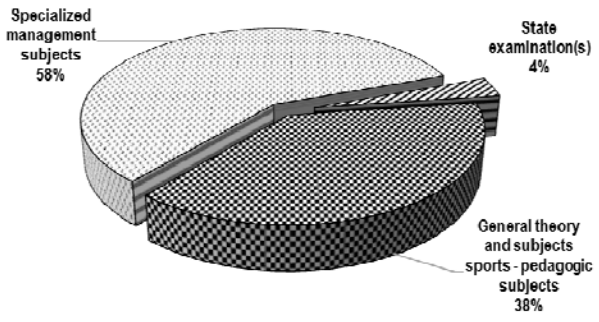

Fig. 2 Structure of the curriculum in the PSC for the acquisition of a sports management qualification, a total of 60 ECTS (in %)

Students who have acquired professional qualification "Sports manager" mostly establish themselves as managers in: fitness and spa centers, sports clubs and federations, sports goods companies, sport and recreational services and sports-entertainment events, state and municipal administrations, etc.

The third qualification gained in the PSC, which is of considerable interest, is the teacher's qualification. The vocational qualification "Teacher of physical education" is regulated by several normative documents - Higher Education Act, Preschool and School Education Act, Ordinance on the State Requirements for Teacher Education and Ordinance No. 12 on the Status and Professional Development of teachers, principals and other pedagogical specialists.

Under the postgraduate studies at the NSA, teacher's training can be acquired by people with a Bachelor's degree. They are trained in a two-year (4-semester) part-time specialization in a specialized curriculum and study programs. The training corresponds to the current ordinance, reflecting the requirements for acquiring a teacher's qualification. It includes a course of 60 ECTS - 1800 academic hours plus, incl. hours for preparation of national exams - theory and practice, Fig. 3). The total number of disciplines studied is 30, including "Pre-graduate Pedagogical Practice".

The acquired qualification "Teacher of Physical Education" provides the opportunity to study also in the higher educational-qualification degree "Master", with major "Physical education". There are 12 specializations in this Master's program.

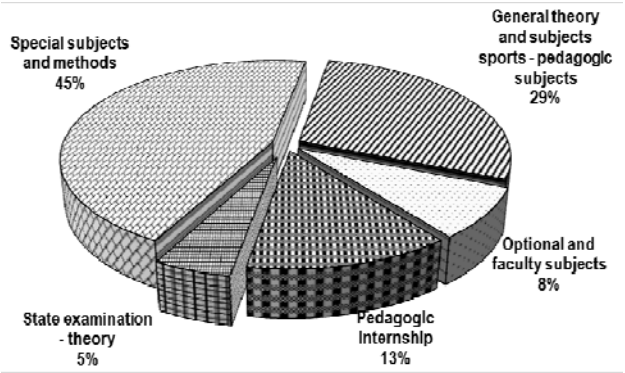

Fig. 3. Structure of the curriculum in the PSC at the NSA for acquiring teacher qualification, a total of 60 ECTS (in %).

An essential element in the qualification process of physical education teachers is their continuing education. This is regulated by the Law on Pre-school and School Education, and by Regulation №12 on the status and professional development of teachers, principals and other pedagogical specialists. In Art. 221 (3) of the Act stipulates that pedagogical specialists are required to increase their qualifications on an annual basis in order to improve the quality of their work and the quality of the preparation for students. The following article states that this must be done with a minimum of 48 academic hours (3 qualifying credits) for each attestation period, i.e. four years. Considering these requirements, the PSC at the NSA "V. Levski" has developed and approved more than 20 syllabuses with one and two qualification credits for physical education teachers. The themes of these trainings, which are being actively conducted, is extremely varied. In addition to the training, it should be clarified that, on the basis of the level of qualification attained, pedagogical specialists can acquire professional qualification degrees, each of which has certain requirements. The NSA "V. Levski " has developed for them a system and technology for awarding the five professional-qualification degrees of teachers.

To the above-mentioned professional qualifications can be added one more - "Methodist of Physical Training in the Ministry of the Interior and Aerospace", as well as a one-year specialization in "Sports Journalism", however, the interest has decreased in recent years for the last one and there are currently no trainings.

The PSC also hosts a number of short-term courses that do not provide professional qualifications, but provide opportunities for graduates, more or less, to establish themselves on the labor market. Among the most preferred ones are several courses for acquiring instructor skills, respectively "Bodybuilding and fitness", "Aerobics and calanetics", "Swimming" and "Equestrian sport". There is also high interest in massage classes - "Classic, East Asian and Anti-Cellulite Massage" and "Massage Reflexology".

Conclusion

The Postgraduate Studies Center at NSA "V. Levski" offers different types and forms of training in the field of physical education, sports, kinesitherapy and related activities. In this way, both students and graduates of the Sports Academy, as well as people with other education, can acquire a new professional qualification or qualification, which extends their knowledge and opportunities for professional establishment. The training at the Center is done through a wide range of methods and tools, which include lectures, seminars, consultations, discussions, modern presentations, internships and more. Every graduate of a particular specialization or course receives a corresponding certificate of professional qualification or certificate, which allows him/her to work in the respective field. The interest in the training and the opportunities offered by the Centre is demonstrated by the fact that during the last years an average of 800 to 1200 students have been training at the PSC.

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IMPROVING DETECTABILITY AND VISUALISATION OF THE WEBSITE OF THE UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKI"

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ABSTRACT. The aim of this report is to present the work of a team from the Department of Informatics aimed at improving the delectability and visualisation of the site of the University of Mining and Geology "St. Ivan Rilski". With the growing popularity of the World Wide Web, its recognition as a leading mass media, and owing to the development of modern tools for the creation of information systems, it has become possible to create functional and attractive applications that are available online. Nowadays, the Internet is one of the most dynamic forms of advertising. In the theory and practice of today's Public Relations (PR), an organisation's website is rated as the most efficient media and as a communication channel with optimum interactivity parameters. According to various studies, over 70% of the Internet traffic worldwide has already become mobile. The number of smart devices is steadily increasing and significantly exceeds the number of PC users. Smart devices are used as navigation tools that employ mobile applications and various dynamic sites. This requires for information to be presented in a form that is appropriate for the respective operating system, in particular for mobile devices that differ in size and resolution. Modern tools are used for building adaptive and responsive web pages. The data provided by the global network should be explored, analysed, and structured in such a way that that they be clear and easily accessible for the user. Currently, to own a corporate website is neither considered an advance, nor a luxury; in fact, it is a mandatory asset for every contemporary business.
The website of an educational institution is expected:

- To meet the information demands of those groups that are important for the development of the educational institution;
- To provide the grounds for active bilateral contacts between university representatives and the external environment;
- To actively participate in the modelling of the public image of the university.

Within the context of a continually evolving information and communication environment, the achievement of these goals requires constant updating and improvement of the site and integration of new technologies. A major factor in the promotion of an internet site that aims at attracting more visitors is the SEO (Search Engine Optimisation). SEO is a set of tools designed to obtain a high-ranking placement of a site in the search results page with an Internet search engine using keywords. The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.
The site of the University of Mining and Geology "St. Ivan Rilski" is not well-optimised and does not have a responsive design.

Keywords: Internet, responsive design, site optimisation

ПОДОБРЯВАНЕ ОТКРИВАЕМОСТТА И ВИЗУАЛИЗАЦИЯТА НА САЙТА НА МИННО-ГЕОЛОЖКИ УНИВЕРСИТЕТ „СВ. ИВАН РИЛСКИ“

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РЕЗЮМЕ. Целта на настоящия доклад е да представи работата на екип от катедра „Информатика“ по подобряване на октриваемостта и визуализацията на сайта на МГУ „Св. Иван Рилски“. С нарастването на популярността на www мрежата, утвърждаването ѝ като водеща масмедия и развитието на съвременните инструменти за изграждане на информационни системи (ИС), се даде възможност за създаване на функционални и атрактивни приложения, достъпни online. Днес Интернет е една от най-динамичните форми на реклама. Броят на смарт устройствата непрекъснато нараства и значително надхвърля броя на потребителите на компютри. Смарт устройствата се използват като средство за навигация посредством мобилните приложения и различни динамични сайтове. Това налага информацията, да бъде представена в подходящ вид за различните операционни системи и най-вече за различните по размер и резолюция мобилни устройства, използвайки съвременни инструменти за изграждане на адаптивни и отзивчиви web страници. Данните, които предоставя глобалната мрежа, трябва да бъдат изследвани, анализирани и структурирани по такъв начин, че потребителят да може да ги разбира и бързо да достига до тях. В днешни дни притежаването на фирмен уеб сайт не е нещо модерно, не е и въпрос на лукс – то е просто задължително за всеки съвременен бизнес.
От интернет страницата на образователната институция се очаква:

- Да удовлетворява информационните потребности на важните за развитието на образователната институция групи;
- Да осигурява възможностите за активни двустранни контакти между представителите на университета и външната среда;
- Да участва активно в моделирането на публичното лице на университета.

В условията на непрекъснато развиваща се информационна и комуникационна среда, постигането на тези цели изисква постоянно актуализиране и усъвършенстване на сайта и интегриране на нови технологии. Основен фактор за популяризиране на един интернет сайт с цел привличане на повече посетители е Search Engine Optimization (SEO). SEO оптимизацията представлява набор от похвати, чиято цел е добро класиране на сайт в страницата с резултати при търсене по ключови думи в интернет търсачка. Колкото по-добра е SEO оптимизацията за един сайт, толкова по-добро ще е неговото класиране в списъците на търсачките и съответно повече ще бъдат неговите посетители.
Сайтът на Минно-геоложки университет „Св. Иван Рилски“ не е добре оптимизиран и няма отзивчив дизайн.

Ключови думи: интернет, отзивчив дизайн, оптимизация на сайт

Introduction

The role of a contemporary website is to attract and engage the user, to promote the respective brand, and to increase the awareness of a product or service. In view of this, the maintenance and development of a web application should be regarded as a continuous process related to the constant updating of the information contained therein and to the integration of new web services and technologies.

Within the past 10 years, there has been a steady trend of increasing access to the Internet over smart devices. According to various studies, over 70% of the Internet traffic worldwide has already become mobile. The number of smart devices is marked by a steady increase and significantly exceeds the number of computer users. All this requires the development of an adaptive or responsive web site design in order to format an optimum and good-looking content that is suitable for viewing through diverse devices with varied resolution (desktops, tablets, mobile phones, etc.).

The website of an educational institution is expected to:

- Meet the information demands of those groups that are important for the development of the educational institution;
- Provide opportunities for active bilateral contacts between university representa-tives and the external environment;
- Participate actively in the modelling of the public image of the university.

A major factor in the promotion of a website that aims at attracting more visitors is the Search Engine Optimisation (SEO). The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.

Adaptive and Responsive Design

Two basic approaches have been established in designing a website intended for different devices. These are the adaptive and the responsive web design.

Adaptive design

The term Adaptive Web Design means creating different web pages that are visualised according to the specific size of the device through which these pages are accessed. In this manner, different web pages will be displayed depending on the screen resolution (Berry 2017).

Responsive design

With the Responsive Web Design (Marcotte 2010), the site is visualised equally well on devices with different resolution (mobile phones, tablets, personal computers, laptops, etc.) without changing the program code that builds it.

The benefits of using responsive web design are as follows (Wiki-RD 2017):

- Greater accessibility from different mobile devices and desktop computers;
- A design is worked out that resembles the basic (desktop design), but is intended for devices with varied resolution. Designers can use a template for all devices and, by just using CSS, to determine how the content is rearranged according to the different screen sizes;
- Better indexing by Google (SEO optimisation);
- Only one site is developed, not several sites that serve different types of device with varying resolution;
- A good long-term solution in terms of a rapidly evolving and diverse mobile device market;
- Comfortable and good-looking content, etc.

The main disadvantages of using responsive web design are as follows:

- Boot speed may be a problem with large-size sites or such with numerous video materials and images;
- Budget is high - the implementation of a responsive web design requires overall rewriting of the code which is usually expensive;
- The slow mobile internet or a poor device may lead to a delay in loading the site.

Comparison between adaptive and responsive design

Both types of design are similar in function. Their purpose is to improve the opportunities for the visualisation of a webpage using devices of various types, screens, and resolution. Most often, we aim at presenting the site in at least three different screen sizes - on a small mobile screen, on a tablet-size screen, and on a larger desktop monitor.

