ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ПРИ БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ

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ECONOMIC STUDIES

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 6

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# DRIVERS OF ECONOMIC GROWTH: A COMPARATIVE ANALYSIS OF MACEDONIA AND BULGARIA

*The aim of the paper is to investigate the sources of economic growth in Bulgaria and Macedonia. We use a growth accounting framework based on production, demand and sector-side approach, for the period 2000-2015. The tree-sided approach enables the analysis of similarities and differences of growth models in the two countries, through altered perspectives. The estimated results of the conventional decomposition of economic growth sources indicate that the main driver of annual rate of economic growth in both countries is investment in physical capital. However, the differences are found in the contribution of labour force and TFP contribution. The higher contribution of labour force is found in Macedonia, while the contribution of TFP is more significant in Bulgaria. Additionally, the results based on demand-side approach of the sources-of-growth analysis indicate that the households consumption and government spending are the main growth drivers in both countries, with negative effects of trade deficit and, as well, negative contribution of net export to economic growth. Furthermore, the estimated results of growth accounting based on sector-side approach show that the economic growth in both countries predominantly is driven by trade and service sector, with lower contribution of manufacturing. Finally, the paper depicts several policy suggestions and recommendations based on underlying insights, estimated results and conventional guiding principles.*
*JEL: O40; O43; O47*

## 1. Introduction

The analysis of the country's growth model based on exploration of sources of growth is important for many reasons. First, it provides useful insights in the growth diagnostic process as a basis for designing optimal economic policy in tackling most binding growth constraints. Furthermore, the identification of growth sources is a basis for analysis of the long run economic growth capacity. In that context, the main goal of this paper is to

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identify the similarities and differences between Bulgarian and Macedonian growth models by applying growth accounting methods based on production, consumption and sectors approach.

The estimated results based on conventional decomposition of economic growth (contribution of capital, labour and total factor productivity) indicate that the Macedonian growth is mostly based on factors accumulation (predominantly on labour) with lower total factor productivity contribution, while the Bulgarian growth is mostly based on investment in physical capital, demonstrating higher contribution of total factor productivity. Additionally, the estimated results based on demand-side approach of growth sources analysis indicate that, households' consumption and government spending are the main growth sources in both countries, with negative effects of trade deficit, and negative contribution of net export to economic growth. Furthermore, the estimated results of growth accounting based on sectors approach show that economic growth in both countries is predominantly driven by trade and services, with lower contribution of manufacturing.

The contribution of the paper within the existing empirical literature related to growth accounting including the empirical studies focusing on Bulgaria or Macedonia is the applying the integrated three-side growth accounting (production, demand and sector) approach in an comparative dimension between Macedonia and Bulgaria for the relatively long time period which include the effects of global economic crisis. The paper findings allow us to make several conclusions about the similarities and differences of the growth models in both countries and give us useful insights for creating economic policies that will accelerate the economic growth in Macedonia and Bulgaria.

The paper is organized in the following sections. In Section 2, we describe the methodological framework of growth accounting approach. Section 3 summarizes the huge body of theoretical and empirical literature related to growth accounting as an empirical growth technique. In Section 4 we identify the growth sources in both countries based on classical production, demand and sector approach. Finally, the last section of the paper puts forward concluding remarks, based on the principal empirical findings.

## 2. Methodological Framework

The growth accounting method is widely applied empirical technique which quantitatively approximates the absolute and relative contribution of each production factor (capital and labor) and estimates the contribution of total factor productivity (technological progress and human capital), known as Solow's residual (Solow, 1956).

In order to elaborate the methodological approach used in this paper we start by explaining a simple production function which assumes one sector economy:

$$Y_t = A_t K_t^a L_t^\beta \tag{1}$$

Where, $L_t$, stands for labor input (number of working hours); $K_t$, is the stock of physical capital, while, $A_t$ stands for the level of technological efficiency, or total factor productivity.

By taking logarithm, differentiating it in terms of time and dividing it with, we obtain the rate of economic growth based on labor augmenting or labor adjusted mode:

$$\Delta Y / Y = \Delta A / A + a(\Delta K / K) + b(\Delta L / L)_3 \quad (2)$$

Coefficient, $a = (MP_K K_t / Y_t)$, presents the elasticity of production with respect to capital, while, $b = (MP_{L_i} L_{it} / Y_t)$, presents elasticity of production with respect to *i-th* type of labor, in terms of the level of education. The first part of the equation, $\Delta A / A$, presents the contribution of global factor productivity to the rate of economic growth, the second part, $a(\Delta K / K)$, measures the contribution of capital accumulation, while the last element, $b(\Delta L.L)$, expresses the contribution of all types of labor, to the rate of economic growth.

This empirical growth method is rather problematic, from theoretical and practical perspectives, due to inherent weaknesses of the economic discipline itself. First, economists do not agree about the weighted value which measures the share of national income of each of the included production factors (physical and human capital), because there is no generally accepted criteria about the valuation of weight (Barro, 1998). Second, as pointed out by Hsieh (1998) the possibility to use dual approach, based on constant returns to scale assumption[4], involves decomposition of growth through changes in the factors income (returns), rather than a change in the quantity of production, $Y = RK + wL$. Third, the measurement of physical capital as a difference between the accumulated capital and depreciation rate does not reflect the real value of capital, because some investment may be inefficient, unproductive and could be probably written off, at a rate higher than the standard (Pritchett, 2000). Fourth, this technique has not the capacity to measure the contribution of natural resources, especially in countries where a substantial share of economic growth is based on exploitation of natural resources (oil, gas, mineral resources), where the return of this factor would appear as part of total factor productivity (TFP), without being explicitly elaborated. Such a lack of precision in the measurement of factors of production makes the results to some extend unreliable.

Moreover, other drawback of growth accounting technique is the assumption of additive separability which means that each individual source of economic growth is not independent from others (Denison et al., 1962; Denison, 1985; Kendrick, 1980; Griliches, 1996; Madison, 1987; Psacharopoulos, 1985). Actually, according to the basic Solow

[3] Mathematical note:

$$\log Y = \log A + a \log K + \sum_{i=o}^{n} b_i \log L \Rightarrow \frac{d \log Y}{dt} = \frac{d \log A}{dt} + a \frac{d \log K}{dt} + \sum_{i=o}^{n} b_i \frac{d \log L}{dt} \Rightarrow$$

$$\Delta Y / Y = (\Delta A / A) + a(\Delta K / K) + \sum_{i=o}^{n} b_i (\Delta L_i / L_i)$$

[4] This assumption goes against all endogenous growth models which are based on some form of increasing returns.

model, the growth rate of the capital stock is determined by technological progress, which means that the factors are not unrelated among themselves (Solow, 1957). However, these remarks do not intend to diminish the value of this concept, but to point out to the necessity of careful interpretation of the results, and the need to use additional research, that will improve and clarify the results obtained by applying this method.

In order to create a more reliable picture about the main sources of economic growth in both countries, we use two additional growth accounting approaches (demand and sector side) which decompose the growth rate by estimating the contribution of the individual components of aggregate demand (household consumption, investments, government spending and net export) and the contribution of individual sectors (agricultural, industry and services).

## 3. Empricical Analysis of Growth Sources: The Case of Macedonia and Bulgaria

### *3.1 Growth source analysis based on production approach*

The basic indicators of economic dynamics for the specified period, the real GDP and annual rate of economic growth for both countries are the following:

Table 1

Basic data for real GDP (in million USD) and growth rate in Macedonia, 2000-2015

| | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| GDP growth (annual %) | 4.55 | 4.72 | 3.36 | 3.67 |
| GDP (current USD) | 3773 | 6259 | 9407 | 10086 |
| GDP (constant 2010 USD) | 7018 | 7736 | 9407 | 10587 |
| GDP deflator (base year varies by country) | 89 | 100 | 117 | 133 |
| GDP per capita (constant 2010 USD) | 3488 | 3787 | 4561 | 5094 |

Source: World Bank Indicators database.

The data show that the real GDP of the Macedonian economy, with few exceptions[5], had constant increasing trend in the entire period, by an average of 2.83% rate of economic growth in the period 2000-2015. However, as a normative value judgment, this growth dynamics is not satisfactory having in consideration the country's aspiration for catching up to more developed transition countries.

On the other side, the data about the Bulgarian growth performance for the same period show that the country has recoded 3.61% average growth rate, which compared to the Macedonian growth performance is slightly higher, though, in the second half of the observed period the Bulgarian economy has been more seriously affected by the global economic crisis.

[5] The break in the positive growth trend was as a result of the conflict in 2001, the economy ended with negative growth of -4.5%. The impact of the global economic crisis in 2009 and 2012 was the cause of reduced economic activity -0.9%.

Table 2

Basic data for GDP (in million USD) and growth rate in Bulgaria, 2000-2015

| | 2000 | 2005 | 2010 | 2015 |
|---|---|---|---|---|
| GDP growth (annual %) | 5.0 | 7.2 | 0.1 | 3.6 |
| GDP (current USD) | 13148 | 29822 | 50610 | 50199 |
| GDP (constant 2010 USD) | 32771 | 43488 | 50610 | 54639 |
| GDP deflator | 57.7 | 73.1 | 100.0 | 109.7 |
| GDP per capita (constant 2010 USD) | 4011 | 5678 | 6843 | 7612 |

Source: World Bank Indicators database.

However, what is more important at this point is to identify the main growth sources in both countries. The first method used in growth-sources analysis is production-side growth accounting which provides a framework to quantify the absolute and relative contribution of each production factor (capital and labor) and to estimate the contribution of total factor productivity (technological progress and human capital) to economic growth (Lazarov and Petreski, 2016).

The first step is to estimation the contribution of physical capital. The measurement of the growth rate of physical capital is based on the assumption that the changes in physical capital stock, $\Delta K$ is the difference between the capital stock in period *t* and the capital from the previous period decreased by depreciation $K(t) - \delta K(t)$, plus demand for capital during the period *t*, i.e. investments $I(t)$:

$$\Delta K = K(t) - \delta K(t) + I(t) \tag{3}$$

where, $\delta$, is the rate of depreciation (amortization). However, the actual empirical estimation of growth rate of physical capital (capital accumulation) is burdened with many difficulties. In fact, in the official statistics there is no available data on the value of physical capital, which makes impossible the implementation of the previously presented method for measuring the accumulation of capital. The only way is to assume that the value of physical capital in equilibrium is equal to investment rate (Popovic, 2010).

The estimated results based on the official statistic data about the investment dynamic in fixed assets show that the growth rate of investment in physical capital in the analyzed period is 3.54% and 6.50% in Macedonia and Bulgaria, respectively.

The second step in applying production-side growth sources analysis is to estimate the labor growth rate. The most appropriate way to estimate the growth rate of labor is to estimate the growth rate of number of working hours of employees in the economy (Popovic, 2006). Unfortunately, such data in the national statistics do not exist. Therefore, in the calculation of labor growth we use the rate of employment growth which is an appropriate approximation. The empirical estimation based on data about the total number of employees show that the average growth rate of employment in the analyzed period in Macedonia and Bulgaria is 1.23% and 0.41% respectively.

Another important issue in applying the production-side growth accounting is the assessment of partial elasticity ratio of capital and labor ( $a_t$ and $b_t$ ). When the economy is on the equilibrium growth-path, it can be formally verified the procedure to apply the Cobb-Douglas production function with constant returns of scale. This means that the factors of production must be constant, $a_t = a$ and $b_t = b.$, or with other words coefficients, do not change regardless of the change in the level of technology (technological progress). The fact that many empirical studies on the economies, with a similar level of development as the Macedonia and Bulgaria are, use given values for the parameters for partial elasticity, there are no significant reasons not to replicate this approach. Namely, the parameter that indicates the share of capital income in GDP has value 0.33, and the other parameter which indicates the share of labor income in GDP has value 0.67.

Finally, we can estimate the contribution of individual production factors (physical and human capital) and total factor productivity (TFP) to economic growth in Macedonia and Bulgaria. In the tables below are presented the estimated results of production-side growth accounting.

Table 3

Growth sources based on production approach in Macedonia, 2000-2015 (%)

| Growth accounting | 2000-2015 | | |
|---|---|---|---|
| a=0.33 | Growth rate | Absolute contribution | Relative contribution |
| Physical capital (K) | 3.54 | 1.17 | 41.34 |
| Labor (L) | 1.23 | 0.82 | 29.13 |
| Total Factor Productivity (TFP/A) | 0.84 | 0.84 | 29.53 |
| **GDP - Q** | **2.83** | **2.83** | **100.00** |

Source: Authors' calculation based on UN and World Bank database.

The results of the growth accounting based on production-side approach show that the major part of Macedonian growth rate in the period 2000-2015 was due to the increase in production factors (physical capital and labor). Physical capital (investments) is the most important factor of growth, with 41% relative contribution to economic growth, while the relative contribution of labor (number of workers) to growth is 29.13%.

The contribution of total factor productivity (TFP) or knowledge in its broadest sense is smaller compare with factors contribution. Actually, the absolute contribution is 0.84%, or nearly 30% of economic growth. The further decomposition of total factor productivity shows that technological progress (knowledge implemented in the machines) is insignificant with contribution of 8.5%. The impact of TFP on economic growth in Macedonia is slower compared with total factor productivity contribution which varies from 40% to 50% in developed countries, and from 35% to 40% in middle-income countries.

The growth pattern of the Bulgarian economy is different from the Macedonian growth model by the role and the importance of physical capital, as the engine of growth. Actually,

the relative contribution of investment in physical capital in Bulgaria is significantly higher (41% of average growth rate is determined by the investment in physical capital), which is automatically reflected in the total factor productivity.

Table 4

Growth sources based on production approach in Bulgaria, 2000-2015 (%)

| Growth accounting | 2000-2015 | | |
|---|---|---|---|
| a=0.33 | Growth rate | Absolute contribution | Relative share |
| Physical capital (K) | 6.50 | 2.15 | 59.55 |
| Labor (L) | 0.41 | 0.27 | 7.47 |
| Total factor Productivity (TFP/A) | 1.43 | 1.19 | 32.96 |
| **GDP - Q** | **3.61** | **3.61** | **100.00** |

Source: Authors' calculation based on UN and World Bank database.

Additionally, the results indicate that labor contribution to growth rate in Bulgaria is significantly lower (7.47%) than the labor contribution to economic growth in Macedonia (29.13%), which is expected, considering that the Republic of Macedonia has had high unemployment rate and low cost labor force. Finally, the results show that the relative contribution of total factor productivity to economic growth is higher in Bulgaria (almost 33%), compare with Macedonia (less than 30%). The results of growth sources in Bulgaria based on production-side approach obtained in our analysis are similar with the previous empirical studies that have been carried out by Gancev (2005), Minassian (2008), Raleva (2013) and Todorov (2016).

### *3.2 Growth source analysis based on demand-side approach*

The growth accounting analysis based on demand-side approach provides additional specifics that go deeper into country's growth anatomy. The results will be presented in two tables; the first table refers to changes in demand structure, while the second tables represent the absolute and relative contribution of individual components of aggregate demand to economic growth.

Table 5

Aggregate demand structure and changes in Macedonia, 2000-2015 (%)

| Individual components of Aggregate demand | 2000 | 2015 | Δ15-00 |
|---|---|---|---|
| Households consumption including NIPIS | 74.31 | 70.93 | -3.38 |
| Government spending | 18.16 | 15.00 | -3.16 |
| Gross fixed capital formation | 19.32 | 31.41 | 12.09 |
| Export of goods and services | 33.90 | 51.32 | 17.42 |
| Import of goods and services | -45.84 | -68.33 | -22.49 |
| Net export | -11.94 | -17.01 | -5.07 |
| **Gross Domestic Product** | **100.00** | **100.00** | **0.00** |

Source: Authors' calculations based on data from State Statistical Office of RM.

Table 6

Aggregate demand structure and changes in Bulgaria, 2000-2015 (%)

| Individual components of Aggregate demand | 2000 | 2015 | Δ15-00 |
|---|---|---|---|
| Households consumption including NIPIS | 63.35 | 69.98 | 6.63 |
| Government spending | 20.85 | 14.68 | -6.17 |
| Gross fixed capital formation | 16.18 | 22.36 | 6.18 |
| Changes in inventory | 1.29 | 1.79 | 0.49 |
| Export of goods and services | 35.48 | 61.15 | 25.67 |
| Import of goods and services | -38.22 | -70.11 | -31.90 |
| Net export | -2.74 | -8.97 | -6.23 |
| **Gross Domestic Product** | **100.00** | **100.00** | **0.00** |

Source: Authors' calculations based on data from National Statistical Institute of RB

The analysis of demand structure shows that the household consumption (including the consumption of non-profit institutions serving households – NIPIS) has the highest relative share in total aggregate demand, both in Macedonia and Bulgaria. Actually, the relative share of household consumption in Macedonia and Bulgaria is 71% and 70%, respectively in 2015. The government spending (government expenditures of final goods and services) participated with 15% and 15.5% in the total aggregate demand in Macedonia and Bulgaria, respectively. Gross capital formation has a relatively high relative share in total aggregate demand in Macedonia (31%), compare with Bulgaria (23%). Finally, net export has negative share in total aggregate demand in both countries, but that negative share is significantly higher in Macedonia (17%), compared to Bulgaria (9%).

Based on the analysis of relative share of individual components of aggregate demand and its dynamic (the change in the relative share of individual components in the aggregate demand), we estimate the growth sources by identifying the relative contribution of individual components of aggregate demand to economic growth.

Table 7

Growth sources based on demand-side approach in Macedonia, 2000-2015 (%)

| Growth sources | 2000-2015 | | |
|---|---|---|---|
| | Growth rate | Absolute contribution | Relative contribution |
| Households consumption including NIPIS | 2.61 | 1.96 | 69.41 |
| Government spending | 2.05 | 0.34 | 12.14 |
| Gross fixed capital formation | 6.79 | 1.67 | 58.98 |
| Export of goods and services | 6.32 | 2.42 | 85.43 |
| Import of goods and services | 5.96 | -3.28 | -115.86 |
| **Gross Domestic Product** | **2.83** | **2.83** | **100.00** |

Source: Authors' calculations based on data from State Statistical Office of RM.

The estimated results show that households consumption (including the consumption of non-profit institutions serving households - NPISH) with the average relative share of 75% and the average growth rate of 2.61%% in the period 2000-2015 has the largest absolute

and relative contribution to the economic growth in Macedonia. Government spending and gross investment has relative contribution to economic growth of 12.14% and 58.98%, respectively. On the other hand, net export has negative relative contribution to economic growth of 30.5%, due to the increasing trend of trade deficit (higher growth of import than the export growth).

Table 8

Growth sources based on demand-side approach in Bulgaria, 2000-2015

| Growth sources | 2000-2015 | | |
|---|---|---|---|
| | Growth rate | Absolute contribution | Relative contribution |
| Households consumption including NIPIS | 4.24 | 2.95 | 83.98 |
| Government spending | 1.14 | 0.20 | 5.56 |
| Gross fixed capital formation | 6.50 | 1.54 | 43.91 |
| Changes in inventory | 6.50 | 0.12 | 3.51 |
| Export of goods and services | 7.62 | 3.64 | 103.68 |
| Import of goods and services | 8.30 | -5.00 | -142.36 |
| **Gross Domestic Product** | **3.61** | **3.61** | **100.00** |

Source: Authors' calculations based on data from National Statistical Institute of RB.

The identification of growth sources in Bulgaria based on demand-side approach indicating that the relative contribution of final consumption of households to Bulgarian economic growth is much more significant (83%), which reflects the huge trade imbalance and significantly higher negative contribution of net export to Bulgarian growth (39%). On the other side, the contribution of government spending and gross investment is lower compare with the case of Macedonia. Actually, the relative contribution of government spending is 5.56%, while the contribution of gross investment is almost 44%.

The general conclusion of this analysis is that the household consumption and government spending are the main drivers of economic growth, with significant trade deficit and negative contribution of net export in both countries. This is facilitated by the bank credit expansion to household and the budget deficits of the countries. However, it's not surprising if we analyze the growth model that the majority of countries in the South-East European region are based on in the last two decades, where the main source of growth is the final consumption.

### *3.3 Growth source analysis based on sector-side approach*

The sectoral decomposition of the growth sources allows us to identify the sectors structure and the contribution of each sector to economic growth. First, we analyze the relative share of individual sectors in real GDP calculated according to production method and changes in the added value of each sector in total country value added.

Table 9

Sectors structure and sectors changes in Macedonia, 2000-2015 (%)

| SECTORS | 2000 | 2015 | Δ 15-00 |
|---|---|---|---|
| Agriculture, hunting, forestry and Fishing (A+B) | 10.23 | 7.70 | -2.53 |
| Mining and quarrying, and Electricity, gas and water supply (C+E) | 3.67 | 3.19 | -0.48 |
| Manufacturing (D) | 8.51 | 10.51 | 2.00 |
| Construction (IF) | 6.36 | 11.15 | 4.79 |
| Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and restaurants (ISICG-H) | 11.23 | 15.01 | 3.78 |
| Transport, storage and communication (I) | 5.89 | 7.88 | 1.98 |
| Other private and public services (IJ-P) | 42.61 | 32.93 | -9.68 |
| **Value Added** | **88.49** | **88.35** | **-0.14** |
| Net taxes on products | 11.51 | 11.65 | 0.14 |
| **Real GDP - Gross Domestic Product** | **100.00** | **100.00** | **0.00** |

Source: Authors' calculations based on National Statistical Office and UN database.

The data related to sectors structure in Macedonia indicates that manufacturing has negligible share in real GDP, though there is an increasing trend from 8.5% in 2000 to 10.5% in 2015. However, the other part of industry (construction and mining sector) has much significant share in real GDP. Actually, the relative share of these sectors increased from 10% in 2000 to 14.5% in 2015.

On the other hand, it is evident an increasing trend in the relative share of widely define "trade" and the tourism sector - hotels and restaurants (line G-H) from 11.23% in 2000 to almost 15% in 2015 and increasing trend of transport sector from 5.9% in 2000 to 7.9% in 2015, while the other private and public services as a largest sector in Macedonian economy has significant decreasing trend from 42.6% to 32%

The analysis of sectoral structure changes in Bulgaria indicate that the relative share of manufacturing had an increasing trend from 12.75% in 2000 to 13.89% in 2015, showing that there is no trend of deindustrialization. On the other side, there is an increasing trend in trade and transport sector, while significant decreasing trend in the relative share of agricultural from 9.75% in 2000 to 4.59% in 2015. In the table below is presented the demand structure and changes in demand structure in Bulgaria in the period 2000-2015.

Table 10

Sectors structure and sectors changes in Bulgaria, 2000-2015 (%)

| SECTORS | 2000 | 2015 | Δ15-00 |
|---|---|---|---|
| Agriculture, hunting, forestry and Fishing (A+B) | 9.78 | 4.59 | -5.20 |
| Mining and quarrying, and Electricity, gas and water supply (C+E) | 6.46 | 5.13 | -1.33 |
| Manufacturing (D) | 12.75 | 13.89 | 1.15 |
| Construction (IF) | 5.27 | 4.90 | -0.37 |
| Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and restaurants (ISICG-H) | 11.06 | 14.15 | 3.10 |
| Transport, storage and communication (I) | 8.39 | 10.49 | 2.10 |
| Other private and public services (IJ-P) | 33.32 | 32.61 | -0.72 |
| **Value Added** | **86.90** | **85.90** | **-0.99** |
| Net taxes on products | 13.10 | 14.10 | 0.99 |
| **GDP – Gross Domestic Product** | **100.00** | **100.00** | **0.00** |

Source: Authors' calculations based on data from National Statistical Institute of RB.

However, the main challenge in this section is to identify the contribution of individual sectors to growth rate in both countries by applying a sector-side growth sources analysis. The estimated results indicate that trade; construction and industry are the main driving sectors to economic growth in Macedonia. Actually, the relative contribution of trade defined in its broadest sense to economic growth in the analyzed period is almost 29%, the construction sector has 23% relative contribution to the rate of economic growth, while the relative contribution of industry (including mining sector and manufacturing) to economic growth is 22%.

The other sectors have smaller contribution: agriculture has 4.85%, service sector (including public administration, defense, social security, education, health and social work sector and the transport, storage, communications and information) has 16.64%, while transport sector has 15% contribution to economic growth.

Table 11

Sectors sources of economic growth in Macedonia, 2000-2015 (%)

| Sectors | 2000-2015 | | |
|---|---|---|---|
| | Growth rate | Absolute contribution | Relative contribution |
| Agriculture, hunting, forestry and Fishing (A+B) | 1.31 | 0.13 | 4.85 |
| Mining and quarrying, and Electricity, gas and water supply (C+E) | 2.96 | 0.13 | 4.79 |
| Manufacturing (D) | 4.58 | 0.48 | 16.99 |
| Construction (IF) | 7.48 | 0.65 | 23.13 |
| Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and restaurants (ISICG-H) | 5.17 | 0.81 | 28.91 |
| Transport, storage and communication (I) | 5.17 | 0.42 | 15.17 |
| Other private and public services (IJ-P) | 1.13 | 0.47 | 16.64 |
| **Value Added** | **2.82** | **2.43** | **86.03** |
| Net taxes on products | 3.05 | 0.42 | 14.96 |
| **GDP – Gross Domestic Product** | **2.83** | **2.83** | **100.00** |

Source: Authors' calculations based on data from State Statistical Office of RM

On the other side, the estimated results of the sector-side growth sources analysis for Bulgaria show that the industry (mining and quarrying, electricity supply, gas, steam and air conditioning, and manufacturing) has lower relative contribution to the economic growth rate (approximately 19.5%), compare with the relative contribution of industry to Macedonian growth rate (approximately 22%). The similar situation is recorded in the comparative analysis between Macedonia and Bulgaria in terms of the relative contribution of construction and agriculture sector to economic growth. Actually, the contribution of these sectors to economic growth is significantly higher in Macedonia (approximately 28%), compared to Bulgaria (approximately 3.5%).

The growth model of Bulgaria is primarily based on trade and service sectors. For illustration, the relative contribution of trade and service sector to economic growth is much than 50%, while contribution of transport sector is almost 15%. This conclusion about the

main sectors that drive the economic growth is also valid for Macedonia, but the relative contribution of these sectors is much lower in the case of Macedonia (60%). In the table below is presented the results of sector-side growth accounting analysis for Bulgaria.

Table 12

Sectors sources of economic growth in Bulgaria, 2000-2015 (%)

| SECTORS | 2000-2015 | | |
|---|---|---|---|
| | Growth rate | Absolute contribution | Relative contribution |
| Agriculture, hunting, forestry and Fishing (A+B) | -0.96 | -0.06 | -1.69 |
| Mining and quarrying, and Electricity, gas and water supply (C+E) | 1.95 | 0.10 | 2.93 |
| Manufacturing (D) | 4.29 | 0.59 | 16.68 |
| Construction (IF) | 3.35 | 0.18 | 5.24 |
| Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, Hotels and restaurants (ISICG-H) | 5.31 | 0.67 | 18.94 |
| Transport, storage and communication (I) | 5.17 | 0.52 | 14.87 |
| Other private and public services (IJ-P) | 3.39 | 1.11 | 31.65 |
| **Value Added** | **3.42** | **2.95** | **83.93** |
| Net taxes on products | 4.33 | 0.60 | 17.06 |
| **GDP - Gross Domestic Product** | **3.61** | **3.61** | **100.00** |

Source: Authors' calculations based on data from National Statistical Institute of RB.

The empirical estimates are open to generic (and specific, as the time length observed) criticisms attached to inherent flaws of aggregate economic modelling (deterministic countenances, intertemporal structures and time distribution, lags, internal linkages in the mechanics of growth, elasticity, productivity and efficiency differentials within the substructures. Nevertheless, the obtained results reveal unequivocal and categorical structures and trends.

## 4. Conclusion

The estimation of main sources of economic growth and the identification of growth model that the country is based on could give very useful insights for improvement of economic policies. Three growth accounting methods are most commonly applied in the growth theory and empirics: classical production-side, demand-side and sector-side approach. The first method, estimate the contribution of production factors (physical capital and labour force) and TFP (Total Factor Productivity). The demand-side approach investigates the contribution of each components of aggregate demand (household consumption, investment, government spending and net export) to economic growth, while the sectoral-side growth accounting approach estimates the contribution of each sector (agricultural, manufacturing, and services) to economic growth.

The main objective of the paper is to investigate the growth-sources and to identify the main drivers of economic growth in Macedonia and Bulgaria by applying the production, demand and sector approaches. The estimated results of the conventional decomposition of economic growth sources indicate that the main driver of annual rate of economic growth in both countries is investment in physical capital. However, the differences are found in the contribution of labour and TFP contribution. The higher contribution of labour force is found in Macedonia, while the contribution of TFP is more significant in Bulgaria. Additionally, the results based on demand-side approach of the sources-of-growth analysis indicate that the households consumption and government spending are the main growth drivers in both countries, with negative effects of trade deficit and, as well, negative contribution of net export to economic growth. Furthermore, the estimated results of growth accounting based on sector-side approach show that the economic growth in both countries predominantly is driven by trade and service sector, with lower contribution of manufacturing. However, the application of growth accounting framework to identify the main growth drivers is open to generic and specific criticisms attached to intrinsic weaknesses of aggregate economic modelling. Some of those drawbacks were discussed in details within the paper. Still, the results provide some convincing conclusions.

The paper gives some general policy suggestions and recommendations based on the estimated results. First, both countries should focus their policy to support productive investment in order to increase the total factor productivity. In that context, transfer of technology, attracting high-technology intensive FDI, improvements in educational system and investment in human capital must be of a high priority. Moreover, the public investment should be focused in infrastructure that will increase the countries competitiveness. Second, both countries should enhance manufacturing sector and industries with higher added value, considering a set of active industrial policies, as a way to improve their export performance. Finally, both countries should gradually bring together shifts in their current demand driven growth models towards supply side induced growth, as the only way to generate and accelerate sustainable long-run economic growth.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

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# THE IMPACT OF MODERN GLOBALIZATION PROCESSES ON INNOVATIVE DEVELOPMENT OF LABOR POTENTIAL

*The influence of modern globalization processes on the innovative development of the labor potential in the paper was defined. The solution of the problems of social and labor sphere development for the regions of Ukraine should be done through new approaches, namely on innovative principles was founded. This means that the focus should concentrate on the efficiency enhancing development of educational-qualification component, because the implementation of the majority of management decisions requires time and generational changes with the formation of the new set of values, obviously can only be achieved through the educational sphere. It is proved that the active cross-border transfers of information, knowledge, technologies and human resources (migration) determine the importance to take into account the globalization factor when searching for opportunities to improve employment conditions.*
*JEL: F01; J40; O15*

## Formulation of the problem

The rapid development of new knowledge and technologies carry great influence on all spheres of human activity. Is no exception and labor-resource field and development of labor potential as a permanent environment of the human self-fulfilling, the source of production of goods and services and final link in the consumption of vital benefits. Calls today for labor-resource field are both threats and sources of new development opportunities. Particularly rapid changes it undergoes from globalization manifestations in the process of changing human development with the introduction of new ideas, technological processes, informatization and robotics. Despite the fact that take place technological breakthroughs, rapid innovation development and significant layoffs that were once occupied at certain links of production, at the same time under the given conditions other active mass of employment potential media gets a real opportunity to realize their labor potential in the field of production of new knowledge and ideas. For

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investigation of the impact of globalization processes on the innovative development of labor potential used aggregate of various methods: statistical, formal and logical, mathematical and economic, structural and functional, analysis and forecasting, regulatory, questionnaires, surveys, balance, target-oriented and others. The methods specified in the course of presentation of the material.

**Analysis of recent research and publications**

The issues of labor potential development belong to the authority of such Ukrainian scientists as V. Antonyuk, Z. Herasymchuk, Y. Luzan, Y. Melnyk, K. Yakuba, S. Pasyeka, N. Lukyanchenko, L. Shaulska, N. Titova, S. Sember. But the issues of the impact of globalization processes on the development of labor potential is marked in our time special relevance. From foreign scientists we can identify M. Dakhli and D. De Clercq (2004), Chen (2009), which noted the relationship of labor capacity and human resources with an innovative level of state development (Chen, Huang, 2009, pp. 104-114; Dakhli, De Clercq, 2004, pp. 10-128).

**The aim** of this publication presents the determination of the impact of globalization processes on the innovative development of labor potential.

At present moment researchers defined the innovative development of labor potential as the process of separation in its component structure the innovative component (Pasyeka, 2013, p. 11), and a mover for formation of regional innovation systems through the effective use of human skills and ideas (Hryshchenko, Kovalenko, 2011, p. 232).

We often see a situation where in some regions exist large volumes of non initiated labor capacity due to lack of capacity of labor market and congestion positions for certain professional-qualification requirements, while at the same time in another region exist shortage of labor potential, although the environmental characteristics of lasts thanks development of information and communication factor may be more favorable for realization of labor potential.

Scientific approaches to defining the essence of labor potential in general reduced to its consideration as a characteristic of measure (number) and quality of total capacity to the work of the working population according to participation in social activities. Dominant in scientific approaches to understanding of the essence of labor potential in the early stages of its study were such basic as labor resource, demographic, political economy, production and employment. Specified and detailed versions of these approaches were demographic and economic, resource and economic, social and demographic, etc., among which gradually became distinguish tendencies of scientists to study of the employment potential in terms of margin approach. With the further improvement of the area of industrial relations and with the gradual distinction in its environment the subsystem of industrial relations took place an organic transition from the consideration of the labor potential in quantitative aspect, while the use of such terms as labor force and human resources, to its study in qualitative terms.

In our view, as labor potential should be understood accumulated and implemented set of psychophysiological, moral and ethical, social and economic, organizational and managerial, educational and qualification, cognitive and psychological characteristics, qualities and capabilities of the individual or aggregate employee that creates, implements or accumulates for implementation in future pool of labor in a particular dimension of space, time and conditions of socio-economic, innovation and technological and environmental development. Please note that a key approach in the treatment of labor capacity is its quantitative and qualitative assessment.

There are different methodological approaches to the calculation of value of labor potential through estimation of human capital size. American scientist J. Kendrick proposed cost method of calculating the value of human capital – based on statistics data to count accumulation of investments in people (Kendrick, 1976). J. Kendrick included in investment in human capital costs of the family, society and the state for the parenting of children until they reach working age and receive a specific profession, on rehabilitation, training, health, migration and others. In accumulation he also included investment in housing, household durable goods, supplies of goods in families, costs for research and development. He received as a result of assessment that human capital in accumulated national wealth in the United States in 1970s amounted to more than half excluding public investment. Method of J. Kendrick allowed to estimate the accumulation of human capital for its full replacement cost, but not allowed to calculate the accumulation of human capital for its full replacement cost excluding its amortization or depreciation. This method does not contain sub-methods for allocation of the expenses used for the reproduction of human capital from the total cost on the real accumulation. In the work of another American scientist J. Minser (Mincer, 1994) the estimation of the contribution of education and length of employment in human capital is made. J. Minser received dependences of the efficiency of the labor potential from the total number of years of general education, vocational training and age of the worker based on the US statistics in the 1980s. C. B. Mulligan and X. Sala-i-Martin (Mulligan, Sala-i-Martin, 1995) proposed a methodology for evaluating the stock of total labor potential through a system of indexes. Contribution of science (R&D) in human capital researched US National Science Foundation in cooperation with experts from the OECD. The Foundation has developed a system of indicators of scientific and technical progress, including R&D expenses. In the manual sets out the methodology of assessment of current R & D expenses and its accumulation as intangible capital and as a factor of economic growth (Brown, 1994, p. 37-71).

*Globalization* as the current state of internationalization, which is characterized by enhancing of economic, political, social convergence of countries and their economic systems based on deepening of industrial ties, growth of amplitude for international trade, international migration of capital and human resources, strengthening the relationship and mutual influences in the banking, financial, insurance sectors obviously going to the single market not only goods and services but also labor market.

Globalization in labor-resource field as an integral part of the globalization of the world economy is reflected not only in the internationalization and the intensification of the movement of human resources, but also in the appearance of significant differences between the positive impacts of globality for movement of labor resource and the adverse

effects that are caused by globalization of change in approaches to conditions for use of labor potential at local level.

In particular, the meaning of globalization impact (globalization and civilizational group of factors that studied in the preceding paragraphs of work) on the national labor market determined by a fundamental asymmetry between countries in terms of integration, degree of innovation and competitive potential, etc., which leading ultimately to a segmentation of the population with income level, gain of instability due to increasing of migration activity, disproportionately high capacity underutilization of employable population due to non-compliance requirements to the quality of their human potential (in particular this applies to educational-qualification component which quality characteristics continue decreasing) and unification and standardization in a globalized labor market. In addition, the trends of movement to the multi-ethnic composition of the population in most of developed countries can not be displayed on the demographic basis of labor potential reproduction and system of social-labor relations in the course of employment potential realization, stability of value-oriented foundations for preserving of national gene pool.

Taking into account, on the one hand, the undeniable importance of labor potential as a major sector of self-realization and guarantee of human reproduction, and, on the other hand, given the ambiguity of manifestations of contemporary globalization impacts on labor-resource sector, research of labor potential in the context of such challenges is extremely important.

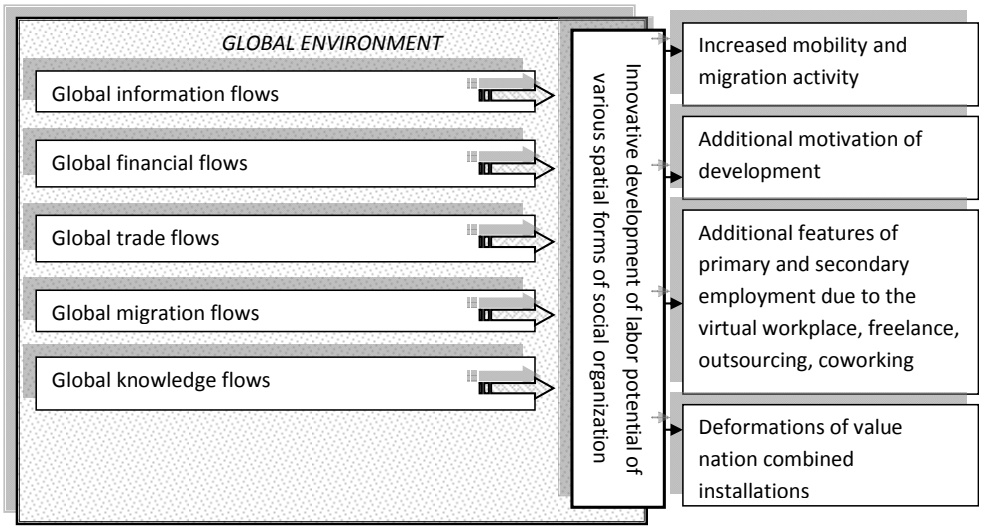
Resource understanding of the labor potential nature practically limited to identification the latter with human resources, namely the definition of labor potential as a resource of work, which is at the disposal of society, determined by number of working-age population and its qualitative characteristics such as gender, age, education and professional equipment. In contrast to the resource understanding of the labor potential nature the factor position lifts by the employment potential notion as a form of personal (human) factor that extends the range of its definition through capabilities of society to use human abilities and the result of their continuous quality improvement as an active subject of production. Thus, according to the factor understanding of the labor potential nature the last is interpreted as form, which quantitatively and qualitatively describes the ability of a society to ensure the dynamic development of the human factor according to the specific needs of its development. Thus, during the study of the specifics of the labor potential development in the context of globalization should dominate factor approach that would also made it possible to detect by other countries experience the most effective catalysts in its improving for qualimetric dimension.

Significant scientific progress to ascertain the nature and prospects of development of labor potential in today's globalized world has become a applying of comprehensive approach to understanding of its contents. Comprehensive view on the phenomenon of labor potential allow to determine it as an integrated, multi-level, system category that characterizes quantitative and qualitative measure and ability to work that part of the part of working population, which by its physiological and cognitive characteristics works or wants to work and improve their potential possibilities to work. Consideration of labor capacity as a system needs to establish its place in the modern globalized system with defined emergent properties (Tsymbal, 2010, p. 48).

Based on the key clauses of the theory of globalization, we should be trace the main specific features of the labor potential development in the present situation. It is important to clarify that globalization should not be seen only as a process of accelerating and improving a variety of international flows of goods and information in the overall context of social development (Geld, Mc Grou, 2004, p. 1). Globalization is the process of increasing the scope and depth of interaction and interdependence between social units in the global system of world (Rennstich, 2006, p. 203). Thus, expression of the theory of globalization in labor capacity development involves formation a single space of human potential development beyond the limits of state frontiers. The key vectors of globalization impact on the innovative development of labor potential shown in Figure 1.

Figure 1

Vectors of impact of globalization on the innovative development of labor potential




Source: Compiled by author.

1. Remote work: type of employment, using the Internet to work remotely on outsourcing or freelance.
2. "Hot" workplaces (Hot desk environment): for employees not granted individual workplaces, but every day is available a specific workplace with Internet, email and necessary files in the local network. It is assumed that employees spend more time at the office of customers, not at the office of the employer.
3. Virtual team: such cooperation of workers, which provides constant close contact, but they are physically located in different parts of the world.

4. The hotel system (Hoteling): system of work organizing in which an employee who wants to work in the office, pre-order a place for a certain (usually short) period of time. Used when workers combine work home with work in the office;
5. The motel system (Moteling): system of work organizing in which the employee upon arrival at the office registered and takes on a certain period of time one of the vacancies.
6. Virtual office: web resource that allows employees of company that are geographically in different locations, organizationally interact through media exchange systems, storage, processing and transmission of information;
7. Teleworking: work that is performed by means of communication equipment and is not geographically linked to the company. Such activities linked with core enterprise by modern communications.
8. Coworking: joint work and sharing of ideas by freelancers in dedicated or leased location.

In general, modern processes of globalization formed for carriers of the labor potential additional motivators for their further development. On the other hand, a consequence of globalization processes may be losing of nation unified characteristics, including those that occur in the labor activity – the tendency to labor in certain sectors (for example agriculture), diligence, rigor, honesty, etc. This is because that by the main approach for the essential treatment of globalization it should be seen as a process of becoming globality. Globality in turn is the situation of the existence of a single, universal for the whole system of international relations, for all local communities formal and informal institutions of interaction. Thus, the leveling of ethnic (national) traditions about the life way, labor activity, individual characteristics and quality features of labor potential carriers for separate nations may caused lose of nation identification and formation of the typical employee with "ideal" criteria.

Analysis of the environmental conditions and the actual state of the labor potential in the regions of Ukraine shows that the current situation requires a radical changei. And these changes should not be implemented spontaneously under conditions of extreme emergency with resource reinforcement (especially financial) by residual principle. For a country and its regions should be formed new philosophy of labor potential development in the context of globalization on innovative principles. Turning of attention to the effects of globalization processes is required because of the weight of their determination of the employment potential development for majority of regions of Ukraine. Therefore, ensuring the development of labor potential should be carried out on the basis of innovation with a clear focus in gaining competitive advantages in the international space of formation of industrial relations. Table 1 considers indicators for development of labor potential of Ukraine in recent years.

As you can see, among the major trends in the employment market in Ukraine is steady drop in the number of employees, increasing in the number of unemployment, increasing in departures due to international migration, increasing in the number of workers who do not pay a salary and aging of workers and increasing in the number of those who are on salary at the same time on pension. On the negative employment trends certainly influenced such

globalization phenomena as the financial crisis of 2008, the EU migration policy in recent years, worsening of geopolitical situation in the east of Ukraine and the conflict with Russia in 2014.

Table 1

Dynamics of volumes of population employment of Ukraine in 2008-2014

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|
| Number of employed persons aged 15-70 years, thsd. | 20972.3 | 20191.5 | 20266 | 19231.1 | 19261.4 | 19314.2 | 18073.3 |
| The average registered number of staff, thsd. | 11390 | 10653 | 10262 | 10083 | 10123 | 9720 | 8959 |
| Accounting number of staff aged 15-35 years, thsd. | 3 546.90 | 3 330.40 | 3 490.10 | 3 452.80 | 3 592.00 | 3429.8 | 2749.8 |
| Number of hired employees, thsd. | 3224 | 2400 | 2722 | 3021 | 2798 | 2729.2 | 2044.9 |
| Number of employed persons from the registered unemployed, thsd. | 1084 | 702.7 | 744.5 | 762.7 | 764.4 | 541.9 | 494.6 |
| Number of registered unemployed, thsd. | 1425.1 | 1958.8 | 1785.6 | 1661.9 | 1589.8 | 1510.4 | 1847.6 |
| Number of retired employees, thsd. | 3736 | 3056 | 3019 | 3260 | 3206 | 3111.7 | 2713.6 |
| Accounting number of staff employees receiving pension, thsd. | 1951.2 | 1903.7 | 1960.5 | 1907.3 | 1865.1 | 1778.7 | 2660 |
| Number of employees economically active enterprises (institutions, organizations) who are not paid a salary, thsd. | 371.7 | 325 | 185.1 | 102.3 | 113 | 57.1 | 382.1 |
| Number of retired persons due to international migrations | 22402 | 19470 | 14677 | 14588 | 14517 | 22187 | 21798 |

* Compiled by State Statistics Service of Ukraine, 2016.

If we consider the following trends in large and small cities of Ukraine, that specifics of development here of employment potential has the following features:

- large (greater than in rural settlements) concentration here economically active population and significantly better opportunities of life, including work;
- increased role of cities for overall socio-economic development of regions in terms of its "nuclear nature", centers of gravity of all flows (human, financial, information, etc.) from adjacent spatial entities;
- strategic nature of their functioning, innovation nature, modernity, generating of progressive approaches through the effects of the accumulation of social capital.

In return for rural settlements justification of the need for identifying and solving the problems of the labor potential development arises because of a long decline of the Ukrainian village that repeatedly was based by domestic scientists. In fact, here there are long processes of deterioration welfare of peasants due to depreciation of human labor, non-compliance with labor laws, reducing of employment and possibilities for obtaining the necessary goods and services, which can be a likely cause of the degradation of human capital and rural economic space in general.

Considering the features of factor influence on the development of labor potential of Ukraine in urban settlements should be considered:

- Demographic specifics of population that complemented by migratory movements, particularly intra regional nature.
- Increased business activity that caused a greater concentration of working-age population, which in an effort to develop their labor potencies realizes itself in self-employment, innovation activities, etc.
- Increased competition among carriers of the labor potential for better conditions of work that forms the a priori reasons to constant development through formal and informal training.
- Mostly worse environment condition, due to higher transport activity, activity of business entities that exert harmful effects on the environment.
- Best opportunities to meet personal human needs, including those that depend on the state of social infrastructure entities.
- A specific system of values with a dominating of physical installations, largely due to a higher rhythm of life, a sufficient level of information mobility and more.

Focus on some important aspects of providing the innovative development of labor potential. Conceptually innovative development involves improving the current state of the object, the flow of the relevant processes with establishing of resistance (adaptation feature) to exogenous changes that transforming the scenario changes. So innovative development of employment potential provides such progressive transformation of its internal-component structure in which the driving force of all modernization changes are educational and qualification characteristics, qualities and capabilities of work carriers and targeted priorities of component development aimed on gradually solving of problems in the sphere of social-labor relations.

Rise to the highest level the role namely education and qualification component of labor capacity due to the fact that real and effective support of innovative development is possible taking into account the space-time coordinates. That should ensure the implementation of management solutions by projects (practice of industrial parks, free economic zones, agglomerations and other taxonomic structures) and weighted prediction of results in different time intervals. Based on the current situation today, when the deformations of values system, rooting of corrupt relationships practices, low labor productivity and propensity to systematic violation of the law (which is often controversial in interpretation), the real innovation changes of the system character can be achieved only through a change of generations. Thus it is possible namely through educational sphere, taking beginning from pre-schools, with the formation of individuals with a developed system of values, including the value of labor as a socially useful activity, and one that allows self-implement and provide a decent standard of living, high moral standards and ethical attitudes.

Overall, the innovative development of labor potential target should provide (aims): 1) productive use of labor potential of its carriers; 2) implementation of the positions of concept of lifelong learning; 3) creating favorable conditions for innovative activities of its carriers.

Component-wise innovative development through priority of educational-qualification characteristics, qualities and opportunities for work carriers displayed specifically for each locality. According to national realities in the context of ensuring of labor potential development in the first place there is the need for the availability of workplaces. New regional programs for promoting population employment for the period till 2017 mostly focused on quantitative parameters for creating of new workplaces, not seeing during this period of difficult socioeconomic category, which may have a different meaning and value (the workplace in the trading and in manufacturing company requires a completely various funds for its creation and commissioning). Because of the needs of localities, and primarily urban, at this stage of ensuring favorable conditions of labor capacity development exist urgent need to create real workplaces. And while attracting of investment have fundamental importance for creating of competitive workplaces that would be in terms of pay and working conditions would have a competitive advantage compared to other regions, thus contributing to the preservation of skilled workforce within the region (Semykina, 2009, p. 10).

The importance of implementation the basic functional appointment of each type of settlement in the context of ensuring of development of labor potential with their further innovation is extremely important. In the case of its failure disrupted interspatial balance of socio-economic development and, consequently, observed spatial deformations in the concentration of the workforce. As a result, for those areas where has a place labor redundancy, carried pressure on social infrastructure and labor markets, which often leads in domestic realities to low legal protection of the population to abusing by employers. First of all, appears the phenomenon of so-called cheap workforce, which further leads to demotivation of population in productive labor activities, especially on innovative principles.

Instead, in those territories that become donors of labor force due to worse conditions of life activities and work, and feather deteriorating of socio-economic situation and there are limited opportunities not only of development but also for use of employment potential in general.

For encourage of real innovation development of the labor potential in today's realities prevalence of formalism in management decisions, corruption and residual resource ensuring of their implementation as key approach this process should be *phasing*. This means that for each type of settlement in the first place should be allocated those measures for stimulating the (creating conditions for) the innovative development of labor potential, on which there are available the appropriate environmental conditions and institutional arrangements (willingness of society to adopt new behavioral attitudes in the labor activity is a significant key to the success of management actions).

For each type of settlements the goals of innovative development ensuring in the early stages will vary. In the final result, it is important not just to provide more or less homogeneous conditions of employment potential in different types of settlements. It is important that the use and development of labor potential components allowed to meet the needs of local communities and perform basic functional appropriate of according spatial formation.

Ensuring the development of labour potential should be carried out on the innovation basis with a clear focus in gaining of competitive advantages in the international space of formation of industrial relations (Fig. 2).

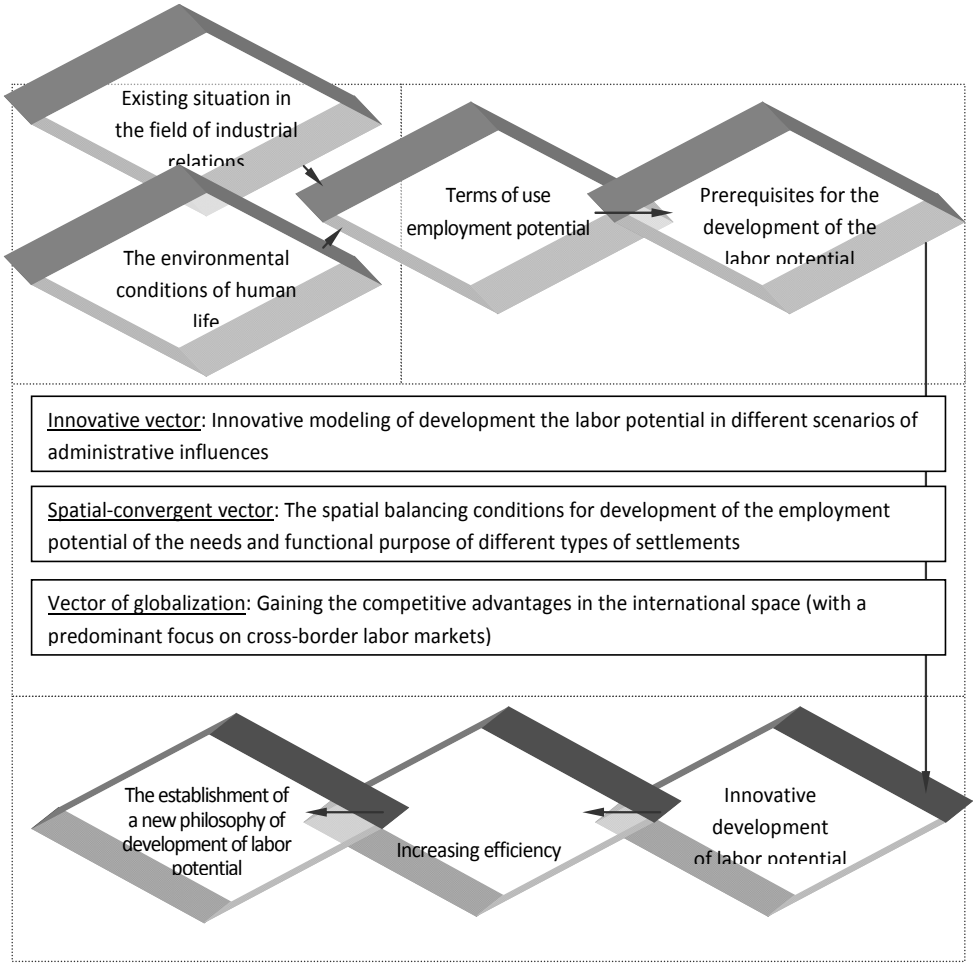
Determinations by globalization of innovation development of labor potential of different spatial forms of organizing of Ukrainian society are bound to take into account, because their neglect can negate all strategic efforts within country and its regions. Providing of innovative development of labor potential, taking into account the challenges of globalization should take position:

1) obtaining a competitive advantages against foreign (including cross-border) labor markets;
2) transforming the destructive effects of globalization in stimulating for the development of labor potential in the regions.

As to the second position, it means that today problematic phenomena and processes in the field of social-labor relations are so many that their solution even in the distant future seems very complex and resource intensive. Therefore, it is important to ensure receipt of benefits from these destructives that having today a place for each region of the country. In the context of the determination of globalization processes it, again, the loss of labor capacity due to migration, leveling of nation identification value orientations, traditions, consumerism of foreign products, transfer of knowledge, technologies and ideas with financial reinforcement of other countries (primarily through grant projects that feather implemented abroad, improving the level of welfare of their population).

Figure 2

Generalized scheme introducing a new philosophy of innovation development of labor potential in the context of globalization




Source: Compiled by the author.

Instead, need to take measures to re-emigration of people in the regions through clearly selective approach that with some experience and knowledge with aim to invest migration capital in the domestic economy. Propensities to consumerism of foreign products must change through cooperative schemes of agricultural production with the active participation of households in their production and marketing processes.

Also in solving of labor potential problems of innovative development should take into account the acute problem of production automation, which will come in the near future with the introduction of artificial intelligence in production processes and all areas of life (Shevchuk, 2016). Innovative approaches to ensuring of employment in this case should be directed on creating of large number of creative and ideological busy places inaccessible to automation and algorithms.

**General conclusions**. Thus, solving the problems of development of social and labor sector for the regions of Ukraine should be done through new approaches, namely on the innovative principles. This means that the attention should focus on effectiveness of development of educational-qualification component, because implementation of the majority of management decisions take time and generational change with the formation of new values attitudes that obviously can be made only through the educational sector. Active cross-border transfers of information, knowledge, technologies, finally human resources (migration) determine the importance in finding the opportunities for improving the conditions of labor activity to consider globalization factor. This will comprehend the need for improving the competitive conditions of local labor markets against foreign and seek new approaches for overcoming the many problem destructives in the area of social-labor relations, which are concentrated around the inefficient use and in future development of labor potential of the population.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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# POLITICAL STABILITY, MISERY INDEX AND INSTITUTIONAL QUALITY: CASE STUDY OF MIDDLE EAST AND NORTH AFRICA

*The Middle East and North Africa (MENA) are of various political regimes with different governance levels. This region is a multi-lingual, populous and resource-abundant area in the world, too. This paper aims to explore the determinants of political stability (instability) in the MENA over the period 2000-2014. The estimation of panel data model indicates political stability stems from natural resources rents, socioeconomic status and institutional quality. The proper allocation of these rents to productive investments, and welfare-enhancing efforts, the decrease in misery index and any increase in government effectiveness and/or rule of law result in political stability in the region. The policy makers in the region need to make sound fiscal and monetary policies in order to reduce gender and income inequalities and invest in enhancing human prosperity. Regarding civil rights and freedoms, and establishment the voluntary and nongovernmental organizations are socio-political requirements in shifting this developing bloc to high levels of development.*
*JEL: I32, O17, P16*

## 1. Introduction

The Middle East and North Africa (MENA) is of ethnic and religious groups and different political regimes. This region have considerable potentials such as higher share of middle-income classes, young and educated population, strong resource base, and economic resilience, which help its members to achieve human development and economic growth.

In this area, some countries including Syria, Iraq, Libya and Yemen have been experiencing unrest and civil war since the first Arabian uprising in Tunisia, 2011. These disorders have yielded considerable human losses and destruction of infrastructures.

According to the World Bank, a tragic migration outflow threatens the lives of 15 million people, i.e. nearly 4% of total region's population, from North African section of the region, i.e. Jordan, Lebanon, Djibouti and Tunisia. Of course, there are promising trends in Tunisia

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Morocco, Jordan and Egypt, where political reforms and amendments in the legislation may benefit to women and protect civil freedoms.[2]

The continued historical and ideological conflicts in the region trigger the violence, which in turn results in turmoil, terrorism and forced migration. In a globalized world, the negative spill over of such turbulence influences the other regions, especially Europe, which is regarded as a heaven for refugees and displaced people.

The politically stable countries including as Algeria, Iran and the GCC minus Bahrain have economic concerns with low oil prices, which cause high unemployment rates in these group. The MENA region is of potential instability due to misinterpretations of Islam teachings and lack of democratic systems.

Most of the region members lack of democratic institutions, so they face socioeconomic and political problems. A considerable number of members is endowed with fossil resources, which forms a basis for rent-seeking parties and governments.

From economic perspective, World Bank forecasted a moderate growth rate as much as 3.1 percent for the region in 2017. This organization cites the spillovers from existing conflicts in several countries, and a heightened incidence of terrorism as risks to regional economic activity. Consequently, the rising risks would increase economic uncertainty and slow investment. The persistent of slow growth may worsen unemployment rate, which entails more instability. In other words, the macroeconomic mismanagement is reflected in internal turmoil, uprising and movements.

In a sound and democratic setting, the higher standards of life and low levels of inflation and unemployment rates are expected to prevail. More specifically, a steady and developed economy may achieve more stable society politically. Thus, there is a direct link between political stability and economic achievements.

Political stability originates from well-established and election-based political systems, which guarantee free participation and voting, and all losers and winners of the political contests respect the election results. In such circumstances, democratic forces act freely on one hand and demand for enhancing social welfare on the other hand. Hence, free media, public participation of citizens in socio-political events, accountable governments, observance of laws and regulations, and enforcement of contracts are characteristics of a typical stable community. As Zhao and Liu (2002) emphasize, "the process of political modernization is both process of political democratization and enlarging political participation". According to Jensen and Wantchekon (2004), "political economists point to the levels of economic development, poverty, and income inequality as the most important determinants of political regimes".

Currently, there is not politically stable system in absolute words, because highly democratized systems occasionally experience re-elections or early elections in order to restoration of ruling cabinet. However, the main point is that these transformations occur with little socioeconomic costs. On the contrary, nondemocratic regimes often ignore elections, or implement them in non-transparent and problematic manners. The historical

[2] http://www.worldbank.org/en/region/mena/overview#1

background of the oil-based economies in the MENA gives sufficient evidence of such practices.

Coming back to economic concepts, inflation and unemployment rates are barometers of economies. Low inflation rates stimulate the producers to produce and supply products to markets and earn profits. Thus, economic stability and low inflation are two sides of a coin. In addition, unemployment, especially involuntary unemployment, is a risk factor of a given economy. The social consequences of higher unemployment are sometimes very hazardous, in particular in the multi-ethnic societies. In the worst cases, turmoil, social unrest, theft of private and public property, addiction to drugs and murders are of unemployment outcomes.

In a social landscape, institutions refer to commonly accepted traditions in written or verbal forms. Ownership and relationship between employee and employer, marriage and so on are some instances of institutions. These are in formal or informal contracts. The enforcement of contracts is highly dependent on well-established laws and regulations, which government, in a broader concept, should guarantee them.

Regarding the above-mentioned paragraphs, this article aims to examine linkages among political stability, misery index and quality of institutions in the MENA countries. To do this, it targets the following hypotheses:

- $H_1$: Resource abundance entails political stability.
- $H_2$: Weak economic conditions trigger political instability.
- $H_3$: Stronger institutions result in stable political regimes.

The remainder of the article is organized in 4 sections. Section 2 devotes to review of literature. Section 3 refers to materials and methods. Section 4 gives the results and discussion. Section 5 concludes.

## 2. Review of literature

Although there is plenty literature on political stability in the economic researches, but there is no robust theory on political stability. It is a fuzzy concept among political scientists regarding concept formation, operationalization, and measurement. The concept of stability originates from mechanics, where a given stable system returns to its initial position after shocks. However, most political scientists look at stability from the behavioral point of view, so it can be measured through reproducible techniques. As Hurwitz (1973) argues, political stability is identified by (a) the absence of violence; (b) governmental longevity/duration; (c) the existence of legitimate constitutional regime; (d) the absence of structural change, and (e) a multifaceted societal attribute.

Margolis (2010) defines political stability as the degree to which formal roles and structures coincide with informal roles and structures within a political object. The wider gap increases the instability.

Some researchers are interested in emphasizing on specific factors/dimensions of political stability. Bah (2013) explores the linkages between military behavior in politics and political stability in Ginea and concludes that the Guinean military played a vital role in maintaining political stability during the period between 1984 and 2010. On the relation between economic equality and political stability, Posner (1997) finds that average incomes in a society, rather than the equality or inequality of the income distribution, increase political stability.

In a study on the political stability in the Northeast India, Lacina (2009) argues that local regimes of corruption and repression manage security threats. According to Kim (2010), countries with high political rights have higher FDI outflows. Also, countries with high level of corruption of government and low level of democracy have higher FDI inflows. Katz (2004) believes that the extreme concentration of authority and the sultanate unwillingness to allow meaningful political participation or dialogue are main political challenges in Oman, which are of capable public objections. In analysing factors causing the environmental degradation in the 14 MENA countries over the period 1996–2012, Al-Mulali and Ozturk (2015) find that the political stability lessens environmental damage in the long-run. Based on Schumacher (2013) study, the higher tax embezzlements and the more bribe-taking by politicians reduce the citizens' trust and re-election chance, which indicates political instability.

Agheli (2016) argues that sustainable development involves many aspects of development in human, environmental, social, political, and cultural dimensions. He uses Genuine Saving (GS), or Net Adjusted Saving, to measure weak sustainability in Iran during 1973-2012 and finds a non-linear relationship between economic growth and genuine saving rate (GSR).

Most empirical studies focus on the impacts of political stability on economic growth and development. For instance, Feng (1997) investigates the interactions between democracy, political stability and economic growth using types of political instability. His results for a panel data of ninety-six countries from 1960 to 1980 indicate that democracy has a positive indirect effect on growth through its impacts on the probabilities of both regime change and constitutional government change from one ruling party to another. In addition, economic growth has a negative effect on regime change and a positive effect on the probability of the ruling party remaining in power; and a long-run positive effect on democracy. Cebula (2011) investigates the impact of political stability on economic growth in OECD nations. Using panel data specification, the author finds that economic growth is positively influenced by political stability. Furthermore, economic growth is negatively impacted by higher long-term nominal interest rates. Thus, policies consistent with political stability promote economic expansion.

Vasileiou (2014) examines political stability in the European Union’s (EU) countries during the period 2002-2012. The Granger causality test confirms a unidirectional causality running from political stability to economic growth. In addition, the long-term recession, the increased unemployment ratios and the high levels of inflation significantly threaten political stability. However, transparency, public health care, and education may increase political stability.

MENA region is rich in natural resources and fossil fuels. Some members of MENA are heavily dependent on oil exports to finance national budgets. With regard to management of oil revenues, there are various hypotheses titled "resource curse" or "resource abundance". Depending on how to use and how to invest the natural resources rents, different countries have paced own development paths.

Jensen and Wantchekon (2004) find a robust and negative correlation between the presence of a sizable natural resource sector and the level of democracy in Africa. They argue that resource abundance not only is an important determinant of democratic transition but also determines the success of democratic consolidation in Africa. They show that post-Cold War democratic reforms have been successful only in resource-poor countries such as Benin, Mali, and Madagascar. They argue that resource-rich countries such as Nigeria and Gabon can become democratic only if they introduce strong mechanisms of vertical and horizontal accountability within the state.

Dunning (2005) believes that elites in many resource-dependent states may face a trade-off between the economic benefits of diversification and the possibility for future political competition. Using a game-theoretic model, he argues that the world market structure for the resource, the degree of societal opposition to elites, and the prior development of the non-resource private sector illustrate the different equilibrium paths in post-independence Botswana, Mobutu's Zaire, and Suharto's Indonesia. These variables shape outcomes along the dimensions of political stability and economic performance. In his view, these countries have varied paths from resource wealth to political and economic outcomes, thus resource-based economies can overcome resource curse.

The distribution of rents resulting from oil resources affects political stability. In a sample of 37 oil-producing developing states, Basedau and Lacher (2006) reveal that oil states with very high levels of oil revenue are remarkably stable. In spending oil revenues, they distinct between two types of rentier systems: the large-scale distributive state and the patronage-based system. Both types are strongly linked to political instability.

On the contrary, Caselli and Tesei (2016) show that natural resource windfalls have no effect on democracies, while they have heterogeneous political consequences in autocracies. In deeply entrenched autocracies, the effect of windfalls is virtually nil, while in moderately entrenched autocracies, windfalls significantly exacerbate the autocratic nature of the political system.

If governments cannot meet social needs, then the confidence in the government will be weakened. The low trust to public policies fuels the political unrest and instability. Conversely, people and civil institutions support an efficient and accountable government, especially if elected through democratic and fair competition between political parties. Low confidence in the government is strongly associated with social protests among those groups whose interests are promoted by visible protest movements (Useem and Useem, 1979).

The existence of patronage in bureaucratic processes is a good indicator of violation of laws and regulations and inefficient governments. In other words, family and friend ties outweigh laws in recruiting personnel and providing services. The final outcome of

patronage in public sector offices is public displeasure, and socio-political instability. In this regard, Arriola (2009) studies political conflict across 40 African countries and finds its link to the pervasive use of patronage in retaining control of the state. He shows African leaders extend their tenure in office by expanding their patronage coalition through cabinet appointments.

Concerning with corruption, Nur-Tegin and Czap (2012) examine the potential tradeoff between stability and autocratic rule for political freedoms but with transitional instability. They find that the level of corruption is lower in unstable democracies than in stable dictatorships.

According to Zhao and Liu (2002), the political participation has a positive role in political stability under normal condition, but sometimes it leads to political unstableness. Thus, accelerating the socialist modernization requires improving people's political participation and developing a socialist democratic political system.

The efficient public sector accelerates economic development. Lack of corruption, a sound legal system and transparent procedures stimulate the investment by private sector. As Adsera et al (2003) point out the degree of citizen information curbs the opportunities politicians may have to engage in political corruption and management. Lederman et al (2005) believe that democracies, parliamentary systems, political stability, and freedom of press are all associated with lower corruption. In a sample of EU and OECD countries, Votápková and Žák(2013) computed the highest institutional efficiency among countries situated in Northern Europe, which are of effective governance and low corruption.

Focusing on the Muslim world, Lust (2011) presents a more complete understanding of when and how political Islam hinders democratization. The historical experiences with Islamists in the 1970s and institutional structures established by the 1980s created a condition of uncertainty. Incumbents exploited the fear of political Islam, convincing many secularist opponents that they were better off with the current regime than with Islamist rule. In Lust's view, the Islamist movements reflected a violent Islamic doctrine.

## 3. Material and methods

### *3.1. Data and Variables*

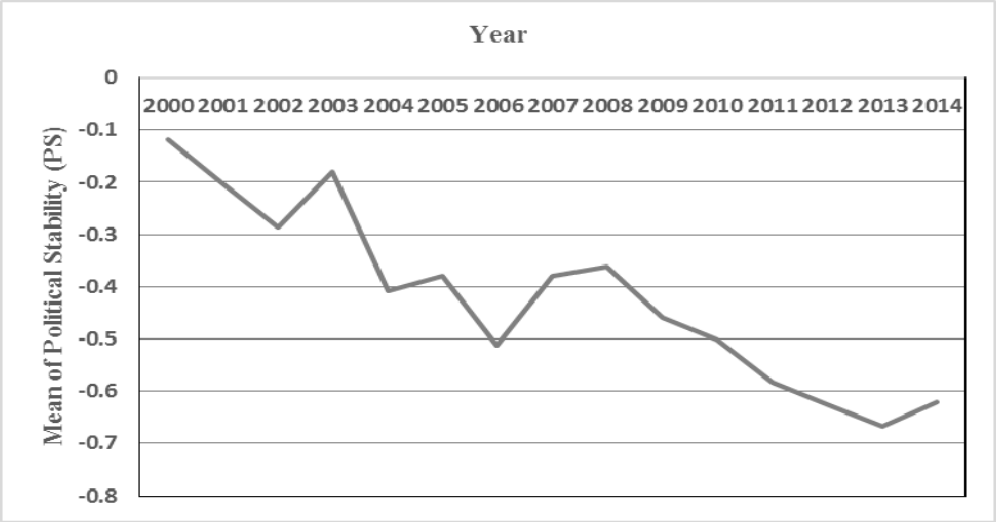
The statistical sample consists of the MENA countries, listed in the World Bank classification, including Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, and Yemen. Gaza Strait was excluded from analysis because of missing data. This research studies the region over the 2000 to 2014 period and uses the latest data provided by the World Bank. The dependent variable is political stability, which is extracted from the World Governance Indicators. This variable measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. It is constructed by using Kaufmann et al (2010) methodology based on the individual variables such as orderly transfers, armed conflict, violent demonstrations, social unrest,

terrorist threats, internal conflicts and so forth. The data is collected from various sources internationally.

The constructed or composite indicator is reported in units of a Standard Normal Distribution, with mean zero and standard deviation of one. It runs from -2.5 to +2.5, which higher values corresponds to more stable society. This approach is repeated for the 5 other variables, i.e., Voice and Accountability, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The governance data are also reported in percentile rank term, ranging from 0 (lowest rank) to 100 (highest rank). The mean score of political stability in the region is depicted in Figure 1. This indicates MENA countries have become less stable from political perspective overall.

Figure 1

The mean of Political stability Score in the MENA




Source of data: Worldwide Governance Indicators (2015).

The explanatory variables are as follows:

- Total natural resources rents ( as percentage of GDP)= RENT
- Misery index= sum of inflation rate and unemployment rate= MISDEX
- Government effectiveness= GE
- Rule of Law= RL

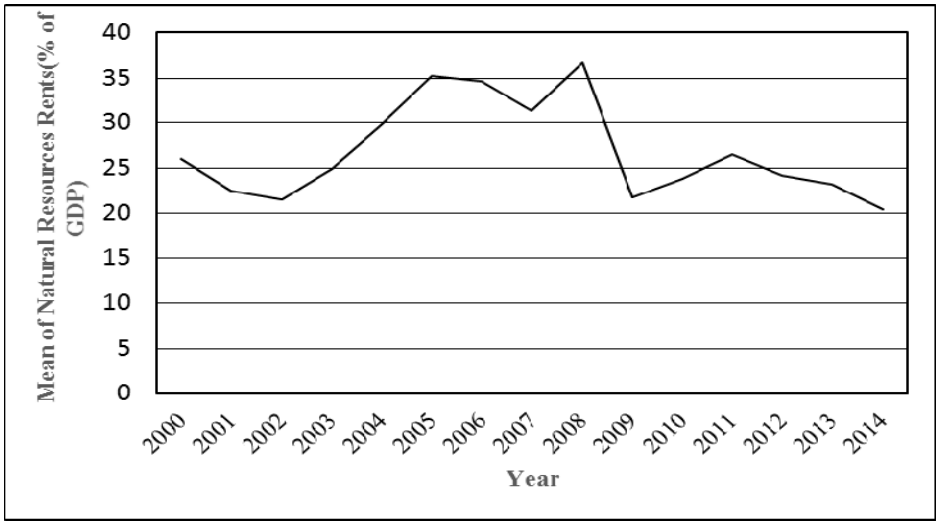
By World Bank calculations, total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.

The US economist, Arthur Okun, introduced the misery index. This economic indicator measures how the "median" citizen is doing economically. It is just sum of the unemployment rate and inflation rate.[3] The simultaneous increase in rate of unemployment and rate of inflation means a worsened economic and social status. As mentioned, government effectiveness and rule of law are subcomponents of world governance indicators.

The trend of mean rents accruing to natural resources is illustrated in Figure 2. It explicitly indicates this group has recorded natural rents over than 20 percent of GDP, on average, during 2000-2014. In addition, the higher oil prices during 2008-2009 have resulted in higher rents.

Figure 2

The mean of share of natural resources rents in GDP in the MENA region




Source of data: World Bank databank (2015).

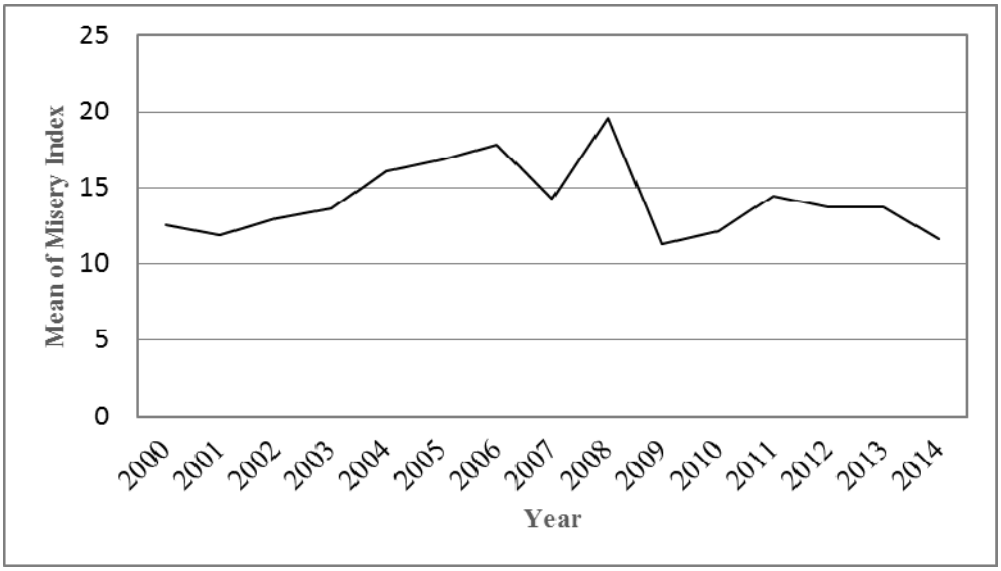
Figure 3 shows average misery index for of the MENA region over the 2000-2014. The misery index varies in the interval (10%, 20%). The worst situation is observed in 2008-2009, when the world surged into recession due to mortgage loans problem in the US.

The last figure devotes to government effectiveness and rule of law indicators on the mean basis. The solid and dotted lines indicate same movements in these indicators. The MENA region has experienced similar development in terms of effectiveness of governments and rule of law. The fall in two indicators after 2010 is accompanied with political instability in the most of MENA countries.

[3] In enhanced or augmented forms of misery index, the changes in house price, stock price, and interest rate are added to initial misery index.

Figure 3

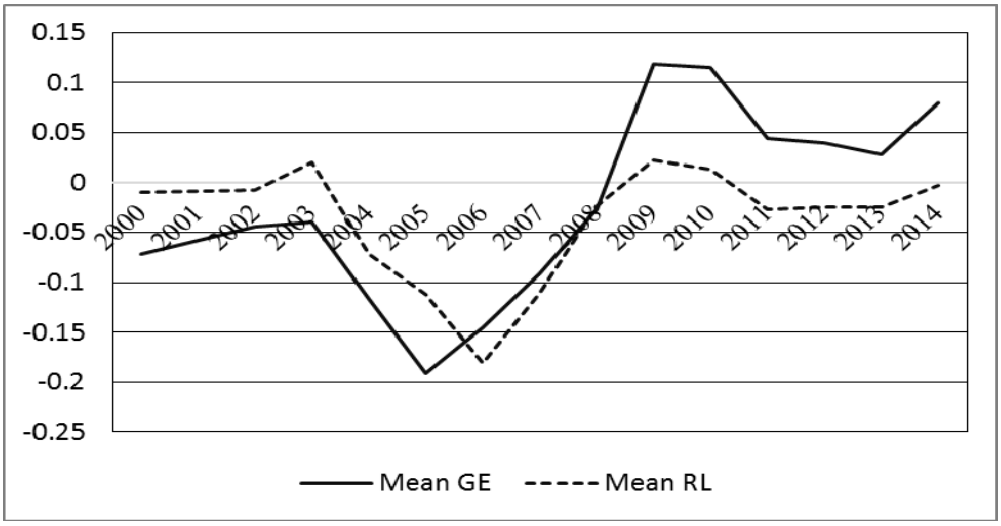
The mean of misery index (MISDEX) in the MENA region




Source of data: World Bank databank (2015).

Figure 4

The mean of government effectiveness (GE) and Rule of Law (RL) indicators in the MENA region




Source of data: Worldwide Governance Indicators (2015).

The government size, as percentage of GDP, expenditure on health, as percentage of public expenditure, GDP per capita were also considered in the model, however, they had no significant effects on political stability. This may be due to inclusion two main economic indicators in the analysis: inflation and unemployment rate.

### *3.2. Model and Econometric Strategy*

The different kinds of conflicts (social, internal, external, ethnic, religious or regional, civil war), violence (social unrest, violent demonstration, protest, and riot) and terroristic attacks are evidently indicators of an instable political environment. Undoubtedly, some of these socio-political responses stem from economic conditions. The higher rates of unemployment and inflation are the most sensible variables in every country, especially if there is free mass media and easy access to economic information. Therefore, political stability may negatively influenced by misery index. In addition, injection of rents from natural resources to the whole economy can increase aggregate supply and enhance social welfare, if they are mixed with good public practices. In this case, the outcomes will be higher satisfaction among people and low tendency to protest. Thus, resource rents can mitigate political instability. After all, effectiveness of government policies and enforcement of assigned regulations and laws are stimuli for political stability. Hence, the regression model is specified in the following form:

$$PS_{it} = f(RENT_{it}, MISDEX_{it}, GE_{it}, RL_{it}, X_{it}) \quad (1)$$

In Equation(1), *i* and *t* denote countries and years, respectively (i=1,2,…,18; t=2000, 2004,…, 2014). Theoretically, the sign of estimated parameters of *RENT*, *GE* and *RL* will be positive; however, the sign of parameters pertinent to *MISDEX* will be negative. *RENT* and *MISDEX* are used in percentage form, however *PS*, *GE*, *RL* are in standard normal distribution units.[4]

Model 1 is estimated by Panel Data methods. The details of the estimation are presented in section 4.

## 4. Results and discussion

Prior to estimate the panel data model (1) we should test the stationary of variables. In panel data, researchers may face weak or strong non-stationary. For testing the stationary in panel data, several methods have been proposed by Im, Pesaran, and Shin (2003), and Levin, Lin, and Chu (2002). The results of unit root test are reported in Table 1.

[4] The other variables such as per capita income and government size can be included in model (1), which may take different signs.

Table 1

Summary of Panel unit root test

| Method | Statistic | Prob. | Cross-sections | Obs. |
|---|---|---|---|---|
| Null: Unit root (assumes common unit root process) | | | | |
| Levin, Lin & Chu t-stat | -7.13987 | p<0.001 | 90 | 1203 |
| Null: Unit root (assumes individual unit root process) | | | | |
| Im, Pesaran and Shin W-stat | -2.21652 | p<0.05 | 90 | 1203 |
| ADF - Fisher Chi-square | 231.978 | p<0.01 | 90 | 1203 |
| PP - Fisher Chi-square | 266.068 | p<0.001 | 90 | 1247 |

Source: Author's calculations based on Eviews 8 Output.

In 5% level of significance, the various methods proposed to unit root test indicate stationary of the series under panel. Hence, the use of variables in levels does not generate spurious regression.

After assuring stationary series, the decision is made on choose between pool or panel specification. By redundant fixed effects test, it is assumed that fixed effects are redundant. If the null hypothesis is rejected, then the panel model is run. This test uses F and Chi-square statistics. Table 2 reports the test results. The results confirm that model should be estimated in a Panel framework, since the probabilities are statistically zero and reject the null hypothesis.

Table 2

Test for Cross-Section and Period Fixed Effects

| Effects Test | Statistic and probability |
|---|---|
| Cross-section F | F(17,223)=61.718; p<0.001 |
| Cross-section Chi-square | $\chi^2(17) = 451.005$; p<0.001 |
| Period F | F(14,223)=4.146, p<0.001 |
| Period Chi-square | $\chi^2(14) = 59.923$; p<0.001 |
| Cross-Section/Period F | F(31,223)=36.808; p<0.001 |
| Cross-Section/Period Chi-square | $\chi^2(31) = 469.059$, p<0.001 |

Source: Author's calculations based on Eviews 8 Output.

The third test is to determine on using fixed or random effects in panel data by Hausman (1978) method. Here, the null hypothesis is the correctness of random effects. If the null hypothesis is rejected, then the fixed effects will be estimated. Table 3 supports estimating model in fixed effects.

Table 3

Hausman Test Results

| Test Summary | Chi-Sq. Statistic and Probability |
|---|---|
| Cross-section random | $\chi^2(4) = 11.969$ ; p<0.05 |

Source: Author's calculations based on Eviews 8 Output.

After doing specification tests, the model (1) was estimated using Eviews 8 software. The software output is reported in Table 4.

Table 4

Model estimation with Panel Least Squares (Dependent Variable: *PS)*

| Variable | Coef. | S. E. | t-Stat. | Prob. |
|---|---|---|---|---|
| C | -0.794 | 0.1024 | -7.752 | p<0.001 |
| *RENT* | 0.022 | 0.0036 | 5.983 | p<0.001 |
| *MISDEX* | -0.009 | 0.0033 | -2.739 | p<0.01 |
| *GE* | 0.819 | 0.1299 | 6.305 | p<0.001 |
| *RL* | 0.784 | 0.1273 | 6.155 | p<0.001 |
| *R-squared* | 0.933 | Adj. R-squared | | 0.922 |
| *Akaike info criterion* | 0.368 | Schwarz criterion | | 0.863 |
| *Log likelihood* | -11.777 | F(33, 221)=88.548, p<0.001 | | |
| *Breusch-Pagan heteroskedasticity* test obs*R-squared=18.36, p<0.01 | | | | |
| *LM test stat. for serial correlation*=166.228, p<0.001 | | | | |

Note: *C , Coef, S.E, t-stat., Prob* and *Adj* refer to intercept term of regression, coefficient, standard error, t- statistic, probability and adjusted term, respectively.
Source: Author's calculations based on Eviews 8 Output.

All coefficients have the expected signs. They are meaningful at 1% level of significance. The Adjusted R-squared and F-statistic indicate the goodness of fit. However, tests for heteroskedasticity and serial correlation imply that residuals of the estimated model are heteroskedastic and serially correlated.

In Breusch-Pagan (1980) heteroscedasticity test in panel data, the squared residuals from the first-stage estimation are fitted on the explanatory variables and intercept term by OLS method. Then the R-squared of the second-stage estimation are multiplied by NT, where N and T denote number of cross-sections and periods, respectively. $NT*R^2$ has Chi-squared ($Chi^2$) probability distribution with degrees of freedom (df)= $k$, the number of regressors in the latter regression. If the computed $Chi^2$ is greater than critical values of $Chi^2$ with $df=k$, then the null hypothesis indicating homoscedasticity will be rejected. In addition, as Baltagi (2008) proposed, the LM (Lagrange Multiplier) test for serial correlation can be used in panel data with fixed effects specification. In doing such test, first the residuals ($e$) and one-period lagged residuals are multiplied by each other and summed up ( $A = \sum_{i=1}^{N} \sum_{t=1}^{T} e_{it} e_{it-1}$ ).

Then the calculated value is divided over the sum of squared residuals ( $B = \sum_{i=1}^{N}\sum_{t=1}^{T} e_{it}^2$ ). Finally, the following ratio, which follows a Chi-squared probability distribution with one degree of freedom, is calculated.

$$LM\big|_{\rho=o} = \frac{NT^2}{T-1}.\frac{A}{B} \sim Chi^2(1) \qquad (2)$$

Where $\rho$ denotes residuals' correlation coefficient. If the LM test statistic is greater than critical Chi-squared values with df=1, then the null hypothesis indicating no correlation among residuals will be rejected. As mentioned above, the estimated residuals suffer from both heteroskedasticity and serial correlation.

To correct the heteroskedasticity and serial correlation in the residual terms, E-views software has set up weighting options for GLS (Generalized Least Squares) estimators. However, none of these options (cross-section weights, cross-section SUR and period weights, period SUR) is applicable in two-way fixed effects version of estimation. Hence, model (1) was re-estimated in two one-way fixed effects specifications: (1) fixed effects in cross-sections, and (2) fixed effects in periods. When model having cross-section fixed effects is estimated, E-views applies a feasible GLS method with cross-section weights to amend the cross-section heteroskedasticity. If the model having period fixed effects is to be considered, E-views estimates a EGLS (Estimated GLS) version in order to overcome the mentioned problems. Table 5 summarizes the results of re-estimation of model (1). For saving space and formatting Table, the column S.E. (standard error) was excluded.

Table 5

Model estimation with Panel EGLS (Dependent Variable: PS)

| Variable | Cross-Sections FE | | Period FE | |
|---|---|---|---|---|
| | Coef. | t-Stat. | Coef. | t-Stat. |
| C | -0.6001 | -8.504 | -0.642 | -6.037 |
| *RENT* | 0.015 | 5.649 | 0.016 | 7.662 |
| *MISDEX* | -0.009 | -3.498 | -0.013 | -2.476 |
| *GE* | 0.707 | 6.626 | 0.011 | 0.083 |
| *RL* | 0.736 | 8.357 | 0.846 | 6.217 |
| *R-squared* | 0.944 | | *R-squared* | 0.634 |
| *Adj. R-squared* | 0.939 | | *Adj. R-squared* | 0.606 |
| F(33, 221)=192.43, p<0.001 | | | F(33, 221)=23.101, p<0.001 | |

Note: *C , Coef, p, t-stat* , *FE* and Adj refer to intercept term of regression, coefficient, probability, t-statistic, fixed effects, and adjusted term respectively. Except for GE coefficient in period FE version, all coefficients are statistically significant at 1% level of significance.
Source: Author's calculations based on Eviews 8 Output.

A glance at Table 5 indicates the relative goodness of fit in the cross-section fixed effects model after adjusting for heteroskedasticity. Again, all coefficients are of expected signs,

and all are statistically significant, expect for coefficient of *GE* in the period fixed effects version.

According to the results of cross-section fixed effects model, the explanatory variables under consideration describe about 94 percent of variations in political stability. As observed, if rents of natural resources (*RENT*) increase by 1%, the political stability (*PS*) will increase by 0.015 units, other things being equal. Both government effectiveness (*GE*) and rule of law (*RL*) affect directly the political stability. The importance of these two variables in explaining political stability is roughly of order 0.7. In other words, government effectiveness and rule of law contribute highly to attain a stable political society. This is crucial finding in the context of MENA region, since multi-language, religious and ethnic groups in this region have potential and hidden tendency to protest against poor and discriminating governments.

The effect of the misery index (*MISDEX*) on political stability is negative. Natural resources rents seem to play stabilizing role in the political arena in the MENA group. According to calculations by World Bank, the share of fossil fuels, i.e., petroleum, natural gas and coal, in total resources rents is high. As a result, oil-dependent countries experience higher resource rents. The rents allocated to construct physical infrastructure and to provide public services can boost social welfare. Increases in social standards hinder political unrest. According to Jensen and Wantchekon (2004), resource abundance is main determinant of democratic transition and the success of democratic consolidation in Africa.

On the contrary, if these rents are exclusively distributed among rulers and governmental bodies, it will result in political corruption, and social alienation and exclusion. For instance, in the Gulf Cooperation Council (GCC), “Because the ruling families dominate politics, many Gulf citizens correctly perceive their political systems as exclusive. Also, corruption and unaccounted for government spending levels are quite high” (Byman and Green, 1999). By Basedu and lacher (2006) argument, resource abundance encourages violent conflict. In opposition, Bahgat (1995) believes that GCC states have historically experienced a low level of political violence due to their enormous wealth.

The coefficient of misery index is statistically significant, although it is small in magnitude. Therefore, any attempt to reduce inflation and unemployment rates in the MENA region will increase the political stability. In this region, the GCC countries and other oil-based economies are of higher chances to lower the misery index, if world oil prices grow in a steady rate. As Vasileiou (2014) noted “the increased unemployment ratios and the high levels of inflation significantly threaten political stability”. In an inverse causality, Samimi and Motameni (2009) find that political instability reduce the probability of Inflation Targeting adoption.

As Hanke (2011) notes, "a large swath of MENA countries suffer from a high level of economic misery and remain ripe for upheaval". In his viewpoint, to introduce dramatic free-market reforms will reduce the cost of doing business and restrict the corruptive power of governments.

As expected, government effectiveness (GE) has significant impact on political stability. Due to historical reasons, most MENA members are of large-scale governments and some

of them are under monarchy system. In addition, the existence of various ethnic and religious groups is an intrinsic element of socio-political system of the region. Thus, the necessity of serving all groups requires efficient and accountable government. Consequently, an effective government can stabilize society politically through improving education and health systems, capacity building for civil freedoms, increasing religious flexibility, and running democratic elections. This finding is in accordance to Gramc (2007) views. In an analysis of factors affecting government transfer spending in developed countries, he found that higher level of democracy [or more degree of political stability] is linearly linked with higher transfer payments, since democratic political parties compete with each other using transfers and subsidies to various target groups.

The rule of law is another factor influencing political stability. As an indicator of institutional quality, it reduces the transaction costs in the society. In effect, social struggles are minimized. The cohesion, solidarity and strong bonds among social strata produce the social capital, which is a main determinant of political stability. The potential tensions and conflicts stemming from ethnicity and religiosity can be resolved with strong enforcement of contracts. The civil laws are national conventions which let rulers exercise justice and equity regardless of race, color, and language. If these conventions are weak, biased or discriminative, the social bonds and national solidarity will collapse. Accordingly, political stability will be out of reach.

## 5. Conclusions

The aim of this paper was to determine the elements of the political stability in the MENA countries with different levels of socio-economic development. Dependency on natural resources, socioeconomic status, and institutional quality are found to be effective in stabilizing the socio-political trends in this region. When the one or more components grow or weaken at the expense of the other factors, destabilizing forces will boost. These unbalancing elements emerge in the forms of ethnic and religious violence, riot and social unrest and even domestic and trans-boundary terrorism. A glance at Arabian uprisings in Tunisia, Libya, Egypt, Yemen and Syria reveal that increasing misery index, i.e. simultaneously growing rates of inflation and unemployment was a crucial factor in shaping social objection and bloody turmoil against ruling governments.

In addition, governance and institutional quality indicators are often weak in the MENA context. Subsequently, mismanagement of the settlement of social and political disputes, weak enforcement of contracts and usage of force and threat fuel and strengthen the public protests. Of course, the case of GCC and oil-producing members of MENA should be analyzed in the light of oil abundance and resource rents. Wealth flows coming from oil and gas exports have contributed to stable political systems in the GCC, Algeria and Iran. However, it should be emphasized that the shaking status of socio-political systems in most MENA countries arises due to religious and tribal disputes.