The main differences between the two types of design (Warner 2013) are the following:

- The responsive design conforms to the alterations in the width of the browser window by smoothly adjusting the location of the elements on the web page in such a manner that they best fit the available space. Thus, while the user slides the pages of the browser to make them larger or smaller, they will see changes in design in real time.
- The adaptive design uses sophisticated scripts to automatically detect the web server in order to identify any device that visits the site and then to deliver the best site version that is based on the size and the capacities of each device. When the user views such a site and changes the size of the browser window, the site will not change. However, should they visit the same site through different mobile devices, they will not only see the differences in design but may even see different content. This is due to the fact that with adaptive design completely different versions of the site may be sent, depending on the type of the device used.

Problems associated with the visualisation of the site of the University of Mining and Geology "St. Ivan Rilski"

A thorough analysis of the web site of the University of Mining and Geology "St. Ivan Rilski"(http://www.mgu.bg) was carried out in the period January - April 2018 and the following faults were registered:

- The English version of the website has a design

differing from that of the main site;

- The drop down menu does not work in the Safari browser, which is the preferred browser for the Mac operating system and the iPhone OS;
- The descriptive code (HTML 5) through which the site has been built contains a multitude of errors and is not validated successfully;

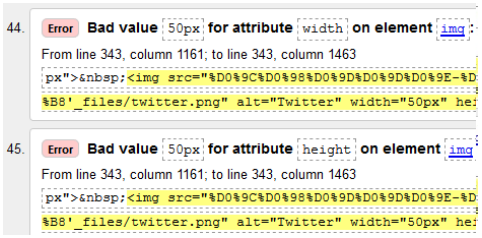

Fig. 1: Validation of the HTML on the first page of the site before

- The same applies to the formatting code (CSS);

Fig. 2: Validation of the CSS on the first page of the site before

- The site of the University of Mining and Geology "St. Ivan Rilski" does not have an adaptive and responsive design.

The test was performed through *https://search.google.com/test/mobile-friendly*

Fig. 3: Design which is not responsive and adaptive

Activities related to the integration of a responsive design into the web site of the University of Mining and Geology

Validation of the site building code - HTML and CSS

The errors detected during the validation of the site code have been reduced to a minimum and the stylistic layout of the site has been fully validated in conformity with the standards for CSS3.

Switching to HTML 5 has made it possible to add micro data; this supports semantic searches and is recommended by SEO professionals.

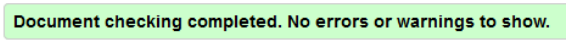

Fig. 4: Validation of the HTML on the first page of the site after

Fig. 5: Validation of the CSS on the first page of the site after

Development of a responsive design for the site of the University of Mining and Geology

Over the past few years, a number of software tools have emerged for automatic generation of a responsive design of an existing site. Duda, bMobilized, Snapmobl, Mobify, goMobi, etc. are among the most popular. They build an automated mobile version of a simple web page within a few steps only: menu recognition; automatic choice of the appropriate mobile view; creation of mobile styles; addition of plug-ins. By using visual settings, the software tools make it possible to specify a multitude of additional settings: to specify the menu blocks and the main content; to choose another mobile view; to set styles; to add different buttons to the site, implemented as plug-ins - phone, e-mail, location map, contacts, links to social networks and sharing links, and so on. Bulgarian developments exist, too, that have a similar application (Rachovski).

Our team has opted for an approach whereby the responsive design is implemented manually, in keeping with the good practices in building and designing a mobile page or a mobile application. These "good practices" come down to the following (Lopez 2017):

- Minimising and mobilising - the content of the site and the amount of information is evaluated. An assessment is made of what part is appropriate to be visualised in the mobile version. It is not necessary to transfer the whole information from the standard application to the mobile one; it is often possible for part of the information to be removed or abridged. In order to sift the information, applications for site usage analysis can be employed, such as: Google Analytics, HubSpot, etc. The strategy here is to create and analyse detailed statistics whereby the number of visits to a given sub-page can be tracked, and, consequently, an extract of the sorting of information to the mobile part of the application be made. This principle is only applicable when creating a standalone mobile version of an already existing desktop one. It can accurately determine which part of the content of the desktop version to filter and what exactly should remain in the mobile version.
- Hiding and selecting of information - this principle concerns hiding part of the content. In most cases, the amount of the information provided is quite large. This requires additional processing so that not all of the information should be displayed on the mobile screen. In case of possible visualisation, the text is usually difficult to read and inconvenient to use. Good practices have shown that, as a rule, the text is placed in separate sections, with a very small portion of the text or just the title displayed to the user. The whole information is visualised only after clicking on the text.
- Using vector graphics that provide the classical advantages: small files, good image quality, easy scaling and processing. The use of these features in

responsive design is almost imperative in rendering icons and images. Easy scalability and processing facilitate their inclusion in mobile displays of various sizes. Small-sized files help alleviate the web page and its prompt visualisation.

- Key and field standardising - a very important factor, given the various mobile devices and displays. In this respect, buttons and links must be separated into individual zones and be of a suitable size for easy user access. Their layout depends strongly on the specific design and implementation of the page.

Rachovski (Рачовски 2014) outlines some more factors that are of particular importance to mobile design:

- Page search - the search in the system is of vital importance in assisting mobile users; with a greater volume of information, the desired result can easily be achieved;
- Code simplicity - sites that use HTML provide a simple and relatively affordable content delivery system with useful features. The use of simplicity of coding results in smaller file sizes, in faster download speed, and is better for use with smartphones that do not have good support for Cascading Style Sheets and other advanced programming features;
- Menu creation - the feature-rich menu is an easy way of communicating in a desktop environment; yet, when it comes to a mobile environment with a small-size screen, the menu should be synthesised and alleviated. It is recommended that the main categories be compared;
- Navigation between menus - to facilitate navigation within the content, a menu for easy access to other topics is imperative;
- Low technical requirements - in most cases, mobile devices have low technical parameters; this should be considered in the event of the use of visualisation modules and a large amount of information (Sharples 2012).

The following were used:

- Hiding and selecting of information;
- Menu creation;
- Navigation between menus.

Having developed the responsive design of the web site of the University of Mining and Geology "St. Ivan Rilski", a number of tests were carried out. They have shown that the site is suitable for mobile devices. The page boot speed has also been improved.

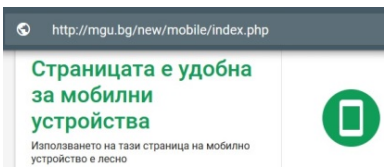

Fig. 6. Testing the responsiveness of the site after the changes

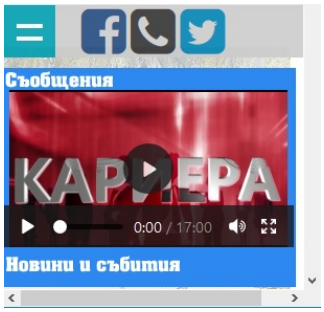

Fig. 7. Responsive design on the site (320x420px)

Search Engine Optimisation

A major factor in the promotion of an internet site and in attracting more visitors is the Search Engine Optimisation (SEO). SEO is a set of tools designed to obtain a high-ranking placement of a site in the search results page with an Internet search engine using keywords.

Commonly, Internet users run into a site by following hyperlinks suggested by such Internet search engines as Google, Yahoo! or MSN Search (now Bing). The better the SEO of a site, the better its ranking on the search engines lists and, consequently, the more the visitors.

Internet search engines make use a large number of factors to determine the relevance of a website (for example, Google is claimed to use over 200 criteria in site assessment). Many of these criteria are company secrets. Overall, SEO is not a static process - the work of search engines often changes and this requires the appropriate adaptation to the new conditions.

The activities that are carried out in order to achieve the optimum SEO can be divided into 2 types:

- On-page SEO – site optimisation involves changes in the HTML code that mostly affect the <head> section, and also addition of extra files to manage the visibility of pages. In general, these changes do not affect the site visualisation but only have an effect on the site index. Since On-page SEO is limited to the capacities of the designed website itself, it can be performed within a short while.
- Off-page SEO – external optimisation involves the overall activity of the optimisation outside the Web site itself. The most popular Off-page SEO techniques are building links to the site, registration of search engines and social networks, content sharing, etc. As a rule, off-page SEO is performed after on-page SEO. Overall, off-page SEO is a very expensive process.

Fig. 8 SEO activities

Modern search engines also have criteria for site evaluation that will result in the lowering of its rating (Black hat SEO). These include the use of hidden text, reciprocal hyperlinks with link farms, etc.

Activities related to improving On-page SEO of the site of the University of Mining and Geology

The site of the University of Mining and Geology is not well-optimised. Convincing evidence as to that is the fact that, by 1st May 2018, when typing keyword "University" in the Google search engine, it appeared on the 4th or the 5th page (Fig. 9).

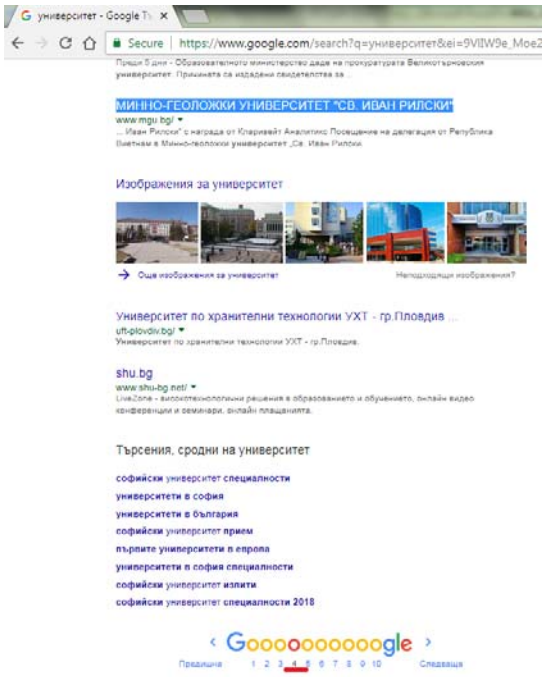

Fig. 9. Google result for the search criteria of "University"

In order to improve SEO, the following On-page activities were carried out:

- A template for a page has been developed that will activate with HTTP status code 404 (the page has not been found);
- A robots.txt file has been added - There are 2 ways that can restrain search engines bots from crawl the site or some of its individual pages. One is to place the so-called META Robots tag in the HEAD section of your site (this only works for those pages in whose header it was placed). The other is by adding a special file with instructions called "robots.txt". The latter is used to set the same behaviour for multi-page robots. Thus, the files and directories that should not be indexed are specified. Robots.txt is the file for the functional performance of the Robots Exclusion Protocol (REP). This file is a set of web standards that regulate the behaviour of the Internet robots as well as the indexing on the part of the search engines. This is the file for the web queries that have been passed to the Webmaster, as well as to the webmaster of the site;
- The sitemap.xml file has been added - XML sitemap is an XML document which lists all the URL addresses that exist in the respective domain. This helps search engine crawlers (scripts that constantly search for new and unique information to index) to easily scan and crawl your site/blog and thus index all of its content. The sitemap.xml site map for robots is the logical addition to the robots.txt file. While robots.txt indicates to search engines which pages are banned for indexing, sitemap.xml reports which pages are available for indexing (Figure 10).

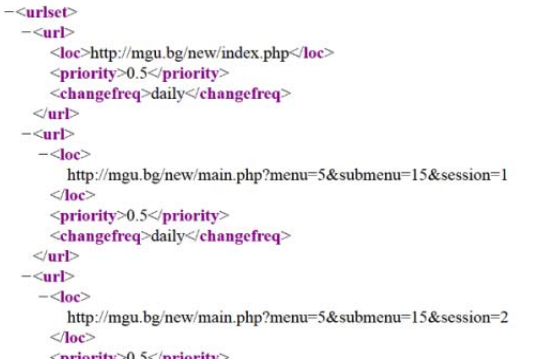

Fig. 10. The sitemap.xml file in the website of the University of Mining and Geology

Besides, recommendations for Off-page SEO have also been given.