The findings of this paper imply that stability of the political system in the MENA region needs to invest the rents from natural resources in improving infrastructure, enhancing

education and health standards, and allocating rents to job creation opportunities in an equitable manner. In addition, proliferation of mass media, usage of information and telecommunication technology and making rulers and governments accountable are effective tools in empowering political system. Moreover, any reform in the legal and judicial procedures and routines in order to minimize the systemic corruption and transaction costs is necessary to reach a civil society and stable socio-political regime.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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# ECONOMIC MODELS FOR STRUCTURING CULTURAL INDUSTRIES AND MEASURING THEIR CONTRIBUTION TO THE NATIONAL ECONOMY

*With the development of digital technologies, the importance of intellectual property becomes a leading for the development of the creative economy, the structuring of the creative industries, their classification and the measurement of their economic contribution. The lack of a unified international conceptual basis on these issues creates a number of challenges for the identification of the creative economy and the determination of its economic share in the economy as a whole. Existing economic models based on the understanding that creativity and knowledge are the required classification criteria do not meet the requirements of the business environment for clear structuring in the creative sector and determining its economic activity. The need to respond to the emerging need allows the development of a new economic model – the one of the intellectual property system.*
*JEL: A20; K0; L1; L7; M3; O3; Z1*

## Introduction – conceptual basis

The development of technologies, the new digital platforms for access and dissemination of content, initially in their development have imposed creativity and knowledge as business assets and have created the knowledge economy. Consequently, with the growing trends in the development of new technologies and the opportunities they offer for business, the fact that creativity and knowledge as a business asset lack the characteristics needed to be used as business resources, has created serious challenges for the knowledge economy and has led to their conditional division and the formation of the so-called creative economy.

The third wave of social development, the so-called information society (Toffler, 1980) led to the restructuring of the national economy from a three-step model into a four-step one, containing the so-called creative sector. These changes have also built up a new type of industries called creative industries. The rapid pace of technological development, unlimited creativity, multiple creative results and business models for their creation and consumption have changed the markets and have made consumers from passive to an active user of intellectual property. These trends have created serious challenges to the economic

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science (Penchev, 2014), related to the structuring of the creative industries, their classification, economic identification as business entities and the development of classification criterion to measure their economic contribution through traditional economic indicators such as gross domestic product, value added, employment, imports and exports

Given the fact that technological development has the greatest impact in the cultural sector with the boom of the entertainment industry, the research interest in resolving the emerging economic challenges is initially directed to the so-called cultural industries (Adorno and Horkheimmer, 1994).The research theme for the cultural industries arises as criticism against the mass entertainment industry, represented by popular newspapers, magazines, films and music. Initially, the concept shocked the theorists and practitioners with their contradiction between "culture" and "industry". Subsequently, the division of two parts of the term sets a boundary between "elite" and "mass" culture, between the higher art of traditional creative production and the mass markets of the popular products of the cultural industries.

The term "cultural industries" places a dividing line between creative works and cultural products produced in an industrial way (Adorno and Horkheimmer, 1994). Although their study does not comply with the drastic changes in technology development from the 40s to the 20th century, it is still relevant due to its fundamental foundation in understanding the relationship "culture" and "industry" and due to the recognition of the importance of technology for the development and consumption of culture. Based on it, the terms "creativity" and "industry" are distinguished, and hence the terms "publicly acknowledged as elite" and "commercial". The mass or otherwise called low culture is considered to be the result of repeated production, while the elite culture is the result of the creation of unique works by artists who would not repeat their creativity driven by commercial purposes. A distinctive criterion between mass and elite culture, besides the way of production of cultural products, is the degree of state commitment to the relevant industries. It can be expressed through the provision of subsidies, the establishment of a copyright regime for the protection of creativity or the development of special measures set it the cultural policy of the country.

The accepted then distinguishing criteria for "elite" and "mass" culture continue to be a basic theoretical consideration in contemporary researches of the creative sector. Gradually, with the expansion of cultural industries and entertainment activity, the research interest is reoriented on the definition of not just the specific activities that are inherent in cultural industries but on those related to creativity and intellectual property. Thus gradually begins the formation of the creative economy and the interest in its economic analysis. Initially, the emergence of the term cultural industries is justified by the need to define the activities forming the entertainment sector of intangible production, and subsequently their definition creates the possibility of calculating their contribution to the economy of the country. At a later stage in the development of the theory of cultural industries, these calculations allow the creative economy to be explored economically.

Thus, the content of the cultural industries is defined by industries that refer to the classical industries in the cultural sphere, namely the film and soundrecord industry, the publishing and the radio-television industry, which unite the forms of commercial entertainment that are realized through their mass industrial production, and are subject to government policy

in the field of culture A detailed study of the content of the term "cultural industries" (Golding, Murdock, 2000)

The cultural industries are inherent in creative activities primarily of a cultural nature, related to the creation and industrialization of cultural products and the provision of cultural services (Towse, 2011). Providing access to a cultural product and the promoting of culture are a cultural service, and its use is a prerequisite for creating a cultural product. These are functionally related and interrelated activities carried out in the creative sector.

Some researchers (Cunningham, 2006) extend the scope of cultural services by accepting that even writers, novelists, screenwriters, poets and lyricists, as well as those who create learning materials and contribute to the development of the educational system represents the provision of a cultural service. Their creative activity is essential for the provision of cultural services and the creation of scientific and cultural products.

Cultural industries operate by performing primarily cultural activities without this meaning that creative activities are not inherent in them. On the contrary, the economically cost-effective functioning of cultural industries is a complex symbiosis between cultural and creative activities inherent in the entire creative sector. Creative activities are directly related to the creation of cultural content in the cultural product and to new material, spiritual and cultural values (Flew, 2002).In this search for a decision on which is the business asset that has economic characteristics can be a classification criterion for the creative industries and allows measuring their economic contribution through it, the presented research is interesting and up-to-date. It offers an author's vision of intellectual property as a business resource for the creative industries and classification criterion to measure their economic activity. The study proposes a new economic model in structuring the entire system of creative industries, through intellectual property as a classification criterion, and provides a new approach to measuring not only the economic contribution of cultural industries but also the economic contribution of the so-called innovation industries. The aim of the study is to bring out a new economic model for structuring the cultural industries and measuring their contribution to the national economy. The aim is achieved through the following tasks:

- comparative analysis of the existing economic models for structuring cultural industries;
- analysis of the methodology for measuring the economic contribution of the copyright industries;
- developing a new economic model for the structuring of cultural industries through the development of the creative industries system;
- developing a new approach to measuring the economic contribution of industries across the whole creative industries system.

A leading research thesis is that intellectual property is a classification criterion for the creative industries system, which allows, due to the economic characteristics of intellectual property law, to measure the contribution of the two major types of creative industries (cultural and innovation industries) in the country's economy. The methodology used in the study is interdisciplinary, with the method of comparative analysis and synthesis of the

known practice in the field being applied as a priority. The methodology for exploring the economic contribution of the creative industries is examined in detail in the study. Although an analysis of international practice has been carried out, the part to determine the economic contribution of the cultural industries is limited to the territory of Bulgaria.

## 1. Criteria model for structuring cultural industries

The complex nature of cultural industries is a prerequisite for a wide variety of definitions. According to UNESCO's definition, cultural are those industries that unite the creation, production and commercialization of intangible content in the cultural sphere. Dualism "creativity" and "production/trade" outlines the cultural and economic aspects of the cultural industries, giving them a different profile. Cultural products are protected by copyright and promote and support cultural diversity and provide access to culture.[2]

Another relatively common definition of cultural industries defines them as activities primarily related to the creation of symbolic goods whose initial economic utility derives from their inherent cultural utility (O'Connor, 1999). The definition includes traditional cultural industries such as telecommunication media, films, book publishing, sound recording, design, architecture, new media and traditional arts such as visual arts, crafts, stage performances, literature, museums and galleries united by the common name art.

The provided definitions for the cultural industries give an interesting, different and comparatively broad view of their content range. Regardless of their advantages, the definition of creative activities in the cultural sector would be unambiguous and limited in terms of their creative and cultural diversity. That is why we will use the so-called "criteria approach". The criteria approach helps to define the scope of cultural industries, not by defining them, but by adopting a criterion for:

- the nature of the activities they carry out;
- the nature of the cultural product and
- the relation cultural product and intellectual property.

This approach allows the identification of cultural industries in the creative industries system, taking into account the structural and functional dependence between them. The criteria that determine the scope of the cultural industries are:

- creativity as a process or inherent human quality;
- the symbolic meaning of cultural products;
- the utility used;
- the methods of production of the cultural product.

[2] http://portal.unesco.org/culture/en/ev.php-URL_ID=34603&URL_DO=DO_TOPIC&URL_SECTION=201.html, 2016.

### *1.1. Creativity as a process or inherent human quality*

In the creative economy, creativity as a process is associated with the formation of new ideas and their practical application for the production of original and functional cultural products, technological and scientific innovations. Creative ideas, combined with relevant knowledge and skills, form intellectual capital. The relationship of creativity and intellectual knowledge and skills determines its economic aspects, in terms of how it contributes to the development of entrepreneurship, encourages the development of innovations, increases productivity and promotes economic growth (cit: WIPO/UNCTAD Creative economy report, 2008, p. 3).Creativity as a process always has a specific focus on its manifestation (Ibid: WIPO/UNCTAD, p.10). This also determines the existence of several types of creativity:

*Artistic creativity* – the ability to generate original ideas expressed in text, music or painting, as well as the ability to interpret reality in a new way. The originality of the creative process is the creation of something that has not existed so far, or the processing of something that already exists.

*Scientific creativity* – expression of science research curiosity and willingness to experiment and seek new solutions to specific issues.

*Economic creativity* – a dynamic process linked to the economic development. It mainly involves the development of new technological innovations and new business practices. Technological creativity – it consists in the creation of new technologies as a means of presenting and using the results of artistic and scientific creativity.

The importance of the creative process for economic, social and cultural development as well as its relation to intellectual property allows its economic aspects as well as those of creativity-related activities to be measured and represented by capital forms as a production resource using the "model of the five capitals – 5Cs" (Desmond Hui, 2005). Capital as an economic resource may have a material or non-material form. The material form of capital is represented by its monetary appearance, and the non-material – by human intellect (intellectual property) and creativity, and is called "creative capital". It is a set of different forms of expression of creativity. The results of using one of the capital forms in the creative process are called "creative results" that define the framework of the *creative index of the 5Cs model*. Its implementation provides values that express the dependence between social, cultural, human (intellectual property), institutional capital, and the formation of creative capital. Applying the creative index makes it possible to value the relationship and the dependence between creativity and intellectual property as its capital expression and means of protection.

### *1.2. The symbolic meaning of cultural products*

The "symbolic meaning" criterion for the identification of cultural industries can consider the cultural product bilaterally as:

- degree of market risk and

- unique intellectual result.

***a) degree of market risk***

Taking the risk of developing and marketing a cultural product and the degree of its unpredictability determines the symbolic character of cultural products (Towse, 2003). This thesis is based on the understanding that the "symbolic meaning" of cultural products is used to determine the scope of cultural industries through comparative analysis between cultural and creative industries. The analysis is carried out in relation to the "commercial" or "creative" nature of the products produced by the industries. Nevertheless, this criterion for distinction is conditional and does not give objective results, given that cultural industries are a kind of creative industries and that creativity, in whatever way it is presented, acquires potentially commercial character from the moment when intellectual property arises on it and from disclosing it to an audience. Therefore, the "symbolic meaning" of cultural products as a criterion can only be used to distinguish the products of the creative industries from those of conventional industries, because despite the differences between the cultural and creative products, as creative results they own symbolic meaning. Moreover, the risk of defining the symbolic meaning of cultural products is not the absolute factor for their characteristic, since symbolic meaning is not a characteristic inherent only in cultural products.

***b) unique intellectual result***

Accepting the above thesis would be unequivocal and would leave the importance of creative and innovation products in a different category outside of the creative economy. As creative results, creative and cultural products are objects of intellectual property. They are of a non-material character, which has a certain symbolic meaning, due to the uniqueness and originality of the creative and intellectual efforts invested in their creation.

The difference between the two products is in the way of their creation. The cultural product is the result of the economic realization of the cultural content and is mainly intended for mass consumption in the entertainment sector (it is also possible to be an elite product – collectors). The creative product is not created in an industrial way but is a result of R&D activities, and as far as innovation is concerned, they is also related to the management of intellectual property.

These arguments are enough to accept that the "symbolic meaning" criterion is not objective in terms of the classification of cultural industries to creative ones, but rather such a criterion is the degree of commitment of the cultural product to copyright protection.

*1.3. The utility used*

The criterion of "economic utility" defines the place of culture and its symbolic products as a potential production resource for part of the creative industries (priority innovation industries). This criterion relates to the distinction of cultural industries from that part of the

industries that are not connected with the production of cultural products.[3] In this way, industries that use cultural products as a production resource help to promote culture without producing cultural products themselves and are therefore not part of the cultural industries (Martin, 2004).

It is possible for certain creative industries to produce a product in which a certain part is inspired by a cultural product and another part is purely industrial production. This is the so-called "joint or connected product" (Bilton and Leary, 2004). The existence of such products raises a number of controversial issues as it is difficult to determine the amount of cultural participation and innovational technological in the product's content (Throsby, 2001), as is the case with Coca-Cola can. This would also create difficulties in defining the cultural and industrial utility of the product.[4] Although it is perceived as a criterion that identifies the cultural industries, it rather identifies how to form the used utility of their product rather than identifying the industries. This is because this utility is formed in all products of the creative industries due to the non-material nature of the intellectual property objects created. Indeed, the reason for the development of related products in the cultural industries is due to the concentration of creative activities in the culture sector, where it is perceived as a transformation of social life into something that allows everything – from design of the urban space, offices, communications, to promotional strategies of corporations rather than the exceptional availability of economic utility in the cultural product (Flew, 2002).

### *1.4. Methods of production of the cultural product*

Although this is another classification criterion, the cultural industries would hardly be identified by the methods of producing the cultural product. Because in a production process it is difficult to determine what is "cultural" and what "industrial". Although the term "culture" avoids the purely industrial meaning of the term "industry"[5] [5], the term "industry" is necessary precisely because it emphasizes the economic importance of creative activities as a competitive advantage. Because of this, production methods rather give the cultural product distinction from industrial products outside the creative industries rather than identifying the cultural industries (Grant and Wood, 2004).

The application of this criterion is also extremely controversial given the fact that its use leads to the alignment of the types of creative industries with the business models of the cultural industries (Cunningham, Stuart, 2002). This leads to a new understanding of the

[3] Of the types of cultural industries, *nonspecific nondependent industries* are essentially innovation industries that facilitate the dissemination and sale of cultural products such as telecommunications, including the Internet, transport, wholesale and retail (NCEA, 2008, see at: www.nsi.bg).

[4] Similar products are created by the architectural and design creative industries (the so-called partial cultural industries) and the advertising industry whose measure of economic utility is in the activity of the radio-television industry (WIPO Classification, see at: www.wipo.org).

[5] "A share of the economy where large-scale machinery in large factories and plants produce goods for the market; industry", Bulgarian language dictionary, “Science and Art” Publ., 1994, p. 326 or "Factory-processing of raw materials in finished products; industry", Dictionary of foreign words in Bulgarian language, Publ. BAS.

creative economy as structurally differentiated only by the creative activities of the cultural industries. In this criterial system, the dynamics in the cultural sphere poses a number of challenges to the different business models of the cultural industries that design the activities of the creative industries. The variety of these challenges forms the so-called "trinity of the three T", which forms the conditions under which business models apply, or said otherwise, the creative industries operate:

- *technologies* (internet and mobile devices);
- *taste* (of the new generation);
- *talent* (the creativity of young people finding new technological means for expression).

This model is conceptually different and does not contribute significantly to the identification and classification of both the creative industries system and the structural differentiation of the cultural industries in it.

In summary, the criteria model does not provide a single criterion on which to structure the cultural industries in the creative industries system. The model provides a criterial link between, creativity, intellectual property, its importance for the formation of the symbolic importance of the cultural product, the utility used, and the models for producing the product. The disadvantages of the model are in the proposed criteria that structure the cultural industries through a comparative analysis of the characteristics of the cultural product and the market with those of the creative product, when the aim is to distinguish the cultural industries from the creative industries. A model that does not fully take into account the network in the creative industries system in the whole creative economy, but focuses on the cultural industries as its primary focus. We believe that this approach does not fully objectively points out the importance of other creative products to the development of the creative economy and significantly reduces its scope. At the same time, it is looking for a comparative analysis of the content of the activities and products of the creative and cultural industries rather than their classification.

The criteria model does not allow the economic contribution of cultural industries to be measured, since its criteria do not have the necessary economic characteristics to apply the relevant economic indicators. The exception is the "intellectual property" criterion which, in the context of the model, is used only as a means of bringing out the symbolic nature of the product due to the intangible nature of its cultural content, i.e. on the subject of copyright protection.

The development of the concept for structuring the cultural industries and moving from the criteria model to the classification model by bringing out the importance of intellectual property is visible in their identification as "industries producing and disseminating cultural products and services." These are those industries whose origin is in the individual creativity, skills and talent and which have the potential to create welfare and work through the generation and exploitation of intellectual property" (Danailov, 2008).

## 2. Classification models of cultural industries

In theory, there is no uniform classification model applicable to cultural industries. Notwithstanding their diversity, each of the classification models uses a different classification criterion directly related to the intangible nature of creative products. The classification model adopted by us – the intellectual property system – is beyond the scope of the following classification models because these models look for the differences between the creative and cultural industries and we assume that the cultural industries are a kind of creative industries operating in the entertainment sector and, unlike other creative industries, create a product by using cultural content and adding different utility to its creation process, which is called a cultural product for mass consumption. We assume that, according to the model of the intellectual property system, the creative industries function in the three-stage model of the national economy, and because of the creativity in their activities they form a parallel forth sector, the so-called creative sector.

The classification model is based on the grouping of cultural industries depending on the sphere of expression of *creativity* and not on the characteristics of the *cultural product* as in the criteria model. Depending on the sphere of expression of creativity, the cultural industries are:

*Cultural industries related to traditional creative production, represented by the so-called elite culture* – they create original works of art that are considered to be cultural content in the sphere of art, science and literature. These are creative products whose performance is a single one and is not a subject to mass production. They do not serve as a matrix, model, pattern or print but represent the so-called "prestigious products" whose possession or consumption is associated with a particular social status.[6] The distinction between elite culture and mass culture is the ability to present and disseminate cultural content in different forms at the same time and in multiple specimens.

*Cultural industries for mass consumption* – they create and distribute cultural products for mass consumption. They are mainly developed in the services and entertainment sector. Their main activity is to industrialize a particular cultural content by increasing its utility in order to maximize the economic effect in the form of additional profits. Mass cultural industries are the publishing, music, film and media industries.

*Cultural industries related to the performance activities* – their activity is related to material provision of cultural products. Such are the paper industry, the production of musical instruments and sound and video records, the production of reprographic and photographic equipment and others. These industries are nondependent and have no direct relation to the formation of the utility of the cultural product or to the copyright protection.

The specificity of creativity makes it difficult for creative results to be attributed to a single economic sector. Often, the final product is a collection of creative efforts in the field of science, technology, literature and art at the same time. Therefore, the grouping of cultural industries based on the criterion of creativity is a priority conditional. In order to overcome

[6] Traditional creativity is considered to be the works considered to be cultural material or intangible heritage, folklore works and craft works.

this conditionality, four major classifications of cultural industries are being developed, systematically building their structure.

Each of them is different in terms of formation of the so-called "basic" and "peripheral" creative activities, which define the so-called cultural industries, and therefore provide a sole classification approach. The proposed classification models group the cultural industries based on the relation of creative activities with the creation of the cultural product (WIPO/UNCTAD, 2008):

- Symbolic text model.
- Concentric circles model.
- British model (UK DCMS) (Department Culture, Media and Sport).
- Trade model (UNCTAD).

All four models use the characteristics of the cultural product as a classification criterion for cultural industries in a comparative analysis with the creative industries. Exceptions are made by British model and Trade model that perceive the cultural industries as creative industries, and the Trade model indicates intellectual property as a classification criterion.

### *2.1. Model of the symbolic meaning of the cultural product*

This model accepts that public culture is formed and transmitted through the industrial production, distribution and consumption of symbolic cultural products communicated by the media, publishers and radio-television operators. According to the model the term creative is identical to cultural. The model divides elite art from mass art.[7] Elite art is not for mass consumption; it lacks market characteristics and is therefore state subsidized. Creative are those industries that give the cultural product mass character. According to the model, the cultural industries are grouped into:

- core cultural industries such as advertising; films; Internet; music; publishing; television and radio; video and computer games;
- peripheral cultural industries represented by the industries of traditional creative production;
- marginal cultural industries such as electronics; fashion; software; sport.

### *2.2. Concentric circles model*

The model considers the cultural utility of cultural products as the main feature that distinguishes cultural from the creative industries. According to the model, creative ideas come from the main creative industries in the form of sound, text or image. The impact of

[7] This model adopts the old European culture as a standard for traditional creative production. In this case, the symbolic meaning of the cultural product is sought in its industrialized cultural content, and its consumption is being associated with a certain symbolism of empathy towards different cultural levels. Here, the dominating cultural level is the elitist European culture.

these ideas is further spread by the multiplicity of layers of other cultural industries, as a result of which the content of the product changes and, from an elite culture one, it becomes a mass-commercial one. According to the concentric circles model, the cultural industries are:

- core cultural industries related to literature, music, performing arts, visual arts;
- other core cultural industries, such as movies, museums and libraries;
- general cultural industries such as publishing, recording, television and radio, video and computer games;
- related industries such as advertising; architecture; design and fashion.

In this model, the grouping of cultural industries is based on traditional creativity criteria, where cultural industries are self-contained in a group of "common cultural industries".

### *2.3. British model*

The British model arises simultaneously with the understanding of British theory of the term creative industries. The model builds entirely on the idea that the emergence of creative industries follows the emergence of cultural industries, which is why the existence of the creative industries is entirely dependent on the cultural industries and in help in their activities. The British model adopts the identity between cultural and creative industries. According to it, the concept of creative industries is due to the expansion of the cultural industries with creative industries that have contributed to the development of the country's economy. Therefore, there is no classification of the creative industries in groups as "basic" or "peripheral". The model lists all creative activities as inherent in the cultural industries: advertising; architecture; art and antique markets; crafts; design; fashion; films and videos; music; performing art; publishing; software; television and radio; video and computer games (WIPO/UNCTAD, 2008, table 1.1, p. 13).

### *2.4. Trade model*

A wider and more detailed approach to defining the scope of the creative industries and their classification has been adopted by the UN conference for trade and development (UNCTAD) in accordance with international economic and commercial interests in the development of this sector. The scope of the creative industries is wider and includes creativity and any economic activity in the production of symbolic products closely related to intellectual property and with the largest possible market (UNCTAD XI Ministerial Conference, 2004).

The trade model distinguishes the creative industries of industries related to traditional cultural activities such as performing and visual creativity, and industries related to activities closer to the market such as advertising, publishing or media activities. The second group of industries forms its commercial potential from low reproductive costs and from its easy transfer to other economic areas. The model also defines the links between creative industries and other business sectors and sub-sectors.

The trade model assumes that the creative industries engaged in the creation of creative (cultural) content use traditional knowledge and cultural heritage as sources of material for the production of cultural products. The other business sectors and sub-sectors with which the creative industries work together are those in the field of technology and services, such as audio-visual, media and others.The business classification of cultural industries sets out their main characteristics as their classification criteria, namely:

- they are associated with the creation, production and distribution of cultural products and services by using creativity and intellectual capital as an initial resource;
- they carry out knowledge-based activities aimed at, but not limited to, creativity generating potential income from trade and from intellectual property rights;
- they themselves relate to the creative sector, the services sector and the industrial sectors;
- their activities set a new dynamic sector in world trade (WIPO/UNCTAD, 2008, p. 13).

Based on the approach used, the business model groups the cultural industries as:

*Cultural Heritage*. The source is creativity and material for cultural content in cultural products is needed. This group of cultural industries is divided into two subgroups: traditional forms of expression (such as traditional arts, crafts and folklore festivals) and cultural locations (such as archeological sites, museums, libraries, exhibitions, etc.).

*Arts*. This group contains industries based on arts and culture. Their products combine cultural heritage, the values of society and have symbolic significance. They are divided into two subgroups: visual arts (such as painting, sculpture, photography and antiquity) and performing arts (such as live music, theater, dances, opera, circus, puppet show, etc.).

*Media*. They industrialize the cultural content of the cultural product aiming communication with the wide audience. There are no new media, they have a self-classified place. They are divided into two subgroups: publishing and print media (such as books, press and other publications) and audio-visual media (such as films, television, radio and other communication organizations).

*Functional works*. This group covers industries that base their activity on demand and service delivery on a functional basis. It is divided into the following subgroups: design (interior, graphic, fashion, jewelry and toys), new media (software, video games and the Internet), creative services (architectural, advertising, cultural and entertainment, research, digital and other related creative services) (UNCTAD, 2016).

In summary, notwithstanding the development of the concept of structuring cultural industries in the creative industries system and its focus on intellectual property, primarily because of its economic characteristics, the proposed classification models cannot go beyond the classification criteria: cultural product and spheres of manifestation of creativity. Classification in these models continues to be based on comparative analysis between the cultural and creative industries, despite the business model's attempt to bring commercial aspects into perspective by proposing a new classification criterion – intellectual property. The following trends can be seen as innovative: the adoption of

cultural industries as part of the creative industries (British model) and the emergence of commercial aspects through intellectual property as a classification criterion (Trade model). Despite the positive trends based on these classification models and their criteria structuring the cultural and creative industries in a differentiated way, it is still not possible to structure the cultural industries, measuring their economic contribution and determining the scope of the creative economy.

## 3. Copyright model for structuring cultural industries

It is for this reason that the World Intellectual Property Organization (WIPO) based on the Trade model, brings out the business aspects of cultural products through intellectual property, and develops the so-called copyright model for structuring the cultural industries. The copyright model focuses solely on cultural industries and the commitment of their creative activities to the copyright protection provided for cultural content in the cultural product. The model does not allow the creative industries to be structured on the basis of the cultural industries but only develops the classification system of the cultural industries. Therefore, the model is not comprehensive for structuring the creative industries system and for determining the scope of the creative economy, but is sufficient to impose intellectual property, in particular copyright as a classification criterion with economic characteristics. It is also sufficient to develop a methodology for measuring the economic contribution of cultural industries in the creative economy of the country. In this regard, "Cultural industries have enormous potential for the economic development of the nation by enriching our daily lives and preserving national cultural traditions. That is why WIPO activity will be aimed at strengthening the copyright system, presenting more effective protection, development, use and management of creative results to ensure the position of all countries in capitalizing their creative assets and cultural industries" (Idris, 2004).

### *3.1. Classification of cultural industries*

According to the model, the core creative industries are the cultural industries that create a product that is intellectual property –the so-called cultural product. Interdependent creative industries have a responsibility to bring the cultural product to the end user. As far as the partial creative industries are concerned, they operate under conditions where the participation of copyright protection in their activities is partial and not so significant. The WIPO's position on the model is that it covers industries directly or indirectly involved in the creation, making, production, communication[8] and dissemination of cultural content, i.e. of author's works (WIPO/UNCTAD, 2008, p. 12).

According to the copyright model, the cultural industries are grouped into:

[8] By communicating, we understand the activities of radio and television organizations and other telecommunications operators that broadcast wirelessly or via telecommunication satellite or via cable cultural products.

- core cultural industries such as advertising; films and videos; music; performing art; publishing; software; television and radio; visual and graphic arts;
- interdependent cultural industries such as the production of blank records; consumer electronics; musical instruments; paper; photocopying and reprographic machines;
- partial cultural industries such as architecture; clothing and shoes; design; fashion; household goods and toys.

The model identifies the cultural industries in a sequence justified by the logic of the creation of the cultural product and its market realization. According to this classification, the cultural industries are grouped into industries that create the cultural content of the cultural product; industries that are functionally responsible for its economic realization and industries that have supporting and maintaining, performing activity during the economic realization of the cultural product.

3.1.1. Core copyright industries

The core copyright industries create and disseminate for commercial purposes the so-cultural content. The creation of cultural content and its dissemination is a systematic process of many creative activities in transforming it into a cultural product and its consumption. The creative activities of the core copyright industries are functionally dependent from the input till the output of the "value chain" of the cultural industries and are: (WIPO, 2003, p. 29):

***a) Functionally grouped by groups of activities:***

- creation and reproduction of cultural products;

In the new technological environment, the creation and distribution of cultural products are done digitally for the purpose of consumption at a place and at a time freely chosen by each user, which is why the Internet is gradually becoming a core copyright industry.

- presenting, communicating, communication and exposure (non-material forms of dissemination) of cultural products;
- distribution and sale (material forms of dissemination) of cultural products

***b) Connected with copyright***

The cultural products of the core copyright industries are protected by copyright, which is why 100% of the value added to the national economy must be attributed as a copyright contribution.

The main features of the copyright industries define them as a "collective concept of various creative activities based on new technologies and industrial production methods for creating a mass cultural product such as television and radio programs, press, films, sound recordings, production of technical devices with a cultural purpose" (Philipov, D., 1996, p. 133).

3.1.2. Interdependent copyright industries

The economic realization of cultural products is made through the activity of the interdependent copyright industries. Their main function is to facilitate the creation, manufacture and use of copyright-protected cultural products (WIPO, 2003, p. 33), by the production of televisions, radios, blank audio and video records, musical instruments, paper, reprographic machines and other. Interdependent copyright industries operate together with other economic sectors outside of the creative economy. Therefore, in its structural analysis, it is important to determine the degree of dependency of cultural products and business services, transport, production and sales factors, commodity investments, wholesale and retail sales to enterprises outside this sector. The relations between the interdependent copyright industries and other economic sectors are important to determine their economic contribution to the economy as a whole.

Interdependent copyright industries have their own classification model, differentiated by the degree of connectivity of the economic realization of their products to that of the cultural product. According to the model they are:

*Dependent copyright industries* – the products of these industries are consumed simultaneously with cultural products[9]

*Partially dependent copyright industries* – the products of these industries do not perform functions related to cultural products but facilitate their use by providing the necessary equipment.[10]

3.1.3. Partial cultural industries

Supporting and sustaining the economic realization of cultural products is carried out by the creative activities of the partially copyright industries. For them, only parts of the activities are related to the creation, production, making, promotion and distribution of cultural products. Their creative activities are not directly dependent on copyright protection. Partial copyright industries are mainly engaged in the production of jewelry and coins, furniture, games, toys, architecture and design and others

3.1.4. Nondependent copyright industries

Nondependent industries operate in a direct functional dependence on business services and supply and their existence is justified for the purpose of conducting an objective structural analysis of the creative economy. They are part of it and part of other economic sectors, so determining their contribution to the development of the creative economy is of

[9] For example, if there is no consumption of televisions, there will be no sense of consumption of television programs. These are creative activities for sale and resale of: TV and radio equipment, CDs, DVDs and other sound techniques; electronic gaming equipment, computers and musical instruments.

[10] These are creative activities for the sale and resale of: photographic and cinematographic instruments; reprographic machines, paper and blank records.

considerable interest and can be done with economic indicators. In statistical classifications, these activities are referred to as general wholesale and retail, transport and telephone internet (WIPO, 2003, p. 35). As far as the main copyright industries are concerned, they act on the transmission, communication, distribution and sale of cultural products.

### *3.2. Methodology of the copyright model*

The exclusive advantage of the copyright model compared to the Criteria and Classification models, apart from classifying the cultural industries, is that through the economic characteristics of intellectual property, copyright in particular allows economic indicators such as gross domestic product, added value and employment to measure their economic contribution to the economy of the country. The economic study requires the application of a special methodology (WIPO, 2015) to collect and process data in the following order:

**a) identifying the creative activities that are subject to research**

At this stage, the cultural industries themselves are identified by the activities pursued by the chain of economic realization of the cultural product as creation; reproduction; distribution and consumption.

**b) statistical classification of cultural industries**

The aim is to associate the creative activities of cultural industries with economic activities under the International Standard Industrial Classification (ISIC) by classes of activities.[11]

**c) collecting relevant data**

The process involves processing the statistics; collecting additional statistics to process the primary information to the required level and identifying the missing information. A questionnaire is being developed to complete it.

**d) measuring the contribution of the copyright industries to the national economy**

This is the most difficult stage in the methodology and is constructed in the following order:

- value added measurement – it is done when determining the ways of forming the added value; collecting relevant value added statistics (according to the classification); value added calculation[12]
- measuring employment through employment statistics in general and by industry;
- measuring international trade by volume of royalties;

[11] ISIC is a standard of united Nation's classification of economic activities arranged so that entities can be classified according to the activity they carry out (see: www.unstats.un.org//unsd//cr).

[12] The added value of cultural industries is calculated in several ways: the output approach, the indicator of intermediate consumption should also be determined; the input approach (the VA is calculated using the compensation of employees plus operating surplus/mixed income plus consumption of fixed capital plus other taxes on production minus other subsidies on production).

- determining the so-called *copyright factor* – the aim is to eliminate creative activities in cultural industries that are not directly related to copyright protection.

**e) analysis and presentation of collected and processed data and results**

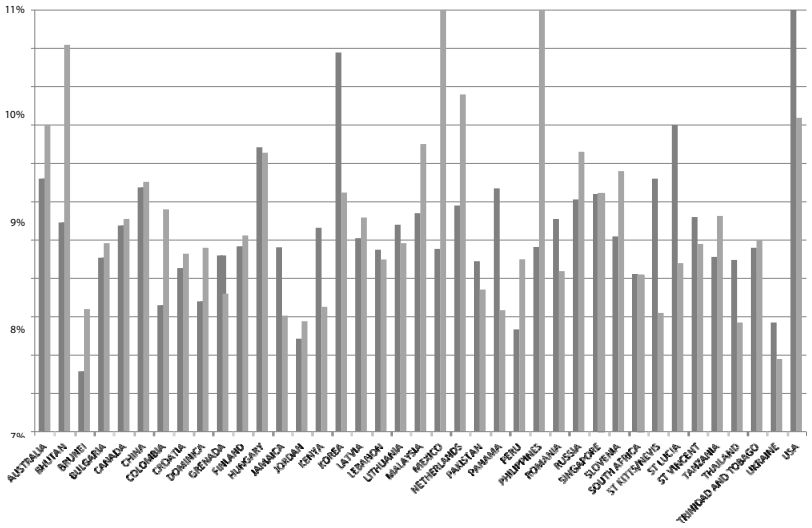
Based on a survey by 39 countries, the data on the economic contribution of cultural industries on gross domestic product and employment for 2015, show that the contribution of cultural industries is significant and often higher than in the agricultural and social services sectors.

The contribution of industries ranges from more than 10% of GDP for the US and 2% for Brunei, with a priority average for most countries of 5.48% and 4.88%, and values between 4% and 6.5% for three-quarters of the countries. Compared to employment, the economic contribution of cultural industries to GDP is comparatively lower. The participation of industries in the formation of national employment is within the average value of 5.34%, with nearly three quarters of the industries accounting for between 4% and 7% of national employment.

The methodology of the copyright model allows a more in-depth analysis of the contribution of cultural industries to the formation of gross domestic product and employment by types of industries. Again data for 2015 for the surveyed 39 countries, are presented in chart 2.

Chart 1

Overall Contribution of Cultural Industries to GDP and Employment




Source: WIPO Guide, p.14[13]

[13] WIPO, 2015, p. 14, Guide of Surveying the Economic Contribution of the Copyright – Based Industries.

Chart 2

Contribution of the Cultural Industries to GDP and employment by groups of industries


Source: WIPO Guide, p.18[14]

As it can be seen from the graph, the core copyright industries make the largest contribution to the formation of both employment and gross domestic product of the countries. In terms of GDP, followed by the core industries are the so-called interdependent copyright industries, with this trend remaining with employment, but with a smaller size of 17.2%. Approximately the same values are the partial and the nondependent industries in terms of employment and with minimal differences in GDP, with the advantage of 16.8% for the nondependent industries. These differences are due to the fact that the nondependent industries carry out, as a matter of priority, innovation activities that, according to the National classification of economic activities, are essentially characteristic for the innovation industries. At the same time, a large part of the innovation productions are robotized productions, which does not require a large number of employed.[15]

The data from the two analyzes allow positioning of the parties on a clustered principle in four clusters by indicators such as GDP and employment. Positioning in clusters is based on the contribution of cultural industries in each country, which allows the development of trends in the development of cultural industries in time with regard to:

- their place on local markets and the global market;
- the monetary value of the cultural product;
- the national policy regarding the cultural sector and
- the cultural characteristics and national traditions (http://www.wipo.int/export/sites/www/copyright/en/performance/pdf/economic_contribution_analysis_2012.pdf, p. 5).

[14] WIPO, 2015, p. 18, Guide of Surveying the Economic Contribution of the Copyright – Based Industries.
[15] The demand for highly qualified staff increases by reducing overall employment in the industries.

Researches on the economic contribution of cultural industries shows a statistically significant correlation between their economic performance by indicators such as GDP, global innovation, global competitiveness and the intellectual property.[16]

*3.3. Identification of the economic contribution of the cultural industries in Bulgaria*

In 2007, under the methodology of WIPO, the first study for calculating the economic contribution of the copyright industries in Bulgaria was conducted (Chalukov, Borisova, and coll., 2007). The study was conducted with the initiative of the competent national ministries and under the guidance of WIPO. Since 2007, no state initiative has been launched to update the survey data. A comparatively updated study but for the purposes of developing a National Intellectual Property Strategy (2015) is annexed to it as Annex 3 for the period 2003-2009.[17]

Table 1

Comparative analysis of indicators of cultural industries in the national economy for the period 2003-2005 and 2008-2009 (%)

| Indicator | 2003 | 2005 | 2008 | 2009 |
|---|---|---|---|---|
| Gross output | 4.00 | 4.51 | 5.58 | 5.71 |
| Gross value added | 2.43 | 3.42 | 5.45 | 4.62 |
| Gross domestic product | 2.08 | 2.81 | 4.54 | 3.97 |
| Employment | 3.93 | 4.31 | 4.92 | 5.18 |

Source: NSIP 2014 – appendix 3.

The economic contribution of the copyright industries was determined using economic indicators such as gross domestic product, value added, gross output, imports and exports and employment in the creative sector for the period 2003-2005. The creative activities of all copyright industries and the economic contribution of each one of them for the development of the national economy are studied.

The economic indicators of the core and interdependent copyright industries have been fully studied due to the higher degree of their economic importance. Data on the economic performance of partial and nondependent copyright industries are reduced by a weighting factor, calculated in advance and applied as a copyright factor.

The copyright factor allows separating that part of the economic contribution of a creative industry that is not directly related to copyright protection. In this way, creative activities that are not related to copyright are eliminated, even though they contribute to their realization. In essence, copyright law is the "weighing of the share in an industry that can be attributed to copyright or to their dependence on it. The weighing process is to establish the proportion of the copyright component in the industry concerned. Its calculation should

[16] EPO and EU Intellectual Property Office, 2016, Industry level Analysis Report: Intellectual Property Rights Intensive Industries and Economic Performance in the European Union and see: http://www.wipo.int/export/sites/www/copyright/en/performance/pdf/economic_contribution_analysis_2012.pdf).

[17] Structurally and methodologically follows the first study since 2007.

be made in all creative industries outside the scope of core copyright industries, where this share is 100%" (WIPO, 2003, p. 57).

In the study course[18] it was found that WIPO copyright classification of cultural industries did not differ significantly from the national classification system (see Table 2).

Table 2

Structure of the cultural industries in Bulgaria according to the copyright model

| Categories of industries (copyright classification) | WIPO | Bulgaria |
|---|---|---|
| 1 | 2 | 3 |
| Core copyright industries | • press and literature;<br>• music, theater, opera;<br>• cinema and video films;<br>• radio and television;<br>• photography;<br>• software and databases;<br>• visual and graphic arts;<br>• advertising services;<br>• CMOs | • press and literature;<br>• music, theater, opera;<br>• cinema and video films;<br>• radio and television;<br>• photography;<br>• software and databases;<br>• visual and graphic arts;<br>• advertising services;<br>• CMOs |
| Interdependent copyright industries | • televisions and radios, video and CDs, DVDs, cassette players and electronic games equipment;<br>• musical instruments;<br>• computers and equipment;<br>• photographic and cinematographic equipment;<br>• reprographic machines;<br>• empty sound and video records;<br>• paper. | • televisions and radios, video and CDs, DVDs, cassette players and electronic games equipment;<br>• musical instruments;<br>• computers and equipment (and reprographic machines);<br>• photographic and cinematographic equipment;<br>• reprographic machines;<br>• empty sound and video records;<br>• paper. |
| Partial copyright industries | • clothing, textiles and shoes;<br>• jewelry and coins;<br>• other crafts;<br>• furniture;<br>• architecture;<br>• design and interior decoration;<br>• museums;<br>• games and toys, etc. | • clothing, textiles and shoes;<br>• jewelry and coins;<br>• other crafts;<br>• furniture;<br>• architecture;<br>• design and interior decoration;<br>• museums;<br>• games and toys, etc. |
| Nondependent copyright industries | • general retail and wholesale;<br>• transport;<br>• telecommunications and Internet | • general retail and wholesale;<br>• transport;<br>• telecommunications and Internet |

Source: Chalukov, I., Borisova, Vl., 2003, p.75[19]

[18] The survey uses data from the 2008 classification of economic activities National classification of economic activities 2008 which applies the new European classification NCEA, Rev.2 in the statistical practice of Bulgaria. The new National classification of economic activities 2008 solves some of the problems with the so-called "mixed codes", identifying important copyright economic activities in separate codes - design, activities in organizing congress and exhibitions, etc.

[19] Chalukov, I., Borisova, Vl., and coll., p. 35 and Annex I from : Guide on Surveying the Economic Contribution of the Copyright-based Industries, WIPO, 2003, p. 73, List of Copyright-based industries.

The creative activities of the copyright industries are empirically identified in the National Statistical Institute through the national statistical system in the form of a database of their economic activity during the reporting period.

The economic indicators used in the survey show the following values generated by the cultural industries for 2008 (see Table 3).

Table 3

Share of cultural industries by national industries by economic indicators

| Indicator | Creative industries (thousands BGN) | National industry (thousands BGN) | Share of cultural industries by national industries |
|---|---|---|---|
| Gross output | 9284458 | 158788000 | 5.85% |
| Gross value added (GVA) | 3147040 | 57733000 | 5.45% |
| Gross domestic product (GDP) | 3147040 | 69295000 | 4.54% |
| Employment | 188273 | 3825315 | 4.92% |

Source: Ibid., 2003[20]

The methodology also allows for a more in-depth analysis by types of cultural industries with economic indicators gross output, added value and employment (see Table 4).

Table 4

Share of cultural industries by type in the national economy

| Cultural industries | Gross output | | Added value | | | Employment | |
|---|---|---|---|---|---|---|---|
| | thousands BGN | % of GDP | thousands BGN | % of GVA | % of GDP | number | % of employed |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Publishing industry | 1412153 | 0.889 | 475438 | 0.824 | 0.686 | 33929 | 0.887 |
| Music industry | 55651 | 0.035 | 22220 | 0.038 | 0.032 | 1121 | 0.029 |
| Visual arts | 26156 | 0.016 | 4557 | 0.008 | 0.007 | 2233 | 0.058 |
| Performing arts | 408377 | 0.257 | 82092 | 0.142 | 0.118 | 15040 | 0.393 |
| Film industry | 197502 | 0.124 | 50841 | 0.088 | 0.073 | 2323 | 0.061 |
| CMOs | 10327 | 0.007 | 9294 | 0.016 | 0.013 | 50 | 0.001 |
| Software industry | 1379651 | 0.869 | 722629 | 1.252 | 1.043 | 25604 | 0.669 |
| Media industry | 443258 | 0.279 | 155671 | 0.270 | 0.225 | 5144 | 0.134 |
| Photographic industry | 39365 | 0.025 | 18752 | 0.032 | 0.027 | 3003 | 0.079 |
| Advertising industry | 1753054 | 1.104 | 292928 | 0.507 | 0.423 | 11498 | 0.301 |
| Architecture | 501311 | 0.316 | 252487 | 0.437 | 0.364 | 10044 | 0.263 |
| Design | 32041 | 0.020 | 9480 | 0.016 | 0.014 | 954 | 0.025 |
| Cultural heritage | 1049 | 0.001 | 437 | 0.001 | 0.001 | 86 | 0.002 |
| Industry of festivals | 48327 | 0.030 | 28170 | 0.049 | 0.041 | 981 | 0.026 |
| Core cultural industries | 6308223 | 3.973 | 2124997 | 3.681 | 3.067 | 112008 | 2.928 |

Source: Ibid.,2003[21]

[20] Chalukov, I., Borisova, Vl., and coll., p. 35 and Annex I from : Guide on Surveying the Economic Contribution of the Copyright-based Industries, WIPO, 2003, p. 73, List of Copyright-based industries.

[21] Chalukov, I., Borisova, Vl., and coll., p. 35 and Annex I from : Guide on Surveying the Economic Contribution of the Copyright-based Industries, WIPO, 2003, p. 73, List of Copyright-based industries.

The dynamics of value added, created in the cultural industries for 2008-2009 shows growth for the film and software industries and relatively low values for the advertising and media industries, performing arts and architecture. As far as the employed are concerned, their number has grown significantly in publishing, software, advertising, architecture and performing arts.

In conclusion, although the copyright model uses the copyright protection of cultural products as a classification criterion and allows the measurement of economic contribution of cultural industries, it is not a sufficient classification basis for structuring them in the creative industries system.

## 5. Model of the intellectual property system

The positive results from the development of the copyright model still do not allow the structuring of cultural industries in the creative industries system, as the model does not support the construction of the system itself but only classifies the cultural industries by themselves. Nevertheless, the copyright model creates a good basis for strengthening intellectual property as a driver of cultural industries (Howkins, 2013), according to the existing economic models, thus helping to make it classification criteria for systematization of the creative industries as a whole. It is this basis that the present study steps on – that the structuring of cultural industries is possible through intellectual property as classification criteria of the creative industries system. Building on the intellectual property, whose subjects are in the fields of science, technology, literature and art and correspondingly protected as industrial property in the innovation sector or as artistic property in the cultural sector, the system of creative industries is built up of three main groups of industries:

- industries in science, research and development activity, and education, the so-called innovative industries;
- industries in the material production sector (extractive industry, processing industry and partially services sector); the so-called innovation industries;
- industries in the culture sector; the so-called cultural industries[22]

The advantage of the intellectual property system as a classification criterion is that the proposed model, apart from revealing the functional structure of the industries in the creative and innovative sector of the economy as a whole, contributes to:

- the new model of systematization of the creative industries, which, compared to the one currently under consideration, offers serious arguments for the self-determination of both the innovation and the cultural industries;
- in contrast to existing classification models that do not recognize science, R&D and education, even as creative activities[23], the new model not only recognizes their

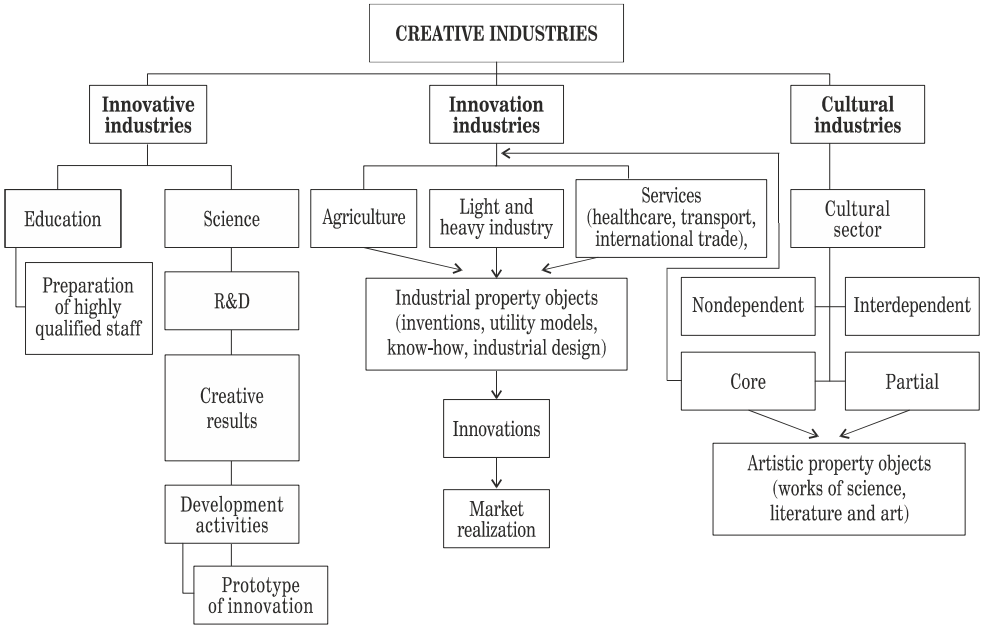
[22] The model excludes the sub-structuring of the cultural industries of core, interdependent, partial and nondependent.
[23] World Conference of Science, 26 June to 1 July 1999, Budapest, see: www.unesco.org.

importance but also identifies science, research and educational activities as a separate group of creative industries.[24]

This model allows, through the proposed systematization of the creative industries, to give an economic explanation of the functional link between cultural and innovation industries, through their classification again through intellectual property (in particular industrial property and copyright) (see Chart 3).

Chart 3

Creative Industries System




Source: Borisova, Vl., 2017[25]

This model allows measuring the economic contribution of both the cultural industries and the innovation industries, both in the creative and the innovation economy. In this case, the

[24] Notwithstanding the fact that researches are not a product for mass consumption, it is undisputed that these are a major resource for the development of the knowledge economy. As they represent creative processes and intellectual property, they are involved in the creation of innovations in the field of technology (product or process), literature and art (social innovation) that determines their importance for the development of innovation and creative economies. Science, R&D and education have their own specific groups of participants, create their own creative product, develop an intellectual property business, and form a self-sufficient market that is sufficient to be identified as a stand-alone industries.

[25] Borisova, Vl., 2017, Business with Intellectual Property at the Creative Industries, Publ. UNWE.

copyright factor should be applied as a research factor for the cultural industries, and the innovation factor should be developed for innovation industries. This may be based on research, development and innovation activities, taking into account the difference between developed inventions, patented inventions and implemented inventions in the production process.

In support of this thesis, a European Union survey can be used which, although it does not determine the economic contribution of the innovation and cultural industries provides evidence-based data on the impact, role and public perception of intellectual property in the economy of the European Union (EPO and EUIPO, 2016).

Table 5

Contribution of IPR-intensive industries to GDP, 2011-2013 average

| IPR-intensive industries | Value Added / GDP (€ million) | Share of total EU GDP (%) |
|---|---|---|
| Trade-mark-intensive | 4,812,310 | 35.9 |
| Design-intensive | 1,788,811 | 13.4 |
| Patent-intensive | 2,035,478 | 15.2 |
| Copyright-intensive | 914,612 | 6.8 |
| GI-intensive | 18,109 | 0.1 |
| PVR-intensive | 51,710 | 0.4 |
| All IPR-intensive | 5,664,168 | 42.3 |
| Total EU GDP | 13,387,988 | |

Source: EPO and EUIPO, Industry-Level Analysis Report, 2016, p.8

The data show that intellectual property industries account for more than 40% of the EU's gross domestic product and generate 38.1% of the total employment of the territory of the single European market. These statistics really indicate the importance of intellectual property for both the functioning of the creative industries sector and for the overall functioning of the economy. Despite the research is focused on the contribution of intellectual property to economic development, it is a good basis for developing a methodology for exploring the economic contribution of cultural and innovation industries, i.e. of the creative industries into economic development. The reason why such a methodology has not yet been developed is the lack of a unified model for structuring the creative industries. Although the present study suggests such a model, it could not be applicable at the moment due to the existence of different classification models developed and applied by international organizations from different spheres of public life but related to creativity, trade, science, education, economy, intellectual property, etc. (WIPO, UNESCO[26], DCMS[27]).

[26] UNESCO, The 2009 UNESCO Framework for Cultural Statistics (FCS), 2009, United Nations Educational, Scientific and Cultural Organization, Montreal. The first FCS dates back to 1986 and has been revised several times, reflecting the changing nature of the cultural sector's breadth. For example, the December 2007 draft of the final 2009 version did not include design and creative services (architecture and advertising) in the core cultural domain.

[27] DCMS/Department for Culture, Media, and Sport, 2011, Creative Industries Economic Estimates, Full statistical Report, London.

## Conclusion

Although economic theory has advanced significantly in recent years in positioning the creative economy and structuring its functional units, there are still many inconsistencies in the international understanding of creative industries. The understanding of the priority role of cultural industries in the identification of the creative industries continues, which makes it difficult to economically identify the creative sector, its products and the market. Despite the comparative comfort of this conceptual basis, the needs of the business environment require the development of a more economically oriented concept that allows a clear structuring of the creative industries and their integration into the economic life. This is complementary because it is related to creativity and alternative, because besides the culture it adds innovation concept as well provides the economic model of the intellectual property system. The intellectual property system is a range of creative results, the so-called objects that are created in the fields of science, technology, literature and art; i.e. from the fields of culture and technological innovation, including cultural heritage. These objects are granted protection in favor of their creator through the intellectual property right whose economic characteristics is the trade monopoly. These economic features of the right (the trade monopoly) and the intangible characteristics of intellectual property (creativity) are actually the real engine and classification criteria of the creative industries. It is these that cause industries to be economically active and to measure this activity as an economic contribution.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

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# THE PLACE OF TRANSPORT IN THE CIRCULAR ECONOMY OF BULGARIA

*The circular economy is based on three basic principles: reduction, reuse and recycle, which can be successfully implemented with the help of transport, which is viewed as a key role in logistics. In the present paper, this idea is developed by performing a theoretical overview of the essence of the circular economy and the impact of transport on the environmental situation of Bulgaria is analysed, in order to open up opportunities for the application of advanced solutions to protect the environment. These opportunities are associated with the implementation of a circular economic model in the country and specialization in the Bulgarian economy in the sector of production of biofuels, recycling of end of life vehicles and tyres.*
*JEL: L62; N70; R40*

## Introduction

The current dimensions of the economic activity require the study of economic activities from the standpoint of environmental and reversing capabilities, which accumulate potential to reduce the footprint, left in the environment. On this basis, the perceptions for the necessity to "generate positive effects on logistics for the environment" (Blagoev et al, 2009, p. 300) are further developed. In the context of responsibilities, which the modern society assumes, the role of transport is specified as a key logistic function which ensures the flow of normal reproduction process by means of the movement of material and human flows.

The purpose of this paper is based on a theoretical overview of the nature of circular economy and an analysis of the impact of transport on its development in Bulgaria, to open up opportunities for the application of the circular pattern in some transport-related sectors of the Bulgarian economy.

In order to achieve the set objective, some key tasks should be solved:

1. Make a review of the theoretical formulations to the nature and purpose of the circular economy.

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2. Analyse of the impact of transport on the development of the circular economy in Bulgaria
3. Reveal the role of transport in the circular economy of Bulgaria

In order to solve the formulated tasks were applied methods of summary and synthesis in theoretical plan, and in the research part the methods of a dynamic statistical analysis and graphical method are used.

The object of study is the transport of the Republic of Bulgaria and subject of the study is its role in the development of circular economy.

The information array of the research includes official statistics accumulated by Eurostat and NSI.

In the course of the analysis emerged some important restrictive conditions which affect mainly the timeliness of the statistics as they are updated in a wide periods of time and that does not allow for a maximum degree of convergence in terms of research up to this year.

Regardless of this fact, the paper addresses key issues, both from theoretical and practical application perspective and allows the author to conduct in-depth studies, based on which to formulate conclusions and recommendations.

## 1. Theoretical overview of the nature of circular economy

### *1.1. Nature and principles of the circular economy*

In the circular economy, the value of products and materials is maintained for as long as possible, the generation of waste and use of resources are minimized and the resources are kept in the economy when the product reaches the end of its life cycle and are used repeatedly to create additional value. This model may create secure jobs in Europe, to encourage innovations that provide a competitive advantage and to provide a level of protection of humans and the environment, which Europe can be proud of. This model may also provide consumers with more durable and more innovative products, through which to achieve financial savings and improved quality of life (European Commission, 2015).

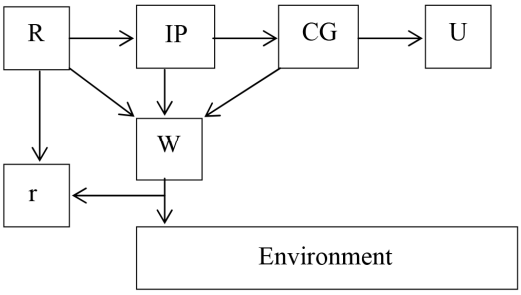
The concept of circular economy has its conceptual roots in the industrial ecology, which suggests symbiosis between many different companies, including transport and manufacturing companies (see. Fig. 1).

According to M. S. Andersen some of the waste can be converted back into resources, can be included in the manufacturing processes and thus create a new product with a new value "in use", which is to satisfy the unlimited needs with limited resources. It is namely on this basis, that the economy can be seen as circular.

According to some authors (Geng, et al., 2012, p. 216-224) the circular economy includes countless strategies that aim to achieve greater efficiency through economies based on system integration. Partnerships between businesses should be encouraged to develop the sectors of service, transport and infrastructure.

Figure 1

Simplified model of circular economy




*Legend: R – Resources; IP – Industrial Products; CG – Consumer Goods; U – Utility; W – Waste; r – recycling*

Source: Andersen, M. S., 2007, p. 134.

The circular economy has the potential to assist in raising productivity levels of resources and their environmental efficiency and to implement the reformation approach in the management of the environment and to achieve sustainable development, given the fact that is based on three main principles (3R's Principles: Reduction, Reuse and Recycle) (Ghisellini et al., 2015, p. 1-22): reduce, reuse and recycle.

The principle of "reduction", adapted to the transport sector aims to minimize the consumption of energy, raw materials and waste both at the input and output of the transport process by optimizing the technology of loading and unloading activities, stowage, transportation of compact products, application of modal transport solutions, advanced vehicles, optimal routes and so on.

The principle of "reuse" refers to any operation by which products or components that are not waste are used again for the same purpose for which they were intended. The reuse of products is very attractive principle in terms of environmental benefits, since its implementation implies less resources, less energy and less labour compared to the production of new products from new materials, their recycling and their disposal. Particularly in the field of transport the principle applies to the options provides by the spare parts for repair and maintenance of rolling stock and infrastructure.

The principle of "recycle" refers to any operation by which waste materials are reprocessed into products, materials or substances, used whether for the original or other purposes. It includes reprocessing of organic material but excludes energy recovery and the reprocessing into materials that can be used as fuels.

This principle in transport is often applied to continuous manufacturing process and the use of tyres, which leads to serious cumulative imbalance and environmental hazard.

In the transport sector, vehicle tyres that are disused, are used in building and maintaining the infrastructure needed to strengthen the banks by building barriers against erosion,

artificial reefs, breakwaters, as well as to strengthen the embankments along the roads. These tyres can also be used to reduce noise and vibration in the railway and tram routes. Added rubber powder prolongs the life of the road surface, reduces the noise from vehicles and improve traffic safety in wet conditions.

Of particular importance in the application of this principle in the field of transport are the end of live vehicles (ELV), which are manufactured by many spare parts, which are marketed and form positive economic outcome for economic agents.

Knowledge of the principles on which the circular economy is based, lets insight into its goal-setting and the design of measures to achieve the targets.

### *1.2. Main objectives of the circular economy and measures to achieve them in the context of transport*

The main objectives of the circular economy can conditionally be reduced to five and they are directly related to the principles of reduce, reuse and recycle (Table. 1).

Table 1

Main objectives of the circular economy and measures to achieve them

| Main objectives | Measures |
|---|---|
| a) Limited use of natural resources | a) Sustainable use of resources, allowing recycling of materials |
| b) A larger share of renewable and recyclable resources and energy in the total consumption | b) Repair, renew, reuse |
| c) Reduced emissions | c) Utilization of advanced technological solutions and modern equipment |
| d) Reduced material losses, preservation of the value of materials and reuse | d) Eco innovations |
| e) Sustainability of production and consumption | e) New business models |

In the context of transport, the main objectives of the circular economy can find a particular interpretation that binds them to the potential of the transport sector to respect the fundamental principles and to seek measures to achieve them, which are directly related to decisions concerning this sector.

#### *a) Objective: Limited use of natural resources*

Transport in logistics can be adapted to the environment if the transported batch loads are optimized and the running time is reduced and thus the costs and emissions decreased.

This goal can actually be achieved, since there are conditions that we associate with modal transport solutions, containerization and the promotion of groupage consignments, which are having increasingly wide application in the practice. This allows businesses to take advantage of these opportunities and to trust the multimodal operators and shippers.

Urban mobility, providing economic development of cities and quality of life of the population, can also protect the environment through an integrated approach. The objectives pursued by the project for integrated urban transport are directly related to the construction of a functioning circular economy. They can be reduced to the following major ones:

- Effective and rapid mass urban public transport (MUPT) with less energy consumption.
- More accessible secondary infrastructure of public transport networks.
- Introducing environment friendly types of urban transport.
- Increasing the attractiveness and the degree of utilization of MUPT.
- Improving the functionality of the city and population mobility.
- Reducing traffic congestions and increasing the capabilities of MUPT.
- Social inclusion and equal access of disadvantaged groups.

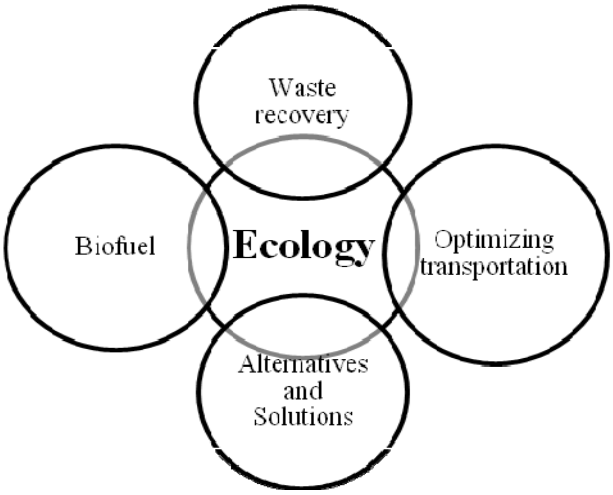
In order to achieve the set objectives actions for implementing the sustainable idea relating to the use of resources, allowing for recycling of materials should be taken.

*Measure: Sustainable use of resources, allowing recycling of materials*

Implementation of the measure "Sustainable use of resources, allowing recycling of materials" is possible with the introduction of new technologies and innovations such as the use of biofuels, alternative solutions (low-emission vehicles), waste recovery (recycling of old vehicles, tyres) and optimization of shipments (see Fig. 2).

Figure 2

Ecology at the centre of the "daisy" efficient transport




Source: Dragneva, N., 2013, p. 58.

Under the Renewable Energy Sources Act (Renewable Energy Sources Act, 2015) the biofuels are liquid or gaseous fuel for the transport, produced from biomass [2] , including:

a) biodiesel: methyl ester, derived from vegetable or animal fats with the quality of diesel fuel, to be used pure or mixed with diesel fuels;

b) bioethanol: ethanol derived from biomass and / or the biodegradable fraction of waste, to be used pure or mixed with fuel for petrol engines;

c) ethers derived from bioethanol, oxygen-containing compounds (ethyl tertiary butyl ether, or ETBE) produced from bioethanol, where the percentage by volume bio-ETBE calculated as biofuel is 47, biodimethylether: dimethyl ether derived from biomass for use as biofuel and bio-methyl-tertiary-butyl-ether: a fuel produced on the basis of bio-methanol, where the percentage by volume of bio-methyl-tertiary-butyl-ether, calculated as biofuel is 36, intended for use in pure form or mixed with fuel for petrol engines.

These fuels are a practical alternative to conventional fuels confronting the real threat of their depletion in the world, albeit in a rather remote in time range. The dynamics of price levels of oil destabilize economies, but the most serious concern arise from the damage they cause to the environment through the emission of greenhouse gases that are released during their use and the new attitudes of society to protect the environment for life. They are adequately reflected in the strategic objectives of the Green Paper of the European Commission "Towards a European strategy for security of energy supply" and the White Paper "Energy for the future – renewable energy sources." The Green Paper sets as a key objective by 2020, 20% of the conventional fuels in the transport sector to be replaced with "new energy sources" – biofuels, natural gas, hydrogen or other alternative fuels produced in an environmentally friendly way.

Another scenario for limited use of natural resources is prepared by vehicle manufacturers, who investing in the so called low-emission vehicles based on the idea of using different propulsion systems within a vehicle infrastructure, depending on which type of energy is available in the area in which the vehicle is used.

Such solutions include:

- Vehicles fuelled with liquefied butane LPG (Liquefied Petrol Gas). When driving on LPG, $CO_2$ emissions are about 18% lower than those in the gasoline mode.
- An electric vehicle, using an entirely electricity powered engine.
- Hybrid vehicles which have engines with electrical power supply and an internal combustion engine.

The development of science gives many solutions to environmental problems in transport, but at the moment most technologies are not fully independent and are indirectly dependent

[2] "Biomass" means the biodegradable fraction of products, waste and residues with biological origin from agriculture (including plant and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and household waste (Renewable Energy Sources Act, 2015).

on natural resources. The massive entry into operation of the electric vehicle, for example, would lead to strong growth in electricity consumption, which in turn will affect carbon dioxide emissions that cause greenhouse effect, making them high.

Implementation of the measure "Sustainable use of resources, allowing recycling of materials" implies waste recovery (recycling of old vehicles, tyres). The recycling of old vehicles enables valuable raw materials to be reused in the production and thereby contribute to environmental protection. Recycling one vehicle takes place in 4 stages:

Phase 1: The recycling of the vehicle starts with its controlled transmission to an authorized location or to an authorized service for disassembly. A certificate of recycling is issued, which is necessary for the further procedure when decommission the vehicle.

Phase 2: The battery, air bags are removed and the pyrotechnic parts are rendered harmless. The actual recycling starts with draining the fluids from the vehicle to a designated location. At this point are drained, for example, the freon and brake fluid, antifreeze, motor and transmission oil, the fuel is extracted with a special device. The different fluids are sorted into appropriate containers and stored or recycled in appropriate plants.

Phase 3: During the dismantling, the parts that can be reused, are set aside. For example, disassembled engines are prepared in special locations for precise recycling. Valuable materials such as precious metals from the catalyst is recycled in a separate cycle.

Phase 4: The remaining parts of the vehicle are transported for further processing in the respective plants for scrap, where they are cut and sorted. Plastics, textiles, metals are used in other industries.

*b) Objective: A larger share of renewable and recyclable resources and energy in the total consumption.*

The automotive industry is a major consumer, which operates in the conditions of limited resources. This requires manufacturers to look for replacement materials that reduce the ecological footprint, e.g. bio-based raw materials as wood, wool, flax, soybeans and hemp.

Recycling should be considered as a key issue during the entire life cycle of a product, in this case a vehicle - from its initial concept to the end of life cycle. In accordance with this view the manufacturing companies engage in activities for as much as possible reduction of waste and recycling everything that can be reused in the phases of development, production, operation and disposal of waste. Even at the stage of design and development vehicle manufacturers concentrate on improving structural components for the purposes of recycling. If possible, easily recyclable materials are selected, materials and structural developments are re-used, increasing the amount of the used recycled materials and efforts are taken to facilitate the final dismantling of vehicles.

*Measure: Repair, renewal, reuse*

During disassembly of an automobile are formed groups of materials which may be utilized repeatedly, for example, for substitution of coal in the casting slag, for adjusting the water content of sewage sludge, some can be processed in the cement industry and so on. This

manufacturing process allows for 85% reuse of vehicles, which reduces the amount of final waste that falls in landfills.

*c) Objective Reduced emissions.*

With regard to achieving this objective most attention should be paid to road transport, given its technical and economic characteristics associated with environmental pollution.

Emissions from road transport can be classified into three main groups – emissions of flue gas emissions from wear and emissions from evaporation (magazine Ecology and infrastructure, 2016). Currently, the controlled by the legislation pollutants in flue gases from vehicles include $CO_2$ , CO, hydrocarbons, nitrogen oxides and particulate matter.

The emission standards in the EU do not yet regulate emissions from transport of: some acidic pollutants such as $NH_3$ and $SO_2$ (although the concentration of $SO_2$ is limited indirectly through the legislation on fuel quality); carcinogenic and toxic organic pollutants such as polycyclic aromatic hydrocarbons, persistent organic pollutants, dioxins and furans; heavy metals such as Pb, Cr, Hg, Ni, Se and Zn. The content of each of these contaminants in the emissions, of course, depends on the type of fuel used and the type of engine.

Emissions from wear result from the mechanical abrasion and corrosion of parts of vehicles. These emissions include only particulate matter and some heavy metals. Significant dust emissions are generated by the mechanical wear of tyres, brakes, clutch, the road surface and corrosion on the chassis of vehicles.

Emissions from evaporation are formed by vapour leaking from the fuel system. They only contain volatile organic compounds that are released into the environment, even when the vehicle is parked and the engine is off.

Taking into account the indicated groups of pollutants emitted by road transport, the measure involving the use of modern technological solutions and modern equipment should be considered, without ignoring other transport alternatives.

*Measure: Utilization of advanced technological solutions and modern equipment*

One of the measures in this direction involves the use of satellite navigation system following the program "GALILEO" (Green Paper on energy efficiency or How to do more with less, p. 30). Namely the transport sector will be the main user of this radio navigation system via satellite. Satellite navigation system will offer reliable and precise positioning systems for vehicles and will enable us to develop information systems for road users and assistance to drivers. In aviation it will assist at different stages of the flight. In seafaring will be used for marine and coastal navigation. The development of a satellite navigation system also helps sustainable transport, thanks to traffic flow optimization in road transport, aviation, maritime and rail transport. Pushing back the limits of infrastructure saturation, will diminish the exorbitant costs of traffic congestions and will help to reduce energy consumption and underpin the better protection of the environment.

*d) Objective: Reduced material losses, preservation of the value of materials and reuse.*

The idea, embedded in the modern economic processes corresponds to the objective, aimed at reducing material losses, preserving the value of materials and reuse. Regardless of whether these processes are aimed at manufacturing a product or offering a service, the shorter the time for their conduct, the more effective is the running of the operating system and more attention is paid to the environmental problems of production, waste reduction and recycling (Blagoeva, 2010, p. 132).

Particularly in the transport sector the economic functions can be grouped around the creation of conditions for carrying out the normal process of reproduction, to overcome the spatial distance between production and consumption in accordance with the economic principles for cost reduction and the time for warehousing in accordance with the basic principles embedded in the international environmental law (Rayanova, 2010, p. 117):

- principle of the common property of mankind;
- freedom of research and use of the environment;
- rational use of the environment;
- protection from environmental pollution;
- international cooperation in the field of environmental protection, and
- international responsibility in environmental protection.

Based on these principles the transport sector should exploit new technologies in its operations, which will allow it to demonstrate responsibility in the problems of modern consumer society concerning the use of obsolete goods.

*Measure: Eco innovations*

Innovations in transport are directly related to modern technologies that reveal the potential for transforming part of the solid waste into fuel. There are developed methods by which waste can be processed and turned into liquid, solid or gaseous fuels (Ecology and infrastructure, 2014).

Production of liquid fuels from waste is associated primarily with methods of thermochemical treatment of organic waste, mainly biomass. the thermochemical treatment is considered viable, environmentally and economically consistent method for obtaining power and chemicals from waste. Usually it involves the processing of waste by pyrolysis.

Solid fuel derived from waste, known as modified fuel or RDF (Refuse Derived Fuel), is produced by shredding and dehydrating solid waste through a special conversion technology. RDF is produced mainly from combustible fractions such as plastics and biodegradable waste, incl. tyres and rubber waste, residues from vehicle dismantling (automobile shredder residue) and others (Energy review, 2015).

The gas from renewable sources is a gaseous fuel produced from biomass and/or the biodegradable fraction of waste that can be purified, until reaching natural gas quality and

is intended for energy purposes, including the production of electricity, heat and energy for cooling and for use as biofuel (Renewable Energy Sources Act, 2015).

*e) Objective: Sustainability of production and consumption.*

According to the definition approved by the European Conference of Ministers of Transportation, "sustainable cause" affects the transport system and in this perusal it (ECMT, 2004): "Allows meeting and development of the needs of individuals, businesses and society to be met safely and in a manner compatible with human health and ecosystems, and promoting equity within and between successive generations. To work fairly and efficiently at affordable prices, to offers choice of transport mode and to maintain a competitive economy as well as a balanced regional development.

To limit the impact on air and water as well as noise emissions, waste and resource use.

To limit emissions and waste within the capabilities of the planet to absorb them, to use renewable resources at or below their rates of generation or use non-renewable resources at or below the rates of development of renewable substitutes while minimizing the impact on use the land and the generation of noise."

In this context, the sustainable aspects of the transport system are associated with main cornerstones, the first of which focuses attention on the needs of individuals, businesses and society discussed in terms of environmental performance and human health status. The second cornerstone links the objectives of a sustainable transport system with a limitation of the environmental impact and the third seeks to limit these processes to the potential for absorption of Earth in regard to "toxic emissions, greenhouse gases and water pollution from transport" (Marsden, et al., 2005, p. 7).

*Measure: New business models*

Today, businesses are looking for solutions that are economically justified and at the same time diffuse the sustainable idea, through optimal management of logistics flows, relying on new technologies and the application of scientific approaches.

The new business models are based largely on the possibilities for connecting, communicating and sharing information. The dynamics of the transport activity involves the accumulation and operation of constantly updating in real-time information on vehicles, the material and accompanying flows, which is made possible by cloud technologies that provide network access to shared resources such as: Internet networks, servers, storage arrays of data and software applications with minimal participation and management by the cloud provider (Sulova, 2013, p. 558).

Transport companies rely increasingly on science-based approaches for building their business models which ensure optimality regarding the criteria cost and time, as well as a number of other criteria such as: optimization of the time, when the incurred for the transport costs are within certain limits (Milkova, 2013, p. 104); optimize the allocation of vehicles following preliminary determined optimal routes (Milkova, 2013, p. 329); optimize the activities with relative criteria using the methods of fractional-linear

optimization, enabling performance optimization by two criteria (profitability, prime cost, relative risk, etc.) (Nikolaev, 2016, p. 10).

The actual dimensions of the environment require the economic agents to be flexible, adaptable and precise in terms of a complex of economic, social and environmental factors.

## 2. Analysis of the impact of transport on the development of circular economy in Bulgaria

### *2.1. Legal framework, related to the role of transport in the circular economy of Bulgaria*

Putting the priorities of environmental policy as a basis for the development of circular economy requires defining three sets of priorities, limited to specific programs and projects (Centre for the Study of Democracy):

A) Main priority: towards sustainability:

- possibly full integration of environmental issues in all sectoral policies, strategies and programs;
- total ecologization of the economic sectors, legally fixed by legislation, consistently brought closer to and aligned with the European norms, standards and procedures;
- consecutive introduction as leading, the shared responsibility principle, which involves both the State, local authorities and industries as well as major groups: private businesses, academia, professional classes, women, youth and children, etc.;
- measures for remodelling the social and economic behaviour of individuals, businesses and civil structures, with domination by economic and market regulators and mechanisms;
- reorientation of management activities towards horizontal measures in the process of ecologization, development of intersectoral policy and coordination between the competent state bodies and enhanced involvement of local authorities and the public.

B) Medium-term priorities:

- reduce and mitigate negative effects from diffuse, difficult to control sources of pollution and impacts in the economic sectors such as transport, agriculture, tourism, energy and specific industrial sectors;
- accelerated development of regulatory changes (limit values, environmental standards and evaluation procedures) in the process of cohesion and alignment with EU legislation, particularly in the field of consumer protection of products and goods with effects on human health and the environment;
- introducing the shared responsibility principle, along with the completion of the privatization process and the development of the private sector, which will basically carry out the country's participation in the internal market of the Union.

B) Short-term priorities:

- activities for accelerated construction of public ecological infrastructure incl. water supply and sewage systems, plants for purifying municipal wastewater, landfills and stations / plants for processing of solid waste and non-hazardous industrial waste, etc.;
- activities to reduce and eliminate the immediate environmental risks to human health, incl. ones generated in the process of manufacturing and consumption of goods / services in sectors such as energy, construction, transport, etc., as well as from the environmental components (soil, water, air, mineral and biological resources);
- activities for liquidation of past environmental damages, including nuclear industries, landfills of hazardous industrial waste (incl. of uranium production), contaminated land in the agricultural land fund, etc.;
- In order to achieve the short- and medium-term priorities is proposed the diversification and development of tools of environmental policy and environmental management through:
- internalization of the costs of environmental protection in the price of each product / service and thus generation of the necessary resources and capacity of the state, local governments and businesses to meet their environmental responsibility to the country, the market and consumers;
- development and enrichment of the economic regulators for environmental behaviour of individuals in balancing the criminal with stimulation / mitigating measures;
- diversification of sources of revenues to the budget and target funds for protection of the environment, the natural resources and the human health through direct and indirect taxes, charges for the use of resources and environmental services and so on.;
- harmonization of legislation, including alignment of the environmental procedures. incl. environmental certification of producers and technical standards and norms with those of the EU, incl. of the systems of standards ISO-9000 and ISO-14000;
- accelerated development and effective use of the active enacted harmonized legislation, especially in the part of environmental regulations and ecological standardization;
- development and strengthening of institutions and effective administrative reform, incl. in the sector of environmental protection, health and natural resources, following models and standards comparable to those of the EU;
- accelerated specialized training of management and executives in order to strengthen the capacity for immediate application of European procedures, norms and standards;

- protection of consumers from environmental and health risks generated by the manufacturing and consumption of goods/services; introduction of environmental labelling for the environmental attributes of the product (origin, processing / manufacturing, consumption) as a form of informing and protecting consumers;
- wide and objective information of citizens about the state of the environment, guaranteed to strengthen the role of civil society and major groups in society by involving them in making decisions on environmental issues.

The legal framework related to the participation of transport in the development of circular economy in Bulgaria is of particular importance given the need to regulate the obligations assumed by the state, especially in terms of European integration. The regulations concerning the transport in the context of its role in environmental protection and sustainable development of the sector are a number of laws, statutes, ordinances, regulations, directives etc., that have one common goal – to regulate the economic activity carried out in the transport sector according to European law and the active legislation of the Republic of Bulgaria.

Given the ecological footprint, which the transport sector puts in the atmosphere, it is important to define the term "air pollution". Under the meaning of Ordinance №2 from February 19, 1998 for emission limit values (concentrations in waste gases) of pollutants, released into the air from stationary sources: "Air pollution" means any entry of harmful substances in it, and "harmful substances" are those that cause changes in air quality, leading to adverse effects on the health and comfort of people, harm living resources, the soil, ecosystems and property.

The adopted in 1996 Clean Air Act, Art. 2 para. 4 declares commitment to regulate the "quality requirements for liquid fuels, including monitoring of compliance with the quality requirements for liquid fuels in their marketing and their distribution, transport and use." The legal requirements relate to: transport vehicles and other individual sources of pollution, transport activities (art. 3, para. 2, 4).

By joining the EU on 1 January 2007, Bulgaria agreed to implement Directive 2003/87/EC establishing a European scheme for trading emissions of greenhouse gases. The scheme for emissions trading is the main EU instrument for implementing the Community's obligations under the Kyoto Protocol under the UN Framework Convention on Climate Change. From 1 January 2012 the scheme for trading greenhouse gas emissions includes all flights arriving at or departing from an airport located in a Member State, for which the Treaty on the Functioning of the European Union applies. For the period from January 1, 2013 to December 31, 2020 and for each subsequent period of the European emissions trading scheme (EU ETS) from aviation activities, the quotas to be allocated to aircraft operators shall be equivalent to 95 percent of the historic aviation emissions multiplied by the number of years in the respective period (art. 37 par. 3 of the Limitation of climate change Act effective from 03.11.2014).

In view of prevention for environmental pollution was introduced the concept of "eco-tax" in the Environmental Protection Act (EPA), according to which (Art. 56a) “(1) Persons possessing motor vehicles, which through its construction, action or used fuel cause air

pollution, ozone layer depletion and climate change, shall paid one time, during the first registration of the vehicle, an eco-tax in the amount and following the procedure established by the Council of Ministers. (2) The eco-tax under para. 1 enters the Enterprise for management of environmental protection activities (EMEPA)."

Practically in Bulgaria there is no fee for motor vehicles (MV) that is associated with air pollution. The impact of motor vehicles on air quality is reflected in the tax on vehicles, which is paid annually to municipalities. It can be reduced in the event that the vehicle is equipped with catalytic devices, and corresponds to certain environmental requirements. Indirectly, vehicle users pay eco-tax when using the fuels, where such is charged.

Another type of fee accompanying the vehicles that can be mapped to eco-fee is the product fee, which is regulated by the Waste Management Act (WMA) (see Table 2).

Table 2

Comparative characteristics of the product fee from WMA and eco-fee from EPA

| Features | Product fee from WMA | Eco-fee from EPA |
|---|---|---|
| Amount and payment procedure | Ordinance for establishing the terms and amount of payment of the product fee (prom. SG., issue 30 from 12.04.2016, effective from 16.06. 2016). | Missing legislation |
| Liable persons | ~ Persons marketing vehicles (according to the WMA and the Regulation establishing the terms and amount of payment of product fee. ~ Persons who acquire for personal use motor vehicles imported or input from another Member State under the Regulation establishing the terms and the amount of the payment of product fee. | Owners of vehicles |
| Reason for introducing the fee | For manufacturers and importers of vehicles not involved in organizations for utilization and who do not perform their duties individually. | Vehicles that through their construction, action or used fuel cause air pollution, ozone layer depletion and climate change. |
| Recipients of the fee | EMEPA or OU | EMEPA |

Source: Renewable Energy Sources Act // December 18, 2015.

Unlike the eco- fee, the product fee is paid by persons marketing vehicles and applies to all motor vehicles. The product fees are paid to either the state Enterprise for management of environmental protection activities (EMEPA) or to the created by the WMA Organizations for Utilization (OU that are committed to collect, utilize and dispose of end of life vehicles (ELV).

Unlike other products (e.g. household appliances), after the use of which widespread waste is also generated and a product fee is due, but during their acquisition a separate document is not required, vehicles require documentary proof of payment to the account of EMEPA or OU (under contract for membership). Thus, with the payment of the fee, the end

customer becomes a person under a contract with OU who has to meet obligations at the vehicle's end of life. In fact, the OU members are individuals and they are, roughly equal to the number of registered vehicles.

The Bulgarian legislation applies Ordinance on end-of-life vehicles (adopted by Decree № 11 of the Council of ministers from 15.01.2013, prom. SG. issue 7 from 25.01.2013). Its conditions mainly try to commit those involved in the design, manufacturing, distribution and consumption of vehicles and the persons carrying out activities with ELV to take measures to limit their harmful effects on human health and the environment. For ELVs, there are basically two scenarios – recycling or reuse. Specifically, in the Waste Management Act, "Waste recycling" is an activity for restoration or resumption of the properties as raw materials, and the "Reuse" is the use of waste as a product that has once already been used in the same form for the same purpose.

Another document that affects the environmental aspects of transportation, is Directive 2003/30/EC fixing objectives regarding the introduction of biofuels. The diversification of EU energy mix relies on multiple technologies for renewable energy (hydropower, geothermal energy, solar energy, marine energy, wind energy, energy from heat pumps, biomass, biofuels) that offer various services in the form of electricity, heating and cooling and transport solutions. Renewable energy sources (RES) together with energy efficiency and the flexible and intelligent infrastructure are options worth to be selected in each case. In the future, RES in Europe will have a larger share in energy supply, for electricity, for heating (which accounts for almost half of the total energy demand in the EU) and for cooling and for the transport sector and will reduce Europe's dependence on conventional energy sources. "Energy Roadmap 2050" involves a share of renewable energy in the energy mix in the EU by at least 30% in 2030; therefore the EU should strive to achieve even higher share for renewables for 2030, taking into account the effects arising from the interaction with other possible objectives of the policy in the fields of climate and energy, in particular in relation to the objective to reduce greenhouse gas emissions and its impact on industries in the EU, including the sector of energy production from renewable sources.

The use of and the tax benefits related to biofuels, is based on different provisions of EU legislation such as the European Directive 98/70/EC as amended by Directive 2003/17/EC dealing with the quality of fuels. This directive authorizes the addition of ethanol of up to 5%, of ethers containing five or more carbon atoms in a molecule, up to 15% in gasoline and of biodiesel – up to 5% in diesel. A larger percentage is fully compatible with today's engines.

Directive 2003/96/EC allows for partial or total removal of excise duties. In the area of biofuels, the intention is to grant favourable tax treatment and to define certain limits, with the flexible option for Member States to adopt their own policy on the issue according to their specific circumstances (26th recital of the Directive).

Thus, under Article 16 of the Directive on energy taxation, Member States, inter alia, exempt products produced from biomass from energy tax or tax them subject to reduced tax provided that the exemptions or reductions in tax must be adjusted to take into account changes in the price of raw materials in order to avoid over-compensation for additional costs associated with the production of these products.

Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania and Slovakia may apply, for the uses specified in Art. 8 and Art. 9[3], a transitional period until 1 January 2021 for the introduction of $CO_2$ emissions taxation.

In Bulgaria the legislation reflects the actual dimensions of the environmental commitments that the country assumes as a full member of the EU in regard to participation in the trading of greenhouse gas emissions, adopt the targets with regard to the introduction of biofuels, joins the provision of favourable tax taxation of biofuels. At the same time, it is noteworthy that under the national legislation no environmental tax related to pollution from motor vehicles is charged, which can be reported as an adverse circumstance, which is offset by tax payable for vehicles, which is paid annually to municipalities.

In practice it is not possible to create special environmental laws covering all the effects that human activities have on the environment, but adopting the principles of sustainable development as a normative approach, which should be reflected in specific rules relating to the ecologization of the economic sectors, including transport is objectively applicable.

### *2.2. Researching the role of transport in the development of circular economy in Bulgaria*

EU member states have set three objectives by 2020 (known as the "20-20-20"): 20% reduction in greenhouse gases of the EU compared with 1990 levels; Increase the share of renewable energy sources in EU energy consumption to 20%; Increasing the energy efficiency in the EU by 20%.

The transport sector is directly involved in achieving the operational objectives for ensuring high mobility of goods and reducing the harmful effects of transport on the environment and therefore the framework indicators for sustainable development focus mainly on energy consumption.

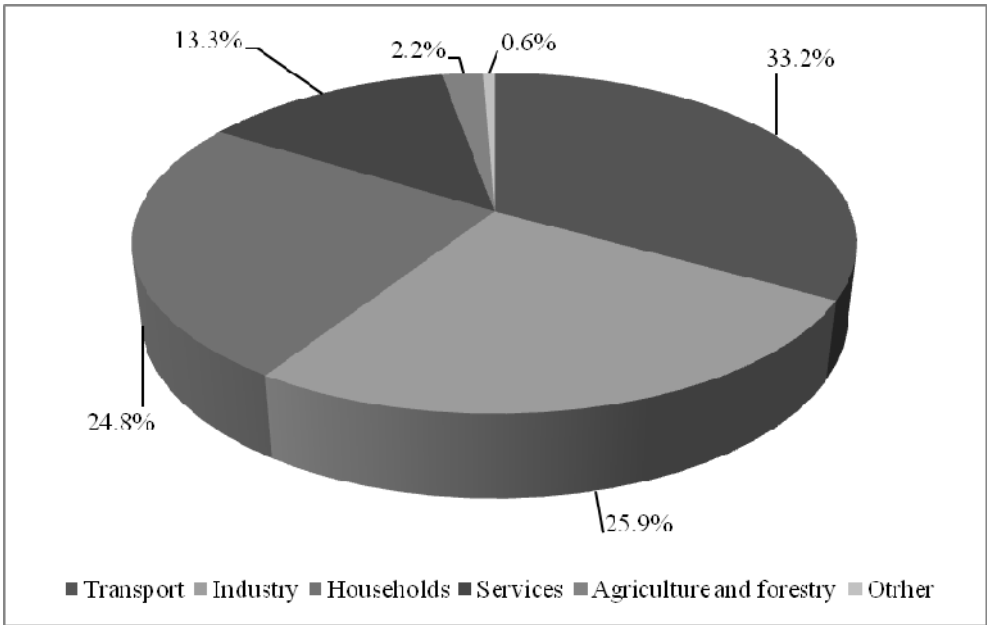
The analysis of the final energy consumption in the EU-28 in 2014, showing three dominant categories: transport (33.2%), industry (25.9%) and households (24.8%) (Fig. 3).

The total energy consumption of all types of transport in the EU-28 amounted to 353 million tons of oil equivalent in 2014. There is a significant change in the development of energy consumption for transport needs after 2007, when consumption began to decline in each year and between 2007 and 2013 energy consumption for transport in the EU-28 decreased by 9.1%. Nevertheless, in 2014 the transport sector holds the first place in final energy consumption within the Alliance.

[3] Art. 8: From 1 January 2013 the minimum levels of taxation applicable to products used as motor fuel referred to in paragraph 2 of this Article uses, shall be fixed as indicated in Annex I, Table B. Article 9: From 1 January 2013 the minimum levels of taxation applicable to heating fuels shall be fixed as indicated in Annex I, Table C.

Figure 3

Final energy consumption of the EU-28 in 2014 in %, calculated on the basis of tons of oil equivalent



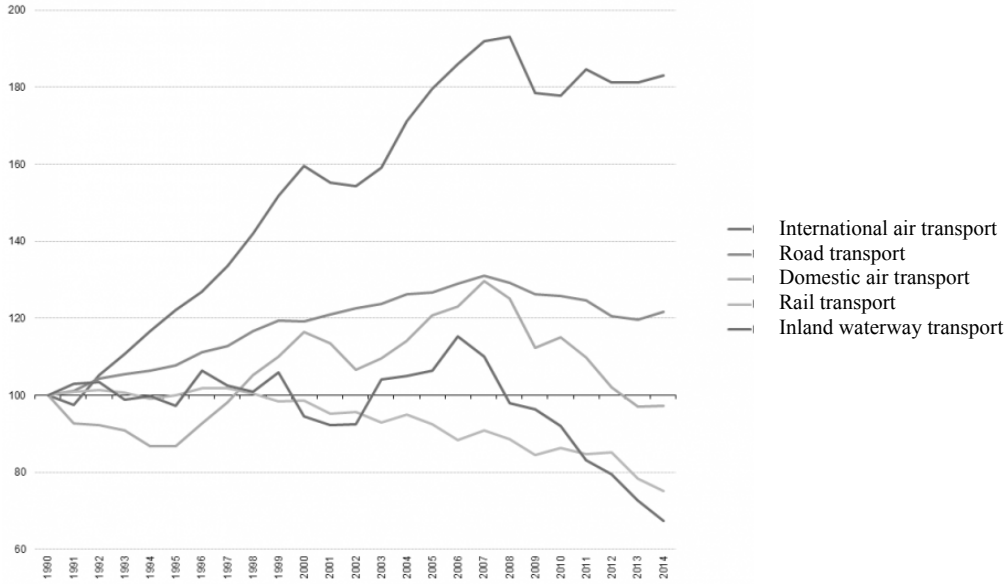

Source: Eurostat

Energy consumption among the main types of transport (air, road, rail and inland waterway) between 1990 and 2014 increases. As shown in Figure 4, the international aviation marks the highest growth in the EU-28. Road transport, which is the most exploited transport alternative worldwide, increases its energy consumption compared to the beginning of the period but also outlines a descending trend in comparison with the 2007 peak.