Other improvements of the site of the University of Mining and Geology

In addition to the above activities, the following improvements have also been made:

- A design corresponding to the main site was integrated into the English version of the website. The substitution of outdated information in English with up-to-date data has also commenced. The template offered can easily integrate other languages as well;
- A new menu was built that works with all modern browsers: Google Chrome, Mozilla Firefox, Internet Explorer, Microsoft Edge, and Safari;
- The Information and Technical Support Division was assisted in integrating a module for uploading exam dates and updating academic staff data into the site of the University of Mining and Geology.

Conclusion

The rise in popularity of the World Wide Web, its establishment as a leading mass media, and the development of modern tools for the building of information systems have all made it possible to create functional and attractive applications available on-line.

Today, the Internet is one of the most dynamic forms of advertising. In the theory and practice of contemporary PR (Public Relations), an organisation's website is rated as the

most effective proprietary media and as a communication channel with optimum interactivity parameters.

Nowadays, owning a corporate website is not just a modern trend; it's not a matter of luxury either; it is a must for any modern business.

Within the context of a continually evolving information and communication environment, the achievement of these goals requires constant updating and improving of the site and integration of new technologies. In the 21st century, smart devices are used as a means of navigation through mobile applications and various dynamic sites. This requires for information to be presented in a form that is appropriate for the different operating systems, and above all for mobile devices of varied size and resolution, using modern tools to build adaptable web pages. The data provided by the global network must be explored, analysed, and structured in such a way that the user could comprehend it and quickly access it.

The integration of a responsive web design into the site of the University of Mining and Geology "St. Ivan Rilski" has brought about an improved vision of the web site of the university and the quality of the data it presents.

These have been the initial steps towards improving the SEO of the site.

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PROTECTION OF PERSONAL DATA IN E-LEARNING - METHODOLOGY AND TECHNOLOGIES

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ABSTRACT. Personal data protection and privacy are a key focus in the work of all institutions that deal with them. The implementation of Regulation 2016/679 of the European Parliament and of the Council of Europe of May 2018 requires that this protection also applies to all types of information systems. In this respect, the introduction of technologies and the establishment of a methodology for e-learning systems, which are increasingly being used by educational institutions, are indispensable. The article discusses possible technological mechanisms for personal data protection and offers a methodology to be implemented in an e-learning system. The proposed methodology is basic and includes fundamental rules for the protection of personal data. Depending on the type and purpose of the specific e-learning system, it can be complemented and further developed.

Key words: e-learning, personal data protection, technologies, methodology

ЗАЩИТА НА ЛИЧНИТЕ ДАННИ ПРИ ЕЛЕКТРОННО ОБУЧЕНИЕ – МЕТОДОЛОГИЯ И ТЕХНОЛОГИИ

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РЕЗЮМЕ. Защитата и неприкосновеността на личните данни се налагат като основен акцент в работата на всички институции, които боравят с такива. Прилагането на Регламент 2016/679 на Европейския парламент и на Съвета на Европа от май 2018 г. изисква тази защита да се приложи и към всички видове информационни системи. В тази връзка е задължително въвеждането на технологии и създаване на методология и при системите за електронното обучение, което навлиза все повече в образователните институции. Статията разглежда възможни технологични механизми за защита на личните данни и предлага методология, която да бъде реализирана в система за електронно обучение. Предлаганата методология е базова, като в нея са включени основни правила за защита на личните данни. В зависимост от вида и предназначението на конкретната система за електронно обучение може да се допълва и доразвива.

Ключови думи: електронно обучение защита лични данни, технологии, методология

Introduction

The main characteristic of modern economy is the need to acquire knowledge, skills and qualifications throughout life. The massive use of information technology for training needs necessitates the use of principles that best protect the personal data of each learner.

The changes introduced by the General Data Protection Regulation (GDPR) require the introduction and enforcement of privacy and privacy rules. In this respect, the introduction of technologies and the establishment of a methodology to ensure the highest degree of protection of all personal data used in training are necessary.

Cases of cybercrime related to theft or misuse of personal data have led to the introduction of privacy technologies.

The basic legal principles on which the lawful use of personal data is based in Bulgaria are set out in the Personal Data Protection Act, which has been in force since 2002.

Security and education

Higher education has gradually started to introduce technology and information systems for e-learning to meet the wishes of students who want something beyond traditional teaching methods. These new training technologies mix online computerized content for a course with various blogs, forums and Webinars.

In this training, students want to use increasingly new tablet and mobile applications that may endanger the security of the e-learning platform used by the university.

Students are one of the largest groups of users of various social networks such as Facebook, Twitter, YouTube and others, seeking to reconcile their use with e-learning platforms. This facilitates the distribution of malware, which may also be related to the theft of personal data from university servers.

For this reason, it is of particular importance to introduce a methodology for working with the e-learning platform of the particular university, which will maximally protect both the

personal data of all learners and the technologies that protect the e-learning system itself.

Personal data protection technologies for e-learning systems

Generally, e-learning systems use the Internet as the main channel for information transfer, trying to prevent attacks on all student communication with the training system. In order for this to be achieved, it is necessary to introduce technologies that, in their joint work, ensure maximum protection of the system and personal data.

A basic technological requirement is to ensure the confidentiality of the network through which data is transferred. Relatively good data security is provided by technologies, such as secure sockets layer and virtual private networks, but they are not entirely sufficient. Since students are using different learning devices, it is necessary to provide protection for all possible channels of communication.

In this connection, the eLearning system may require the use of an additional technology requirement, such as registration of the location and the devices used by each student. The eLearning system can require anyone to register in their individual profile the location and all the devices they use to get learning content, and to impose limitations on the number and type of devices used. It is possible to introduce limitations on the IP addresses used by the trainee in e-learning and distance learning systems that provide specific learning content. A requirement may also be that tests are to be performed only from fixed fixed-term addresses and in specialized centers.

Another additional technology requirement is the site that accesses the e-learning system to use the P3P developed by the World Wide Web consortium. Through this technology, students can easily be informed about the rules on personal data in the system. This technology provides a mechanism that ensures that users are informed about privacy policies before submitting personal information but does not provide a sufficiently reliable mechanism to ensure that the site is working in compliance with this policy.

A technology solution used is an Anonymizer web service to redirect web queries. Combined with secure communication channels, this approach may be well suited to protecting information in e-learning systems. Even better protection would occur if this proxy server is configured on a virtual machine, which will provide an extra level of data protection.

There are also other defense technology solutions such as Onion Routing (D.Goldschlag, M.Reed, P.Syverson, 1999), Crowd (Reiter, MK, A.D.Rubin, 1998), MIX Networks (D. Chaum, Net (D. Chaum, 1988) and others, but in addition to good personal data protection, they can cause some inconvenience in handling them, some of them commercial.

Perhaps the best technological solution is to implement cryptographic functions and use a fully encrypted connection when transmitting the information, but this will further burden the e-learning systems.

In order to assess what combination of technologies will be applied to each specific e-learning system; a preliminary analysis is needed to determine the balance between the protection of personal data and the quality and speed of the information exchanged.

Methodology for the protection of personal data in e-learning systems

The methodology for personal data protection can include a number of rules that need to be laid down in the process of designing and implementing the e-learning system concerned. These rules and requirements are directed both towards the users of the training system and towards the persons involved in the administration of the system.

Depending on the objectives of the e-learning system, the proposed electronic content and the validity of the certificates issued, the methodology may include a different set of rules, but the basic data protection standards are:

- Defining user groups in the system;
- Defined mechanism for registration, entry and exit of the system;
- Accountability;
- Term of storage/erasure of personal data and information;
- Rules for the transfer of personal data to other authorized institutions.

Defining user groups

Already in the process of designing the e-learning information system, it is essential to define the main user groups, such as the administrators of the system itself, the training administrators, leading lecturers for each course and some systems and users with special powers.

From the point of view of personal data protection for each user group in the particular system implementation, the "minimum sufficient amount of information" rule is used. For each group of users, the system only provides access to the information required for their specific work. Thus, the e-learning system designs rules for personal data protection.

To accomplish this, a detailed description of the entire amount of information that will be exchanged during the actual operation of the system is necessary.

A defined mechanism for registration, input and output

Obligatory conditions in the methodology are strict compliance with the mechanisms for registration of users, entry and exit of the system.

Depending on the requirements of the specific e-learning system, the type of information exchanged and the platform used for its implementation, input/output mechanisms are introduced and controlled. It is imperative to use an account that includes at least a unique user name and password that

are obtained by filling in all the fields in the registration form of the system. For some systems, the password is set by the system and is not subject to change, while others require additional activation by code, e-mail, etc. after verification of the information entered by the user.

If the training system includes financial instruments, the so-called "fiduciary mechanisms" are introduced that include the use of encryption and various types of digital certificates that the system generates.

In this additional security mechanism, you can also define the number of account entries, authorization time, device verification, single key session encryption, automatic shutdown, and system shutdown in case of suspected attack and other security mechanisms.

Accountability

Accountability in e-learning systems is directly related to the control of input and output mechanisms used.

Logs for all system events such as login, exit, session duration, user authorization, access to system resources, duration and time of use, passwords used and other defined requirements are required.

Systematic reporting mechanisms check these logs - periodically or continuously - and in the event of inconsistency or suspicious action they end or block the work of the user concerned.

Term for storage/erasure of personal data

In the implementation of the e-learning systems, rules on the term of storage of personal data are defined, which must correspond to those stipulated in the legislative acts of the government.

The storage methodology sets both technological and organizational measures for archiving and long-term storage outside the system, subject only to regulatory mechanisms for the protection of personal data.

An important element is the permanent deletion of personal data, and it should be possible for them to be deleted at the request of the person concerned, if this is not in contradiction with the normative acts.

Rules for the transfer of personal data to authorized institutions

Many e-learning systems that are associated with issuing different types of certificates require the transmission or sharing of personal data to users.

Already at the design stage of e-learning systems, strict rules are laid down which set out a legal framework for the exchange of personal information between the educational institution and the relevant governmental institutions. The mode of transmission, the type of data and the authorized personnel to do this are specified.

The training on the protection of personal data both by the administrators of the system in the university and the users of this system is also an important part of the methodology.

Conclusion

E-learning today is an integral part of higher education, with more and more universities taking advantage of the benefits it offers when it comes to further qualification or retraining.

The rules imposed by Regulation 2016/679 on the protection of personal data of the European Parliament and of the Council of Europe require the introduction of technological solutions and mechanisms in the systems used that fully comply with those rules.

To respond to these challenges, it is imperative to add new functionalities to existing eLearning systems. When creating new ones, it is imperative to apply a methodology that includes different technological mechanisms to ensure the protection of personal data.

It is important to make sure that as personal data protection technologies evolve, development is also subject to attempts to modify or steal them, and therefore data security methodology and technologies need to be complementary and further developed.

Depending on the information contained in the e-learning system, the most appropriate mechanisms according to the development are applied. However this must not hamper the basic functionality, namely the provision of electronic content to authorized users.

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DIFFICULTIES IN TEACHING ENGLISH FOR SPECIAL PURPOSES TO ENGINEERS AS A FOREIGN LANGUAGE

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ABSTRACT. In an age of globalisation, English is the language of science and technology and it is an essential part of the professional training for engineers. The purpose of this paper is to highlight some difficulties and challenges faced in teaching English for Special Purposes to engineering students and to suggest some solutions. Among the difficulties faced by teachers is adapting study materials to the specific groups of learners, especially those in the IT area. Another challenge is that the language teacher is not an expert in the respective professional technical field they are teaching. Moreover, the issue of students' attitude to learning the language plays a very crucial role. An instrument in this study was a questionnaire consisting of 30 items. Students were asked to express their opinion and make an assessment of the language course and the teaching process. The study was carried out with the students in the courses of studies in Automation, Information and Controlling Equipment, Computer Technologies in Engineering, Processing and Recycling of Materials, Development of Mineral Recourses, Management of Recourses and Production Systems, Electrical Energy and Electrical Equipment.

Keywords: English for Specific Purposes (ESP), Foreign Language Teaching (FLT), difficulties.