All other types of transport, including domestic air, rail and inland waterway, registered a decline in terms of energy consumption. This fact is not taken as a positive indicator, influenced by the application of modern transportation solutions, but is linked to the intensity of use of these transportation options from EU member states, including Bulgaria (see Table 3).

Figure 4

Energy consumption by types of transport in the EU-28 for the period 1990-2014 (1990 = 100, based on tons of oil equivalent)




Source: Eurostat

Table 3

Relative share of goods transported and work performed by road and other transport in Bulgaria for the period 2000-2015 (%)

| *Indicators* | *2000* | *2001* | *2002* | *2003* | *2004* | *2005* | *2006* | *2007* |
|---|---|---|---|---|---|---|---|---|
| Goods carried by road transport | 38.289 | 41.225 | 51.293 | 51.156 | 49.676 | 51.013 | 52.476 | 53.515 |
| Transport performance by road transport | 4.683 | 6.618 | 8.649 | 9.103 | 10.293 | 12.989 | 12.569 | 12.939 |
| Goods carried by other transport | 61.711 | 58.775 | 48.707 | 48.844 | 50.324 | 48.987 | 47.524 | 46.485 |
| Transport performance by other transport | 95.317 | 93.382 | 91.351 | 90.897 | 89.707 | 87.011 | 87.431 | 87.061 |
| *Indicators* | *2008* | *2009* | *2010* | *2011* | *2012* | *2013* | *2014* | *2015* |
| Goods carried by road transport | 52.675 | 56.366 | 54.97 | 58.107 | 60.906 | 65.877 | 66.11 | 67.916 |
| Transport performance by road transport | 11.634 | 20.819 | 31.931 | 40.335 | 51.836 | 65.064 | 73.657 | 76.058 |
| Goods carried by other transport | 47.325 | 43.634 | 45.03 | 41.893 | 39.094 | 34.123 | 33.89 | 32.084 |
| Transport performance by other transport | 88.366 | 79.181 | 68.069 | 59.665 | 48.164 | 34.936 | 26.343 | 23.942 |

A database of National Statistical Institute.

The data in the table shows the road transport as the most preferred by the transport operators in Bulgaria in the recent years, which was not typical for the sector at the beginning of the study period. Gradually over the years, can be observed, increasingly higher relative shares that are accumulated by road transport both in terms of transported goods and the work performed. To a large extent this trend of development is seen as unfavourable because it is the result of the growing interest of carriers to transport of goods by road, which is not a consequence of the economic boom in the country, but is the result of decreased levels of operational activity of other modes of transport and, in particular, rail and water, which can be defined as a form of cannibalism in the transport sector.

The main reason to prioritize road freight transport is a consequence of the limited volumes of business of the enterprises, which does not allow them to benefit from the main advantage of rail transport, associated with a lower cost per unit load transport. On the other hand, the reasons for the observed decline in the activity of the railways can be connected with the narrow relation and with the poor state of the infrastructure and rolling stock, with which the companies in the transport sector operate. On this basis it can be concluded that the "revitalizing the railways" is yet to be seen in Bulgaria as set out by the European Commission in the so called White Paper.

Particularly in water transport the lack of economic interest in this transport option is related to the general state of the Bulgarian economy, regarding the impact of key sectors whose products are subject to import or export, such as:

- oil processing industry (import of oil and export of oil products)
- metallurgy (import of ore, coke and other products of the metallurgical industry and export of the metallurgical industry and scrap);
- energy (coal import);
- construction (cement export, domestic shipments and export of inert materials, import and export of building materials and structures);
- agriculture (export and import of grain and fodder); chemical industry (export and less import of fertilizers);
- light industry and others sectors of industry (import and export of various general and containerized cargo).

The lack of basic raw materials in the country is a precondition for the preservation of existing or close to them volumes of imports from Russia and Ukraine. The partial recovery of the positions of Bulgarian products on the Russian market is expected to have a positive impact on transportation, but from March 2014 EU gradually imposes restrictive measures in response to the illegal annexation of Crimea and the deliberate destabilization of Ukraine.

The high degree of use of road transport, which is characterized by unfavourable influence on the ecological parameters of the environment requires a comparative tracing of the shares of emissions of harmful substances, defined by a calculated method based on the following indicators: consumed fuel, calorific properties, quantity of manufactured

production and input raw materials and emission factors for the respective pollutants emitted into the atmosphere of Bulgaria by road and other transport (see Table 4).

Table 4

Share of emissions of harmful substances into the atmosphere of Bulgaria from Road transport (RT) and Other mobile sources (OMS) for the period 2000-2014[4] (%)

| *Emissions* | *2000* | *2001* | *2002* | *2003* | *2004* | *2005* | *2006* | *2007* |
|---|---|---|---|---|---|---|---|---|
| Sulphur oxides (SOx) RT | 95.791 | 96.265 | 95.998 | 96.342 | 92.332 | 89.922 | 73.651 | 60.271 |
| Sulphur oxides (SOx) OMS | 4.209 | 3.735 | 4.002 | 3.658 | 7.668 | 10.078 | 26.349 | 39.729 |
| Nitrogen oxides (Nox) RT | 94.910 | 95.556 | 95.597 | 96.108 | 95.425 | 95.277 | 94.722 | 94.060 |
| Nitrogen oxides (Nox) OMS | 5.090 | 4.444 | 4.403 | 3.892 | 4.575 | 4.723 | 5.278 | 5.940 |
| Non-methane volatile organic compounds (NMVOC) RT | 99.384 | 99.408 | 99.448 | 99.495 | 99.324 | 99.303 | 99.234 | 99.272 |
| Non-methane volatile organic compounds (NMVOC) OMS | 0.616 | 0.592 | 0.552 | 0.505 | 0.676 | 0.697 | 0.766 | 0.728 |
| Methane ($CH_4$) RT | 99.528 | 99.558 | 99.603 | 99.641 | 99.593 | 99.617 | 99.636 | 99.673 |
| Methane ($CH_4$) OMS | 0.472 | 0.442 | 0.397 | 0.359 | 0.407 | 0.383 | 0.364 | 0.327 |
| Carbon oxide (CO) RT | 99.617 | 99.621 | 99.636 | 99.638 | 99.496 | 99.437 | 99.375 | 99.281 |
| Carbon oxide (CO) OMS | 0.383 | 0.379 | 0.364 | 0.362 | 0.504 | 0.563 | 0.625 | 0.719 |
| Carbon dioxide ($CO_2$) RT | 97.653 | 98.022 | 98.239 | 98.593 | 98.635 | 98.733 | 98.814 | 98.927 |
| Carbon dioxide ($CO_2$) OMS | 2.347 | 1.978 | 1.761 | 1.407 | 1.365 | 1.267 | 1.186 | 1.073 |
| Dinitrogen oxide ($N_2O$) RT | 88.731 | 89.461 | 91.003 | 92.163 | 85.617 | 86.102 | 87.219 | 88.522 |
| Dinitrogen oxide ($N_2O$) OMS | 11.269 | 10.539 | 8.997 | 7.837 | 14.383 | 13.898 | 12.781 | 11.478 |
| Ammonia ($NH_3$) RT | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 |
| Ammonia ($NH_3$) OMS | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| *Emissions* | *2008* | *2009* | *2010* | *2011* | *2012* | *2013* | *2014* | *2015* |
| Sulphur oxides (SOx) RT | 71.131 | 74.851 | 55.805 | 47.734 | 49.327 | 43.575 | 44.811 | : |
| Sulphur oxides (SOx) OMS | 28.869 | 25.149 | 44.195 | 52.266 | 50.673 | 56.425 | 55.189 | : |
| Nitrogen oxides (Nox) RT | 93.507 | 93.964 | 94.487 | 93.286 | 93.379 | 93.140 | 93.421 | : |
| Nitrogen oxides (Nox) OMS | 6.493 | 6.036 | 5.513 | 6.714 | 6.621 | 6.860 | 6.579 | : |
| Non-methane volatile organic compounds (NMVOC) RT | 99.051 | 99.354 | 99.304 | 99.305 | 99.191 | 99.319 | 99.423 | : |
| Non-methane volatile organic compounds (NMVOC) OMS | 0.949 | 0.646 | 0.696 | 0.695 | 0.809 | 0.681 | 0.577 | : |
| Methane ($CH_4$) RT | 99.563 | 99.736 | 99.733 | 99.726 | 99.652 | 99.744 | 99.815 | : |
| Methane ($CH_4$) OMS | 0.437 | 0.264 | 0.267 | 0.274 | 0.348 | 0.256 | 0.185 | : |
| Carbon oxide (CO) RT | 99.155 | 99.265 | 99.299 | 99.069 | 98.976 | 98.930 | 99.049 | : |
| Carbon oxide (CO) OMS | 0.845 | 0.735 | 0.701 | 0.931 | 1.024 | 1.070 | 0.951 | : |
| Carbon dioxide ($CO_2$) RT | 98.711 | 99.187 | 99.163 | 99.250 | 99.120 | 99.324 | 99.532 | : |
| Carbon dioxide ($CO_2$) OMS | 1.289 | 0.813 | 0.837 | 0.750 | 0.880 | 0.676 | 0.468 | : |
| Dinitrogen oxide ($N_2O$) RT | 86.505 | 90.029 | 89.891 | 90.743 | 89.327 | 91.806 | 94.144 | : |
| Dinitrogen oxide ($N_2O$) OMS | 13.495 | 9.971 | 10.109 | 9.257 | 10.673 | 8.194 | 5.856 | : |
| Ammonia ($NH_3$) RT | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | 100.000 | : |
| Ammonia ($NH_3$) OMS | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | : |

*Legend: ":"missing data.*

Source: Database of National Statistical Institute.

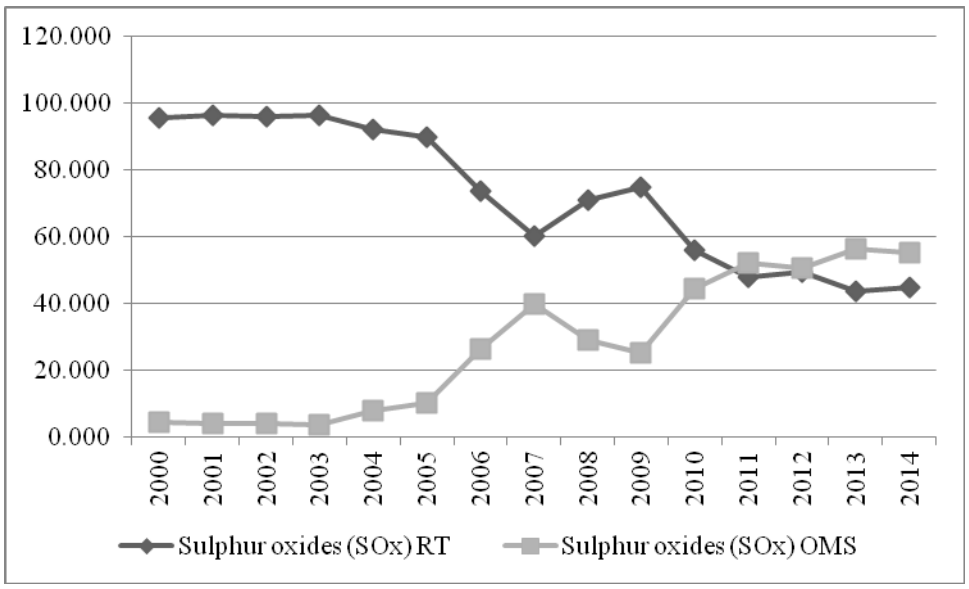
[4] The emissions are calculated according to the latest edition of the methodic CORINAIR.

From the data in the table is established that over 90% of the nitrogen oxides, non-methane volatile organic compounds, methane, carbon monoxide, carbon dioxide and ammonia are emitted from the road transport and only with nitrous oxide were observed years, in which the levels are lower, but they also gravitate within 85.617% (2004) and 94.144% (2014), while with sulphur oxides seems to be present a downward trend in road transport from 95.791% (2000) to 44.811% (2014) and growth in other modes of transport, respectively from 4.209% (2000) to 55.189% (2014).

Emissions of SOx in the exhaust gas of internal combustion engines result from oxidation of the sulphur contained in the fuel during the combustion process. Therefore, the amount of sulphur oxides in the flue gas depends entirely on the sulphur content of the fuel used. In this connection, the complete penetration of petrol and diesel with a maximum sulphur content of 10 mg / kg contributes to reducing SOx emissions after 01.01.2009 in the EU, which is laid down in Directive 2003/17/EC of the European Parliament and the Council from 3 March 2003 amending Directive 98/70/EC on quality of petrol and diesel fuels (see Fig. 5).

Figure 5

Dynamics in relative share of emissions of harmful substances into the atmosphere of Bulgaria from Road transport (RT) and Other mobile sources (OMS) for the period 2000-2014




In other modes of transport measures to reduce emissions are also taken, e.g. in maritime transport, the parties to the International Maritime Organisation (IMO) have negotiated significant revision of Annex VI of MARPOL at the end of 2008 (COM/2011/0441 final). This review recommended a phased reduction to 0.50 % from 2020, of the sulphur content

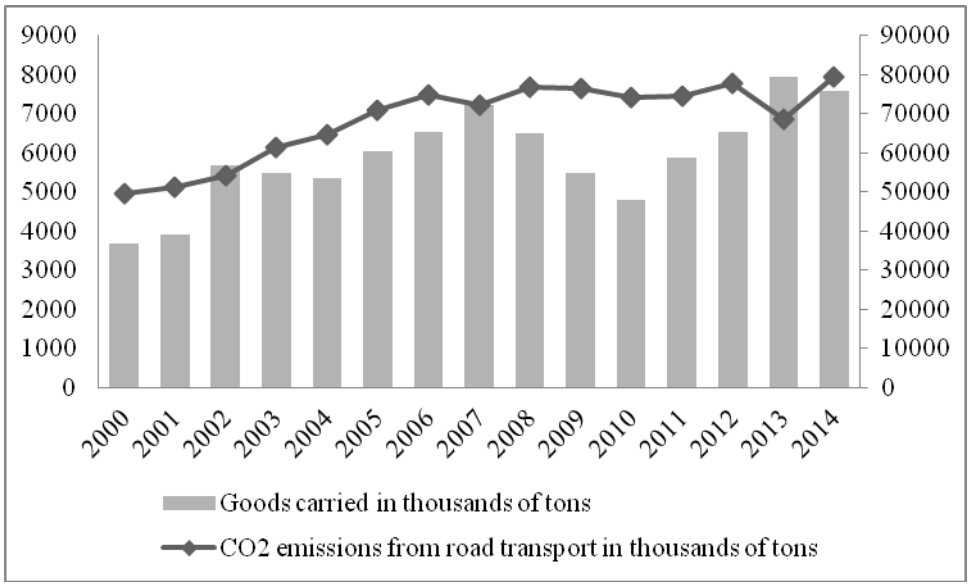
of fuels used in all seas to 0.10% in the SECA[5] from January 2015. The provisions to achieve compliance with regulations are technologically neutral and can be met through alternative methods of emissions reduction, such as systems for cleaning the exhaust gases or the use of alternative clean fuels such as liquefied natural gas.

In regards to the carbon dioxide, requirements on the quality of petrol and diesel fuels are introduced by Directive 2003/17/EC of the European Parliament and of the Council of 3 March 2003 amending Directive 98/70/EC and the reported progress towards the goal of the Community is 120 g/km for the average emissions of $CO_2$ per vehicle.

In this regard, in Fig. 6 is reported the dynamics in the development of $CO_2$ emissions in the atmosphere of Bulgaria and the goods carried by road transport (RT) for the period 2000 – 2014. A decline in the amount of separated carbon dioxide per unit of transported cargo is observed. The data show that for the period under study, $CO_2$ per 1 ton transported cargo from 0.135 tons reaches levels of 0.105 tons., with the lowest values achieved in 2013 – 0.086 tons. $CO_2$ per 1 ton of transported cargo. At the same time, we should also take into account the fact that the average distance travelled increases by 210.629 km., calculated at the end of the period compared to the beginning of 2000, which means that the quantities of harmful $CO_2$ emissions, emitted for the distance of one kilometre travel are reduced.

Figure 6

Dynamics in the $CO_2$ emissions in the atmosphere of Bulgaria and the goods carried by road transport (RT) for the period 2000-2014




[5] Due to the particular contribution of shipping emissions to acidification problems in northern Europe, MMO has designated the Baltic Sea, North Sea and the English Channel SECA in the EU.

It can be objectively argued that the measures taken by the EU to reduce the negative impacts of transport activities in the Community have reflection on the current picture of the emissions of harmful gases within Bulgaria.

The consumption of biodiesel in road transport in the country develops in this positive direction. Regarding biofuels, with the entered into force on 04.01.2013 Regulation on sustainability criteria for biofuels and liquid fuels from biomass, Bulgaria reports growing consumption of energy from renewable sources in the "Transport" sector in 2013 and 2014 compared to previous years (see Table 5).

Table 5

Share of biodiesel in the total consumption of diesel (thousand tons) in road transport for the period 2006-2014

| Years | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|
| Share in % | 0.63 | 0.30 | 0.27 | 0.42 | 1.59 | 1.27 | 5.69 | 7.17 | 6.38 |

Source: Database of National Statistical Institute.

In 2013 and 2014 the consumed quantities of biofuels in the sector "Transport" meeting the sustainability criteria according to NSI data, are respectively 104 thousand tons of oil equivalent and 111 thousand tons of oil equivalent, of which for 2013 : biodiesel – 105 435 tons (96 thousand tons of oil equivalent) and bioethanol – 12 568 tons (8 thousand tons oil equivalent) and for 2014 biodiesel – 106 321 tons (96 thousand tons of oil equivalent) and bioethanol – 22 824 tons (15 thousand tons of oil equivalent).

Although the fixed 10% use of biofuels in the transport sector by 2020 are not reached, there is an indication of a certain potential in this area and the state should motivate the production and consumption of these fuels.

An important aspect of the development of the transport sector in Bulgaria in the context of circular economy is the waste generation from end-of-life vehicles (see Table 6).

Table 6

Waste generated by end-of-life vehicles in th. tons for the period 2006-2014, in EU-28 countries

| Country/Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|
| EU-28 | : | : | : | : | : | : | 6240.000 | 6450.000 | 6350.000 |
| Bulgaria | 45.127 | 23.433 | 38.600 | 63.027 | 74.422 | 65.428 | 59.191 | 62.723 | 82.258 |
| Czech Republic | 48.094 | 62.000 | 132.533 | 147.217 | 135.479 | 118.147 | 114.800 | 114.833 | 122.450 |
| Estonia | 10.637 | 12.334 | 13.716 | 7.712 | 7.679 | 12.123 | 14.056 | 16.391 | 16.617 |
| Croatia | : | : | : | : | : | : | 33.221 | 29.017 | 22.584 |
| Latvia | 5.659 | 10.979 | 10.578 | 8.946 | 9.650 | 10.115 | 10.435 | 9.037 | 8.983 |
| Lithuania | 14.057 | 17.207 | 19.426 | 19.014 | 22.885 | 27.823 | 26.187 | 31.037 | 33.265 |
| Hungary | 16.380 | 30.207 | 28.287 | 27.419 | 15.589 | 14.959 | 14.388 | 14.865 | 13.887 |
| Poland | 124.173 | 150.063 | 170.100 | 192.281 | 217.636 | 284.307 | 340.212 | 401.639 | 462.202 |
| Romania | 17.624 | 32.007 | 44.031 | 48.424 | 162.276 | 110.035 | 50.732 | 34.566 | 38.137 |
| Slovenia | 7.810 | 6.041 | 4.790 | 5.428 | 5.305 | 5.703 | 4.528 | : | : |
| Slovakia | 11.907 | 23.414 | 29.885 | 54.051 | 27.396 | 30.341 | 26.373 | 29.678 | 24.710 |

*Legend: ":"missing data.*

Source: Eurostat.

It is noted that in most countries of Eastern Europe, including Bulgaria over the years the generated waste from end of life vehicles is increasing, except for Hungary and to some extent Croatia, which joined the EU on 01.07.2013. The outlined trends are logically influenced by the growth of the operation of road transport for freight and people. As a whole the fleet of vehicles in Bulgaria increases and only for five years in 2014, there is a growth of 493 569 in the number of available vehicles, according to Eurostat data, which logically leads to the decommissioning of some of the vehicles. Moreover, it must be borne in mind that Bulgarians are among the biggest consumers of used vehicles. Used are generated are a prerequisite to saturate the environment with large amounts of pollutants from different categories, they are a real threat to life and health of people, given the manipulation of measuring instruments and general technical condition of road vehicles and create prerequisites for the development of new business activities.

Therefore, in Bulgaria there is a marked economic interest in the market niche for recycling and reuse of vehicle regulated by the legislature. The data for reused and recycled vehicles for Bulgaria shows that in the country there is a well-developed market segment for recycling and reuse of motor vehicles and share growth was observed in 2014 compared to 2006 (see Table 7).

Table 7

Total recycled and reused end-of-life vehicles, in % of waste generated by end-of-life vehicles for the period 2006-2014, in EU-28 countries

| Country/Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|
| EU-28 | : | : | : | : | : | : | 84.5 | 85.3 | 85.7 |
| Bulgaria | 82.4 | 89.5 | 81.0 | 82.7 | 88.9 | 90.0 | 89.5 | 93.2 | 94.1 |
| Czech Republic | 79.0 | 79.0 | 80.0 | 80.3 | 80.3 | 80.3 | 80.3 | 80.3 | 80.3 |
| Estonia | 82.5 | 82.2 | 92.4 | 87.2 | 77.3 | 76.1 | 80.9 | 77.7 | 87.0 |
| Croatia | : | : | : | : | : | : | 97.2 | 100 | 89.5 |
| Latvia | 86.0 | 88.0 | 87.0 | 85.0 | 85.7 | 85.4 | 97.6 | 92.4 | 92.2 |
| Lithuania | 88.0 | 86.4 | 85.0 | 86.0 | 88.1 | 87.2 | 89.2 | 92.1 | 93.5 |
| Hungary | 81.2 | 81.6 | 83.0 | 84.4 | 82.1 | 84.4 | 84.4 | 90.7 | 90.3 |
| Poland | 84.7 | 72.8 | 79.5 | 87.1 | 88.8 | 89.5 | 90.4 | 88.6 | 85.5 |
| Romania | 77.1 | 83.7 | 83.7 | 80.1 | 80.9 | 82.9 | 84.0 | 83.8 | 84.1 |
| Slovenia | 76.8 | 87.2 | 87.6 | 84.1 | 88.6 | 86.1 | 100 | : | : |
| Slovakia | 82.8 | 88.0 | 88.4 | 88.8 | 88.4 | 93.1 | 89.9 | 92.5 | 94.8 |

*Legend: ":"missing data.*

Source: Eurostat

In fact, after joining the EU only in 2008 and 2009, when is the peak of the global economic crisis, we report a slight decline, but in other years the processes take place upstream in this sector, which can be associated with the perceived overall environmental EU policy, with legislative changes, but to a great extent also with the potential market for final processing of secondary raw materials in the country, determined by the age structure of the fleet.

It is noteworthy that in the last three years of the study period Bulgaria is ahead of recycled and reused vehicles out of use, total EU-wide and with increasing pace. Of the countries

that were part of the socialist block until 1989, only Slovakia is positioned in front of Bulgaria with a minimum of 0.7 points.

Virtually every vehicle has a complex structure and includes a number of components that can be recycled and reused:

- The batteries are a source of plastics and lead. In Bulgaria they are recycled from "Monbat" AD, town of Montana, "KCM" AD, town of Plovdiv, "EL BAT" AD, Dolna Banya municipality.
- The glass is 100% recyclable and is commonly used to make new glass products. One of the businesses that use in the manufacture of new products, cleaned of impurities cullet is "Druzbha Glassworks" AD, town of Sofia.
- Fluids (brake fluid, oil, freon, antifreeze). In Bulgaria the collected waste oils are recycled by two companies – "Lubrica" EOOD, town of Ruse and the workshop on "Polychim - SS" EOOD in the town of Lukovit. The enterprises use a technology where a base oil is produced, which can be used for production of new oils for the automotive industry and the industry as a whole.
- End of life tyres can be used in construction to strengthen banks – barriers against erosion, artificial reefs, breakwaters; to strengthen the embankments along the roads. New technologies allow their implementation in manufacturing: safety flooring, safety, sports and anti-shock mats, artificial grass cover, paving blocks and materials for building roofs, waste bins, carts and so on. The largest importers of tyres in Bulgaria – "Medina med" AD, town of Stara Zagora and "Diana" OOD, Sofia built in Stara Zagora a factory for recycling of discarded tyres – "Ecomediana Recycling" OOD.
- Automotive plastics are used to manufacture products from recycled plastic, but it can reasonably be burned to produce energy. In Bulgaria this market is operated by a number of small and medium enterprises, but one of the leaders is "Ecoinvest" EOOD,. Pazardzhik – the company produces plastic pellets and PET (polyethylene terephthalate) flakes (scales) for reuse. PET flakes are used as raw material for the production of packaging materials, bottles and packing containers for a wide range of food products and other consumer goods.
- Ferrous (steel) and non-ferrous (aluminium, copper, etc.). metals. "Steel Industry" AD, town of Pernik is a major consumer of ferrous metals in Bulgaria, which are a major part of the mass of a motor vehicle.
- Other materials: textiles, catalysts, oil filters, hazardous waste.

Based on the analyses the following main conclusions on the participation of transport in the circular economy of Bulgaria can be systematized:

1. Road transport is the preferred by the transport operators in Bulgaria and it is characterized by an unfavourable influence on the ecological parameters of the environment and this requires the proportion of emissions of harmful substances into the atmosphere of Bulgaria to be examined.

2. Over 90% of nitrogen oxides, non-methane volatile organic compounds, methane, carbon monoxide, carbon dioxide and ammonia are liberated from road transport. based on the performed analysis, it can be objectively argued that the measures taken by the EU to reduce the negative impacts of transport activities in the Community have reflection on the current picture of the emissions of harmful gases within Bulgaria.
3. The fixed 10% use of biofuels in the transport sector by 2020 is not reached, but a positive trend is reported after the entry into force of the Regulation on sustainability criteria for biofuels and liquid fuels from biomass.
4. It is noted that in most countries of Eastern Europe, including Bulgaria over the years the generated waste from end of life vehicles is increasing, except for Hungary and to some extent Croatia.
5. The processes related to recycling and reuse of vehicles in Bulgaria, are taking place upstream in the sector, which can be associated with the perceived overall environmental policy of the EU, the legislative changes, but also to a great extent by the potential market for final processing of secondary raw materials in the country determined by the age structure of the fleet.

Transport plays a key role in the construction and development of circular economy in the country, but from all transport alternatives the biggest part is played by road transport. In this respect it should be concluded that in the Bulgarian economy operate in a competitive environment business entities, who on the basis of a synchronised with the European legislation legal basis are engaged with the issues of environmental protection and the application of the basic principles associated with reuse and recycling.

## 3. Possibilities to apply the model of the circular economy in the transport sector of Bulgaria

The Bulgarian state must develop a clear program for the transition from linear model to circular economy, because circular economy creates conditions for more efficient use of raw materials and hence accumulate effects for businesses, citizens and governments, especially in the long term. Thus, the circular economy will create more jobs, reduce dependence on countries, supplying raw materials and will help avoid climate change. The actual implementation of this model is important for Bulgaria because of the limited resource base available, which makes the country dependent on a number of international suppliers. Therefore, if our country adheres to the linear economy, the final consumption will be defined by raw materials prices, costs and profits.

The basic principle which the development of this model must use as a foundation step is connected with the idea that in the circular economy there are almost no waste products and materials as they are reused. Nevertheless, there is a need to provide new resources, but they must be extracted in a sustainable way in order to avoid negative consequences for the environment.

In this circular economic model, a particular place should be given to certain sectors related to transport and in particular to the production of biofuels, recycling and recovery of end of life vehicles and tyres.

In the presence of a free and competitive market, each country has the opportunity to specialize in a production, in which it has a natural or acquired competitive advantage (Zhelyazkova, Grozdeva and Stoyanov, 2010, p. 97). In this regard, some of the possible effects that the state may pursue in the applied by it policies, are stimulating the economic growth through exploitation of such production and service sectors that focus on specialization in waste recovery and recycling of old products, manufacturing of biofuels, etc. whilst taking into account the negative influence of these proceedings. For example, the different biofuels increase the effect of greenhouse gases that contribute to global warming of the planet, because these gases are emitted during the entire production cycle - during the manufacturing of the fertilizers, pesticides, the fuel used during the processing of agricultural land, transport and distribution, and during the actual combustion (Staikova, Baikov, 2012, p. 174).

Biomass is essential to reduce carbon emissions and reduce dependence on fossil fuels such as petrol, diesel and gas. Through the deployment of more biomass, the government will build a greener economy and it will be possible to talk about bioproductive economy.

Unlike other renewable energy sources, biomass can be converted directly into liquid fuels for transportation needs. The two most common biofuels are ethanol and biodiesel. Ethanol, which is alcohol, is obtained by fermentation of any biomass high carbohydrates, such as corn. It is mostly used as a fuel additive to reduce the carbon monoxide from the vehicle and other emissions that cause smog. Biodiesel, which is an ester, is obtained from vegetable oils, animal fats, algae and recycled cooking greases. It can be used as a diesel additive to reduce vehicle emissions or as a fuel in its pure form.

Bulgaria could exploit the market niche of biofuels and specialize in their production, with which it will solve the problems of dependence on external suppliers of fuels and will export the finished production on one hand, and on the other will utilize part of the accumulated waste.

Like all business entities involved in the economic life of Bulgaria, the companies associated with transport should make a commitment to implement the concept of circular economy in the country. For this purpose, they should develop and implement strategies and tactics focused on environment friendly practices in their business.

An advanced concept that gives impetus to modern production cycles is the so called. "foretold death of the products", which is directly related to the initial design phase of the product when its useful life is determined, which is precisely reduced to minimum levels. This option offers the potential for the formation of needs of new production volumes and thus provides a relative intensity of the production processes.

In the automotive industry this concept also finds its practical application, which concerns both ELVs and individual components such as tyres.

Vehicle manufacturers are already facing many regulations on emissions, safety and recycling of their products. The greatest environmental impact is caused by vehicles during the stages of production and use, so the focus is much more directed at the harmful emissions and to energy efficiency measures in production than the use of the materials at the end of life cycle product.

The commitments for recycling of ELVs and their parts must be an envisaged option for the use of the product after its designated exploitation.

At present such an idea in Bulgarian legislation is discovered in Art. 13 of the Waste Management Act, Section II, entitled "Extended Responsibility of the Manufacturer" which regulates product requirements, after which use is generated widespread waste, the procedure and methods for separate collection, reuse, recycling and/or recovery, including the targets for separate collection, reuse, recycling and/or recovery.

This includes ELV, but unlike other ordinary waste (paper, batteries, appliances, etc.) in vehicles, the marketing of components is sufficient to achieve the economic objectives and in practice the principle on which the system functions, is self-financing. The vehicle is one of the most sophisticated consumer products. Vehicles are composed of a huge amount of raw materials and a large number of suppliers. Also, vehicles have a longer life and impact on the environment throughout their entire life, both during production and during use.

On this basis it can be argued that one introduced in Bulgaria product fee could be waived, as is the practice in many countries, leaders in the recycling of ELV by Austria, Germany, France, Spain, the UK and Italy.

Especially important commitment concerning the transport sector and reflected in the development of circular economy of Bulgaria, are end of life tyres (ELT). For this purpose, in 2011, the Bulgarian state adopted the Regulation on the treatment of end of life tyres under the Waste Management Act, which created a legal base, which regulates the duties and responsibilities of the companies engaged in manufacturing and commercial activities with tyres. The state thus stimulates the development of a market niche, utilizing end of life tyres.

According to this Regulation, the persons who market tyres are responsible for the collection, storage, transport, recovery or disposal of end of life tyres, as the salvaging is performed in one of the following methods:

- through regeneration;
- through recycling;
- through their incorporation as a material in construction, including the addition of whole and sliced tyres as a material in the construction of landfills;
- by incineration with energy recovery.

The persons, marketing tyres are responsible for meeting the following objectives:

- not less than 65 per cent of the amount (in tons) tyres, marketed by them in the Republic of Bulgaria during the current year to be utilized;

- not less than 50 per cent of the amount (in tons) tyres, marketed by them in the Republic of Bulgaria during the current year to be regenerated and/or recycled. The introduced targets for recycling and regeneration of ELT are achieved incrementally by 2020 and come into force on January 1, 2013.

Key objectives for the activities of ELT in Bulgaria for the period 2014-2020 are planned as outlined in the National Plan for Waste Management 2014-2020 (see Table 8).

Table 8

Key objectives for the activities of ELT in Bulgaria for the period 2014-2020

| Waste streams | Year | Target | |
|---|---|---|---|
| | | Utilization | Recycling |
| Tyres | | Utilization of not less than: | Regeneration and / or recycling of not less than: |
| | 2014 | 65% of the quantities (tons) of tyres, marketed during the current year. | 20% of the quantities of tyres, marketed during the current year. |
| | 2015 | 65% of the quantities (tons) of tyres, marketed during the current year. | 25% of the quantities of tyres, marketed during the current year. |
| | 2016 | 65% of the quantities (tons) of tyres, marketed during the current year. | 30% of the quantities of tyres, marketed during the current year. |
| | 2017 | 65% of the quantities (tons) of tyres, marketed during the current year. | 35% of the quantities of tyres, marketed during the current year. |
| | 2018 | 65% of the quantities (tons) of tyres, marketed during the current year. | 40% of the quantities of tyres, marketed during the current year. |
| | 2019 | 65% of the quantities (tons) of tyres, marketed during the current year. | 45% of the quantities of tyres, marketed during the current year. |
| | 2020 | 65% of the quantities (tons) of tyres, marketed during the current year. | 50% of the quantities of tyres, marketed during the current year. |

Source: Ministry of Environment and Water. National Plan for Waste Management 2014-2020, p. 152.

The development of circular economic model, in the conditions of the Bulgarian economic realities may be applied by a relatively narrow specialization in certain sectors, related to transport such as manufacturing of biofuels, recycling and utilization of end of life vehicles and tyres.

## Conclusion

The multiple set of challenges posed in front of the modern society impose taking commitments that are directly related to long-term economic, environmental and social goals. Adequate models applicable at various levels, covering the perimeter of corporate activity and the state responsibility for sustainable development are being more and more actively developed.

One option that corresponds directly with the public and corporate interests in this direction is the implementation of a circular economic model. It is based on three basic principles: reduce, reuse and recycle. In practice, the idea is to close, as far as possible, the economic cycle and for it to allow for maximum utilization of the scarce resources to meet the unlimited needs.

In a circular economic model, the role of transport is especially important and in particular the related production of biofuels, recycling and utilization of end of life vehicles and tyres.

In Bulgaria this model can find its application, because the state is relatively poorly provided for with raw materials and has untapped potential for specialization in the production of biofuels. The favourable conditions for the formation of biomass as raw material for biofuel production give reason to believe that the country can develop in this direction. Thus the Bulgarian economy can obtain some independence from fuel supplies from other countries and can export the finished product.

Modern concepts for business development are directly or indirectly focused on environment friendly practices in doing business. One such concept that gives impetus to modern production cycles is the so called "foretold death of products" which is applied in vehicle manufacturing and directly binds planning the vehicle with the stage after its operational use.

Particularly important in this respect are the processes involved in recycling and utilization of end of life vehicles and tyres. Bulgaria strictly adheres to the regulations of the European Union but could initiate some changes which to contribute to the development of this sector. In particular, the author refers to removing the product fee for motor vehicles, given the opportunities provided by the vehicle as a product that can find market realisation as spare parts and thus form a positive economic results.

The studies outlined in the guidelines are extremely comprehensive and current and create the basis for the development of the subject in future scientific papers.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
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# ENTREPRENEURIAL RISK THEORIES AS COMPONENT OF THE THEORETICAL FOUNDATIONS OF INFORMATIZATION PROCESSES IN THE NATIONAL ECONOMY

*In the article the place of business risk theories in the structure of theoretical background for processes of informational-communicative technologies introduction in the national economy. In addition, the relationships in the structure of risks theories for ICT introduction in conditions of the development of the national economy are outlined. The theories and concepts of business risks are considered and their significance for the revitalization of the national economic system development and improving state regulation of the economy are described.*
*JEL: D81; L83*

## Formulation of the problem

The development of the national economy certainly associated with various risks of economic, natural or political character. No exception is such important way of sectoral development as processes of information introduction in it.

As the basis of the aforementioned processes should be quality theoretical background, the main components of which are business and financial risk theories. In this study, we decided to stop on business theories and concepts of economic risk. The development of the national economy should be viewed through the prism of business risks, theories and concepts of which should serve as a reliable theoretical basis for progress activating in it.

## Analysis of recent research and publications

Block of risk theories has passed long on a few hundred years evolution, in which the object of study of these theories has shifted from research of entrepreneur risks to investor portfolio risks and identifying of regularities for its acceptance of rational solutions in the financial market and also constructing a variety of theoretical and applied mechanisms for neutralization of these risks. Theories of risk includes classical, neoclassical and modern

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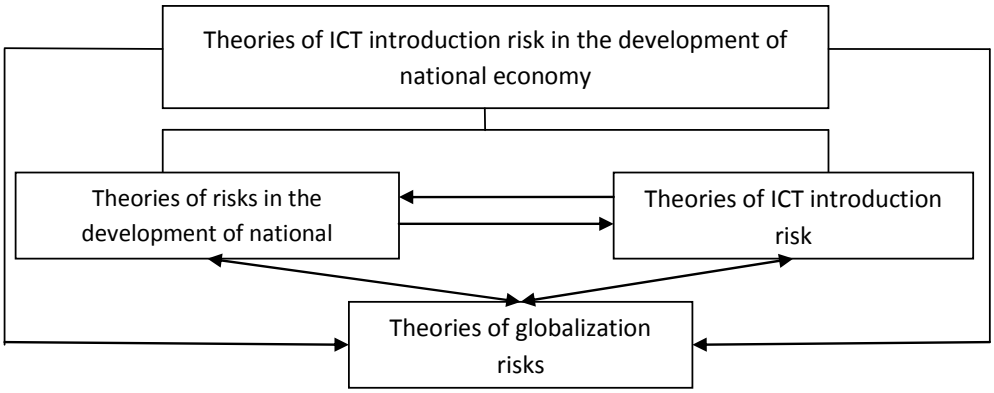
theories and concepts of economic risk, including mercantilist and physiocratic concepts of risk, the concept of business risk of A. Smith (Smith, 1962), the theory of production and distribution of J.B. Say (Say, 2000), the concept of insured risk by J. von Tunen (Thünen, 1926), the theory of business risk and business income of G. von Mangoldt (Blaug, 2008, p. 195-197), risk scientific theory of J. N. Tetens (Pradier, 2003), the paradox of D. Bernoulli, the theory of economic risk and profit of J. S. Mill, the concept of economic crisis of J. S. Mill (Mill, 1980), the concept of business risk of N. Senior (Blaug, 2008, p. 266-268), the concept of excess profits and risk of D.B. Clark (Clark, 1992). The neoclassical risk theories includes the theory of uncertainty and profit of F. Knight (Knight, 2003), the theory of risk and profit of K. Marx (Marx, Engels, 1960), innovative concept of risks and business cycles of W. Sombart (Sombart, 2005), the concept of risk of A. Marshall (Marshall, 1961), Keynesian risk theory (Keynes, 1993), the concept of risk of J. Schumpeter (Schumpeter, 1982), the concept of risk of M. Friedman (Friedman, 2006), portfolio risk theory of J. Hicks (Hicks, 1975), the theory of portfolio risks H. Markowitz (Markowitz, 1959) and others.

The paper purpose is outlining of theories of risk groups, which serve as the basis for the deployment of ICT processes in the national economy.

Modeling of the processes of macro development is not possible without consideration of risks both economic and non-economic. It suggests the need of studying the structure of theories of ICT intrusion risks in the development of national economy. The system existing in its relationships presented graphically in Fig. 1.

Figure 1

Structure of risks theories of ICT in the development of national economy




Source: Compiled by the author.

Theories of globalization risks are closely intertwined as with the development of ICT such as with the development of the national economy. But anyway, just the theory of economic risk is the basis of all above penciled theoretical concepts. Therefore, it consideration is necessary to begin with its evolutionary origins.

Founder of macro-analysis physiocrat Francois Quesnay, who created the first in economy scientifically based model of social reproduction through "economic table", in which allocated three classes: productive (agricultural), land-owning and unproductive (employed in non-agricultural production), paid attention to risks and uncertainties. In particular, he proposed measures group aimed at comprehensive development of agriculture, considered possible tax risks, threats of government regulation and restriction of competition, risks of trade restrictions system.

The ability to take risks as an integral feature of the individual entrepreneur first praised at the scientific level the founder of the theory of entrepreneurship Richard Kantilyon. According to this theory risk is a defining feature of business activity, which is based in acquiring by an entrepreneur means of production for producing of products and its marketing in terms of price uncertainty. Kantilyon paid great attention to the analysis of price and management risks, presenting them as key conditions that affect on business activity. Thus, from the perspective of physiocratic school uncertainty is the environment of business activities accomplishment, which directly affects on its performance. At the same time, in the physiocratic economic thought the risk is characterized probability, i.e. the possibilities of some negative events development in the implementation of the basic principle of economic life organizing named "laisser-faire".

Physiocratic concept of business risk of K. Bodo comes from two perspectives: firstly, the responsibility of the entrepreneur means taking the risk for it and, secondly, he indicated on the importance of information about the market situation and the availability of knowledge, skills and practices of the entrepreneur as the main factors for successful business transaction.

Group of classical theories of risk covers a number of fundamental theories that laid the foundation for further research in this area. However, views in its on risk are significantly different from modern concepts, but their value lies primarily in the fact that they first put the need to study risk in economic science. The first of these developments is the concept of business risk of Adam Smith, the clauses of which are set out in his fundamental work "The study about nature and reasons of wealth of nations".

Economic risk of Adam Smith is an indispensable attribute of market the same as the main motivating tool of its development, that is profit; between them is always a close relationship, which is that the risk from this point of view is the probability to suffer loss by entrepreneur, but at the same time it acts factor in the formation of profit part, i.e. compensation for risk, which agreed entrepreneur, that is also a potential possibility of obtaining additional income. In other words, profit by Smith is reward to capital owner for risk. It should also be noted that this same regularity – a greater reward for risk – scientist traces also in workforce wage. On this occasion, the Scottish scientist notes that wage of workers in any case can't be profit, it is only part of the value added, reward for overhead work. In this context, Smith stresses about important social significance of the risk, as the owner of capital receives a fee for its risky use because income distribution is socially just. It should be added that Scottish economist identified entrepreneur wages and profits. Thus, profit in the Smith's theory bear labor character and is the difference between the value added and wages paid to workers. Surely the risk acting engine of a market economy development. From the theoretical clauses set forth by Adam Smith follows that risk is

income factor, and profits in turn is a factor of the interest rate in the market, i. e. price of leverage use. Thus, the total economic risk is a factor of market interest rate. Smith argued that "the entrepreneur as the owner, going on the economic risk for the implementation of commercial idea or profit getting" (Smith, 1962). Founders of classical economic theory also came close to understanding the category of industrial risks, analyzing them for potential bankruptcy; particularly at the time it was the sphere of trade. Also, the scientist concluded that the fee for accepted risk which is the share of profit, which compensates it reduces the high level of competition between risky projects that competition creates an additional risk of a shortfall in revenue. We can also say that in terms of the theory of profit and risk theory proposed by Smith, the main motivator of business development is not profit, and risk and profit is positive result of the introduction of venture capital into action. On the other hand, Smith saw monopolism as the only threat to the established economic order which creates an artificial shortage of products on the market for market price overstatement. In addition to the foregoing, the founder of political economy teaching first described the idea of profit insurance procedure, which are widely used in modern developed economies. In summary, we note that the merit of A. Smith is that it firstly discovered and described motivating, regulatory and social functions of economic risks and, secondly, suggested and substantiated the idea of profit insurance as a form of economic activity.

In addition, Adam Smith in his work "The theory of moral sentiments" (1759) the deep studied relationships between man and society, the nature of social and political risks, claimed that selfish economic interest must necessarily be combined with moral and ethical behavior, that actually neutralize these risks.

Special attention should be paid to the theory of the entrepreneurial function of J.B. Say, in which the author sees the main purpose of the entrepreneur to effectively combine and coordinate the factors of production (land, capital), human factors (labor, scientific, scientific-technical, scientific-technological knowledge) for goods production. By Say, its combining and coordinating always associated with the element of risk, but special significance scientist for it does not paid. The business income scientist determined with a residual, i.e. from the total income take away incomes of owners of the factors of production. Such profit in Say included interest for equity of entrepreneur, award for the performance by it of control-combinational functions as well as in Smith's bonus reward for risk.

German classic economist J. von Tunen proposed also his own concept of risk, essence of which in the following clauses: first, business risk can not be fully insured because the insured by Tunen be overhead and the risk of bankruptcy of employer is not insured, but it must be compensated by share of the profits, and secondly, a scientist for the first time introduces in economic theory the concept of alternative choice (decision) and prioritizing of riskier alternate for business as well as explaining the nature of opportunity costs, i.e. potential income from the realization of non-selected alternate of acts. It should be stressed that in the concept by Kantilion entrepreneur is only risk carrier, concept by Tunen considered entrepreneur as carrier of risks and technical innovations, but German economist did not singled out the risks of such innovations.

Developing the ideas of Tunen another German scientist and economist G. von Manholdt that in his work, unlike predecessors, business risk puts to the forefront in this field of activity and the willingness to take risks, along with controlling the production process considered as the key features of the entrepreneur. Also Manholdt differentiate risks according to the degree of danger to the risks of production on demand (when the risk is almost absent) and the risks of production to the market (from small risks in markets with stable demand for certain commodity nomenclature to the highly competitive and commodity-substitute markets, where the risks of losses for the entrepreneur are maximum). Mangold defines the main in his opinion factor of formation risk for entrepreneur as the time lag, the longer it is, the greater is magnitude of the risk. Accordingly, the premium for such risk should be higher. So Manholdt merit first is that it is the first scientifically outlined the crucial role of risk in the business technology.

Risk scientific theory of J. N. Tetens has made an invaluable contribution to economic theory, since it was first proposed a mathematical definition of risk, investigated the European experience in insurance of that time, especially life-insurance. The size of the possible loss of the insurance company Tetens offered to count as half of standard deviation value. In addition, generally as founder of risk scientific direction in economic science considered Tetens.

Daniel Bernoulli paradox lies in the fact that the risk assessment has always individual character (which confirms the fact that entrepreneurs are people more at risk), and the value of possible reward for risk lies not in its absolute value, but in the usefulness of such prize. Bernoulli based on empirical observation in tendencies noticed that the marginal usefulness decreases with another growth because the entrepreneur or consumer expects on a greater reward than in the previous time. It should be noted that the usefulness also has individual character.

The theory of John Stuart Mill found interconnection between the level of profit and risk, which is in the tendency of profit to decline because of the desire of owners to insure own capital against the risk and falling of capital profitability. Scientist to the composition of income included entrepreneur wages, his share in invested capital and premium for the accepted risk. Reducing the rate of profit leads to economic depression. To avoid this, Mill recommends the need to intensify the scientific and technological progress and international capital movement. Today, the theory of Mill founded wide implementation through the system of transnational corporations and the scientific and technological revolution. With the territorial and product diversification of business activities diversified accordingly set of risks. It should also be noted that Mill explored the nature of the risks of economic crisis appearance and concluded that they are caused by not overproduction but the cessation of lending and speculative activities in the commodity market.

Similar scholarly views on the nature and importance of risk seen in the works of N. Senior and D. B. Clark. In the concept of business risk by Senior risk is the mathematical expectation of losses as a result of the adoption by entrepreneur manager flawed management decisions. Like Mill, Senior in profit composition singled percentage on invested capital and the entrepreneur compensation for risk.

The content of the concept of excess profits of Clark, who substantiated on a scientific level the theory of marginal usefulness, is in the fact that superprofit is derived by implementing of innovative function of entrepreneur, systematic improvement of the technical component of production. Thus, the entrepreneur partially neutralize the risks that would be incurred as a result of simple reproduction, without modifications.

The concept of risk of Clark comes down to several important clauses, including the following: 1) the risk bearer is the only owner of the capital; 2) pay for that risk should be included in the percentage for used capital; 3) scientist applied the theory of marginal productivity to assessment the level of wage of workforce and it allows the entrepreneur does not carry additional risks of losing their income. In addition, Clark interprets economic dynamics offered by Mill as a source of formation of business risks. It is also important that the theoretical search of regularities of consumer demand behavior Clarke brings to the choice of production factors and their effective combination. That demand risks, as out of the theories Clark are risks of wrong choice by entrepreneur the factors of production or inefficient use.

Along with the theories of business risks emerged and actively developing the theory of actuarial calculations, which theoretically reflects the mechanisms of insurance at that time and was described in the works of J. Graunt, E. Halley, J. Dodson and others. In addition, in this theory began to play an active role modern for its time mathematical and statistical methods due to the significant contribution to its content collections by such mathematicians as L. Euler, B. Kersseboom, C. Lacroix and several other scientists.

From the theory of uncertainty and profit of Frank Knight follows a number of important theses: 1) Knight in the first time explained the difference between uncertainty and risk, the latter is subjected to numerical assessment (risk is a concrete plan of actions under uncertainty, calculated uncertainty); 2) economist identified three types of probabilities: statistical, mathematical and estimation (i.e., expert); 3) Knight examined the correlation ratio between the value of profit and uncertainty, in terms of risk probability of obtaining higher profits is higher; 4) scientist proposes fight with risk the following measures: insurance mechanisms, information transparency, preferential loans, corporate system development, diversification of risks by dispersal of shares in the ownership of various companies, development of capital market instruments (forwards, futures); 5) monopoly, imperfect competition contributes to the high-tech projects implementation; 6) just uncertainty, according to Knight, is the main reason for the inability to establish perfect competition in any market; 7) in the theoretical constructions of Frank Knight behavior approach prevailing, namely crucial in the flow of economic processes usually are the behavioral factors (consumers, business managers), on which has a direct impact economic uncertainty.

New for its time view on the nature of economic risk gave Alfred Marshall, who saw it first not as the possibility of losses oncoming but as possibilities to maximize enterprise profit. So the possibility is determined by efficiency of organizations management and nature of current market dynamics, i.e. the ratio of market demand and market supply. In this regard, the British economist in his fundamental work "Principles of economics" (1890) distributes risks on business (i.e. depending from the market) and personal (which are determined by decision-making by the governance of enterprises, their abilities, skills and talent).

However, Marshall, unlike other economists of his epoch, was opposed to agreeing to undertake any risky options of solutions. He argued its by marginalist concept of marginal usefulness, according to which the more usefulness has guaranteed income than expected income of larger size, but that can undergo exposure to market fluctuations. Thus, the main essence of the concept of risk by A. Marshall was that the scientist was a staunch supporter of business strategy to avoid the risk, even for the possibility of obtaining additional positive economic effect. Also, scientists on the first time launched economic analysis of volatility in earnings and presented it as one of two main criteria (along with the size of the expected profit) of managerial decision making by heads of business structures in terms of risk and uncertainty.

In his theory of risk and profit K. Marx first described the mechanism of modern venture capital investment as funding of high-risk innovative projects, by which are expected large profits. Moreover, it is one of the two, along with a second source – increased pressure on workforce, stimulants of support prevailing at that time economic system. In addition, Marxist theory has shown that venture capital activity is a major competitive advantage for companies in market conditions. Moreover, Marx set regularity, whereby the higher is the expected return, the greater is the risk, which the owner agrees to accept equity. He wrights if "in the presence is the sufficient level of profit, capital became decisive. Provide 10 percent, and capital agree to any application, at 20 percent it is lively, with 50 percent positively is ready break own head, at 100 percent he tramples all human laws, at 300 percent there is no crime for which he would not risk, even on pain of the gallows" (Marx, Engels, 1960, p. 770). Yet Marxists considered the risk as weaknesses of the market economic system and argued that in a coming of administrative-command management this disadvantage disappears because, in their view, centralized macro planning prevents any economic risks.

Werner Sombart, a prominent representative of German institutional direction of political economy, in own, innovative concept of risk tried to move from microeconomic to a higher level – meso-economic, considered the processes of diffusion of innovations in the industry. For Sombart entrepreneur who always acts in terms of risk (risk is the main feature of the entrepreneur) is not the bearer of risk, but the bearer of innovation, and when it creates new technical developments, it tries to extend them not only in their company, but on the whole market. Sombart argued that the entrepreneur (entrepreneurial spirit) always inherent ingenuity, creativity and adventurism. Also scientist offered to consider on macroeconomic level economic conditions, which does not mean the necessarily onset of the economic crisis. It is caused by uncertainty, expectations of profit by entrepreneurs, expansion of production, which generates disproportionate gaps between mining and not-mining sectors of national economy, between the amount of fixed and working (money) capital, which in turn leads to economic depression. According to scientist, interchange of recessions and economic recovery does not mean the crisis and possible self-destruction of market economic system (Marxism), this interchange means changing development phases of capitalist spirit (business, middle-class). Sombart deeply analyzed the phases of the business cycle and found that during the phase of its economic growth its drivers are risk and innovation, and in the phase of recession – organizational changes, optimization of corporate structures by the criterion of economic efficiency. That phase of growth in Sombart has speculative innovative nature and the depression phase – optimization nature.

For alignment of economic cycles German scientist offers to stimulate enterprises to stabilization the market conjuncture, integration of monopoly capital, normalization of monetary circulation, active concentration of production. So Sombart contribution to the history of risk scientific thought lies in the fact that he put the risk from micro to mesoeconomic and macroeconomic levels, shown its relationship not only with profit, and with the phases of the business cycle and innovation process.

Neoclassical theory of risk was fully described in the work "General theory of employment, interest and money" founder of macroeconomic theory John Maynard Keynes. In it work scientist offered subjective classification of risks in the national economy. To this classification he took business, credit risks and the risk of devaluation of the national currency. Keynes suggested that enterprises must first cover the price, depreciation and force majeure risks (which should be taken into account in their pricing policies) and cause of their appearance he consider risks of staff, conjuncture and costs (i.e. a possible sharp rise of fixed costs, rise in price of production equipment). For this, he introduces in the scientific terminology special term – "risk costs" in order to distinguish above showed covered expenses. Like Knight, Keynes clearly separates content of categories of "risk" and "uncertainty". Thus, uncertainty neoclassicist identifies as "a situation in which there is no scientific basis for determining any probability" (Keynes, 1993, p. 132). Keynes also found tendentious regularity that entrepreneurs tend to go at high risk for getting significant profits. This confirms the thesis of Marshall that the large size of the expected profit is forcing entrepreneurs taking to accept risk. Moreover, Keynes in order to explain this biased regularity introduces the economic concept of "fun", for which, according to the researcher argues, businesses going on high risk. The rest of the Keynesian theory of risk associated with the analysis and selection of investment projects. According to Keynes's theoretical conclusions in practice optimum project should be selected according to two criteria: first, the profitability of investment projects, and secondly, by the sets of possible risks for analyzed projects. Scientist-economist warned from uniqueness in the preparation of the decision making about investment, only weighted score with the above criteria can serve as a reasonable basis for the selection of this or other project.

Theory of economic dynamics and innovative development of J. Schumpeter, which he outlined in 1912 in his work "The Theory of Economic Development" is based on a number of such basic theoretical positions:

- any economic system dynamically developing and task of economics is primarily the clarification, analysis, modeling and forecasting of socio-economic processes and factors that determine or affect on them;
- the driving force of the dynamic development of market economic system is, according to Schumpeter, technological progress, and key factor of socio-economic growth is the introduction of innovative technologies;
- protagonist of macroeconomic development stands entrepreneur who takes themselves a certain set of risks, combining factors of production for achievement of maximum economic effect (profit);

- according to Schumpeter theory, there is a direct functional relationship between business profits and results of innovation activities;
- discrete implementation of innovative potential in the economy leads to the cyclical nature of macroeconomic development, which in turn is a legitimate feature of economic development of the market systems (during the cycle the system goes to a new level of development);
- consistent implementation of processes of economic development is due to monetary relations, which, according to J. Schumpeter, represent economic dynamics.

The concept of risk of Austrian Joseph Schumpeter based on a number of next claims and their theoretical conclusions: 1) compensation for the risk should not be included in income, is the subject of insurance business; 2) entrepreneur as previously thought – not carrier of risk, and this carrier is a creditor (but willingness to take risks, initiative and ability to innovate Schumpeter believes the key features of the entrepreneur); 3) Austrian economist presented his own version of risk classification, dividing them into technical (through the errors in production construction and in technology of its management) and commercial (due to unfavorable market conditions); 4) scientist investigated the relationship between risk level and yield of industries and found that the companies will enter into such sectors when average in sector income offset risk; 5) Schumpeter clearly divided the difference between an entrepreneur and a manager, that it is often equated (entrepreneur tendentious at risk, and vice versa manager for caution and career advancement); 6) compared to the corporate form of management Austrian scientist prefers business form that is much more stimulate market actors to innovation, innovative thinking, initiative and risk perception as an opportunity and not as a "foreign" problem that needs to be avoided in any way. Unlike Sombart, in which drivers of entrepreneur behaviors were risk and innovation in Schumpeter is the only innovation, and the value of the latter he literally absolutizes, treating market as a result of constant changing of waves of innovation. Also, if in many other scholars contemporary to Schumpeter are desirable to achieve a certain static equilibrium, the Austrian scientist supported the ongoing dynamic growth of the economy, and based on innovations, rejecting the establishment of any equilibrium as elements of economic stagnation.

Monetarist Milton Friedman developed a ranking of economic risks by the possible scale of display of their consequences (positive/negative), which requires their quantitative and comprehensive qualitative assessment, in particular, he singled out small, moderate and high risks respectively. But Friedman did not clarified in their own classification moderation of risk that is acceptable risk, and is not, it is no measure of acceptability of risk that directly influences on decision-making process in this regard. Nevertheless, Friedman first tried to quantify the risk assessment, and that quantitative assessment he gave based on the theory of marginal usefulness. In terms of the risk factors acting and diminishing marginal usefulness American scientist came to the opinion that requires a certain fiscal equalizer for the incurred risk. Equally important is grounded thesis of Friedman about ability to measure and risk alternatives (which in turn can be expressed in a certain set of functional dependencies). You can mention that the scientist to put forward his followers demand of supporting of approximation for economic models, i.e. their numerical

approximation to the test economic phenomenon or process, not realistic, since any model always theoretical and abstract. Friedman also shared social environment of manifestation of risk on such that subject to him, and that it tends to avoid using instruments insurance. Thus, Milton Friedman contribution to the economic theory of risk is that scientist brought the research of economic risk on a new – quantitative level, made his from economic concept in the economic indicator. This opened broad prospects for macroeconomic forecasting and planning, made it possible to adjust the magnitude of the risk of implementation of various projects and programs of socio-economic nature.

First from the sector of entrepreneurship in the sector of stock market functioning suffered a problem John Hicks risk that justified the structure and nature of returns of securities that included compensation for expectations of fluctuations in market and risk. At the same time as risk in this context Hicks understands the risk of default of debt in the long time period. Hicks also created a fundamentally new theory – the theory of portfolio analysis, the essence of which is that an economic entity (investor) can distribute their property among different types of assets (public, private securities, investment projects), placing it so as to ensure maximum returns and minimize risk. According to Hicks, the size of the investment portfolio is in functional dependence from interest rate, risk level and amount of real cash balances. Using indifference curves (reflecting supply and demand) instead of the dominant until then marginal usefulness, a scientist based on empirical material analysis provides an alternative for marginalist usefulness – marginal rate of substitution, which is deducted from the value of the indifference curve slope. Thus, 1) Hicks first scientifically grounded technology of the stock market functioning, where risks are one of the key factors of the value of the securities formation; 2) transferred research of market balance to a new, compared to marginalism level by offering a theory of diminishing marginal rate of substitution.

Nobel laureate Harry Markowitz, author of the investment portfolio theory (1952), which opened a new chapter in research of investment risks, spent a great job of finding an effective structure of the portfolio of real investment for firms to identify patterns for ensuring of efficient portfolio investment. In particular, scientist brought the concept of "optimal portfolio", which must meet two criteria: first, there will be no less risky project with the same income, and secondly, there will be no other, more profitable project with the same level of risk. It should also be noted that the portfolio can be not only investment but also banking, stock exchange, stock, currency, commerce, information and more. Furthermore, Markowitz suggests a more complex but efficient combination of assets with low risk but low correlation between the levels of profitability of each of the assets. Based on the theory of investment cost of Williams, Markowitz proposed the use of instruments of economic and mathematical modeling to study the stock market, including the technique of linear programming. Therefore, using his method of optimizing a quadratic function that is subject of linear (and for some cases – and non-linear) restrictions, built algorithm to calculate the optimal portfolio. Return on the investment portfolio scientist calculated as the average value for probability distribution, and risk as standard deviation of possible level the expected yield (i.e. standard deviation, which calculated as the square root of the variance of returns). As an initial base for implementation of portfolio comparisons Markowitz proposed make the so-called spaces of potential portfolios, containing a list of assets, vector of their respective average expected yields and covariance matrix. Having

developed the mathematical side of his theory of portfolio investment, it also paid considerable attention to finding of ways for effective diversification of investments, which enables minimizing and neutralizing risks. However, at the same time, portfolio theory does not take into account the time lag to its investment portfolio implementation, factors influencing on the crisis phenomena was difficult for practical use because of the complexity of preparation empirical input information. This is especially visible when volatility changes sharply (i.e. amplitude of stock price fluctuations) and mathematical expectation (ie, the slope of the Bollinger line) because there is a serious problem with the selection of previous periods data for formation of probability distribution (yield). Nevertheless, Markowitz in terms of risk science, first demonstrated the practical significance of ratio using the probability distribution of risk categories and profitability of a particular investment portfolio, and he introduced in economics algorithmic approach to the selection of the optimal project for investments attraction that are the basis for application packages programs of the corresponding profile, which are now easily solved empirical complexity of the realization of model of optimal portfolio and diversification of investments by G. Markowitz, proving its greatest importance for the development of modern financial sector of the national economy. Interesting is the fact that the scientist in his theory exclude the possibility of speculations (currency, price) and "short positions", that took care of the full effectiveness of investment.

For these reasons, we proposed structure of theories risks of ICT introduction in the conditions of development of the national economy. On Fig. 2 schematically shows the structure of the theoretical basis of introduction of information and communication technologies in the context of national economic complex.

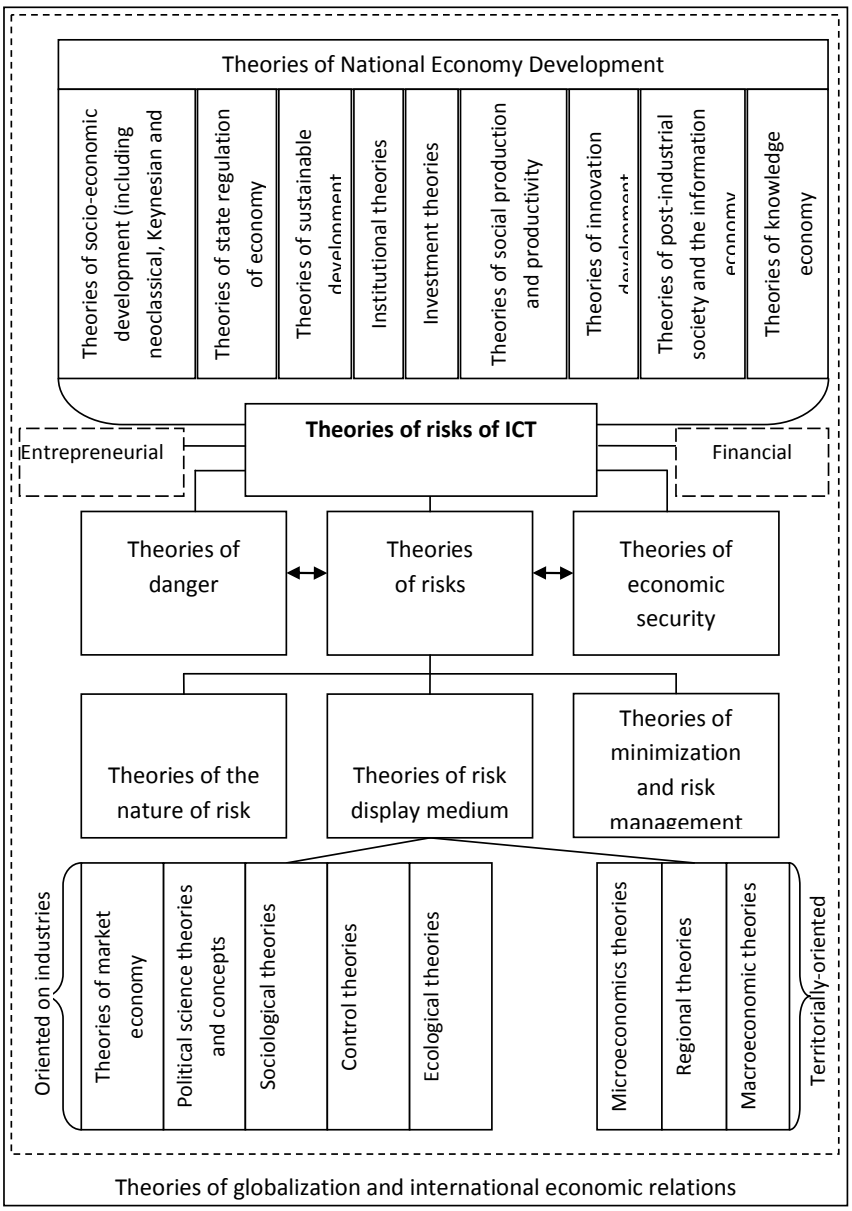
The main groups of theories of risks of ICT introduction in the conditions of development of the national economy is, first of all, the theories of ICT risk, including properly theories of risk, theories of danger and, secondly, theories and concepts of economic security, and the theories of national economy development.

It is worth paying attention to the Ross infocratic signal concept, whereby managers based on information available to them, are able to manage by the risk sending "signals" to investors. In other words, for a fee as a percentage of the market value of the enterprise manager can indirectly control the actions of the shareholders.

Modern concepts of risk also include the theory of "black swans" by N. Taleb, i.e. high probability of occurrence of force majeure events due to unpredictability of financial markets; multi-model of adaptive market by E. Law, which implemented attempt to combine theoretically the aforementioned G. Markowitz portfolio model.

Figure 2

The relationship in the structure of theories risks ICT in the development of the national economy




Source: Compiled by the author.

## Conclusions

It can be concluded that the development of the national economy should be viewed through the prism of business risks, theories and concepts of which should serve as a reliable theoretical basis for progress activating in it. In particular, the contribution of W. Sombart in the history of risks scientific thought lies in the fact that he put the risk from micro to meso- and macro-economic levels, showed its relationship not only with profit, and with the phases of the business cycle and innovation process. Compared with the corporate form of management Austrian scientist J. Schumpeter prefers entrepreneurial form that stimulates much stronger market actors to innovation, innovative thinking, initiative and risk perception as an opportunity and not as a "another's" problem that we must avoid any way; he advocated constant dynamic economic growth, and through innovation, rejecting the establishment of any equilibriums as elements of economic stagnation. M. Friedman's contribution to the economic theory of risk is that scientist brought research of economic risk on a new level – quantitative, turned it from economic concepts in economic indicator. This opened broad prospects for macroeconomic forecasting and planning, made it possible to adjust the magnitude of risk implementation of various projects and programs of socio-economic nature. J. Hicks first scientifically grounded technology of the stock market functioning, where risk is one of the key factors of the formation of value of securities and also transferred research of market equilibrium to a new, compared with marginalism level by offering a theory of diminishing marginal rate of substitution. Nobel laureate G. Markowitz, author of investment portfolio theory, which opened a new chapter in research of investment risks, spent a great job of finding an effective structure of the portfolio of firms real investment, identifying of patterns for ensuring of efficient portfolio investment. In terms of risks science, it was he who first demonstrated the practical significance of value using the probability distribution of risk categories and profitability of a particular investment portfolio, and also he was introduced in economics algorithmic approach to the selection of the optimal project for investments attraction that are the basis for application packages of the corresponding profile, which are now easily solved empirical complexity of the optimal portfolio model realization and the diversification of investments by G. Markowitz, proving its great importance for development of modern financial sector of the national economy; scientist in his theory exclude the possibility of speculations (currency, price) and "short positions", taking care about the full effectiveness of investment. Thus, a group of theories of risk is increasingly becoming the subject of study three sciences: economics (economic risks science), applied mathematics and psychology, explaining the various aspects of behavior of the economic individual in terms of risk and uncertainty. In theories of economic security single view about its nature does not exist, but on the other hand they are theoretical paradigm for some of its aspects, which is important for the formation of public economic policy objectives and the successful implementation of its tasks.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

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# SPECIFICS OF THE DANUBE FLEET MANAGEMENT (TRENDS AND PERSPECTIVES FOR DEVELOPMENT)

*In the last years the main objective of most of the European strategic documents concerns establishment of sustainable and competitive transport system while promoting the development of secure, safe, reliable, energy effective and environmentally friendly transport modes such as inland waterway transport. The free capacity of European inland waterways provides opportunities for transportation with no traffic jams in the living areas; oversized and bulk cargoes, less green house gas emissions, compared to the road transport. Thanks to the development of the information and communication technologies (ICT) much more innovative vessels, which are economically efficient and environmentally friendly are used. Improving the technical specifications of Danube river fleet is of great importance for the development of the transport sector in the separate countries in the region. This fact is also proved by the growth rate of the inland waterway modal split during the last 5 years in the West-European countries such as Germany (12.6%), France (4.3%), United Kingdom (13.4%), Austria (5.1%), the Netherlands (39.1%) (EUROSTAT, 2016) compared to the road and rail transport.*

*In this regard the main objective of the current study is to analyze, as an example of Bulgaria, the development trends of Danube river fleet and as a result the specifics of its management will be revealed. The following economic indicators are analyzed: Danube fleet performance, number and capacity of vessels, coefficient of capacity usage and average stay of ships at ports for handling activities. These indicators allow the strengths and weaknesses, as well as the threats and opportunities of river fleet to be assessed and also measures for its development to be proposed.*

*The proposed model for analysis could be successfully used for studying the specifics of river fleet of other countries with transitional economies.*

*JEL: R49; O31; Q56*

## Introduction

Transport is the key factor that makes easier the trade relations among economic entities and in this way helps the economic growth and social welfare to be improved. In the last years the advancing climate changes, the continuous depletion of natural resources and the pollution of environment due to the road freight and passenger carriages force measures to

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be taken for its development. In this regard the European (European Commission, 2006) and national policy (Koralova, 2013) in the field of transport are oriented towards establishment of sustainable and competitive transport system where all passenger and freight transportation services are carried by secure, safe, environmentally friendly and energy efficient transport modes.

Compared to the other transport modes, inland waterway transport satisfies to great extent the main policy objectives as it is characterized by free capacity. This makes possible the optimal usage of river fleet and promoting its development in order a sustainable transport system, social benefits and minimizing of transport costs for stakeholders to be achieved. Compared to the rolling stock of road and rail transport, river fleet has the following advantages (Via Donau, 2004):

- High security and safety of freight carriages – cargoes could be carried over long distances without causing traffic jams in the living areas;
- It is extremely suitable for carriages of oversized and bulk cargoes – the capacity of vessels is 2000 t. while carrying bulk cargoes and 3000 t. for carriages of liquid cargoes, which approximately equals the capacity of 125 wagons of 40 t. or 250 trucks of 20 t. (UNECE, 2011);
- Environmentally friendly – the volume of green house gas emissions of vessels is from 3 to 6 times lower than that of road vehicles (UNECE, 2011);
- The delivery costs and subsequent costs of operation and maintenance of one ton load capacity are much lower than the relevant costs in the other surface transport modes;
- High energy efficiency – the fuel costs per transportation unit are much lower than those in the other surface transport modes.

Despite the aforementioned advantages, the following disadvantages are also typical for the inland waterway transport:

- Dependence on weather and climate conditions resulting in ice formation, high and low waters which lead to transportation seasonality;
- Much lower speed of vessels than that of rolling stock of road, rail and air transport, which result in long delivery time of cargoes to the recipients.
- Necessity of usage of auxiliary transport services when the network of inland waterways is not sufficiently developed or such network is missing on the territory of the relevant country, which results in higher price of the transportation services provided.

Till the moment many studies in the field of river fleet management are conducted but no publications of Bulgarian authors could be noticed. In his publication R. Hekkenberg (2015) examines the possibilities for optimal usage of inland waterway transport on Rhine through implementation of innovative vessels in order the transport costs to be minimized and the volume of green house gas emissions to be reduced. This publication however

analyzes the results of the technical development of river fleet rather than their economic impact.

H. Jessen (2015) proposes specific measures for development of inland waterway transport again on river Rhine, as he emphasizes on the European policy framework and puts the accent on the technical and commercial requirements for effectiveness of river fleet management. This publication again does not examine the future development of inland waterway transport from economic perspective but from legal one.

Another important research that is of great importance for the problem analyzed in the current publication is that of Sv. Mihic, M. Radovanovic and M. Mihajlovic (2011) who studied the Danube river fleet management. Their publication analyses the possibilities for sustainable transport system through promoting transport services on the river Danube. Special attention is paid to the recommendations of the European policy for sustainable development and the data analysis about freight and passenger carriages, as well as to the cargo volumes of separate river ports. There is also a short review of the development of the Danube river fleet but it is not based on economic indicators analysis, concerning the specifics of the fleet which is one of the main objectives of the current study.

The aforementioned papers do not cover the main objective and assignments of the current research.

**The main objective** of the publication is through analysis of the development trends of Danube river fleet, the specifics of its management to be revealed and measures for its efficient operation and maintenance to be proposed. Trends and perspectives for development of river fleet are studied as an example for Bulgaria and the proposed model could be successfully implemented in other countries with transitional economies.

The river fleet of Republic of Bulgaria is the **object of the analysis**.

In order the main objective of the research to be achieved, the following **assignments are discussed**:

- A review of the European policy in the field of inland waterway transport;
- The application of intelligent transport systems in the Danube fleet management is analyzed;
- The performance of Bulgarian river fleet by carrying capacity, coefficient of loading capacity usage and average stay of vessels at ports is made; The strengths and weaknesses, threats and opportunities for development of the river fleet are summarized;
- Specific measures for development of the river fleet in order its effectiveness to be improved are proposed.

## 1. European Policy in the Field of Inland Waterway Transport

The European policy in the field of inland waterway transport is oriented towards rising up of an integrated market of river transportation services based on the principles of equity, freedom of navigation and competition. In this regard a harmonized legislation in each member-state must be established, based on the following principles:

- Lack of discrimination among participants in the transportation process based on their nationality;
- Free access of the river operators to the market of transportation services;
- Freedom of pricing and negotiations among the participants in the transportation process;
- Free movement of people and goods within the territory where the market of river transportation services is located.

The main organizations that are of great importance for the establishment and harmonization of the legislation in the field of inland waterway transport are: the Inland Transport Committee at the United Nations Economic Commission for Europe; Directorate General for Transport and Mobility; Danube Commission and the national institutions and organizations of the member-states.

The main objective of the **Inland Transport Committee** (UNECE, ITC, 2005) is to be established and unified the technical specifications and conditions for navigation along the inland waterways, as well as cooperation among countries in the field of inland waterway transportation services to be achieved. The Committee shall perform the functions of an advisory body in the field of amendments of European legislation and economic development of the member-states in order a flexible and balanced transport system to be established, based on the market economy principle. This institution shall promote the interoperability between surface modes of transport (road and rail transport) and inland waterway transport through simplification and harmonization of the administrative procedures and implementing the electronic transfer system in intermodal carriages.

**General Directorate for Mobility and Transport** (DGMT, 2016) is the main legislative body in the field of transport, whose main obligation is to guarantee the free movement of people and cargoes through the implementation and harmonization of legal acts that allow access to the transport market and prevent unfair competition. Many directives, regulations and communications are brought into use, concerning the conditions for market access; technical specifications of the river fleet; working conditions and required qualification of the personnel; transport infrastructure; border control; fiscal regime; protection of the environment and etc.

**The Danube Commission** (DC, 2012) is an intergovernmental commission, established as a result of the signing of Belgrade Convention (Convention regarding the regime of navigation on the Danube). The member-states of this convention are Austria, Bulgaria, Hungary, Germany, Moldavia, Russian Federation, Romania, Slovak Republic, Ukraine and Croatia. The main objective of the Commission is to monitor the compliance with the

requirements and conditions of navigation, written in the Belgrade Convention. It helps the Danube countries transpose the main European legal acts in their national legislation. The commission publishes regulations and decisions in three main fields: conditions of navigation on the Danube; regulations for the technical parameters of vessels; protection of the environment. The main activity of the Danube Commission is the focus on the mutual recognition of regulations for navigation on the Danube River and the integration of the river to the European inland waterways.

**The International Commission for the Protection of the Danube River** (ICPDR, 2016) is an administrative body whose main responsibilities are related to the cooperation with government and non-government organizations, interested in the protection of the Danube River, the reduction of green house gas emissions to the environment and the sustainable development of the ecosystems in the region.

The main institutions that defend the interests of river shipping companies are as follows:

1) **European Barge Union** (EBU, 2016) – this union represents and defends the interests of river shipping companies and the owners of non-propelled vessels to the European and international bodies. The headquarters of the organization is in Rotterdam and Brussels. The association has the functions of a consultative body in the field of dangerous goods carriages in European inland waterways, as well as contracts of towage and pilotage and passenger carriages;
2) **European Skippers Organization** (ESO, 2016) – its main objective is to defend the interests of river shipping companies on European level. Its headquarters is in Brussels.
3) **European Federation of Inland Ports** (EFIP, 2016) – members of this organization are more than 200 port administration from 19 European countries. The federation represents and makes popular the inland ports as important intermodal terminals and defends the interests of port administration to the European institutions. The main objectives of the organization are:
    - To make popular the competitive advantages of inland waterway transport in order more forwarders to be attracted;
    - To strengthen the role of inland waterway transport in the intermodal transportation services;
    - To promote the establishment of single European inland waterway net through the unification of rules of navigation and building up the missing links among inland waterway corridors in Europe.
4) **Inland Navigation Europe** (INE, 2016) – it is an independent non-profit organization that promotes the economic benefits of the transportation services with inland waterway transport. Its main objective is to attract much more customers of the river transportation services and the market share of inland waterway transport to be increased.

The introduction of the European programmes NAIADES (2006) and NAIADES II was an important progress in the promotion of inland waterway transport. In this way the European

Commission strives to enhance the customer interest in inland waterway transport by emphasizing on its advantages and the possibilities a sustainable, environmentally friendly and competitive transport system to be established. These programmes focus on five key areas: crew; infrastructure; market; image and fleet. They include also propositions to the member states for the development of the European inland waterways.

*The European policy in the field of inland waterway transport is oriented mainly towards development of the economic and energy effectiveness and environmental friendliness of the river fleet along the inland waterways of Europe. Moreover the application of information and communication technologies and insurance of well-managed transport infrastructure are of great importance for the better positions of this transport mode on the transport market. The established organizations for defending the interests of river shipping companies help the competitive advantages of inland waterway transport to be popularized and its role in the intermodal transportation services to be strengthened. This fact is proved by the development trends in the river fleet along the Rhine River and the Netherlands inland waterways, where the modal split of inland waterway transport during the last 5 years is higher than the share of rail and road transport.*

## 2. Trends in the Development of the Bulgarian River Fleet

River fleet is one of the key elements of the organization and management of inland waterway transport, together with river ports and their superstructure, waterways and locks. It is defined as set of vessels that have the same function, nationality and are assigned to the river shipping companies of the relevant countries (OECD, 2007).

The number of fleet is an indicator that measures the performance and competitiveness of freight transportation services. It consisted of various types of vessels distinguished by technical specifications, carrying capacity, equipment, reliability, safety and security. These parameters of vessels are of great importance for defining the competitive advantages of inland waterway transport compared to the other transport modes. They are necessary also for the competitiveness among operators in inland waterway transport as well as for the competitiveness among relevant transport modes. In this regard the parameters that are of most significance are listed below:

- Displacement;
- Carrying capacity;
- Size and coefficient of loading capacity usage;
- Gross tonnage;
- Vessels type, equipment and age;
- Nationality of the ship;
- Time of the vessels trip (14, 18 or 24 hours per day);

- Information about the crew (number, nationality and qualification of the crew members).

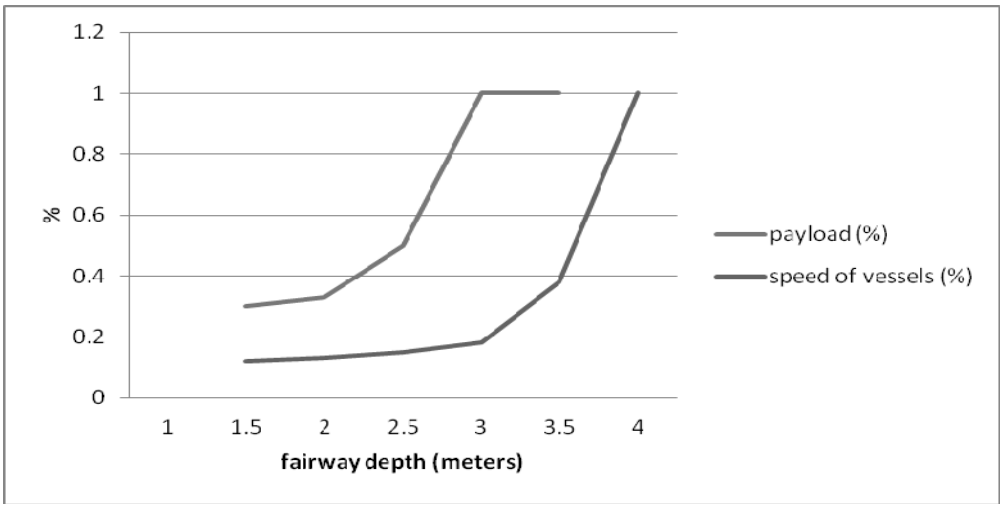
Danube river fleet consists of various types of vessels. What is important when choosing a ship for freight transportation is its physical parameters (length, altitude and latitude), as they depend on the navigation and fairway conditions. The latitude of the vessel is of great importance for passing through the locks, the altitude – for the bridge clearance and the wading depth is determined by the fairway depth in high or low waters. That is why; the Danube river fleet consists only of self-propelled vessels and convoys of pushed barges.

The reasons for this on one hand are the continuous fluctuation of the water levels, and on the other hand – the cargo flow structure. E.g. the unfavorable navigation conditions results in lower wading depth of vessels.

Studying the correlations between technical parameters of vessels and fairway conditions is of great significance for the improvement of river fleet performance. On figures 1 the influence of fairway conditions on the carrying capacity and speed of vessels are displayed. Both indicators impact directly the performance of vessels and indirectly the operational costs. As one can see, in unfavorable navigation conditions, the vessels' carrying capacity and wading depth is increasing with lower pace (e.g. the payload increases with 30% in 1.5 m. fairway depth and with 50% in 2.5 m.). Accordingly, the better the physical characteristics of locks and fairway are, the lower the operational costs will be as a result of the increase of the wading depth of vessels.

Figure 1

Permissible loading capacity and speed of vessels depending on the fairway conditions




Source: Statistical Yearbook of the Danube Commission and author's calculations.

Each improvement of the fairway conditions results in higher speeds of vessels (e.g. when the fairway depth is 2.5 m. the speed of vessels increases with 15% and in 3.5 m. fairway depth, the speed of vessels increases with 38%). The speed increase of ships is a factor that impacts positively the regularity of transportation services and delivery time of cargoes. The higher the values of these quality indicators are the better the competitiveness of river shipping companies is.

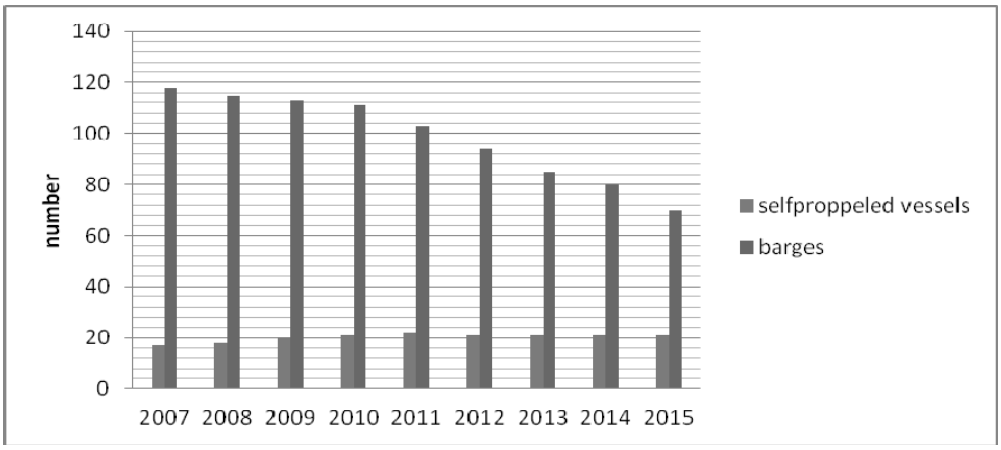
The construction and type of vessels influence the structure and nature of cargo flows.

The usage of convoys of pushed barges is more efficient for transportation of containers, because the payload volume of the vessel could be enhanced. The decks of barges are constructed in a way that allows containers stiffing on three and four layers which leads to better performance and improvement of their loading capacity.

As far as the structure of Bulgarian river fleet is concerned, the convoys of pushed barges predominate. On figure 2 below, the proportion of self-propelled and pushed barges is presented.

Figure 2

Dynamics of the number of vessels by types in the Bulgarian river fleet




Source: National Statistical Institute of Bulgaria, Annual reports of Bulgarian River Shipping Company for the period 2007-2015.

The huge share of convoys of pushed barges (83%) is determined by the favorable conditions of navigation in Lower Danube that allows movement of vessels with high carrying capacity. Some of the vessels of Bulgarian river fleet could be used in river sections where conditions of navigation are unfavorable but others could be used for transportation of various types of cargoes such as bulk and liquid cargoes, oversized constructions, containers and etc.

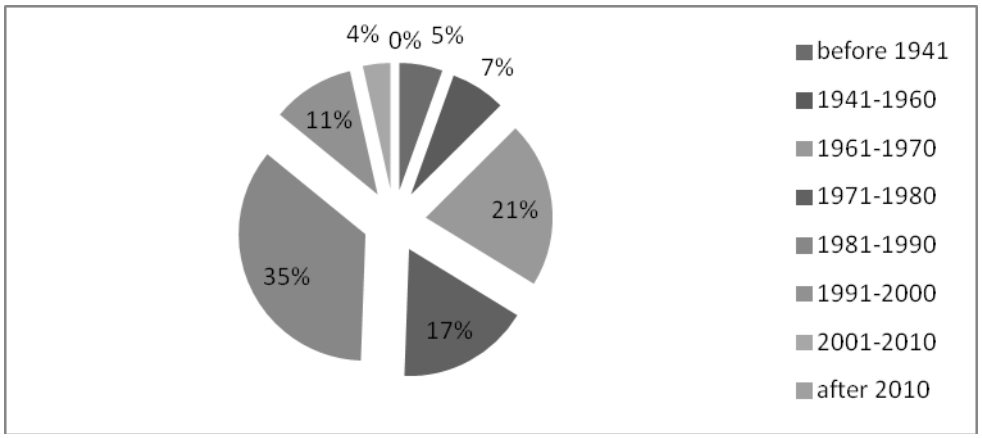
On figure 2 one can see that the number of self-propelled vessels is constant and a slight increase of 23% in 2015 compared to 2007 is observed, while the number of pushed barges is continuously decreasing and a drop of 41% in 2015 compared to 2007 is recorded.

What is typical for Bulgarian river fleet is the long period of their exploitation. This fact has its pros and cons. On one hand, building of river vessels is a long term investment (the amortization period of ships is 20 years), but on the other hand – the market of modern information and communication technologies is developing quite rapidly and it is not possible such technologies to be implemented in ships that has been built during the 80s and 90s years of the last decade. Most of the vessels of Bulgarian river fleet are of age between 40 and 65 years, as most of them are second hand and purchased from river shipping companies, providing transportation services on the river Rhine.

The analysis of age of vessels is of great importance for the energy effectiveness and environmentally friendliness of freight transportation. This fact is determined by the licensing of river shipping companies in order to access the freight transportation market to prove that vessels are seaworthy for safe and secure navigation.

Figure 3

Age of Bulgarian river fleet in 2014




Source: Danube Commission Navigation Statistics, 2013-2014.

As one can seen from the figure above, the biggest share is possessed by the vessels, built in the period 1981-1990 – 35%, which means that their age is approximately 30-35 years. There are vessels that are built 70 years ago – 5%. Next rank self-propelled vessels of age between 40 and 50 years old – 21%. There are no vessels that have been constructed after 2010 and the number of these, aged less than 20 years old is hardly 4%.

One of the reasons for the high share of physically obsolete vessels in the Bulgarian river fleet are as follows: inland waterway transport is determined as capital-intensive as the initial investments for purchasing of rolling stock are significant and in most cases river shipping companies could not take advantage of funding from the state or bank institutions. Credit organizations refuse to assist companies in purchasing new vessels because of the high financial risk and uncertainty, high price of the fixed assets and lack of crediting in such activities. The observed drop of 85.5% of imported and 20% of exported goods in

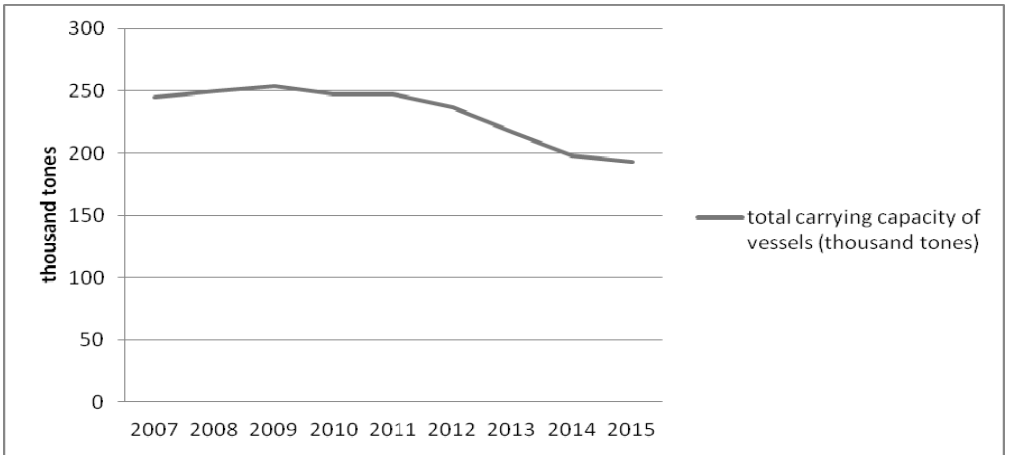
2015 compared to 2007 (see figure 10) force many river shipping companies to decrease the sum of their investments for modernization of fleet.