ТРУДНОСТИ ПРИ ПРЕПОДАВАНЕТО НА АНГЛИЙСКИ ЗА СПЕЦИАЛНИ ЦЕЛИ НА ИНЖЕНЕРИ КАТО ЧУЖД ЕЗИК

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РЕЗЮМЕ. В ерата на глобализация английският е езикът на науката и технологиите и е съществена част от професионалното обучение на инженерите. Целта на този доклад е да изтъкне някои трудности и предизвикателства, пред които се изправяме в преподаването на английски език за специални цели на инженерите и да предложи решения. Сред трудностите, пред които са изправени преподавателите, е адаптирането на учебните материали към конкретните групи обучаеми, особено тези в областта на ИТ. Друго предизвикателство е, че преподавателят по английски език не е експерт в съответната професионална техническа област. Освен това много важна роля играе и отношението на студентите към изучаването на езика. Инструмент в това проучване бе анкета, състояща се от 30 въпроса. Студентите бяха помолени да изразят своето мнение и да направят оценка на езиковия курс и учебния процес. Изследването беше проведено със студенти по Автоматика, информационна и управляваща техника, Компютърни технологии в инженерната дейност, Обогатяване и рециклиране на суровини, Разработване на полезни изкопаеми, Управление на ресурси и производствени системи и Електроенергетика и електрообзавеждане.

Ключови думи: английски за специални цели, чуждоезиково обучение, трудности.

Introduction

As English is the language of business, technology, education, and research, the need for ESP is growing rapidly. Students of engineering need specific language skills for their future career. Technical English focuses on the professional field and vocabulary varies in each subject area. Teaching Technical English is part of English for Special Purposes (hereinafter referred to as ESP). ESP is occupationally-oriented since it is aimed at the learners' specific vocational needs. In the area of Technical Education, most of the information sources are in English. In view of this, mastering the language is very important so that the students could perform at a high level in future and continue to develop professionally. The rising academic standards and the requirements for occupational fulfillment of the alumni necessitate the continuous improvement of the teaching methods in the engineering courses of study (Terzieva et al., 2014). In general, language teaching is not intended to just transfer knowledge but also to develop abilities. Choosing the appropriate content for the purposes of learning becomes more difficult to design, especially since university lecturers in foreign languages are usually non-specialists in the respective engineering area. Most of them have limited knowledge in the vocational field taught in the courses of study and it is a great challenge for them. They often have to master matter that is beyond their competence. In addition, learners are sometimes more knowledgeable about the subject matter than the language lecturers themselves. The teaching material in such courses should be designed and adapted to the learners' needs and should be based on activities related to their profession. When designing the course, lecturers should consider students' General English (GE) level. The competence gained through GE enables the students' learning of ESP and guarantees their interest in using it. The aim of the module in ESP is to produce a syllabus which gives high priority to the language forms students would meet in their Science studies and, in turn, gives low priority to forms they

would not use (Hutchinson and Waters, 1987). During the course, it is of prime importance to decide what approaches and strategies will be applied to teach students in engineering majors. Attitude towards the language immensely influences the learning process and has been identified as one of the most important factors in education. The needs analysis is considered to be an essential feature and as such, it aims at collecting sufficient information on the students' language needs. Therefore, it should be a continuing process. A survey conducted by means of a questionnaire and interviews can also serve as a guide to match the teaching materials with the learners' needs.

The findings in this paper are based on the authors' experience in teaching students of engineering areas. Some suggestions are given related to English for Special Purposes which could be beneficial for other ESP university lecturers.

Difficulties and Solutions in Teaching ESP

1. Course design

Much of the work performed by teachers is related to designing appropriate courses for various groups of learners. Whereas course design plays a relatively minor part in the life of the GE teacher, for the ESP university lecturer course design is often a substantial and important part of the workload (Hutchinson and Waters, 1987). It is questionable, though, whether the teaching methods used in ESP courses meet the learners' needs. The students' command of the English language must be such that they can achieve a satisfactory level in their specialist subject area. Foreign language university lecturers should have in mind that the subject matter requires real life learning situations and the content should be useful to the students. Even though there are many course books designed to serve this area of English, it is very confusing to choose the relevant one. Our choice is as follows:

- we examine in detail the curricula for each course of studies offered to our students (*Automation, Information and Controlling Equipment; Computer Technologies in Engineering; Processing and Recycling of Materials; Development of Mineral Resources; Management of Recourses and Production System, Electrical Energy and Electrical Equipment* at the Kardzhali Branch and *Computer Technologies in Engineering* at the University of Mining and Geology - Sofia);
- we focus on the most important course units on the respective curriculum, i.e. the ones that form the foundation of the specialist subject area, and incorporate them into the overall course design;
- then we search for suitable published materials in each topic included in our course design, preferably textbooks with suitable exercises and training materials; the use of authentic materials is essential in order to prevent students from being bored and lack of interest.
- if textbooks are not available, we resort to the Internet; it should be noted that in recent years the Internet has become a source for authentic or nearly authentic materials for almost any field. In this sense, it is a major asset in the difficult task of designing the respective ESP course. One drawback, however, is that the materials from the Internet are often too detailed or rather complicated, so the foreign language university lecturer has to be able to alleviate the content and grammar, to adapt them to the students' level of command of the foreign language, and make them suitable for the specific purpose of teaching a language through terminology.

Training in the ESP course should be aimed at achieving foreign language skills related to the particular specialty concerned and, therefore, oriented towards the implementation of specific language tasks in specific situations of the professional life (Purvanova et al., 2010). What is more, knowing the characteristics of the learners should help educators to formulate strategies. Nowadays, it is not uncommon for learners to work and study at the same time, so they may not be very successful linguistically, they may have no time for homework, or they may be very tired by their work. All these factors will need to be taken into account by the ESP lecturer when designing the courses. Another factor that is very important is cooperation between language lecturers and specialists in the relevant fields of knowledge in order to design the course.

2. The ESP lecturer

From the very beginning it is made clear to the students that they are learning engineering and that we are specialists in teaching English as a foreign language, not engineers with a degree. The real challenge occurs when the language lecturer must try to appear somewhat knowledgeable about the field of technology which they are teaching. In order to be effective in the courses, it is important the language lecturer to acquire basic knowledge on the particular subject area and to become familiar with the ESP course material. It is absolutely necessary to remember that no matter what technological discipline is being taught, the reason for teaching English through technology is for communication (Caissie, 1978). The emphasis should not be only on specialised knowledge, but above all on skills which will enable students to be more competitive in the labour market. It is significant to keep in mind that the new teaching methodology has competency-based philosophy and the encouragement of critical thinking and creative knowledge acquisition are of great importance. Collaboration with content university lecturers is essential in teaching ESP. By analysing the previous researches and different specialisms of English language lecturers and content lecturers, the former will not strive to learn as much content knowledge as possible but find their own and unique status in teaching with their linguistic knowledge (Luo and Garner, 2017). It is essential to keep up-dated about the latest developments and trends in the field (Latha, 2014). And this is where collaboration with the lecturers in the respective departments, as well as the guidance through the materials extracted from the Internet come is useful.

Another important issue is that special attention should be paid to the arrangement of the topics and the gradual introduction of the specialised content. The ESP university lecturer needs to avoid difficult material and go no further than touching only surface. Teaching too complex professional content can lead to frustrating situations.

After all is said and done, being an effective ESP lecturer requires more experience and extra effort compared to that of the GE lecturer.

3. Students' attitude towards the English Language

From our point of view, many students in engineering are not taking enough interest in the English language and they give advantage to their specialised subjects. Some students do not attend classes regularly, nor do they prepare for the exam properly. As a consequence, this pejorative attitude toward English creates a barrier for effective teaching. This is particularly obvious in the groups that are offered language training "in a stream" where students from different courses of study attend language classes together. In the ESP module, students from each faculty are offered topics that are from the area of each course of study and are evenly distributed in terms of number and duration but are not within the field of expertise of the specific student. As a result, students' motivation, as high as it may have been, sometimes drops.

Moreover, each group has a different English proficiency level which is a big challenge for adequate teaching. When learners are with mixed abilities, stronger students may feel held back and weaker student may feel stressed. Hence, the role of the teacher is to create conditions for positive working environment and motivate the students. This drawback has recently been overcome in the course of study in *Computer Technologies in Engineering* at the University of Mining and Geology - Sofia where last year and this academic year first-year students were divided into two sub-groups depending on their results from a placement test in GE. ESP is generally taught to intermediate or advanced students but teaching students at an elementary level is not an exception, especially in the course of study in *Computer Technologies in Engineering* and in *Geology and Geoinformatics* where the English language is mandatory.

Dudley-Evans and St. John (1998) assume that basic knowledge of the language system is required in ESP courses. English curriculum and class activities should be planned according to students' necessities, feelings, and behavior. Besides, language lecturers should recognise and respect the students and encourage them to positive attitudes towards English learning (Eshghinejad**,** 2016). The ESP syllabus at the University of Mining and Geology "St. Ivan Rilski" is designed according to students' needs and their former knowledge of GE and it focuses on professional vocabulary relevant to all disciplines. Training is upgrading and it aims to prepare the future engineers for work with specialised literature and actively communicate in the relevant language within the framework of their professional responsibilities at the workplace (Purvanova et al., 2014). Relationships with colleagues and teachers, the atmosphere in the classroom, the nature of the learning activities, and other factors can affect students' attitude towards learning the language. The issue of attitude can be resolved by establishing a positive learning environment, by paying more attention to interactive activities in class such as discussions, debate sessions, role-plays, pair and group work, problem-solving tasks so that students can gain more confidence.

It is also very important to set realistic goals for student achievements. Specifically, it is obvious that the learners will not be able to perform like native speakers by attending English classes only four periods a week in the course of 2 or 3 semesters. In reference to the ESP course, the students are in the process of attaining education but there are students who are already experienced in a certain job. Those who have returned to learning after a break of some length are inclined to have a low opinion of learning the language. In such cases, the lecturer's task is to change the students' expectations, to motivate them by offering non-judgmental feedback on their work, and to look for and find ways to encourage advancement, such as giving them the opportunity to choose paper topics and project assignments and assessing them in many and various ways like grading tests, encouraging and rewarding presentations delivered, giving credits for project, etc. In our opinion, it is evident that the more positive attitudes students have towards the English language, the better they learn it.

Approaches for Overcoming Difficulties in ESP Classes

The communicative approach is learner-centered and based on real life situations and its final aim is the communicative competence. In teaching ESP, the focus is on presenting terms and reading and translating a number of sometimes boring and complicated texts. So, extensive communication is not used during most of the lessons. Since the 1960s, foreign language teaching has expanded from teaching grammatical structures to promoting abilities for communication. The purpose of ESP is to prepare learners to communicate effectively in different work situations. It has become evident that for acquiring a language, the mere realisation of the grammatical competence is not sufficient; the communicative competence is required as well.

The motivational factor is of great importance in the process of learning a foreign language. We need to focus on the way we can motivate our students based on the psychology of their age, on the way a learner psychologically perceives the use of language, and on the way a second language is acquired. What is more, current cultural trends in teaching need to be taken into account in order to respond to the current learners' needs (Drobot, 2016). Giving positive feedback can increase learners' satisfaction and stimulate positive self-evaluation. A learner who has a sense of accomplishments and achievements will feel more comfortable and self-confident.

Another aspect of student motivation is related to the fact that the ESP classes should not precede the topics in the special subjects, as Saliu puts it (Saliu, 2013). The reason is that since the ESP university lecturer is not a subject specialist this can sometimes lead to misunderstanding. Moreover, if a topic has already been discussed in the special subject, this motivates the learners and gives them confidence to communicate or discuss.

Finally, learners are expected to take on a greater degree of responsibility for their own learning. And language university lecturers have to assume the role of facilitators rather than just being models for correct speech. They have to develop a different view of learners' errors and of their own role in facilitating language learning (Richards, 2006). In view of this, in the module of ESP, we tend to ignore the errors students make - and they do, quite often, regrettably, because second

language acquisition is not a miraculously effective fault-free process - and focus on their communicative performance, on their confidence in presentations or in the views they express or defend.

Questionnaire Results

The aim of the survey was to find out students' opinion about their attitudes and assessment of the teaching process. The respondents were students who learn ESP at the University of Mining and Geology "St. Ivan Rilski". There were *35* participants altogether, as 91 % of them were from the Kardzhali Branch. The students were asked to answer questions. In 26 of the questions students were expected to tick the appropriate answer according to the Scale: Not at all, Partly, and Completely. Students had to comment on learning ESP concerning subject matter of the ESP course. To guarantee a positive participation, the students were informed that their answers would be confidential and they were not required to write or give their names. The survey was anonymous also for the purposes of finding out the problems of ESP lecturers. The survey results are shown in Table 1:

Table 1.
The frequency and percentage of the students' attitude towards their English teachers

№	Question / Indicator	Students' attitudes		
	The extent to which the level of lectures / practical classes conducted by the lecturers meets the following indicators.	**Not at all**	**Partly**	**Completely**
	Multiple choice questions			
1.	Clearly outline the purpose and structure of the course unit. Adequately guide the students in their ESP course.	1	12	22
		2.86 %	34.29%	62.86%
2.	Organised teaching and optimal use of the class. Assigning effective exercises which are conducive to learning.	1	9	25
		2.86 %	25.71%	71.43%
3.	Systematic teaching of the learning content delivered in an accessible and understandable way. Providing good grammatical explanations.	0	11	24
		0%	31.43%	68.57%
4.	A skill to motivate students to learn.	2	14	19
		5.71%	40.00%	54.29%
5.	Effective use of modern appliances and technologies (multimedia and visual aids for teaching), interactive methods and new teaching materials, facilitating the learning process.	6	11	18
		17.14%	31.43%	51.43%
6.	Attracting students' attention and creating a lasting interest in the course unit.	5	9	21
		14.29%	25.71%	60.00%
7.	Regular monitoring of the audience response during teaching.	3	10	22
		8.57%	28.57%	62.86%
8.	Providing the newest trends in the subject area taught. Use of reliable books and sources.	6	9	20
		17.14%	25.71%	57.14%
9.	Connecting the learning matter (theory) with practice.	9	10	16
		25.71%	28.57%	45.71%
10.	Explaining the ambiguities and difficult issues that arise in the process of delivering the course content. Good explanations about the technical terms and collocations needed for the specialty.	1	9	25
		2.86%	25.71%	71.43%
11.	Summarising key points and regularly reviewing the lessons.	4	15	16
		11.43%	42.86%	45.71%
12.	Case study approach and stimulation of self-thinking.	5	9	21
		14.29%	25.71%	60.00%
13.	Developing their own views and concepts in academic style.	9	9	17
		25.71%	25.71%	48.57%
14.	Making and maintaining informal contact with students.	6	11	18
		17.14%	31.43%	51.43%
15.	A person of principle and cultural in their relations with students.	1	8	26
		2.86%	22.86%	74.29%
16.	They have teaching and human morality.	1	6	28
		2.86%	17.14%	80.00%
17.	Level of impartiality in assessing knowledge and skills.	0	12	23
		0.00%	34.29%	65.71%

18.	They have personal charm.	1	8	26
		2.86%	22.86%	74.29%
19.	They have rich general knowledge.	1	6	28
		2.86%	17.14%	80.00%
20.	Professional competence of the lecturer.	0	4	31
		0.00%	11.43%	88.57%
21.	Teaching skills to present and explain the educational material.	0	7	28
		0.00%	20.00%	80.00%
22.	Completeness of exposition.	2	15	18
		5.71%	42.86%	51.43%
23.	Clarity of speech and answers.	1	8	26
		2.86%	22.86%	74.29%
24.	Applicability of the educational material. It is oriented towards putting in practice.	2	16	17
		5.71%	45.71%	48.57%
25.	The educational material offered is topical and up-to-date.	1	17	17
		2.86%	48.57%	48.57%
26.	Your complex assessment for English teachers compared to your idea of an ideal lecturer at a university.	1	11	23
		2.86%	31.43%	65.71%
Open-end questions				
		Analysis		
27.	What was most useful and interesting for you in the conducted module in General English / ESP?	Students point out the following as the most useful and interesting aspect in English language learning: - the acquisition of English speaking skills; - learning new technical terms; - refreshing knowledge of grammar; - acquiring skills for discussion on specialty related topics; - technical English related to the field of IT; - writing an academic summary (Abstract).		
28.	What topics would you like to be included in the curriculum that are not covered by the curriculum for this course ?	Students express their willingness to learn more new vocabulary items applicable in everyday situations.		
29.	Your suggestions for improving the quality of teaching, the content of the teaching material, the organisation, and the tteaching methods:	Students outline the following: - discussing topics related to the latest development in the field of IT; - using more visual aids; - highlighting similarities and differences in the meaning of the words.		
30.	Your recommendations and advice to the lecturer:	Students recommended that teachers should use power point presentations (or equivalent) more often as those will provide a stimulating addition.		

Data analysis

The table demonstrates that the majority of the students express a high opinion of the language lecturer's professional competence (items 20, 21 and 3). Students are also pleased with the lecturer's ability to explain the educational material in an understandable way, but at the same time they show uncertainty in developing their own views and concepts in academic style (item 13). This can be attributed to the fact that the students have difficulties in applying past knowledge to new situations. Lecturers must give their students the chance to use their prior knowledge to solve a problem or explore a new idea. It can be seen from the table that there is more to be desired in terms of enhancing students' motivation to learn English and the use of modern technologies, interactive methods and authentic books (items 4, 5 and 8). Students' assessment of connecting study material to practice is low (items 9 and 24). This problem can be effectively solved by close collaboration between the ESP lecturer and the content lecturer. According to the students' opinion, it is necessary to improve summarising key points and regularly reviewing the lessons, as well as to be aware with the latest trends in the professional field. The respondents evaluate as insufficient applying the case study approach (item 12) and maintaining informal contact with students (item 14). A number of students do not have enough knowledge of GE and in consequence they experience difficulties in learning ESP which leads to challenging situations for both teachers and students in the classroom. The last four questions were optional. The students were asked to comment on teaching and learning ESP. The

majority of the students wrote that the ESP course was useful and excellent.

In the analysis of students' answers and attitudes, their level of General English, their level of professional knowledge, and their expectations about the ESP course must be considered.

Analysis of the results in the table is useful in establishing learners' preferences concerning the goal of the ESP course: to be able to communicate and discuss in the professional area.

Conclusion

The aim of this paper was to discuss the difficulties in teaching ESP to engineers. Although we are faced with many challenges, we can analyse the present situation, provide an effective method of ESP teaching, and find a suitable way to improve the educational process. Teaching ESP combines skills along with the task of obtaining specific information. The ESP lecturer not only teaches but also provides materials, designs a syllabus, collaborates with content lecturers, carries out research, and evaluates students' progress. In order to provide an appropriate design, communication approach is suggested due to time restrictions. Teaching methods should regularly be updated by reducing grammar and focusing on the skills of students. The ESP lecturer should develop students' positive attitude towards the learning process. The students will learn with high motivation if teachers know about their learners' needs and interests.

It can be concluded that the successful ESP lecturer must possess general qualifications of a good teacher, as well as enough information related to the principles of adult learning. They must also make an attempt to develop all various components of the ESP program. And last but not least, in order to have meaningful communication, they should try hard to get information about the discourse and content of the subject matter which they are supposed to teach.

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DIGITAL SURFACE MODELING THAT IS SUITABLE FOR THE PURPOSES OF EDUCATION IN PHOTOGRAMMETRY

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ABSTRACT. A study was conducted that presents a contemporary method for generating a digital model. The article is related to the educational process in the courses of study in the field of Photogrammetry. The aim of the article is to include this method in the curriculum, so that students could become familiar with the means and ways of creating digital surfaces, as well as to practically implement such means and ways.

Keywords: close-range photogrammetry, digital photogrammetry, education

ЦИФРОВО МОДЕЛИРАНЕ НА ПОВЪРХНИНИ, ПОДХОДЯЩО ЗА ЦЕЛИТЕ НА ОБУЧЕНИЕ ПО ФОТОГРАМЕТРИЯ

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РЕЗЮМЕ. Реализирано е изследване, което представя един съвремен метод за генериране на числен модел. Статията е свързана с учебният процес по дисциплините с направление Фотограметрия. Целта е този метод да бъде включен в учебната програма, така че студентите да се запознаят със средствата и начините за създаване на цифрови повърхнини и практически да реализират такива.

Ключови думи: близкообхватна фотограметрия, цифрова фотограметрия, обучение

Introduction

Education is the foundation on which specialists' knowledge and skills in various fields are based. The dynamic development of the ways of collecting information, along with the methods of processing, storage and exchange of information, determine the development of the process of education in photogrammetry.

Photogrammetry includes methods for image measurement and interpretation that provide information about the shape and location of objects to each other through a set of photographs. It uses the central projection as the basic mathematical design method. The shape and location of each object is determined by means of a reconstruction of beams of rays.The projection center, along with each point in the image, defines the spatial direction of the beam towards the corresponding point of the object. Provided that the coordinates of the projection centers and the geometry of the image are known, then each imaging beam can be defined in the 3D object space. The point of the object that is defined in the three-dimensional space can be obtained from the interception of at least two corresponding (homologous) spatially separated rays.

The main objective of a photogrammetric measurement is the three-dimensional reconstruction of an object in a digital or a graphical form (images, drawings and maps). Photogrammetry is closely related to such sciences as photography, computer graphics and vision, digital image processing, GIS, cartography, automated computer design, etc. (Luhmann et al., 2006). Nowadays, data used in photogrammetry are in a numeric form and this predetermines the use of digital processing methods. Digital photogrammetry is applied both in the processing of air and ground imaging and in solving various tasks in mine surveying and geodesy. All this proves the significance of the training and preparation of students in the field of digital photogrammetry.

In addition to the theoretical knowledge of students, practical training in a given course of study is essential. The use of presentations, information from the Internet, implemented projects, educational aid materials, and other tools are inherent to the process of learning. Practical training should include the implementation of the basic stages of photogrammetric processing within the digital environment.

The methods for image measurement and interpretation make it possible for a point from the captured object to be identified in terms of its shape, brightness, or colour distribution. Radiometric data (intensity, grey value, colour value) and geometric data (position within the image) can be obtained for each point in the image. Converting the information from the set of images to he stage of receiving a digital model requires systems with the appropriate geometric and optical processing quality. The degree of automation and adaptation of these systems varies according to their

application direction. This also determines their diversity. The most common software products with full processing capacities are: PHOTOMOD, ERDAS, PCI GEOMATICS, AGISOFT PHOTOSCAN, PHOTOMODELER, CONTEXT CAPTURE, and iWITNESS. A research has ben carried out that present different software products and analises their capacities for the purposes of photogrammetry education. (Draganova et al., 2004). The creation of increasingly simplified software results in saving time and resources and makes the working process convenient. The end products obtained are with the necessary precision and detail. One of the most popular software products for photogrammetric processing and generation of 3D spatial data is Agisoft PhotoScan. The fact that it is not used only by specialists makes it suitable for employing in the educational process as well. The capacities of the program allow the operator to adjust the workflow to various specific data and tasks (http://www.agisoft.com). This software is used for the processing of images obtained through the methods of close–range photogrammetry.

Photogrammetry began its development with ground photogrammetry which has always accompanied this development in one way or another. Ground photogrammetry deals with determinaing the shape, dimensions and position of different objects based on photographss taken from the earth's surface. Today, in a modified form, ground photogrammetry has focused its application on close-range photographic (non-topographic) photogrammetry (Кацарски, 2002). The coordinates of the projection centers and the elements of internal and external orientation can be specified very precisely. This also predetermines their application in various areas of geodesy and mine surveying. The capturing of façades of buildings or of various architectural objects, as well as the monitoring of facilities, are just a small part of the applications of terrestrial photogrammetry. In open-cast and underground mining, the generation of digital models of surfaces, pillars, parts of galleries, etc. can provide data to be used in performing various mine surveying tasks. For example, for geological mapping, for determining joint tectonics of rock masses, for tracking deformations and landslides, for calculating volumes, etc. The safety and the low-cost equipment are the other advantages of the methodology proposed.

Research materials exist that examine the effects of information processing technologies in the course of education and also how they affect the abilities to think and to easily solve mathematical problems. Training students through software products allows them to explore the optimised simulation of physical, social or mathematical systems (Katz, 1995).

The main objective of this study is to develop such methods for generating surfaces that are suitable for educational purposes. Seminars are introduced into the curriculum where one of the most common software products is used nowadays. These seminars will introduce students to the main stages in modeling and will train them to model. They will also be able to create such models themselves and to develop their creative thinking, to learn how to solve various problems, and to improve their analysis skills.