The main reasons for the current status quo of Bulgarian river fleet are as follows: the restrictive measures of banks in crediting river shipping companies to purchase new ships; the significant decrease in demand of river transportation services during the world economic and financial crisis and uncertainty for the future development of the Bulgarian economy after the post-crisis period.

Liberalization and deregulation of river transportation services market have led to certain changes under which river shipping companies operate. This is also the reason for the decreasing number of vessels at Bulgarian river fleet. Another important factor that influences the Danube river fleet structure is the total carrying capacity of vessels.

Figure 4

Dynamics in the carrying capacity of Bulgarian river fleet




Source: National Statistical Institute of Bulgaria.

A continuous trend of decrease in total carrying capacity of Bulgarian river fleet is observed on figure 4 and in 2015 a drop of 21% compared to 2007 is reported. This decrease dues to the changes in the cargo flows structure and turnover (e.g. the transportation of small batch cargo loads is not efficient for river freight carriages).

By increasing and/or decreasing the number of vessels their carrying capacity accordingly increases and/or decreases. The explanation of this conclusion is related to the constant cargo flows which are oriented towards the East (Ukraine, Russia) and West destinations (Serbia, Croatia, Hungary, Slovak Republic, Austria and Germany) as well as to the regular transportation services in separate sections of Lower Danube.

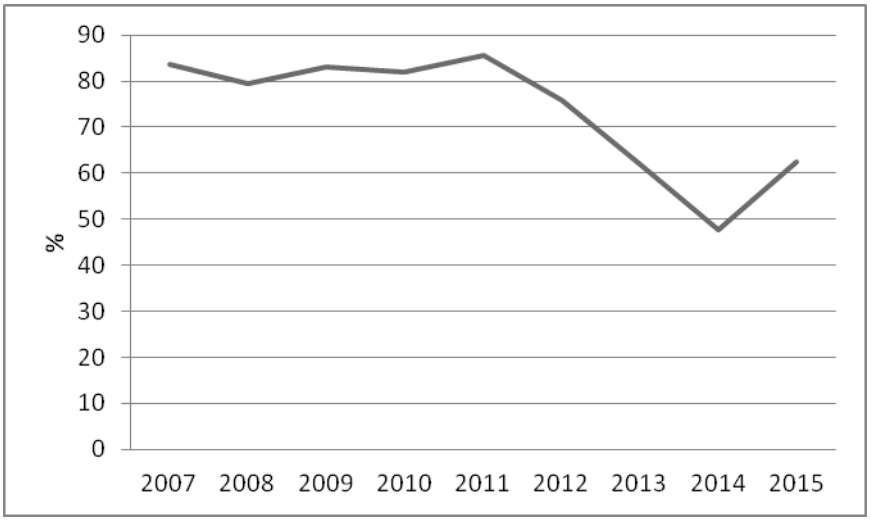
## 3. Danube Fleet Performance

The analysis of operational activity of Bulgarian river fleet is an important prerequisite competitive price of river transportation services to be achieved. In this regard the influence of a group of economic factors defining the usage of vessels according to their carrying capacity must be reported (Via Donau, 2007). The first group of factors consists of: coefficient of capacity usage; empty running coefficient and the second group includes average stay of ships at ports; travel time coefficient; speed of vessels and river fleet performance.

*The coefficient of vessels capacity usage* is calculated when the influence of a few factors is concerned – travel distance, type of trip and carrying capacity of the vehicle. Its value is accustomed to be lower than 1.

Figure 5

Annual average variations of the vessels capacity usage coefficient (%)




Source: Annual reports of Bulgarian River Shipping Company for the period 2007-2015.

The values of this indicator were the lowest in 2014 – 47.5%, compared to 2011 (see figure 5) when the carrying capacity of vessels was optimally used – 85.5%. These decreases are caused by the conditions of navigations because during this period high and low waters occurred many times in the year. Another problem is also the drop of cargo volumes imported and exported through Bulgarian river ports.

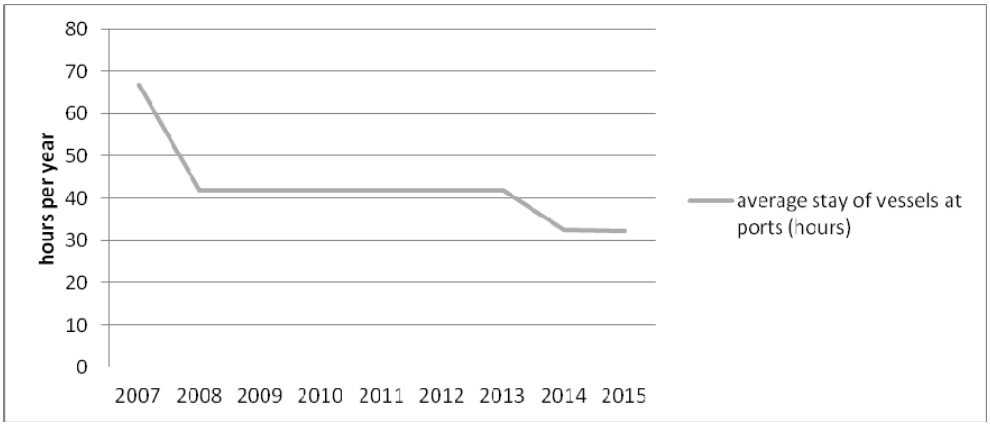
*The empty running coefficient* is the loaded and empty trip ratio. Empty trips in inland waterway transport occur when in one direction the vessels are loaded and in the opposite direction they are empty. Another reason for the barren trips is the long stay of ships at locks or ice formation at separate sections of the waterways.

*The travel time coefficient* measures the productive trips of the ships when they are in motion. It is defined by the travel time and total vessels trip ratio. The travel time includes the time when the vessel is in motion as well as the time for average stay at locks and at river ports for handling operations. The travel time depends on the vessels direction of movement (upstream or downstream).

*The average stay of vessels at river ports* is calculated when the time of vessels in motion is deducted from the total travel time. The duration of average stay of vessels at ports is determined mainly by the technical development of handling facilities.

Figure 6

Dynamics of the average stay of vessels at ports




Source: Annual reports for the operational activity of Bulgarian river ports for the period 2007-2015, Ministry of Transport information technologies and communications.

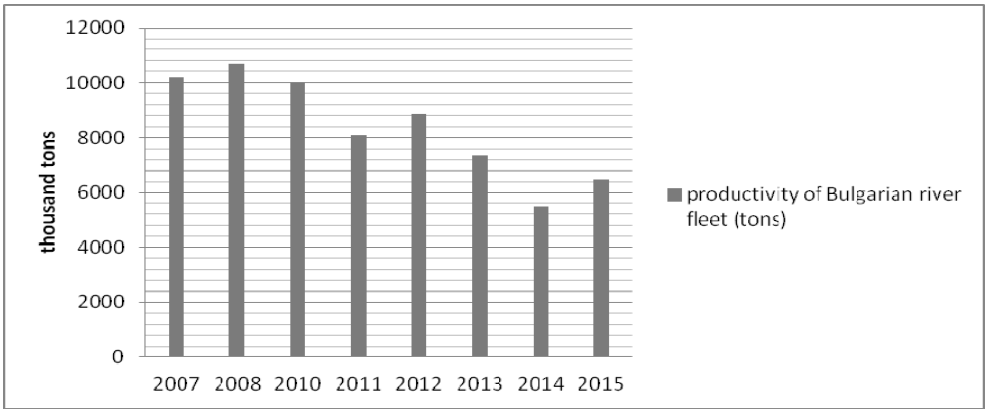
As can be seen on figure 6, the average stay of a ship for handling operations at ports is decreasing as in 2015 approximately this time was 32.5 hours while in 2007 it was 67 hours per year. These variations show that innovative handling facilities are implemented at ports.

*Vessels speed* is measured in kilometers or miles travelled per day. Its calculation is of great importance for the regularity of freight transportation services and the competitiveness of the inland waterway transport.

*River fleet performance* is an indicator that measures the volumes of cargoes carried by river shipping companies. It can be calculated separately per type of vessels or totally for the whole fleet. In accordance with the observed decrease in the number of self-propelled vessels and pushed convoys (see figure 2) as well as in the carrying capacity coefficient (see figure 5) the fleet performance index is also decreasing (from 11 000 tons in 2008 to 6500 tons in 2015).

Figure 7

Bulgarian river fleet performance




Source: Author's calculations.

The performance of Bulgarian river fleet depends also on crew. The human resources in inland waterway transport unite the total number of employees, whose main objective is the strategic goal of the organization to be achieved (Torrington, Hall, Taylor, 2005). Labor organization at companies is a complex of the following activities: personnel selection; allocation of duties; education and development of personnel; working time; wages. In this regard the main indicator for secure and effective navigation is the well-managed and high qualified personnel.

Human resources in inland waterway transport are divided into two categories: *vessels crew*, whose main responsibilities concerns ensuring secure and safe freight and passengers' transportation, and *stevedores*, who are occupied with the main and auxiliary services at river ports. The necessary number of crew members depends on the type and size of vessels, as well as on the cargo type transshipped. Each vessel is steered by the captain, who possesses the necessary certificate and is responsible for the carrying out of the transportation. The other important element of the labor organization process in inland waterway transport is the wages of personnel.

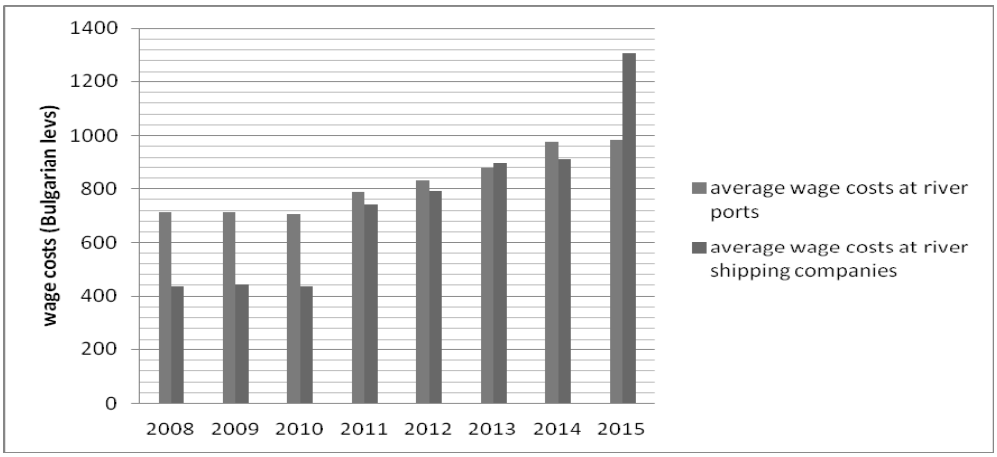
The analysis of average wage costs can be determined by the following:

- Efficient use of labor – any increase in its value is accompanied by an increase in labor productivity as a result of the improvement of working conditions and personnel management, application of information and communication technologies in the management and organization of logistics processes;
- Purchasing power of population – any increase in the amount of average personnel costs deals with increased disposable income of population which is directly related to social welfare;

- Competitive prices of transportation services – any reduction in the amount of average personnel costs reflects in reduction in transport services price.

Figure 8

Dynamics of the average wage costs in inland waterway transport of Bulgaria




Source: Ministry of Transport, Information Technologies and Communications, Executive Agency Maritime Administration.

A trend of continuous increase in the average wage costs in Bulgarian river ports and shipping companies is observed on the figure above. In 2015 the amount of wage costs at river shipping companies increases approximately 3 times compared to 2008. As far as the river ports are concerned, the average wage costs are again increasing but not so sharply as in the river shipping companies, e.g. in 2015 their amount rises with 37.4% compared to 2008. This result again dues to the reduction of the number of persons employed on one hand and on the other, many of the port terminals in this period were managed in the form of public-private partnership and much of the personnel were retired.

The growth in the amount of these costs is mostly driven by the established trend of continuous reduction in the number of employees (see Figure 14). The reported variations in the sum of wages due to the economic, social and demographic development of the various regions, as well as the changes in macroeconomic indicators such as GDP, inflation rate, unemployment rate and others.

Another important indicator that concerns freight transportation services of inland waterway transport is the crew performance. It can be defined as the marginal product, produced by a separate employee for a certain period of time (per hour, per day) (Gille, 2011). Labor productivity covers both the effectiveness of the fixed assets exploitation (vessels) and the crew performance (crew and stevedores) according to the cargo volumes shipped. It depends on many factors such as education and professional qualification of employees, application of information and communication technologies; working

conditions, developing human resources management and etc. These factors influence directly also the image of inland waterway transport as a favorable environment for professional realization of transport workers. In this way the harmonization and unification of standards for certification and education of crew, as well as the free access to the labor market are of great importance for the effective transportation services. As can be seen on figure 9, fluctuations of crew productivity during the observed period are reported. Crew performance was the lowest in 2014 (1842 tons) compared to 2008 (2332 tons). Main problems evolve from both the decreasing number of personnel and low cargo volumes in this period.

Figure 9

Dynamics in labor productivity of crew in Bulgaria

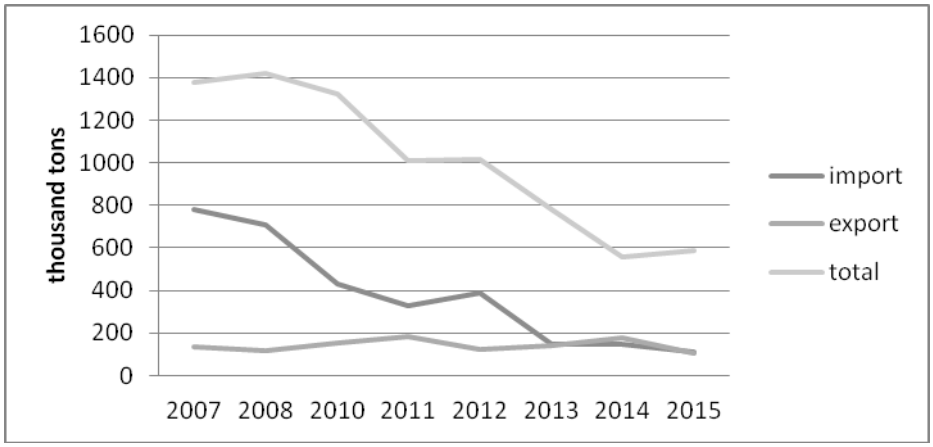

Source: Author's calculations.

The economic and political situation in Bulgaria has led to many changes in its development – on one hand an increase in the cargo turnover of road transport is observed and on the other – overloading of the transport infrastructure, traffic jams and noise pollution, as well as increased green house gas emissions in the atmosphere. At the same time, as a result of the world economic and financial crisis, many economic sectors suspended their productions and this affects the structure and volumes of cargoes carried by river shipping companies and especially the river fleet performance.

On figure 10, volume of cargoes (including export, import and transit traffic) carried by Bulgarian River Shipping Company is presented.

Figure 10

Dynamics of cargo volumes carried by Bulgarian river fleet



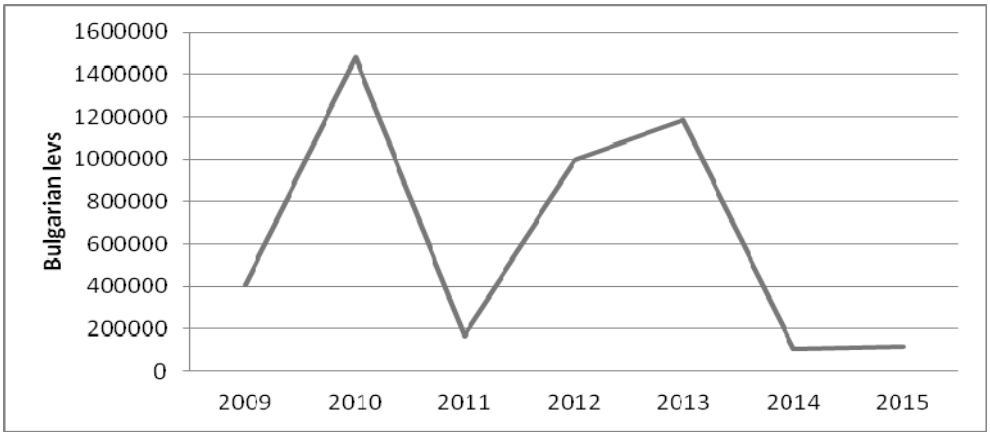

Source: National Statistical Institute and the Annual reports of Bulgarian River Shipping Company for the period 2008-2015.

At the beginning of the analyzed period, the cargo volumes carried are constant. The main reasons are related to the accession of Bulgaria to the EU; free movement of goods, capital and work force, as well as elimination of much of the tariff barriers. The share of imported cargoes from Germany, Hungary, Austria and Slovak Republic is the biggest. The observed decrease in cargo volumes in 2010 dues to the unfavorable conditions of navigation in the Bulgarian section of the river Danube, affected by ice formation during the winter months. As far as the export is concerned, the biggest share is possessed by the exported agricultural products. The general trend observed is of permanent decrease in the imported (drop of 85.5% in 2015 compared to 2007) and exported (drop of 20% for the same period) goods by Bulgarian river fleet. The observed trends in the volumes of cargoes carried impact directly the investment policy of Bulgarian river shipping companies, which is important for the modernization and innovation of the fleet.

*The investment costs* in inland waterway transport could be defined as the cash payments that river shipping companies made in order to purchase or improve the status quo of the river fleet. The investment costs impact the performance of river shipping companies as the effect of their increase or decrease occurs over a long period of time. In this regard their influence over the economic activity of river shipping companies differ significantly from the running costs for repair and maintenance which aim at servicing the short-term goals of the river operators. The importance of these costs is related to the improvement of the quality of transportation services provided; safety, security and regularity of the freight carriages. It concerns also the increase in the loading capacity of vessels; usage of specialized ships; application of information and communication technologies.

Figure 11

Investment costs of Bulgarian river shipping companies for modernization of fleet




Source: National Statistical Institute and the Annual reports of Bulgarian River Shipping Company for the period 2008-2015.

As one can see on figure 11 river shipping companies invested financial resources for modernization of fleet mostly in 2010 – 1 480 300. Subsequently, the investment costs sharply decreased and their sum in 2015 is merely 117 700. The investment activity of river shipping companies is oriented mainly towards modernization of fleet as the average age of vessels in Bulgarian river fleet is between 45 and 60 years. On the other hand it depends on the volumes of cargoes carried as well as on the coefficient of the vessels capacity usage.

As it was mentioned in the introduction of the current research, the main objective of the European transport policy is the sustainable development of the transport sector. The implementation of energy effective and environmentally friendly vessels and promoting the participation of inland waterway transport in the intermodal transportation services is of great importance for enhancing Danube river fleet performance.

Intermodal transportation services involve freight transportation by using various transport modes without any handling of cargoes when changing the mode (Commission for Navigation on the Rhine, 2010). The intermodality is a quantitative indicator that assesses the level of interaction among transport modes – rail, road, sea, air and inland waterway, as high operation efficiency of the transport system could be achieved. The intermodal transport allows the relevant competitive advantages of each mode of transport to be integrated in the transportation process. It can be defined also as a process through which the application of information and communication technologies and well established and managed transport infrastructure could lead to optimization of the transportation services.

The specialized vessels could be successfully used when involving two modes of transport such as: inland waterway and sea transport; inland waterway and road transport and inland waterway and rail transport. In this way it is necessary:

1. Interoperability of information and communication technologies, applied in the various modes of transport;
2. Harmonization of the operation of handling facilities and transport units carried according to the construction of the rolling stock;
3. Enhancing the handling facilities performance and improving the quality of the main and auxiliary operation services provided at river ports;
4. Improving the organization of the intermodal transport services in order the capacity of the rolling stock to be optimally used.

Mostly used forms of intermodal transportation services on the river Danube are the Ro-Ro and inland waterway –sea freight transportation carriages.

What is typical for the Ro-Ro transportation services is the horizontal transshipment of cargoes on special Ro-Ro ramps at the river ports. This type of intermodal services is widely used in the transportation of cars, trailers, semi-trailers, tractors and etc. Such type of transportation services are carried in destinations such as Passau – Vidin – Passau; Magdeburg – Vienna; Passau – Budapest. The main benefits, concerning the usage of this technology are:

- The variable costs per transport unit carried for river shipping companies decrease significantly;
- The free capacity for transportation services of river Danube is optimally used and the quality and reliability of the transportation services is improved as the road traffic in the living areas is reduced;
- Carrying out environmentally friendly and energy efficient transportation services of oversized and bulk cargoes;
- Competitive prices of the river transportation services are achieved;
- The operational costs of the oversized freight carriages are decreased (e.g. in the road transport there is restrictions concerning the movement of oversized vehicles in various periods of the day and additional infrastructure charges need to be paid).
- The implementation of a regular Ro-Ro service in a relevant destination allows better planning of the delivery time of cargos.
- Enhancing the fleet performance and productivity of crew.

The intermodal transportation services, involving inland waterway and sea transport are suitably used in carriages of large containers on container ships. The so called LASH pushing barges are also applied. They are typically used for navigation on inland waterways, where the barges are transshipped at the sea harbor with special facilities. Such kind of transportation is carried between Europe and Middle East through river Danube and the Black Sea. The main advantages of this technology are as follows:

- Vessels with huge loading capacity are used compared to ordinary ships;

- The average transshipment time is shortened as the lighter is directly loaded on a "mother ship" for 15 minutes;
- The delivery time to the destination is being forwarded;
- Lower various costs due to the absence of handling operations.

Another type of carriage is the usage of river-sea ships that is not classified as intermodal transportation services. Thanks to them, cargoes are directly loaded through ports and harbors or between two river ports by coastal shipping. The main requirements such carriages to be done are (Buck Consultants, et.al. 2004): *first of all* the construction and the main technical parameters of ships to allow its navigation in inland waterways and at sea; *secondly* the special conditions of fairway and locks to allow safe and secure navigation of sea ships. Such kinds of ships are used on the Romanian section of the river Danube. The main purpose of such technology is:

- The price of transportation services to be reduced as a result of the transportation carried simultaneously in inland waterways and at sea waters;
- The delivery time of cargoes to be shortened due to the missing handling operations at a way ports.

## 4. Application of Information and Communication Technologies in the Danube Fleet Management

The application of information and communication technologies could be determined as a prerequisite for the development of the current status quo of Danube river fleet and improvement if its economic effectiveness. The proposition of information secured transport services is a way for optimal transport process management. The adoption of such services is of great importance for the customer's needs satisfaction and enhancing the safety, security, regularity and reliability of inland waterway freight carriages.

The organization of the transport services nowadays is related to the continuous exchange of information among stakeholders and transport operators. The core component of information and communication technologies in the field of inland waterway transport is the **River Information Services (RIS)**. They are harmonized information services that assist transport and traffic management in European inland waterways and help the interoperability among different transport modes.[2] These services enhance the information exchange between stakeholders and transport operators through the use of harmonized and standardized information and communication applications. These services could also be determined as a way to achieve efficient, safe and flexible transport processes management and optimal usage of the transport infrastructure.

[2] In accordance with art. 3 of DIRECTIVE 2005/44/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on harmonised river information services (RIS) on inland waterways in the Community, 2005, Brussels

The core element of the system of river information services is the **information**. It is defined as a set of data that prevent the stakeholder's uncertainty and help them take the right decisions in the right time (Alassane, et.al. 2006). The main information that is exchanged among participants in the transportation process is the following (Via-Donau, 2007):

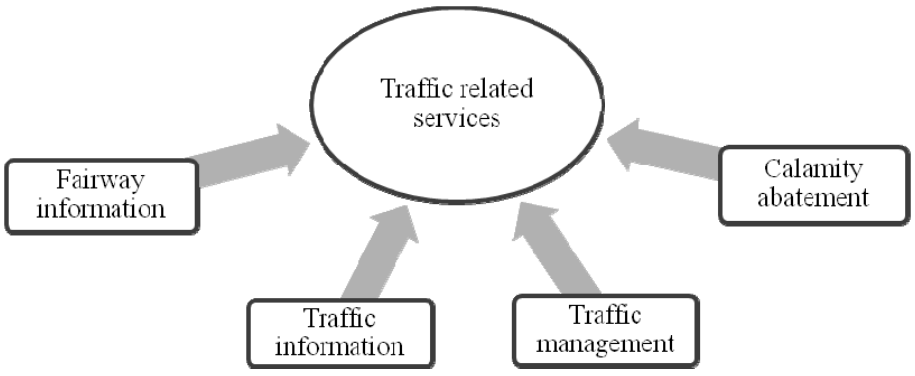
- About the actions of ship crews in order safe and secure navigation to be achieved – when it is necessary the trip or destination to be changed;
- About the optimal organization of the transportation services – when it is necessary the shortest destination to be chosen or efficient transshipment operations to be made;
- About the operational time of locks along the inland waterways – temporary closed locks; a change of technical parameters of bridge clearance; insufficient fairway depth and etc.;
- About the volume, state (hard, liquid or gaseous) and packing of cargoes;
- About the transport operator – technical parameters of the vessels; travel time and trip of the ships.

River information services are applied both in inland waterways of class IV and higher and at ports. They could be classified into two groups: **traffic related services (figure 12)** and **transport related services (figure 13).**

On figure 12 the information about traffic related services is presented as a system of four elements:

Figure 12

Traffic related river information services




Source: Directive 2005/44/EC and conclusions of the author.

1. *Fairway information services* – propose geographical, hydrological and administrative data which is necessary for captains and crew members in order to plan, execute and

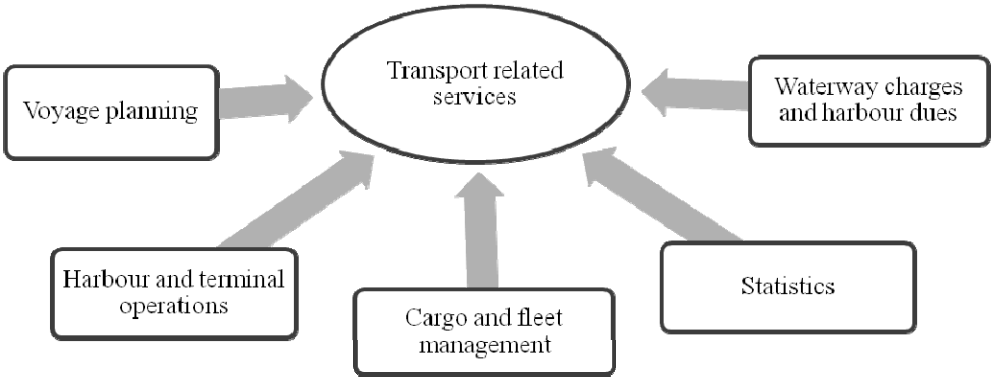
monitor voyages. These services propose static (about water levels) and dynamic (about traffic signs, opening hours of locks) one-way information – it is sent between port authorities and crews and is related to the infrastructure and conditions of navigation;

2. *Traffic information* – includes tactical and strategic information about the traffic management. **Tactical** information contains data about position, speed and direction of vessels movement (upstream or downstream) in a separate section of the waterways. **Strategic** information is mainly used to plan and monitor traffic on a certain section of the waterways. Through this type of information the delivery time of ships; traffic and working cycle of locks are calculated;
3. *Traffic management* – it is carried out by the relevant port authority and its purpose is to be optimally used the infrastructure capacity and to be ensured safe navigation. In this way the port authorities and transport operators could sufficiently exchange information about delivery time of cargoes as well as the staying of ships at locks and at ports for transshipment operations.
4. *Calamity abatement* – through these services the vessels and data throughout the whole transportation process is registered and it is updated on every stage of navigation. In this way when an accident is registered, the port authorities could immediately inform and send the data to the rescue teams. For that purpose the vessels are equipped with reporting systems, where the data is recorded and could be accessed at any time by the port authorities.

On figure 13 the river information services related to transport management are presented.

Figure 13

Transport related river information services




Source: Directive 2005/44/EC and conclusions of the author.

From the figure above could be seen that the main elements of the system of transport related river information services are:

1. *Voyage planning* – the voyage is the distance that the ship must travel from the initial to the final port. Voyage planning is related to the calculation of the expected arrival time of vessels at ports and measurement of the permissible wading depth of ships;
2. *Harbor and terminal management* – these services help the port authorities to be informed about the exact time of ship arrival at ports and the volume of cargoes they carried. In this way the capacity of ports and their superstructure could be optimally used and the time for transshipment operations could be reduced;
3. *Cargo and fleet management* – two types of data are important for these services: information about the vessels and information about the type, volume and packing of the cargoes carried. As far as the ships are concerned the information exchanged is related to calculate their accurate location; exact time for handling operations and share of the empty voyages.
4. *Statistics* – river information services facilitate the collection of statistical data on national and European level. The data exchanged consists of information about volumes of cargoes carried; freight performance of river operators; number of vessels served at ports and locks; ports turnover; number of the accidents. This information is of great importance for the transport process planning and optimization;
5. *Waterway charges and harbor dues* – river information services facilitate also the payment of waterway charges and port dues. They could be successfully used to automatically calculate the amount due between transport operators and port authorities. In this way the river operator receives an electronic notification that certifies the charges paid.

Based on the aforementioned, it could be concluded that the system of river information services depend both on *the geographical, hydrological conditions and density of the river section* and *on the subject that will apply it* (crew members; port authorities and transport operators; inland waterway administrations).

In order to successfully carry their functions, the river information services must be harmonized, standardized and interoperable with the intelligent transport systems, applied in the other transport modes. This could be achieved by the application of communication technologies at vessels and ports in a way that allows reliable data exchange among participants in the transportation chain. These technologies consist of the following:

1. *Inland Electronic Charts Display and Information System (ECDIS)* – it is a set of nautical electronic atlases that allow safe and secure navigation as they generate audible and visual alarms about the technical parameters of the river section (e.g. fairway depth). This system is interoperable with a similar system used in maritime transport;
2. *Automatic Identification System (AIS)* – is an automatic tracking system that exchange data between port authorities and crew members. The main requirement for using it is all of the participants in the transportation process to be applied with the system, otherwise the exchanged information will be imperfect and useless;

3. *Electronic Ship Reporting System (ESRS)* – it facilitates paperless exchange of data about the traffic management; waterway charges and statistics among the participants in the logistic chain;
4. *Notice to Skippers* – key technology that provides standardized information about the technical parameters of the fairway; traffic on the waterway section and hydrological and meteorological conditions of the river section.

Taking into account the analyzed river information services, it could be determined that they are of great importance for both *the crew members* as they facilitate safe and secure navigation and *port authorities* as they allow the variable costs for transshipment operations to be optimized and throughput of ports to be improved. In this regard it is necessary the system of river information services to be harmonized in the waterways of all of the Danube countries. As a result exchange of reliable and up-to-date information will be achieved. In table 1 the information and communication technologies applied in inland waterway transport at the separate Danube countries that are member states are presented.

Table 1

River information services implemented in the Danube countries

| Country | Information and communication technologies | River information services | Implementation phase |
|---|---|---|---|
| Austria DoRIS | AIS; Notice to Skippers; ESRS; ECDIS | Fairway information; cargo and fleet management; calamity abatement; statistics | The project is implemented in 2006; measures for development of the information and communication technologies are taken |
| Bulgaria BulRIS | AIS; Notice to Skippers; ESRS; ECDIS | Fairway information; cargo and fleet management; calamity abatement | Fully implemented communication net; the project is expected to be fulfilled in 2019 |
| Romania RoRIS | AIS; Notice to Skippers; ESRS; ECDIS | Fairway information; traffic management; vessels location at Danube and the Black Sea | The project is implemented in 2013 |
| Slovak Republic | AIS; ESRS | Fairway information; cargo and fleet management | The project is implemented in 2006 |
| Hungary PannonRIS | AIS; Notice to Skippers; ESRS; ECDIS | System for danger goods transportation monitoring; calamity abatement | The project is implemented in 2004 and measures for development of the communication application are taken |

Source: Conclusions of the author.

As one can seen in table 1, the vessels in most of the Danube countries are equipped with notice to skippers, as the data is transmitted through national web sites that could be accessed by river transport operators, port authorities and national river administrations. An electronic transfer of data about the type and packing of cargoes as well as the conditions of navigation and location of vessels is done.

Approximately 45% of the Danube fleet is equipped with electronic charts display and information system that ensure safe and secure navigation and protection of the environment.

To be achieved fully harmonization of the river information services on the river Danube; some of the countries have taken measures for development and modernization of the communicational infrastructure. The main objective of such measures is to be optimized the transportation processes as well as the handling operations at ports.

## 5. Conclusions for the Development of the Bulgarian River Fleet

For transportation services in the Rhine-Danube Core Network Corridor, various types of vessels are used, depending on the structure of cargo flows. What is typical for the Danube fleet is the long-term period of exploitation and that it is out of date. Most of the vessels are purchased as second hand from Rhine shipping companies. This hinders the application of modern information and communication technologies at ships. Another disadvantage of fleet is the absence of such innovations that makes the integration of inland waterway transport in intermodal transportation services much more complicated.

Some of the important factors that determine the competitiveness of vessels are their speeds of movement; energy efficiency of traction; environmentally friendliness and total various costs. Compared to the vehicles and rail rolling stock, river vessels move at lower speeds, that impacts negatively on delivery times and help customers choose another mode of transport.

In general, the total various costs depend on the technical specifications of vessels traction and on the average fuel consumption per cargo carried. The absence of investments for reconstructions or purchasing new vessels is serious obstacle for improvement of the effectiveness of freight transportation services. This fact influences also the volume of green house gas emissions.

Another important problem is the lack of interoperability among navigation on the various inland waterways – e.g. in the Danube region mostly convoys of push boats are used while in the Rhine corridor the self-propelled vessels are prevailing. These differences hinder safe and secure navigation on Rhine-Danube Core Network Corridor, as in some section additional services are necessary for the adoption of vessels to the fairway conditions.

The effectiveness of river freight transportation services and sustainable development of the sector are determined to a great extent by the professional qualification (Nozharov, 2014) of the work force. The main problem here is the lack of well-educated and qualified crew members at the Bulgarian river fleet. A sharp drop in the number of personnel at river

shipping companies as well as high share of aging ship crews is observed in many Danube countries, including Bulgaria.

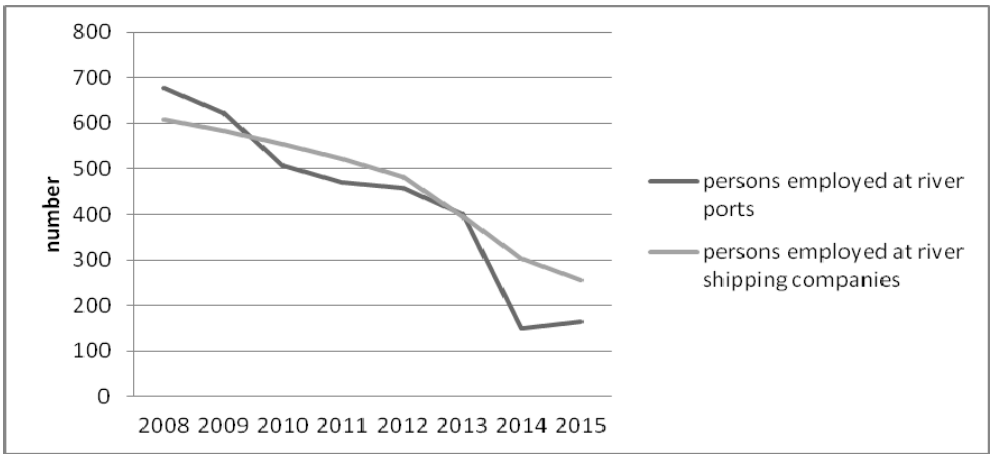
Structure and employment of staff at ports is determined by the volume of transshipped and stored cargoes as well as by the number of handling and warehousing facilities. The number of persons employed at ports depends also on the required time for handling operations.

The general trend that can be seen in the figure below is of continuous reduction in the number of employees at river ports. The total number of employees at ports in 2014 decreases approximately 5 times compared to 2008.

The observed decline is determined by the reduction of cargo flows from one hand and the concession of several port terminals on the other.

Figure 14

Dynamics in the number of persons employed in inland waterway transport of Bulgaria




Source: Ministry of Transport, Information Technologies and Communications, Executive Agency Maritime Administration.

The observed general trend is of reduction also in the number of persons employed at river shipping companies. For the analyzed period their number decreases with 257 in 2015.

The working conditions at ships, characterized by the long time during which members of the crew are far away from their families, are unattractive for most of the graduates. On the other hand the wages of crew in East-European countries, especially in Bulgaria are five times lower (EUROSTAT, 2016) than these in the West-European countries and lead to much more migration of workers.

The lack of high qualified workers in the East-European countries (incl. Bulgaria) force river shipping companies to expand the working time of personnel. In general the duration

of the working shift is 14, 18 or 24 hours. Due to the situation in the country most of the river transportation services are carried in 24 hours working shifts. This has negative impact and contributes to the decision of transport workers to leave the sector because they cannot use their resting time sufficiently. The increasing of working shifts influences negatively also the productivity of crews.

The effectiveness of river transportation services depends also on the professional qualification of transport workers. The theoretical and practical training in the country is conducted in accordance with the Bulgarian legislation. However the absence of unified educational standards in the field of inland waterway transport in EU impedes the mutual recognition of certificates of crew members (NEA, 2008).

In terms of personnel structure, the group of retirement aged workers (between 51 and 60 years) is prevailing at Bulgarian river shipping companies. This will directly lead to increase of deficit of qualified workers in the next years.

The lack of adequate knowledge of crew for movement of vessels at optimal speeds, as well as the application of modern information and communication technologies and ability to lower fuel consumption, are the main prerequisites for decreasing the effectiveness of river transportation services.

In table 2 the main strengths, weaknesses, threats and opportunities for the development of the Bulgarian river fleet are summarized.

Table 2

SWOT analysis of the Bulgarian river fleet

| Strengths | Weaknesses |
|---|---|
| • Safe, reliable, secure and regular transportation services are provided;<br>• Carriages of environmentally friendly and energy efficient transportation services are made;<br>• Huge variety of vessels in the river fleet, concerning type and technical specifications is observed; | • Prolonged lifetime of vessels;<br>• Lack of harmonized application of information and communication technologies;<br>• Prolonged time for transshipment operations at river ports;<br>• The number of retirement aged workers is prevailing at river shipping companies in the country;<br>• Irrational distribution of the working time between working and resting time is accounted;<br>• Lack of unified communication language; |

| Opportunities | Threats |
|---|---|
| • Increase in the volume of freight transportation services of containers;<br>• Involve inland waterway transport in intermodal freight carriages;<br>• Promote shipbuilding and use of environmentally friendly and energy efficient vessels;<br>• Develop the vessels 'traction systems;<br>• Harmonize the educational systems for training of the crew members on EU level;<br>• Ensure favorable working conditions for personnel and sufficient use of the resting time. | • Change in the cargo flows structure because of the necessity of high value and small butch cargoes transportation services;<br>• There are differences in legislation of the River Commissions, concerning the technical specifications and equipment of vessels;<br>• Deficit of qualified working force;<br>• Lack of mutual recognition of certificates of crew members among single river corridors; |

Source: Author's conclusions.

## 6. Perspectives for the Development of Bulgarian River Fleet

During the last years many structural changes have occurred in the Bulgarian river fleet, such as privatizing the monopoly state-owned companies; appearance of small and medium-size enterprises; emergence of intermediaries, governing the transportation services among customers and shippers. The unfavorable conditions of the business environment, the cumbersome administrative procedures and changes of cargo flows lead to lower competitiveness and effectiveness of the river freight transportation services. That is why the gradual and continuous developing of the river fleet is one of the key factors for achieving environmentally friendliness, energy efficiency of inland waterway transport, increase of its market share and entering new market niches as well as improving the safety and security of carriages.

Implementing technical upgraded river fleet is one of the reasons for improving the performance of the vessels and their environmentally friendliness. These actions are related mostly to the adoption of innovations in shipbuilding and ship mechanics, improvements in the navigation facilities and involving inland waterway transport in the intermodal freight carriages, which result in:

- Lower consumption of scarce liquid fuels;
- Improved safety and security of navigation;

- Improved interoperability among different transport modes in direction the total fixed costs to be decreased.

Conditions of navigation in inland waterway are determined by the fairway depths that impact the sustainability of vessels over water. This influences the fuel consumption of vessels. The climate changes are important factor for the fluctuations of Danube water levels and ice formation in winter months of the year. As a result the payload of vessels is significantly decrease and the total various costs increase. In order these problems to be overcome; the shipbuilding industry should be oriented towards production of vessels with developed traction systems and design that allow optimal adoption to the navigation conditions in each section of the river Danube.

This also helps the loading capacity of ships to be increased even when their technical specifications are the same; the days of the year when navigation is impossible to be shortened, as well as interoperability with the other transport modes (rail and road transport) and increased share of specialized vessels to be achieved.

The hydrodynamic sustainability of vessels depends on the technical structure and design of the ship. These parameters impact directly the vessels speeds and fuel consumption and indirectly the volume of green house gas emissions in the environment. The ship design determines its function to carry various types of cargoes.

As a result of the aforementioned, the performance of the Danube river fleet will be improved if high capacity vessels are applied and much more trips are carried. Consequently the ship design must be optimized as the status quo of port infrastructure and fairway conditions are taken into account as well as the specific needs of customers and working conditions on board.

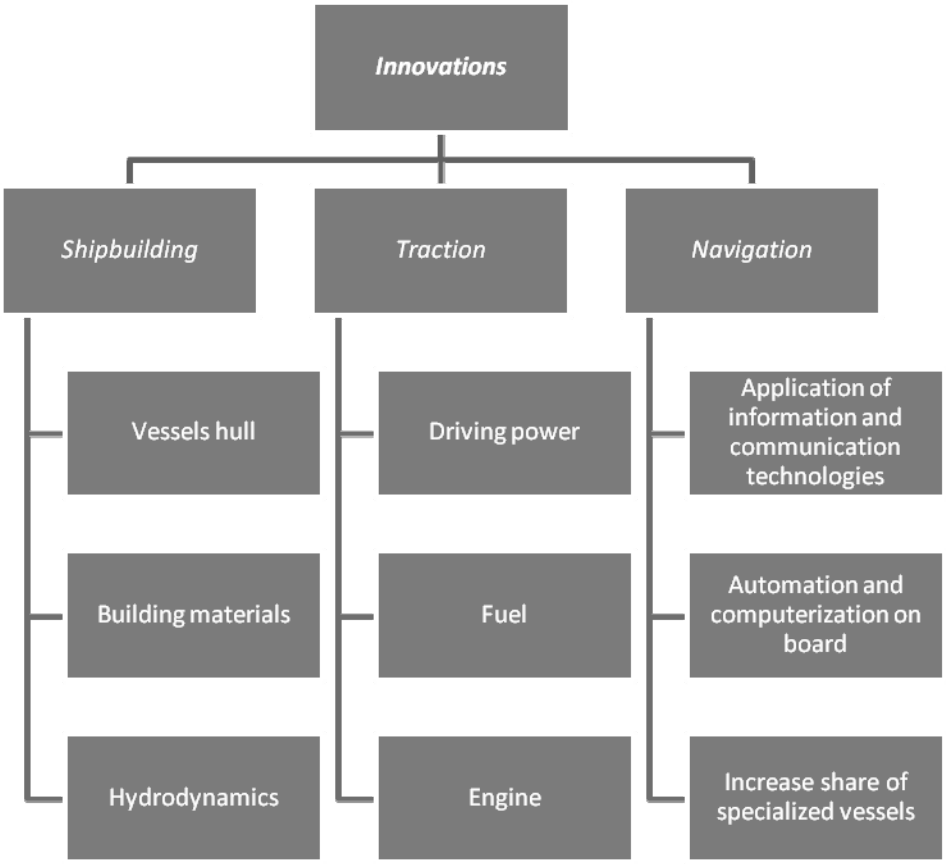
The application of light materials in the shipbuilding industry is a way the ships gross tonnage to be reduced and as a result their payload to be increased. In other words, limiting the gross tonnage of vessels could enhance its loading capacity even when the conditions of navigation are unfavorable.

On figure 15 are presented the opportunities for improvements of the Danube fleet, concerning the innovations in the shipbuilding industry, in the traction systems of vessels and in the conditions of navigations. The technical specifications of driving power of vessels are factors that influence their consumption of scarce liquid fuels and determine the energy efficiency of fleet. The continuous reduction of fossil fuels stocks force the usage of renewable energy resources (liquid petroleum gas) for vessels and the necessity of environment protection requires the ships to be equipped with catalyst converters and particulate filters engines that comply with the European standards for environmentally friendliness, such as EURO V and EURO VI, implemented in road transport. In 2009, the European Commission funded a project “The Cleanest Ship” through which methods for improving the energy efficiency and environmentally friendliness of inland waterway transport are proposed. The ship built was powered in a way that allows the green house gas emissions evolved to comply with EURO V in road transport. This ship is equipped with catalyst converter and particulate filter, as well as with a Tempomaat, which main function is to help the captain of the ship steer the vessel at optimal speed. The main results

of the project prove that the green house gas emissions are reduced to 82% (A. Roos, 2008). Consequently the construction of such vessels is an important innovation in the river fleet in order the environmental friendliness of inland waterway transport to be enhanced and at the same time the modal split of this mode of transport to be increased compared to road and rail transport.

Figure 15

Opportunities for improvements of the Danube Fleet




Source: Manual on Danube Navigation and conclusions of the author.

Another step of innovation of the river fleet is the application of information and communication technologies. The intelligent transport systems are based on the concept for traffic management and they are used mainly when the optimal exploitation of vessels loading capacity and transport infrastructure is necessary. Through their application the following results are achieved:

- Reduction of operation and administrative costs for transport infrastructure usage;
- Reduction of green house gas emissions;
- Reduction of the delivery time of cargoes and low share of empty carriages;
- Increase the safety and security of transportation services and better working conditions for the crews.