Modern methods in the educational process

Does the educational process need to be changed and what modern methods are used at present? A specialist, trained with modern equipment and processing methods, would be employed sooner and would feel satisfied both from an economic perspective and from a purely human point of view. This brings to a new level the competitiveness of the graduates of a given university and also improves its status.

A contemporary photogrammetric method is presented for generating digital surfaces, which is applied in solving various engineering tasks.

A study related to the generation of a digital model of a building façade presents the methods for capturing by using a smartphone. Photogrammetric processing of data is performed using the Russian Agisoft PhotoScan software. The results obtained show that the methods presented can be employed to create digital models and orthophoto images of buildings and other objects and to monitor different processes (Gospodinova et al., 2017).

The creation of a three-dimensional photorealistic model of a quarry based on digital images is presented by Borisov and colleagues. A digital camera and photogrammetric processing software are used. The control points are measured by a total station. The method is not optimal for large-size objects but is applicable to medium- and small-size objects. Based on the data obtained discontinuities and shear zones in the model can be determined, the geometry of fissures and slope faults can be assessed, unstable pillars can be evaluated, and the geotechnical and geological characteristics of objects can be determined (Borisov et al., 2012).

Are these methods also applicable to capturing objects inside the buildings themselves or generally in enclosed spaces? This would greatly facilitate the educational process and would make it independent of the weather conditions.

Research studies exist that are related to the capturing of excavation walls and pillars in underground mines for the purposes of extracting geological and geotechnical information. These studies examine the feasibility of digital models for monitoring deformations, for updating mine mapping, for volumes calculation, for assessing the stability of the rock mass, etc. (Benton et al., 2016, Slaker et al., 2017).

The essential advantage of close-range stereo photogrammetry is that it allows comprehensive geological mapping in a digital environment. The various digital surfaces can be tied during excavation work without measuring reference points only by elements that are visible in single images. To achieve greater accuracy, geodetically measured control points are used whose purpose is to orient the model within the coordinate system of the object (http://3gsm.at).

Based on the above studies, the methods for capturing enclosed spaces by means of digital photogrammetry are proposed to be implemented it in the process of training in different courses units.

First stage

The object of the study is part of the corridor wall in the building of the University of Mining and Geology "St. Ivan Rilski". The purpose was to make attempts to capture the wall during the day with and without the using a tripod and artificial lighting. Afterwards, the results obtained were analyzed. The capture was performed with a smartphone Huawei P10.

Fig. 1. Visualisation the of model for the right-hand side of the corridor

Fig. 2. Visualisation of the model for the left-hand side of the corridor

It is clear from the results obtained that the illumination of the object influences the quality of the generated model. Therefore, there is a darker area in the left corner in Figure 2 because the light from the windows affects the initial few pictures. To avoid this, some of the photos should be pre-processed using Photoshop, Adobe Photoshop Lightroom, or similar software packages. Such areas will be eliminated when the illumination of the object is uniform and well-balanced.

The condition for the direction of the rays to be perpendicular to the object was met, but some of the exposures were slightly sloped towards the ceiling and the floor. Marks were placed, but during the first capture they were not geodetically determined. 65 photos were obtained which were then processed by using the Agisoft PhotoScan software product in observation of the processing steps described in the Agisoft PhotoScan User Manual Professional Edition for version 1.2. Processing was completed within less than an hour without filtration of the images. The model was not geodetically attached. The result after image processing is shown in figure 1 and figure 2

Photos from the working process are presented in Figure 3.

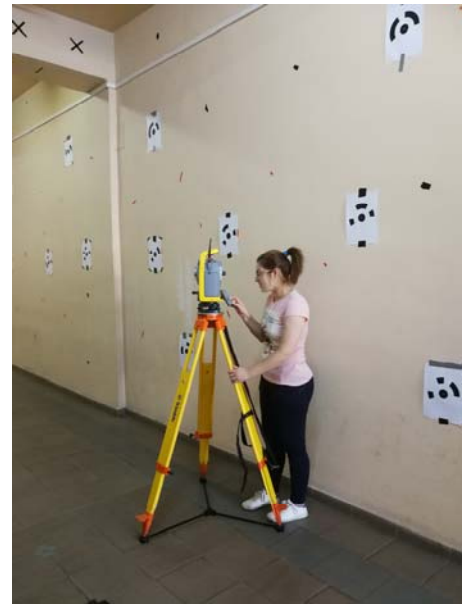

Fig. 3. Photos from the working process

Second stage

The purpose of the second capture was to obtain digital surfaces (digital models) which would in a local coordinate system and to analyse the results. Fifteen marks were placed on the object to indicate the control points. They were measured with a Trimble S6 total station. The multifunctional and flexible station is characterised by a wide range and accuracy of measurement to various surfaces and provides a standard square error when measuring distance of 2 mm + 2 ppm (0.0065 ft + 2 ppm) and accuracy of angular measurement of 2'' (0.6 mgon). All marks are automatically recognised by the software in the photogrammetric processing.

136 photos were used for image processing. The resulting average square error of the model after equalising was 0.0181m and it ispresented in Figure 4. The visualisation of the generated model of smartphone is presented in Figure 5.

Markers	X (m)	Y (m)	Z (m)	Accuracy (m)	Error (m)	Projections	Error (pix)
target 21	1999.491000	1002.437000	501.771000	0.005000	0.005600	21	0.490
target 32	1994.753000	1002.402000	501.623000	0.005000	0.006980	30	0.372
target 3	2000.649000	1002.441000	501.818000	0.005000	0.007134	23	0.808
target 23	1998.473000	1002.446000	501.645000	0.005000	0.012561	23	0.839
target 9	1998.924000	1002.458000	500.802000	0.005000	0.013398	22	0.485
target 14	1998.518000	1002.422000	502.719000	0.005000	0.013830	25	0.535
target 7	1994.913000	1002.392000	502.729000	0.005000	0.014052	32	0.319
target 13	2000.890000	1002.419000	502.775000	0.005000	0.016073	29	0.421
target 2	2001.158000	1002.453000	500.874000	0.005000	0.017538	25	0.485
target 33	1996.201000	1002.386000	501.575000	0.005000	0.018050	25	0.463
target 10	1993.581000	1002.402000	501.896000	0.005000	0.019143	19	0.502
target 8	1996.908000	1002.360000	502.811000	0.005000	0.021515	26	0.558
target 25	1997.265000	1002.372000	501.663000	0.005000	0.023243	26	0.720
target 22	2001.847000	1002.444000	501.693000	0.005000	0.027460	27	0.481
target 34	1993.005000	1002.415000	500.929000	0.005000	0.032684	15	0.216
Total Error							
Control points					0.018149		0.536

Fig. 4. Coordinates of the control points and the average square error of the visualised model

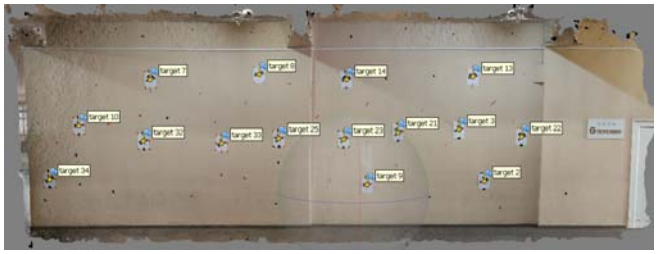

Fig. 5. Visualisation of the digital model of the surface obtained by a Huawei P10 mobile phone with 20Mpix resolution

The model obtained by means of a smartphone displays some curvature in the upper left corner. This is mainly due to the illumination and the daylight effect of the windows.

The same study was also carried out with a Canon EOS 600D digital camera with a resolution of 16 Mpix using a tripod. Capturing was performed during the day under artificial lighting (with lamps switched on). 53 frontal and sloping images were taken. Fifteen control points were used for the photogrammetric processing. The marks' coordinates were measured with the same total station. The average square error of the model after the equation was 0.0088m. It is presented in Figure 6. The model generated is given in Figure 7.

Markers	X (m)	Y (m)	Z (m)	Accuracy (r	Error (m)	Projectic	Error (pix)
target 2	2001.161000	1002.443000	500.874000	0.005000	0.012843	6	0.228
target 3	2000.652000	1002.432000	501.818000	0.005000	0.002709	11	0.239
target 7	1994.913000	1002.392000	502.729000	0.005000	0.008958	8	1.473
target 8	1996.908000	1002.360000	502.811000	0.005000	0.012521	6	0.277
target 9	1998.927000	1002.454000	500.803000	0.005000	0.013052	5	0.469
target 10	1993.581000	1002.402000	501.896000	0.005000	0.008212	12	0.473
target 13	2000.893000	1002.411000	502.776000	0.005000	0.007914	9	0.177
target 14	1998.521000	1002.420000	502.719000	0.005000	0.010577	6	0.159
target 21	1999.491000	1002.437000	501.771000	0.005000	0.008390	10	0.224
target 22	2001.850000	1002.432000	501.694000	0.005000	0.005552	14	0.395
target 23	1998.476000	1002.444000	501.645000	0.005000	0.007816	10	0.224
target 25	1997.265000	1002.372000	501.663000	0.005000	0.004332	10	0.999
target 32	1994.753000	1002.402000	501.623000	0.005000	0.004683	10	1.588
target 33	1996.201000	1002.386000	501.575000	0.005000	0.001688	7	1.061
target 34	1993.005000	1002.415000	500.929000	0.005000	0.012001	6	0.151
Total Error							
Control points					0.008837		0.731

Fig. 6. Coordinates of the control points and the average square error of the model

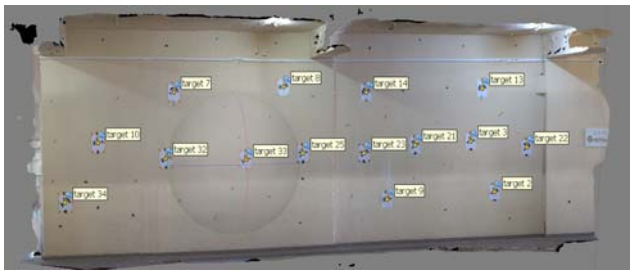

Fig. 7. Visualisation of the digital surface model obtained by a Canon camera

The obtained accuracy indicates that the results can be used by the mining engineers to solve different tasks. During shooting, the lighting must be positioned opposite the object in order to produce a good-quality digital model and an orthophoto image.

For this object, a larger number of pictures taken by a smartphone rather than by a digital camera are needed in order to get a better geometry of the model.

Conclusion

It can be concluded that the presented methods can be used in underground mining for generating digital surfaces.

The proposed methods will enrich the knowledge of students trained in the course of studies of Mine Surveying and Geodesy, as well as of other specialists in various fields. Students will be given the opportunity to learn and apply this contemporary method of capturing as early as during the stage of university education.

From an economic perspective, good lighting and the characteristics of the digital camera are essential for the implementation of the methods in real-life conditions. To a great extent, they determine the quality of the end product, the way of processing, and the processing time. The advantage of the method is the low cost of the equipment, the safety, and continuity of the data compared to the traditional apparatuses and methods of capturing.

The future studies will focus on the generation not only of surfaces, but also of digital models of various objects (e.g. side walls, props and supports, pillars) and enclosed spaces, such as galleries, mine workings, tunnels, etc. This will bring about thorough geological mapping within a digital environment and will allow the acquisition of data on the excavation work in underground mines.

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SPECIFIC SOURCES OF STRESS IN PHYSICAL EDUCATION AND SPORTS TEACHERS /PE TEACHERS/ DEPENDING ON PEDAGOGICAL EXPERIENCE

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ABSTRACT: Different studies of stress in the work environment enable the identification of risk professions and associated stress factors. Based on these studies, the teaching profession stands out with high levels of stress.
The purpose of this empirical study is to identify the specific sources of stress in PE teachers, depending on their pedagogical experience.
Tasks: dentify the intensity (quantitative and qualitative characteristics) of specific sources of stress in PE teachers.
2Identify the impact of specific sources of stress on the working environment of PE teachers, depending on their pedagogical practice.
Methods of study. The following methods are used to collect empirical information:
Questionnaire on sources of stress in the working environment of teachers. Includes 28 items and a 5-degree scale for evaluating responses – the Likert type. The items are divided into 6 subscales (factors).
A tool that includes a set of questions about the professional-demographic characteristics of the surveyed persons - sex, age, educational degree, subject, teaching experience, etc.
The most significant differences were found among teachers in the 6-10 and 11-20 years of pedagogical practice. With the increase of their teaching activity, respectively the age, other more stressful factors are also: the volume of the tasks during the school year they have to manage on a daily basis, the administrative and unrelated tasks of implementation, the assessment of the work guidance and the stressful work of the job as a whole.

Keywords: PE teachers, sources of stress, pedagogical experience

СПЕЦИФИЧНИ ИЗТОЧНИЦИ НА СТРЕС ПРИ УЧИТЕЛИТЕ ПО ФИЗИЧЕСКО ВЪЗПИТАНИЕ И СПОРТ В ЗАВИСИМОСТ ОТ ПЕДАГОГИЧЕСКИЯ СТАЖ

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РЕЗЮМЕ: Различни изследвания по отношение на стреса в трудовата среда, дават възможност за определяне на рисковите професии и съпътстващите ги стресогенни фактори. Въз основа на тези проучвания, учителската професия се откроява с високи нива на стрес.
Целта на настоящото емпирично изследване е да се установят специфичните източници на стрес при учителите по физическо възпитание и спорт, в зависимост от педагогическия им стаж.
Задачи: Да са разкрие интензивността (количествените и качествените характеристики) на специфичните източници на стрес при учителите по физическо възпитание и спорт. Да се установи въздействието на специфичните източници на стрес в трудовата среда на учителите по физическо възпитание и спорт, в зависимост от педагогическия им стаж.
Методи на изследването. Приложни са следните методи за събиране на емпирична информация:
Въпросник за източници на стрес в трудовата среда на учителите. Включва 28 айтеми и 5-степенна скала за оценка на отговорите – тип Ликерт. Айтемите са обособени в 6 субскали (фактори).
Инструментариум, който включва блок от въпроси за професионално-демографските характеристики на изследваните лица – пол, възраст, образователна степен, преподаван предмет, педагогически стаж и др.
Резултатите от проведеното изследване по отношение на специфичните източници на стрес в трудово-професионалната среда на учителите по физическо възпитание и спорт, в зависимост от педагогическия стаж, дадоха основание за формулиране на следните изводи:
Като най-значими стресогенни източници учителите по ФВС определят: осигуряването на безопасността на учениците по време на занятия, броят на учениците в класовете и шумът в училище по време на занятията и извън тях.

Ключови думи: учители по физическо възпитание и спорт, източници на стрес, педагогически стаж

Introduction

Teachers' work can be defined as a profession with daily stress. Along with the positive trends in the education system, aligning it with the level of European education, the introduction of innovative and information technologies in the management and pedagogical practice in many schools, there are also some basic problems - decreasing the social, material and health status of the teachers' profession, increasing the job insecurity and lack of opportunities for realization. All this determines the workplace of pedagogues as highly stressful and with increased risk of occurrence of a burnout (professional burnout) (Maslach, Schaufeli & Leiter, 2001).

Survey data on stress in various occupational fields allows for the identification of risky occupations and accompanying stress factors. The stimulus which induces stress is defined as a stress factor or stressors (Karastoyanov, 1996). In general, the stressors are divided into three main categories: *psychological, physical and behavioural* (Rusinova-Hristova and Karastoyanov, 2000).

Based on various studies, the teaching profession stands out among others as one of the leading risky professions in terms of stress. Pedagogical activity is very diverse in its practice. Regarding the conditions and ways of carrying out its activity and the opportunities for realization outside the educational

institutions, the subject is a basic prerequisite for difference. In this sense, the teacher of physical education and sports is "a unique subject of pedagogical activity" (Tosheva, 2012).

The professional activity of sports pedagogues determines the specificity and intensity of the sources of stress in the implementation of the teaching process. The working conditions differ significantly from those of the teachers of other subjects. Physical education and sports classes are held outdoors in the open air "outside the comfort of the classroom" (Tsigilis, N., Zournatzi, E. & Koustelios, A., 2011) at the sports grounds, the school yard and the gymnasiums.

The unsatisfactory state of the material base, the lack of sufficient facilities for the optimum course of the classes, the volume of physical activity, the disrespectful attitude of colleagues and parents and many others are defined as specific sources of stress in the working environment of PE teachers.

The stress of PE teachers is steadily increasing. It is characterized by a cumulative effect. It has been found that a single stressful event cannot affect a person fatally but chronic stress increases the likelihood of a disease to a significant extent (Cohen S., Frank E., Doyla W., Skoner, D., Rabin B., Gwaltney, J, 1998).

The level of accumulated stress in everyday life, throughout the school year and during the entire pedagogical practice inevitably reflects on the behaviour of the teacher and the quality of his/her educational activity (Tzonkova, 2013).

Fig. 1 presents a model of interaction between specific sources of stress in the professional environment of PE teachers and their pedagogical experience.

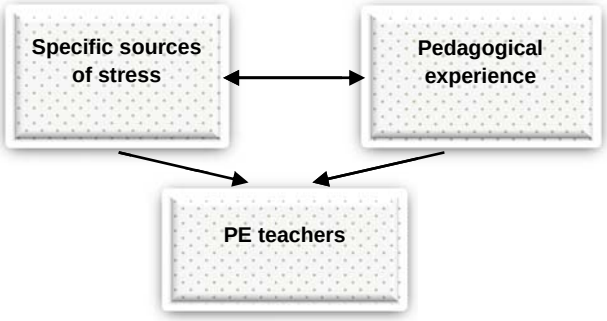

Fig. 1. Theoretical model of the interaction between the sources of stress and the pedagogical experience

Overall aim and objectives of the study:

The overall aim of this empirical study is to identify the specific sources of stress in physical education and sports teachers, depending on the pedagogical experience.

Objectives:

1. To disclose the intensity (quantitative and qualitative characteristics) of specific sources of stress for PE teachers.

2. To identify the impact of the specific sources of stress on the working environment of PE teachers, depending on their pedagogical experience.

Subject of research - 71 Bulgarian teachers of physical education and sports, of which 47 women and 24 men. The study is part of a thesis dissertation on stress of PE teachers and was conducted in secondary schools in Sofia and the country.

Table 1 gives a breakdown of the persons surveyed by age and pedagogical experience.

Table 1

Frequency distribution of the persons surveyed by age and pedagogical experience

Age		Pedagogical experience	
25-40	19.7 %	1-5	16.9 %
41-60	74.6 %	6-15	16.9 %
over 61 years	5.6 %	16-25	29.6 %
		over 25 years	36.6 %

The gender distribution is uneven and the number of women is almost twice as large as the number of men in the sample. This is to a certain extent expected due to the feminization of the profession in the Bulgarian schools. The large proportion of women practicing the teaching profession reaches the extent to which it can be defined as feminized. This probably is due to the fact that it satisfies their need for personal expression (Tosheva, I., Fenerova, D., Georgiev, M., 2008).

The percentage data with regard to the pedagogical experience of the teachers is also impressive, with the highest value being for the teachers with over 25 years of professional experience.

Methods of research. The following methods for collecting empirical information are applied:

1. Questionnaire on sources of stress in the working environment of teachers - the questionnaire was developed in connection with stress study in physical education and sports teachers (Tosheva and Kostova, 2015). It includes 28 items and a 5-step scale for evaluating responses - the Likert type. The items are divided into 6 subscales (factors) - *behaviour of the students; the amount of teaching workload; conditions for training and comfort of the working environment; organization of the work and relationships; general problems (peculiarities) of the teaching profession; work-personal life relationships.* The psychometric indicators of the questionnaire are good. The intrinsic consistency of the items according to the factors is generally high (Table 2).

2. A set of tools that includes a block of questions about the professional-demographic characteristics of the surveyed persons - gender, age, educational degree, subject, teaching experience, etc.

Table 2
Analysis for the internal consistency of the items in the questionnaire for the sources of stress

Factors	***Cronbach´s Alpha***
Problems with the pupils	0.80
Work conditions and teaching activity	0.74
Organisation of the work and relationships	0.75
Amount of the teaching workload	0.73
Peculiarities (problems) of the profession	0.55
Work-personal life relation	0.79

The results of the study are subjected to mathematical and statistical methods for quantitative processing and analysis of experimental results, via variation analysis, internal coherence analysis of the scales (α of Kronbach), comparative analysis (Mann-Whithey). Calculations were made using the statistical program SPSS 19.0

Conclusion

Table 3 presents the values of the variance of the indicators of the stress sources questionnaire. It can be seen that the most important specific sources of stress in the work of PE teachers are: ensuring the safety of pupils during the classes (M = 3.77), the number of pupils in the classes (M = 3.76), noise during and outside the classes (M = 3.74).

The results of the analysis reflecting the high levels of the indicators is logical as the class of physical education and sports is accompanied with active physical activity. The safety of children is one of the most important requirements facing the sports pedagogue. Along with the implementation of the tasks to be learned in the lesson, it is also necessary to create order and discipline during the classes. The number of children in the classes is one of the main reasons for the optimal course of the learning process.

Concerning the analysis of the stress factors for the teachers with pedagogical experience of 1-5 years, there is a slight decrease in all directions, which can be explained by their period of adaptation to the teaching profession.

After the 6th year there is a gradual increase in the intensity of the stress factors, with the most significant indicators in terms of amount of workload, working conditions, organization of work and relationships (Figure 2).

The comparative analysis of the teachers divided into different groups according to the duration of the pedagogical service revealed significant differences between teachers with experience between 6 and 10 years and those with professional experience between 11 and 20 years (Table 4).

Table 3
Average values of the sources of stress in the work of teachers of physical education and sports

Sources of stress	***Min***	***Max***	***M***	***SD***
The amount of tasks that the PE teacher has to deal with	1.00	5.00	3.29	1.16
The time to fulfil all your engagement as a teacher	1.00	5.00	3.26	1.19
Administrative workload	1.00	5.00	3.39	1.24
The number of pupils in the classes you teach	***1.00***	***5.00***	***3.76***	***1.35***
Presence of pupils with special educational needs	1.00	5.00	2.70	1.30
Ensuring pupils' safety	***1.00***	***5.00***	***3.77***	***1.28***
Manifestation of aggression by the pupils	1.00	5.00	3.56	1.33
Problems with the discipline in class	1.00	5.00	3.18	1.30
Noise in school	***1.00***	***5.00***	***3.74***	***1.09***
Availability of educational and technical means	1.00	5.00	2.88	1.29
Lack of suitable premises for the classes	1.00	5.00	2.93	1.52
Comfort of the working environment - light, temperature, dustiness	1.00	5.00	3.18	1.33
Motivation of pupils to achieve results	1.00	5.00	3.18	1.04
The status of the subject	1.00	5.00	3.00	1.24
Frequent reforms in education	1.00	5.00	3.43	1.18
Need for continuous upgrading of the professional qualification	1.00	5.00	2.93	1.21
Opportunities for career development	1.00	5.00	2.62	1.23
The amount of payment	1.00	5.00	3.18	1.62
Danger of job loss	1.00	5.00	3.14	1.35
Relationships with parents	1.00	5.00	2.97	1.43
Relationships with colleagues	1.00	5.00	2.73	1.58
Style of leadership and organization of work	1.00	5.00	2.91	1.40
Assessment by the school management	1.00	5.00	2.97	1.33
Participation in the decision making process in the school	1.00	5.00	2.86	1.23
Psychological climate among the colleagues	1.00	5.00	2.79	1.37
Combining the work and personal engagements	1.00	5.00	2.82	1.39
Financial problems at the moment	1.00	5.00	3.49	1.26
Domestic problems	1.00	5.00	2.75	1.28
My work as a whole	1.00	5.00	3.23	1.34

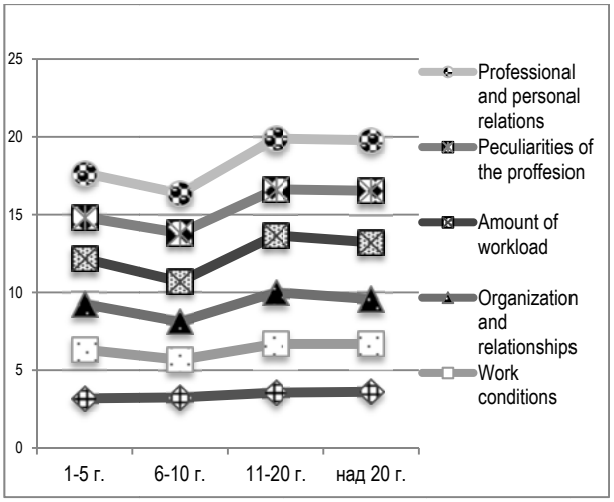

Fig.2. Average values of stress factors of PE teachers depending on the pedagogical experience.

Table 4

Sources/factors of stress	M Pedagog. experience 6-10 years	M Pedagog. experience 11-20 years	u	α
The amount of tasks during the school year	2.66	3.53	2.32	0.05
The administrative workload and the performance of unusual tasks	2.66	3.71	2.17	0.05
Assessment by the school management	2.42	3.48	2.16	0.05
My work as a whole	2.08	3.09	2.43	0.01
Factor 4: The workload amount	2.58	3.65	2.47	0.01

The results of the survey on the specific sources of stress in the working and professional environment of physical education and sports teachers, depending on the pedagogical practice, provided for the following conclusions:

1. As the most significant stressors in the classroom, PE teachers define: ensuring pupils' safety during classes, the number of pupils in class, and the noise at school in and outside the classroom.
2. When analysing the stress factors there is an increase in their intensity after the 6th year of professional activity.
3. The most significant differences were found among teachers with pedagogical experience of 6-10 and 11-20 years. The comparative analysis found these differences with respect to 4 sources of stress and one stress factor. With increasing the teaching practice and the age of the teachers as the more stressful factors were determined: the amount of tasks during the school year they have to deal with, the administrative and unusual tasks on a daily basis, the assessment of the work done by the school management and the perception about the stressfulness of work in general.

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WORK IN SMALL GROUPS - THEORETICAL AND METHODOLOGICAL ASPECTS

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ABSTRACT. This paper discusses a current issue related to group work when training teachers. In this relation, it clarifies the essence of basic concepts which are directly related to the topic on this problem, namely group work with the focus on working in small groups. When discussing those, concrete examples are used in order to give a clearer and more complete view of their specifics and application. The paper focuses on the specifics and the work in small groups and their effectiveness when forming different knowledge and skills related to the subject. The methods of creating groups are clarified, as well as the specific features and rules of how to work in small group. When working in a small group, the participants acquire specific skills (linguistic, intellectual, social, etc.): to communicate, for effective speaking and listening, for discussing, analysing, summarising, systematising, presenting arguments, participating in disputes, to negotiate, for producing multiple ideas, analysing and finding evidences to support theses, etc. All those allow it to find a quicker and optimum solution to the problems raised and help achieve greater efficiency in the overall training process.

In order to better clarify the topic of the opportunities and benefits of working in groups, an example is given presenting how to form knowledge and skills in a small group when training teachers on the topic of "Diagnostic Activity of the Teacher". In this material, an example of inquiry card is presented as one of most common diagnostic tools. The task that teachers have to accomplish while divided in small groups is to develop an inquiry card which includes 10 closed-type questions on a current issue (of their choice) in order to identify the opinion and the attitude of the respondents on the selected issues.

Keywords: group work, work in small groups

РАБОТА В МАЛКИ ГРУПИ - ТЕОРЕТИКО-МЕТОДИЧЕСКИ АСПЕКТИ

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РЕЗЮМЕ. В настоящия материал се разглежда един актуален въпрос, свързан с групова работата при обучение на учители. В тази връзка се изяснява същността на основни понятия, пряко свързани с темата на разработката, а именно: груповата работа и се акцентира на работа в малки групи. При тяхното изясняване са използвани и конкретни примери за по-голяма яснота и пълнота относно тяхната специфика и приложение. В материала се акцентира върху спецификата и работата в малки групи и тяхната ефективност за формиране на различни знания и умения, свързани с темата. Изясняват се начините на формиране на групи, характерните особености и правила за работа в малка група. При работа в малки групи участниците придобиват различни умения (лингвистични, интелектуални, социални и др.): комуникативни, ефективно говорене и ефективно слушане, дискутиране, анализиране, обобщаване, систематизиране, аргументиране, водене на спорове, умения за преговаряне, продуциране на множество идеи, анализиране и намиране на доказателства в подкрепа на твърдения и др. Всичко това позволява по-бързо и оптимално решение на поставените проблеми и спомага за по-голяма ефективност в цялостния обучителен процес.

За по-пълно изясняване на въпроса за възможностите и ползите от работа в групи, е представен примерен вариант за формиране на знания и умения в малка група при обучение на учители по тема „Диагностичната дейност на учителя". В конкретния материал е представен примерен вариант на анкетна карта – като един от често използваните инструменти за диагностична дейност. Задачата, която учителите трябва да изпълнят, разделени в малки групи, е да разработят анкетна карта, която да включва 10 въпроса от закрит тип по актуален проблем (по техен избор) с цел да установят мнението и отношението на респондентите по избраната проблематика.

Ключови думи: групова работа, работа в малки групи

Introduction

In the contemporary literature on didactics and methods of teaching, the issue of group work is discussed in various publications. The methodical practice shows that working in small groups is effective. (6) One of the definitions for a group is "a union of persons, events, based on a common feature" (Burov et al., 1994).

The group system of education is not a new one. It was applied even in the 16th century in the ecclesiastical and knight's schools, and later in the common village schools. In the meantime, it was developed and refined (4).

The possibility for working in groups and to solve effectively various problems – this is a virtue that is priced vaguely by the employers. In this kind of format, there are various benefits which can be described in the following way:

- broadening the knowledge of the participations in the group;
- formation of knowledge for contributions, communicative skills, etc.;
- skills for discussion;
- attaining an individual and group responsibility;

- exchange of ideas and thoughts;
- formation of a group behaviour;
- exchange of information;
- determination of roles and responsibilities;
- confirmation of ideas;
- formation of common conclusions, etc.

The practice of educational programs for teachers shows that working within a small group (4-6 persons) is more effective. It suggests more possibilities for cooperation and for adoption of many new ideas (2)

Pedagogical practice shows the efficacy of education when working in a group. Educating people in that way and with the aid of various interactive methods provides the opportunity to reach the proper decision and to extend their knowledge in a given area.

Main characteristics of working in a group

The practice shows that education of teachers is more effective when part of the time is dedicated to the implementation of concrete task and the participants are divided into small groups. The number of the participants in the group depends on various subjective and objective factors. In the specialised literature there are various opinions about the number of the participants. In practice, the so-called "small group" consists of 3-6 participants. The optimum group is formed of 4 participants. It is recommended to work with groups that are approximately equal.

Work in a small group is more effective ecpecially in the occasion when the main decisions are made, or important conclusions on a particular problem are made. Work in a small group is a contemporary interactive method which has a broader application in the education programs for teachers.

There are two forms of group participation:

- all groups work on one theme or item;
- every group discusses different topics or investigates similar topics from a different perspective. (3)

Formation of the groups

It may be performed in various ways:

- accidentally;
- based on common interest (in this way, the group will work on a small unit);
- based on sex, age, knowledge, etc.

When working in small groups, the participant will attain various skills (linguistic, intellectual, social, etc.):

- communicative;
- for effective speaking and effective listening;
- for discussing, analysing, systematising, argumentation;
- for contesting and presenting arguments;
- for producing and sharing ideas;
- analysing and finding argumentation, etc.

All this allows faster and accurate solution to the problems and helps come to a more effectively solution in the whole educational process.

In the process of working in a group, there is a possibility of a conflict. For resolving this conflict, it is necessary for all the participants to analyse the conflict situation and to determine the objective and subjective factors that caused the conflict. Based on this, a decision must be found for resolving the conflict situation and a consensus must be reached based on the appropriate methods and skills.

Characteristic features in working in a small group

They may be described as follows:

- It allows intensive communion;
- Every participant has the possibility to show themselves in a new role;
- Every participant has the possibility to enrich and to experiment new roles (that of an instance leader, a mediator, etc.);
- It stimulates research, investigation, the formation of new ideas for the sake of common aim which creates the feeling of nearness and mutual dependence on the members of the group;
- It helps generate, procure, and estimate ideas and their implementation.

All of the above bring about a more effective education with an accent on the role of the educating person who is in the "centre" of the educational process.

Main rules for working in a small group

These are as follows:

- free and constructive explanation of the feelings and the problems;
- avoidance of esteems in the process of working;
- working of a specific problem;
- taking responsibility for self-conduct;
- free explanation of self-opinion on the issues discussed in front of all participants in the group;
- responsibility for the self-auctions, behaving according to group norms and with self-responsibility;
- attaining the inviolability of the person without disregarding the other participants;
- assertive behaviour on the part of the leader and control for attaining the self-inviolability of the participants;
- offering and taking support when needed;
- parity of the participants, i.e. equal possibilities of all members of the group;
- participating in a constructive dialogue and displaying openness in the process of mutual work;
- effective participation. (5)

Variant of a practical application of work in a small group

For a better explanation of the issue of the opportunities and use of working in groups, an example variant is shown of the formation of knowledge and skills in a small group when educating teachers on the topic of "Diagnostic activity of the teacher".

The main **knowledge** which the teachers must attain when realising that educational program are connected with the specifics of the diagnostic activity:

- diagnostic;
- diagnostic procedure;
- diagnostic methods;
- diagnostic tools (inquiry, test).

The main **skill** in a practical aspect is to be able to perform diagnostics in their direct work as teachers both in the "input" (as current trainees) and in the "output" (in the education of their own students).

One of the main skills to attain is for the teacher to learn, develop, and use diagnostic tools. The educational program is a practical activity for resolving tasks on that issue by the aid of working in small groups. The participants are divided into groups. As usual, this is attained in accordance to the principle of common interests and subject that is taught. This way, the group may perform as a very good team. In the periods that are allocated for attaining diagnostic tools in a theoretical aspect, attention is given to the test and the questionnaire. The tasks which must be performed in groups are related to these. For instance, when the educator presents and clarifies the essence of the questionnaire, the types of questionnaires, the requirements to the questions and answers, the structuring, the type of layout, etc. and presents an example of an inquiry, the participants are divided into small groups and work on the same task. The example of an investigating card which aims to establish the opinion and the relation to the visualisation of the information is as follows:

With this investigation, we wish to establish your opinion on the issue of the usefulness of the information. With respect to this, you should underline the answer that is most suitable to your opinion.

№	*Question/Affirmative statement*	*Response*
1	*Do you think that the visualisation of information helps its adoption?*	*Yes* *Maybe – yes* *Maybe – no* *No*
2	*The visualisation of information enhances the learning process.*	*Yes* *Maybe – yes* *Maybe – no* *No*
3	*The visualisation of information increases the interest in the problem that is examined.*	*Yes* *Maybe – yes* *Maybe – no* *No*
4	*The visualisation enhances the activity of the person who is taught.*	*Yes* *Maybe – yes* *Maybe – no* *No*
5.	*The visualisation of information enhances the activity of the teacher/ lecturer.*	*Yes* *Maybe – yes* *Maybe – no* *No*
6	*The visualisation supports the development of skills for selecting information.*	*Yes* *Maybe – yes* *Maybe – no* *No*
7	*The visualisation develops skills for the analysis and synthesis of information.*	*Yes* *Maybe – yes* *Maybe – no* *No*
8	*The visualisation develops a closer connection with the practice, with real situations in life.*	*Yes* *Maybe – yes* *Maybe – no* *No*
9	*Do you often visualise the information that you present?*	*Yes* *Maybe – yes* *Maybe – no* *No*
10	*Should the visualisation of information be supported by a discussion on the topic?*	*Yes* *Maybe – yes* *Maybe – no* *No*

Please indicate:

Sex: *Man* / *Woman*

We thank you in advance for the time spared.

The task that is applied by the teachers who are divided into small group is as follows:

1. **Choose the actual topic** on and investigate the opinion on and the attitude to this topic of a task group (by choice).
2. **Formulate 10 questions/statements** (closed type) through which to investigate the opinion of the task group on the issue discussed.
3. **Prepare the card according** to the requirements.

Conclusion

In conclusion, it is important to point out that working in a small group is a successful interactive method for training teachers, but it is not necessarily to be absolutised. The application of this method and its efficacy depend on various objective and subjective factors which must be taken into account.

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