The application of intelligent transport systems in inland waterway transport is related to certain benefits for the river and port operators, operators of ground facilities and state administrations.

The main benefits for **the river operators** in short term are direct effects related to safer transportation services and better labor productivity; lower variable costs and higher profit. Evidence for that are the maintenance and operation costs savings as well as savings of the fuel costs per ton carried. If the Bulgarian river fleet is equipped with communication applications (AIS; ECDIS; ESRS) the total sum of the maintenance costs of vessels are reduced with (COMPRIS, 2006):

1. 7.25% as a result of the application of ESRS software;
2. 0.75% when using radar;
3. 2.25% as a result of the application of AIS software;
4. 2.75% when using ECDIS software.

These applications are necessary for the live monitoring of cargo carriages with inland waterway transport. They allow the liability of transport operators to be limited in the event of uncertain circumstances such as total or partial loss of the cargo carried. As a result the total costs for compensation losses will be reduced and higher financial performance of river shipping companies will be achieved. E.g. the gross added value of the river shipping companies in Austria is continuously increasing after 2006 (in this period the river information services DoRIS are fully deployed).

The reduction of fuel consumption is related to less variable costs and lower prices of the transportation services. This also leads to maximization of the positive effects for the society and environment as the volume of green house gas emissions is reduced.

The application of the aforementioned communication technologies is important also for the decrease of the average wage costs and the increase of labor productivity of crew with 16.1% in 2015 compared to 2013 (in this period most of the activities related to the deployment of river information services in Bulgarian section of the river Danube are fulfilled). This fact is an evidence for the better working conditions for crew and the optimization of the transportation process.

The application of river information services is of great importance for the improvement of safety and security of freight carriages. For example the number of incidents on Middle and Lower Danube is decreasing in 2014 compared to 2010 (DC, Annual Navigation Statistics, 2010, 2011, 2012, 2013, 2014). That is why the application of communication technologies (AIS, ECDIS and ESRS) is very important as the cargoes carried could be monitored

through the whole transportation process and in such way to be limited the possibilities of environmental catastrophes especially in the freight carriages of dangerous goods on inland waterways.

**The port operators** get benefits through the application of river information services as direct effects related to better usage of the free capacity of port infrastructure; better productivity of the stevedores and handling facilities. When the ports are equipped with communication and information technologies the productivity of handling facilities increases with 5% (BMVIT, 2006). E.g. the average hours for staying of ships at Bulgarian river ports decreases with 52% in 2015 compared to 2007 (see figure 6).

The application of intelligent transport systems in the port management process is very important for the precise calculation of the mooring time of vessels in order the handling facilities to be ready for operations. The continuous monitoring of vessels location allows port operators to prepare the necessary wharf depending on the vessels technical parameters so the safety moorage of ships to be guaranteed. This results in low variable costs for river operators and fuel and time savings.

**Ground station operators (lock operators)** get benefits through the application of information and communication technologies in the form of direct and indirect effects, such as increasing number of passed and serviced ships at the lock stations which results in better productivity of these facilities – it can be increased from 1% to 10% (COMPRIS, 2006) depending on the traffic. The equipment of gateway stations with river information services helps the capital costs to be decreased with 7.8% (BMVIT, 2006).

**The state authorities** benefit from the application of information and communication technologies in the form of direct economic effects. They are related to 21% (BMVIT, 2006) decrease in the sum of average costs per employee as a result of the shorten personnel due to the automation of most of the services provided. Furthermore the implementation of river information services rationalizes the services of custom clearance of vessels and makes easier the statistics for inland navigation. They allow also the electronic transfer of data among river administration agencies and shorten the time for analysis and prevent making mistakes. Data is collecting on a paperless basis leading to reduction in the amount of government spending.

The application of intelligent transport systems makes possible the integration of inland waterway transport in the intermodal transportation services, based on the harmonization and interoperability among communication technologies in the relevant transport modes. The implementation of sensors, automatic locators, computer signals and radio- and navigation applications allows efficient use of the transport infrastructure, rolling stock and freight carriages in the fastest, safest and most optimal route. Such interoperability is possible among the following systems (DGMT, 2016):

- „Telematics" in road transport;
- European rail traffic management system (ERTMS) in rail transport;
- Vessel traffic management information system (VTMIS) in sea transport;
- Single European sky air traffic management research (SESAR) in the air transport;

- River information services (RIS) in inland waterway transport.

The interoperability among the aforementioned communication technologies allows:

1. Continuous data transfer between forwarders and consignees;
2. Accelerating the cargo delivery process as the competitive advantages of each transport mode are combined;
3. Limit the harmful effects of transport on the environment;
4. The probability of accidents and environmental disasters is reduced.

The application of information and communication technologies in vessels movement allows the main operations on board to be computerized. The electronic systems control the information flow and relieve the crew of many complicated obligations, concerning the vessels exploitation. These systems influence positively the fuel consumption. The application of river information services helps the safety and security of inland navigation to be enhanced. The electronic exchange of data in the supply chain allows the cargoes transportation process to be observed during the whole trip and any lacks and damages of the goods to be avoided.

In order inland waterway transport to be involved in intermodal transportation services the application of specialized vessels is needed. In this way the performance of vessels will be improved and the total various costs will be decreased. The usage of specialized ships is especially effective for oversized and bulky cargoes carriages and that is why the inland waterway transport takes the biggest market share, compared to road and rail transport. Another way the effectiveness of river freight transportation to be improved is the building of hybrid vessels:

- River snake (Holtman, Zigic, 2004) – it can be used when large cargo flows are aggregated in a separate sections of the river. The convoy is composed by few pushed boats, attached to each other as a snake. In this way many cargoes to different destinations could be carried as each push boat can be set free from the convoy.
- Self-discharging vessels – they could be used in Ro-Ro transportation services. They are equipped with special cranes or Ro-Ro platforms by means of which the vessels are self-discharging their payload when berthing at the quays. This leads to reduced total costs as no handling facilities are used and the price of transportation services decreases. The implementation of self-discharging vessels is related to better competitiveness of inland waterway transport as quality indicators such as safety and reliability of freight carriages are improved (WP, 2004).

The effectiveness of river freight transportation services is determined by the employment of professional crew members. Better training of graduates; the guaranteed free movement of working force through the separate river corridors and the sufficient social and labor conditions on board are the factors of great importance that determine the labor productivity. The effectiveness of river freight transportation can be improved by:

1. Ensuring more public and European funds for fully deployment of information and communication technologies for statistics collection, voyage planning, waterway

charges and port dues in the Bulgarian section of the river Danube in order the delivery time of vessels to be improved and administrative and custom formalities to be reduced.

2. Ensuring governmental support in bank crediting of fleet modernization or new vessels purchasing (vessels are one of the most capital intensive assets compared to the rolling stock of the other transport modes) in order the technical conditions of vessels to allow efficient transport of containerized products and goods as well as lower green house gas emissions.
3. Conducting post-graduate courses for theoretical and practical training of crew members in order their knowledge to be up-to-date;
4. Amendments of the labor legislation in the field of inland waterway transport in order harmonized rules for mutual recognition of certificates among European inland waterways to be adopted;
5. Make equal the level of wages among the European inland waterway corridors in order the crew members to be motivated to improve their labor productivity;
6. Financial grants through European and national funds for establishment of educational institutes that will help the image of inland waterway transport as a working environment to be improved.

## Conclusions

The development of the Danube river fleet and the usage of specialized and innovative vessels will lead to the realization of benefits such as:

First of all the usage of technically updated traction systems and design of vessels will allow high speeds and low fuel consumption of vessels to be achieved. In this way, inland waterway transport will be preferred by logistic operators, trading and industrial companies for freight transportation as a competitive mode of transport, concerning reliability, flexibility and cost-effectiveness.

Secondly, the implementation of information and communication applications on the board of vessels will allow the consumption of scarce fuels and green house gas emissions to be lowered. In this way, the crew members will have the opportunity to choose the optimal speed of movement of vessels and have the necessary information about the fairway conditions (ice formation, low or high water levels) in advance.

Thirdly, the development of handling facilities at ports and the implementation of communication applications related to the waterway charges and port dues will allow the average stays of ships at ports to be decreased. This will helps the delivery times of cargos to final destination to be improved and inland waterway transport to be successfully involved in the intermodal transport planning.

Lastly, the existence of regular line services in the Danube region as well as an efficient transport link between Bulgarian section of the river Danube and the Black sea will allow a

balance among the export and import flows through river ports in the country to be achieved. In this way, Bulgarian river fleet will optimally work at full capacity and the implementation of hybrid vessels (self-discharging or river-snake vessels) will be possible. This fact will contribute to the sustainable development of inland waterway transport and to the provision of combined and multimodal transportation services at Bulgarian river ports.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 6

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# REGIONAL DISPROPORTIONS – BUSINESS DEMOGRAPHY AND ECONOMIC GROWTH (EXAMPLE OF BULGARIA)

*The study investigates imbalances of business demography of regions NUTS 2, Bulgaria, which of them are key determinants of regional economic growth disparities; compares business demography at the time of Bulgaria's accession with the beginning of 2014-2020 programming period in EU; determines the impact of key factors on the dynamics of business demography.* ***Methods:*** *The study applies comparative, variance and regression analysis in business demography and economic growth. A statistical test was done of the relation between some indicators and test of correlation between the coefficient of variation of regional growth and the variation in business demography.* ***Results:*** *Differences in GDP per capita are strongly related to differences in the number of NFC/1,000. Average dependence of differences in GDP per capita on the differences in the number of industrial enterprises and employees has been found out. Moderate negative relationship was observed between GDP per capita and the number of dead companies, as well the number of employed in services.* ***Conclusions:*** *Business demography is strongly influenced by economic processes at national and international level. Regions react differently to the socio-economic impacts. Attention needs to be drawn towards business environment, which is determined by the state, improving regional policy and measures to business environment in the companies.*
*JEL: R11*

## Introduction

The main objectives of Europe 2020 Strategy to ensure smart and sustainable growth, and more and better jobs in the EU can be reached, among others, through the support of entrepreneurship and entrepreneurial dynamism, the presence of which, demonstrated by Eurostat – OECD (2007), can be revealed by the analysis of business demography over time.

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One of the prevailing aspect drawing the attention of scientists and policy makers as regards the relation between business economy and regional economic growth is the link between performance/survival of the firms and regional economic growth (Nunes and, Sarmento, 2010; Fritsch and Mueller, 2004; Georgelis and Wall, 2000). Enterprise creation also is regarded as an indicator of competitiveness and as a vital means of creating jobs. The subject of enterprise demography, is often linked to the potential contribution that enterprise creation can make to employment (Ottens, 2014; Schrör, 2009; OECD, 2011; Eurostat, 2016) and to decreasing of inequality (Karanovsky, 2014).

A study, funded by the European Parliament (2015), confirms the need and significance of research related to enhancement of business perspectives which will result in economic growth and a regional and national level. Unfortunately, there isn't enough about this problem in Bulgaria due to the lack of appropriate longitudinal data on firms. The content and observation (official data) of term "business demography" has started in Bulgaria since 2007 and includes market oriented legal forms and activities in area of industry, construction, distributive trades and services on the base of current coverage of statistical business registers by national statistics and Eurostat.

According to the Doing Business Index of the World Bank (2016) Bulgaria ranks 38$^{th}$ out of 189 countries in the latest report, whereas in the previous one (2015) it ranks 36$^{th}$. This means that Bulgaria makes very small or no steps for improvement of the business conditions. Moreover, regardless of the implemented policy for regional cohesion on a European and national level, the situation of reginal inequalities with regard to economic growth continues in Bulgaria. Thus each study related to tendencies, changes, challenges and opportunities for the regional business demography in Bulgaria becomes a useful tool to support the programming and planning of the regional economy and development.

Based on the thesis that business activity is of paramount importance for the regional, social and economic prosperity, the first part of the present study seeks which of the disproportions in business demography among regions are basic determinants of the disproportions in the reginal economic growth. Of investigation interest is also comparison of business demography and its regional disproportions at the moment of Bulgaria's accession to the EU to those at the beginning of the second program period for the country (2014-2020).

Second part of the paper presents the influence of some determinants for the business demography dynamics in the country. Selected determinants – quality of demographic potential, measured by the average age of population and total volume of demographic potential, measured by number of population the region, are leading factors for the business demography in most of the Bulgarian regions. The price of the credit resource as another determinant in present study could be pointed as crucial factor for business development – the ability to pay off debt has been quoted as one of the most important determinant of the firm survival by Nehrebecka, Maria Dzik (2013) and López-García, Puente (2006).

**Survey Methods**

The object of study is the non-financial sector in the region of NUTS 2 level. The aggregation of non-financial enterprises comprises enterprises classified in sectors B to J, L to N and section 95 of sector S pursuant to the Classification of Economic Activities – 2008. The grouping in the analysis is based on the Eurostat definitions and more specifically on the regulations on structural business statistics: micro enterprises (0-9 employees), small enterprises (10-49 employees), medium-sized enterprises (50-249 employees) and large enterprises (250 and more employees). The definitions of small and medium sized enterprises (SME) in the structural business statistics (SBS) of Eurostat and the European Commission (EC) are identical. The regional distribution of data is classified by the regional units NUTS 2 in the 6 statistical regions: Northwest region (NWR), Northcentral region (NCR), Northeast region (NER), Southeast region (SER), Southwest region (SWR), Southcentral region (SCR). Basic notions in the study are: ***number of active enterprises*** (number of registered legal or physical entities which had turnover or employees, i.e. were active during the reference year (t)), ***enterprise births*** (during the year (t), are those which: - were active during the reference year (t) but were not active either in year (t-1), nor in year (t-2) or were active in years (t-1) and (t-2) but with zero employees) ***enterprise deaths*** (in year (t), are those which were active during the reference year (t), with at least one employee but were not active either in year (t+1), or in year (t+2) or were active in years (t+1) and (t+2) but with zero employees) (NSI, 2016).

The analysis in the present paper applies comparative analysis, variation and regression analysis concerning the following parameters:

- Level and dynamics of GDP per capita 2007-2015;
- Distribution of non-financial enterprises by regions NUTS 2 level according to employees 2007 and 2015;
- Distribution of non-financial enterprises/1000 people by regions in NUTS 2 level according to number of employees 2007 and 2015;
- Enterprise death rate , NUTS 2 regions;
- Enterprise birth rate, NUTS 2 regions;
- Enterprise birth net rate NUTS 2 regions;
- Sector (industry/services) variation rate according to number of non-financial enterprises and number of employees;
- Statistical test for available connection between some parameters of business demography (by regions) and selected indicators, related to the analysis, as well a test for availability of correlation dependence between the regional growth variation rate and the variation rate in basic parameters for business demography.

**Results Obtained**

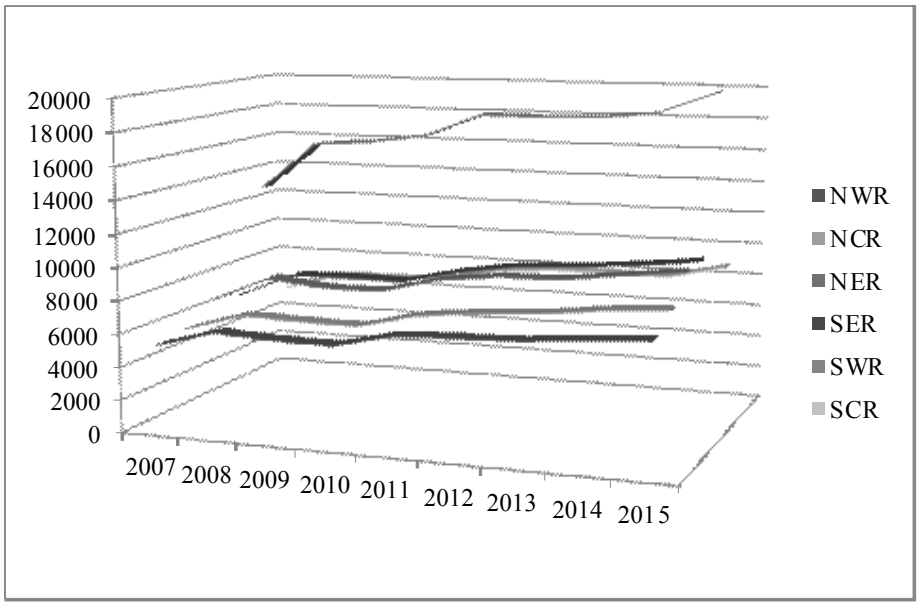
According to Eurostat data the level of gross domestic product per capita (GDP/cap) for the country is under 75% compared to the average for the EU (Eurostat, 2016), and the existing interregional differences increase through the greater part of the monitored period, presented in table 1.

Disproportions in the level of the parameter GDP/cap in NUTS 2 regions (Fig.1) have the following characteristics:

1. Differences range from medium to big and the highest registered GDP/cap (Southwest region – SWR) is 2.4 times bigger than the lowest (Northwest region – NWR) at the beginning and 2.6 at the end of the period.
2. The growth rate for the GDP/cap for the entire period is the lowest in the region with the lowest level of development (45.1%). On the other hand, the highest growth rate (60.3%) does not belong to the most developed region, but the one with medium level of development compared to the others.
3. Increase of differences in period of crisis and subsequent trend of their reduction, but with no signs of absolute (β) convergence and in 2015 a new increase in disproportions and respectively the highest heterogeneity level for the entire period.

Figure 1

GDP per capita, BGN, NUTS 2 2007-2015




Source: Eurostat, 2016.

Table 1

Variation rate V (%) GDP/cap., NUTS 2 2007-2015

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|
| Variation rate V (%) | 37.6 | 38.2 | 39.4 | 41.3 | 40.3 | 38.0 | 37.5 | 36.8 | 41.9 |

Source: own calculation based on NSI data.

**The regional distribution of non-financial enterprises** (NUTS 2) is presented in table 2.

Table 2

Distribution of non-financial enterprises by regions from NUTS 2 level according to number of employees 2007 and 2015

| | 2007 | | | 2015 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | SME | Large | Total | SME | Large | 2015/2007 (%; 2007=100%) | | |
| | | | | | | | Total | SME | Large |
| **Bulgaria** | **283444** | **282615** | **829** | **393460** | **392721** | **739** | **138.8** | 139.0 | 89.1 |
| NWR | 26080 | 26017 | 63 | 28580 | 28535 | 45 | 109.6 | 109.7 | 71.4 |
| NCR | 31653 | 31559 | 94 | 35510 | 35438 | 72 | 112.2 | 112.3 | 76.6 |
| NER | 38831 | 38728 | 103 | 52631 | 52548 | 83 | 135.5 | 135.7 | 80.6 |
| SER | 42655 | 42560 | 95 | 56600 | 56518 | 82 | 132.7 | 132.8 | 86.3 |
| SWR | 92829 | 92497 | 332 | 151933 | 151600 | 333 | 163.7 | 163.9 | 100.3 |
| SCR | 51396 | 51254 | 142 | 68206 | 68082 | 124 | 132.7 | 132.8 | 87.3 |

Source: NSI data and own calculations.

By means of the data in the table variation rates about the number of non-financial enterprises have been determined. Its value for the total number in 2007 shows high heterogeneity of regions of NUTS 2 (V=50.8%), and in 2015 the rate grows even further (V= 67.2%), which already determines very high dispersion of that trait.

Due to the high share of SME (2007 – 99.63% – 99.78%; 2015 – 99.78% – 99.86%) the total variation in the number of enterprises correlates with the variation of SME. Concerning the number of Large enterprises there are very big differences both at the beginning and the end of the monitored period – 2007 V=72.9%, 2015 V=84.3%.

The aggravating disproportions in the number of enterprises at the end of the monitored period is a result from the uneven dynamics of the parameter in the NUTS 2 regions – the growth rate varies from 8.7% to 58.4%, in favor of the more developed regions.

Thus three cluster groups of regions are formed with regard to the dynamics of non-financial enterprises:

1. In the Southwest region, which is the richest in the country throughout the entire monitored period (based on Eurostat data in 2014 GDP of SWR is 75% compared to the average for EU[)], the highest growth in the number of non-financial economic units has been registered;

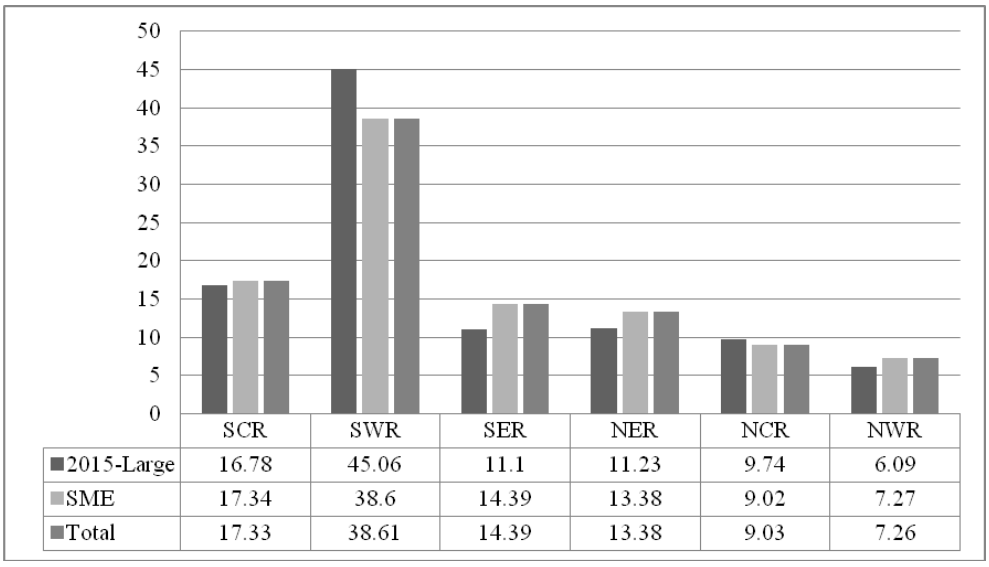
2. In the two north regions – Northwest and Northcentral regions (NWR is the second poorest region in the EU based on Eurostat data in 2014 GDP of NWR is 30% compared to the average for the EU), the changes is the weakest;
3. In the other three regions similar growth rates have been reported.

The increase in the number of enterprises in all regions is basically at the expense of SME, since with large enterprises a decrease has been noticed, except for the most developed region (SWR).

With regard to the contribution of the NUTS 2 regions in the total number of enterprises in the non-financial sector significant differences have also been observed, and again the variation sweep is formed by the Southwest and the Northwest region. The biggest number of non-financial enterprises is concentrated in the Northwest region and their share grows. Almost half of the large enterprises (45,06%) in 2015 also belong there (Figure 2).

Figure 2

Non-financial enterprises by NUTS 2 regions (Bulgaria=100%) 2015




| | SCR | SWR | SER | NER | NCR | NWR |
|---|---|---|---|---|---|---|
| 2015-Large | 16.78 | 45.06 | 11.1 | 11.23 | 9.74 | 6.09 |
| SME | 17.34 | 38.6 | 14.39 | 13.38 | 9.02 | 7.27 |
| Total | 17.33 | 38.61 | 14.39 | 13.38 | 9.03 | 7.26 |

Source: Graphic presentation by own calculations based on NSI data, Bulgaria

Analyzing interregional differences with regard to business demography, when the population factor is eliminated, through the parameter *non-financial enterprises per 1000 persons* (Table 3) it is established that variation among NUTS 2 regions is considerably lower in 2007 V=15.2%, while in 2015 V=23.3%. Yet the tendency for increase of differences is preserved and the growth rate is in favor of the richer regions (Figure 3).

Table 3

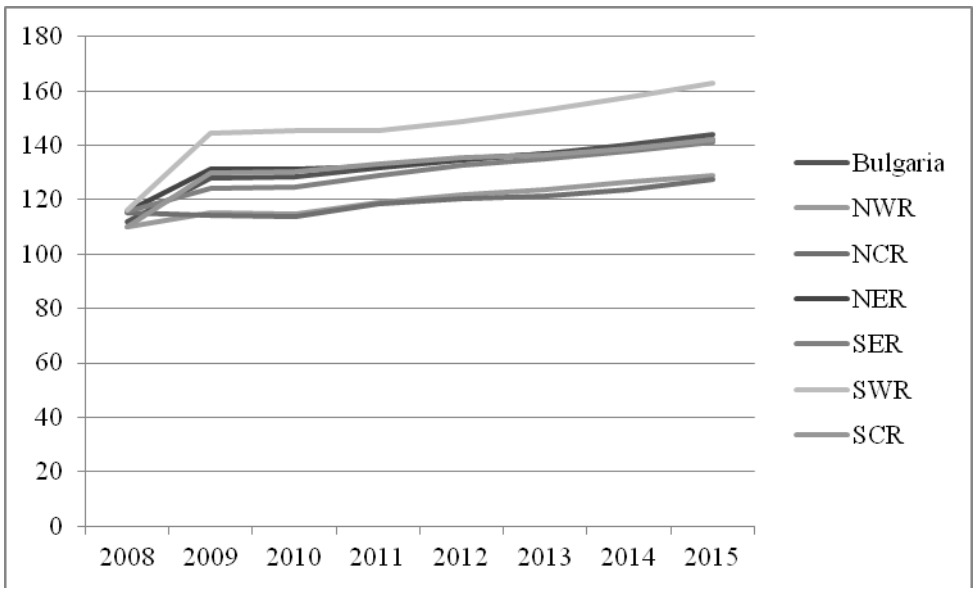
Distribution of non-financial enterprises/1000 persons by regions in NUTS 2 level according to number of employees 2007 and 2015

| | 2007 | | | 2015 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total/1000 p. | SME/ 1000 p. | Large/1000 p. | Total/1000 p. | SME/ 1000 persons | Large/1000 p. | 2015/2007 (%; 2007=100%) | | |
| | | | | | | | Total/ 1000 p. | SME/ 1000 p. | Large/1000 p. |
| Bulgaria | 38.0 | 36.9 | 0.11 | 54.8 | 54.7 | 0.10 | 144.2 | 144.1 | 90.91 |
| NWR | 28.1 | 27.9 | 0.06 | 36.2 | 36.1 | 0.06 | 128.8 | 148.2 | 100.0 |
| NCR | 34.0 | 33.9 | 0.10 | 43.3 | 43.2 | 0.09 | 127.4 | 129.4 | 90.0 |
| NER | 39.1 | 39.0 | 0.10 | 55.6 | 55.5 | 0.09 | 142.2 | 127.4 | 90.0 |
| SER | 37.9 | 37.8 | 0.08 | 53.6 | 53.5 | 0.08 | 141.4 | 142.3 | 100.0 |
| SWR | 43.9 | 43.7 | 0.16 | 71.6 | 71.4 | 0.16 | 163.1 | 141.5 | 100.0 |
| SCR | 33.3 | 33.2 | 0.09 | 47.3 | 47.2 | 0.09 | 142.0 | 163.4 | 100.0 |

Source: Own calculation based on NSI data, Bulgaria.

Figure 3

Growth rate of non-financial enterprises per 1000 persons 2007-2015 2007=100%




Source: Graphic presentation by own calculation based on primary NSI data, Bulgaria

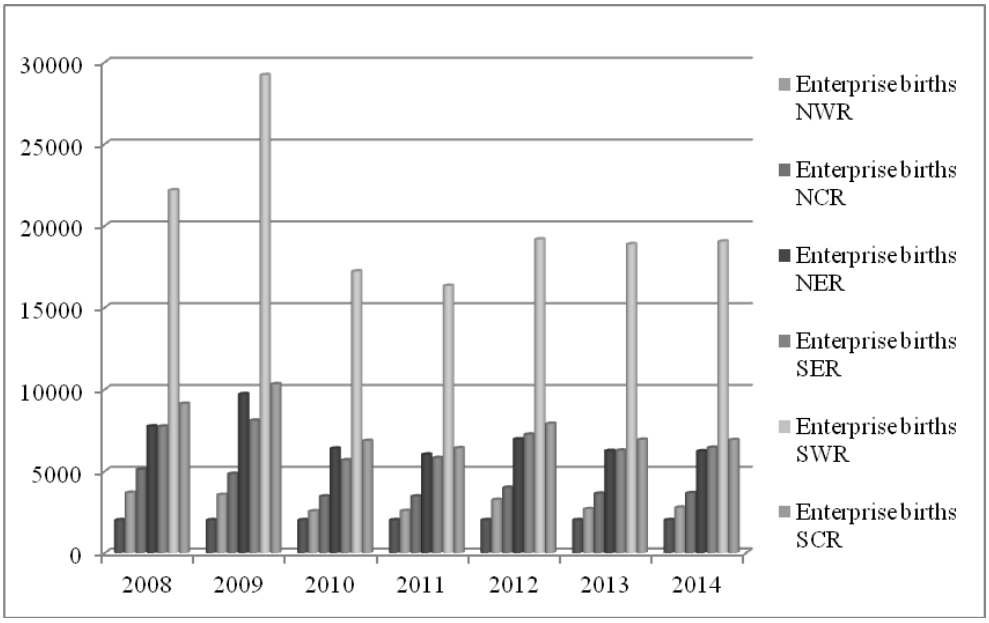
By temp of development of non-financial enterprises per 1000 persons the highest growth (163.1% in 2015 compared to 2007) the Southwest region stands out – over 2 times higher rate compared to the lowest values of growth in the two north regions (NWR and NCR).

Figure 4 shows the dynamics in the number of ***enterprise births and deaths*** *for the six regions in the period* 2008-2014. Throughout the analyzed period the highest number of new born enterprises was recorded in the beginning. The decrease in their number coincides with the financial and economic crisis, the growth being restored sustainably in the most developed Southwest region – after 2011. In most of the other region restoration is short lived – in 2012. With regard to deceased enterprises reduction has also been observed except for a visible apex in the climax of crisis 2010-2011, only the Southwest region showing lasting tendency of increase in the number of deceased enterprises (after 2011), which demonstrates instability of the relatively high business initiative.

Figure 4

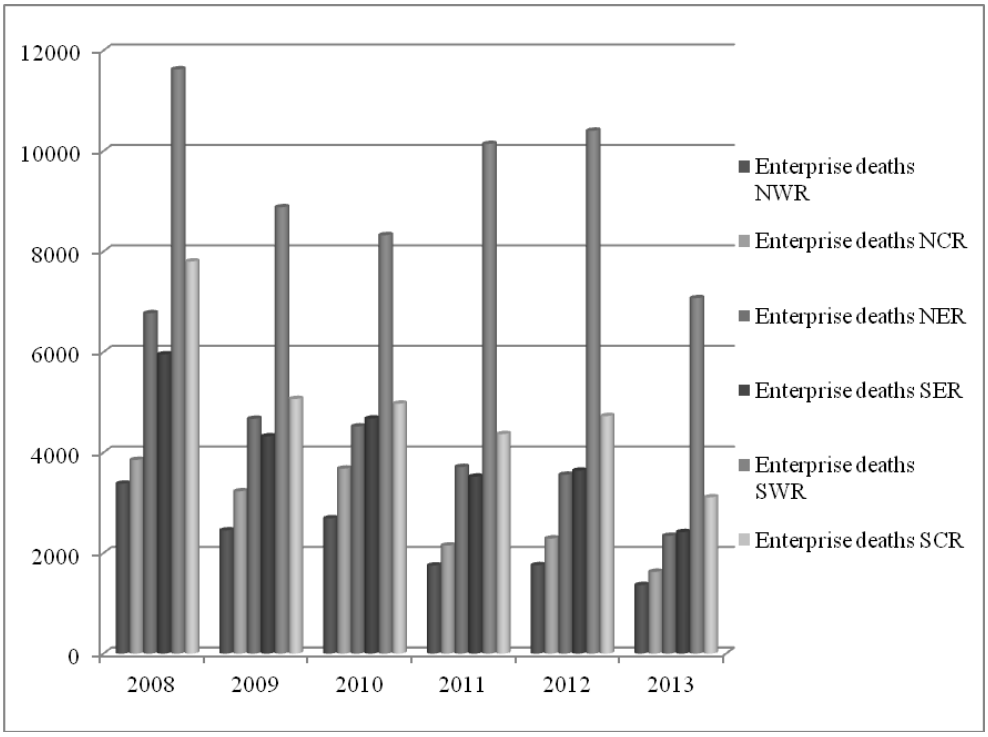
Dynamics of enterprise births and deaths by regions NUTS 2 for the period 2008-2014

***4-A Enterprise births***




Source: NSI, http://www.nsi.bg/en/content/13218/business-demography

***4-B Enterprise deaths***




*Source: NSI, http://www.nsi.bg/en/content/13218/business-demography*

Clearer idea about the need of the comparative regional analysis is given by the ***enterprise birth and death rate*** as share of the active enterprises in the region.

Map 1 (Eurostat) presents the level of ***enterprise birth rate*** for the NUTS 2 regions in 2010 (for Bulgaria the data are for 2009). It is evident that two north regions ((Northwest region – NWR and North-Central Region – NCR) have value of the rate between 7 and 10, while in the other four regions the value is between 10 and 13, i.e. they are relatively homogeneous. On the other hand, this information shows favorable positioning of most Bulgarian regions compared to the NUTS2 regions in EU.

Table 4 sets the rates of new born enterprises in the period after 2010.

Table 4

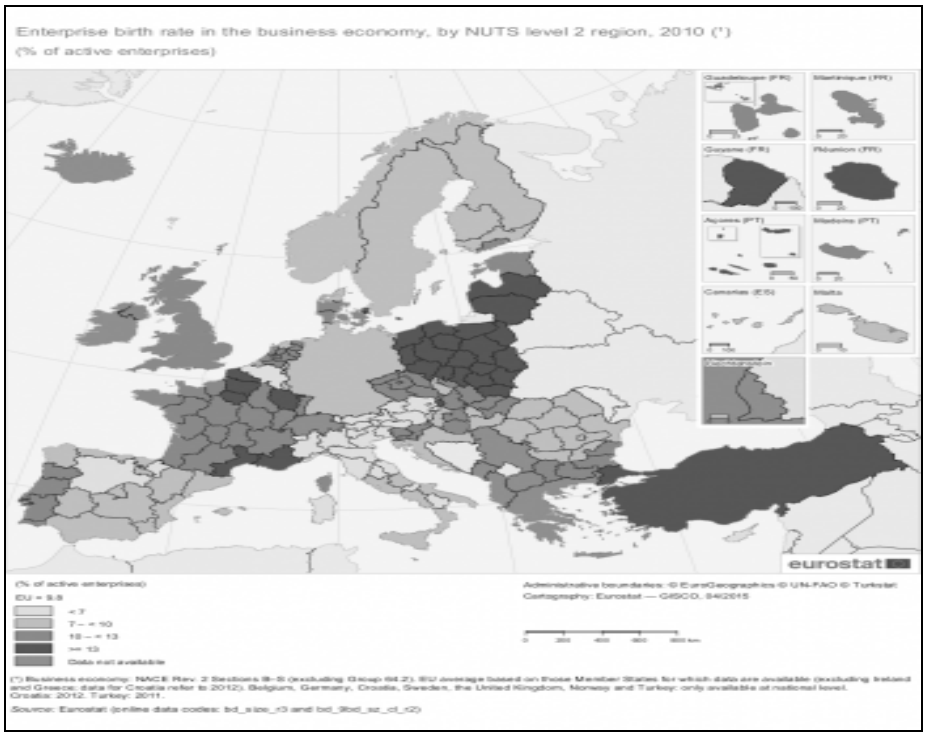
Enterprise birth rate, NUTS 2 regions

| | NWR | NCR | NER | SER | SWR | SCR | Variation coef. V (%) |
|---|---|---|---|---|---|---|---|
| 2011 | 9.22 | 10.06 | 12.12 | 11.10 | 11.48 | 9.81 | 10.8 |
| 2012 | 11.55 | 11.54 | 13.84 | 13.53 | 13.18 | 11.98 | 12.7 |
| 2013 | 9.63 | 10.52 | 12.36 | 11.62 | 12.59 | 10.47 | 11.5 |
| 2014 | 9.92 | 10.52 | 12.19 | 11.69 | 12.38 | 10.32 | 9.38 |

Source: Own calculations based on NSI data.

Map 1

Enterprise birth rate in the business economy, by NUTS level 2 region, 2010




Source: Eurostat, Structural business statistics.

In all four years the enterprise birth rate is lowest is the least developed regions (NWR and NCR). In 2009 and the following years all regions (except for the poorest – NWR) are in the group with enterprise birth rate between 10 and 13. Only in 2012 three regions (the most developed) are with rate value above 13.

Although with variable trends over the four years, the enterprise birth rate increases in 2014 compared to 2011 in all regions, with differences between them being rather low.

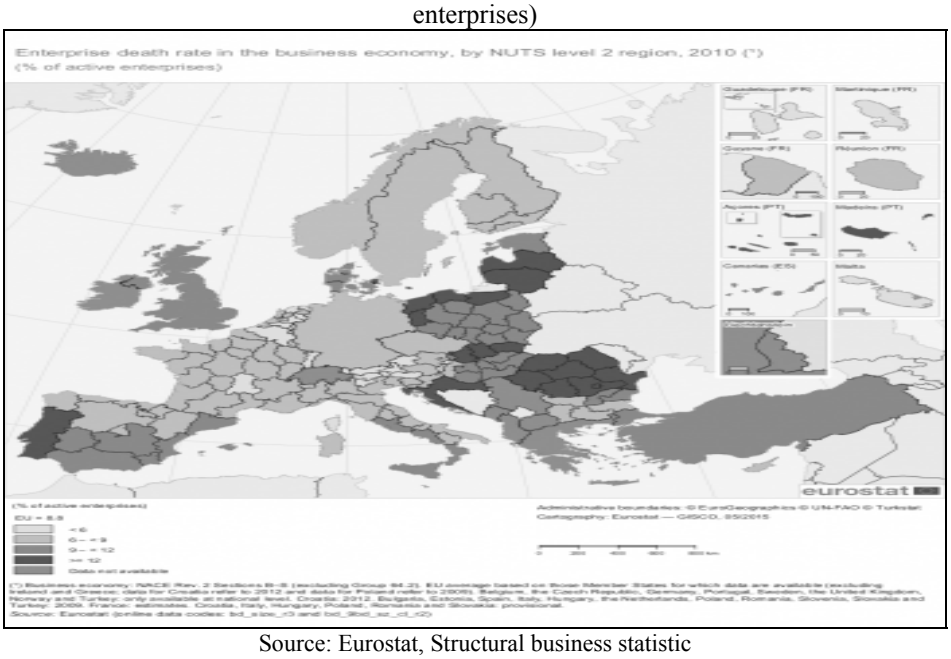
Significantly higher are inter-regional differences in the beginning of the recovery (2012) after the economic crisis. This can be explained by the short-term effect of using the potential of entrepreneurial activity factors. There is also faster rate growth in less developed regions. Although this is a manifestation of catch-up development in terms of business demography, it is a fact that both in the beginning and in the end of the period the highest enterprise birth rate is recorded in the highest developed regions.

Map 2 presents the ***enterprise death rate*** for NUTS 2 regions in 2010 (for Bulgaria the data are for 2009). By this indicator, the Bulgarian regions have favorable positioning compared to NUTS 2 regions in EU. NCR and NER are among those with rate value between 9 and 12, and the value of the remaining 4 regions is between 6 and 9. In 2011 most regions (excluding SWR and South-Central region – SCR) are in least favorable rate groups (above 12) (Table 5). This is due to the crisis period. It is very noticeable that enterprise death rate lowers in 2013, which mainly results from leaving the state of market instability by the economic subjects. It has to be noted that the highest enterprise death rate is not in the lowest developed regions. As a whole with regard to inter-regional differences small to very small variation in the value of enterprise death rate is observed.

Not only due to the historical experience, which shows that, but also due to the strong global economic inter-relations in the 21st century, one can assert that negative processes (world financial crisis) are dispersed via "shock wave", the effect of which can be defined as „unification in the evil". That could account for the smaller interregional differences in the enterprise death rate compared to those in the enterprise birth rate.

Map 2

Enterprise death rate in the business economy, by NUTS level 2 region, 2010 (% of active enterprises)




Source: Eurostat, Structural business statistic

Table 5

Enterprise death rate, NUTS 2 regions

| | NWR | NCR | NER | SER | SWR | SCR | Variation coef. V (%) |
|---|---|---|---|---|---|---|---|
| 2011 | 12.2 | 12.4 | 14.1 | 12.4 | 10.6 | 11.2 | 9.7 |
| 2012 | 11.3 | 11.7 | 13.7 | 11.0 | 10.8 | 10.9 | 9.4 |
| 2013 | 4.89 | 4.72 | 4.64 | 4.48 | 4.71 | 4.70 | 2.84 |

Source: Own calculation based on NSI data

With the ***enterprise birth net rate*** (this rate is the difference between the enterprise birth rate and the enterprise death rate) one can pin point the presence of very strong disproportions among NUTS 2 regions (table 6). In 2011 due to the economic crisis in all regions (except for SWR) it is evident that enterprise death share exceeds the birth share. It is also reported that it is in a varying degree – the value of the variation rate is within the upper scale V = -88.2%. During the following years a positive value of that rate predominates and the variation among regions reaches its highest level in 2012. This is the year in which revitalization of economic activity starts. Some studies (Manolov, 2016) in Bulgaria show stronger effect of the components of nationally determined conditions in the regional localization of business activities. There is sufficient justification to account for these strong disproportions in the enterprise birth net rate with regional specifics – demographic, social, financial, economic, and institutional. In 2013 there is already strong "attenuation" of differences and variation can be defined as one of medium scale, which is typical of the greater part of the analyzed business demography parameters.

Table 6

Enterprise birth net rate NUTS 2 regions

| | NWR | NCR | NER | SER | SWR | SCR | Bulgaria | Variation coef. V (%) |
|---|---|---|---|---|---|---|---|---|
| 2011 | -3.0 | -2.3 | -2.0 | -1.3 | 0.9 | -1.4 | -0.8 | -88.2 |
| 2012 | 0.2 | -0.2 | 0.1 | 2.5 | 2.4 | 1.0 | 1.4 | 119.2 |
| 2013 | 4.74 | 5.8 | 7.72 | 7.14 | 7.88 | 5.77 | 4.74 | 19.3 |

During the studied period almost three quarters of ***employment in the non-financial sector*** is provided by SMEs. Their share increases from 74.5% of the total number of employees in all non-financial enterprises in 2007 to 75.4% in 2015. Variation by regions is low both at the beginning and at the end of the period. With regard to the ***enterprise birth employee/enterprise death employee*** rate in non-financial enterprises low differences are also accounted for: 2011 V = 14.2%; 2013 – 14.7%.

Inter-regional differences in NUTS 2 regions with regard to ***branch sectors*** are from high to very high (table 7). With the number of enterprises in the service sector differences are greater and they increase quicker compared to those in the industrial sector. With the parameter ***employees*** (in industry/services) there is a tendency for reducing the differences which remain high in industrial non-financial enterprises and very high in number of employees in services.

Table 7

Inter-regional variation rate (V%) of non-financial enterprises and employment by branch sectors

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|
| Industry (incl. construction) – No. of enterprises | 51.7 | 52.6 | 58.1 | 58.7 | 59.0 | 59.0 | 59.2 | 59.2 |
| Industry (incl. construction) – No. of employees | 48.2 | 48.3 | 51.1 | 49.2 | 48.7 | 50.5 | 47.7 | 45.6 |
| Services – No. of enterprises | 55.2 | 56.5 | 64.8 | 65.8 | 67.0 | 67.8 | 69.9 | 70.1 |
| Services – No. of employees | 92.4 | 83.3 | 85.6 | 87.1 | 88.0 | 90.4 | 90.7 | 91.7 |

Source: Own calculations

Correlation analysis (correlation coefficients of GDP/cap and variation coefficients of basic business demography parameters) shows that regional differences in the parameter GDP/cap are in closest positive dependence on the differences in the number of non-financial enterprises/1000 persons (0.3899). Moderate negative dependence is observed between GDP/cap on the one hand, and on the other, the number of enterprise death (-0.4610).

**Determinants impact on business demography**

When assessing the possible impacts on the process of creating new enterprises, one of the theoretical assumptions is that there is both direct link between "entrepreneurial activity – economic growth" and reverse dependence. Economic activity is determined by the cyclicality of the economy, represented by the volume of goods and services produced. Growth, measured by positive GDP/cap growth, results in an increase in entrepreneurial activity measured by new non-financial enterprises. The tests carried out show that there is no significant linear dependence between the regressor (GDP/cap) and the number of enterprise births. Weak dependence, coupled with low level freedom (caused by a small number of observations since the indicator has been reported and announced only since 2008), leads to results with low experimental value (test in 5% and 10% significance level). This is not surprising – however, an enterprise, based on the adopted technology, combines production factors and produces a result that is projected into GDP, and therefore the primary link is the straight link in which enterprise birth could have a positive impact on GDP. And here the results of research for Bulgaria are contradictory. If some indicate that with the rise in the number of non-financial enterprises per 1000 people by only one, annual GDP per hectare rises by 1640 BGN (ILS, 2013), others make a conclusion about negative dependence (albeit weak and statistically unreliable) (Karanovsky, 2014).

In view of the effect of demographic parameter as basic factors with unfavorable action on a national and regional level, the other hypothesis about the effect of demographic component of the business environment is outlined. Human resources have structural significance for the overall development of regions, incl. in Bulgaria. That focus is additionally pointed out by the concept about “production function”, which in a simplified „Cobb-Douglas“ type puts the accent on labor resources along with physical capital and

adopted technology. The demographic factor is presented by a quality and quantity indicator: 1) quality of demographic potential measured by the average age of population (Eurostat, 2016); 2) total volume of demographic potential measured by number of population the region.

**First test** – a hypothesis is adopted about the presence of linear relation between average age of population in the relevant region (regressor) and number of enterprise birth. The relation results from the assumption that entrepreneurial initiative is typical of the younger part of the population in the region. The equation is the following:

$$\mathbf{РП = a_0 + a_1\ СВ + \epsilon}$$

Where:

EB – enterprise births acting as output element;

AA – average age of population acting as factor (regressor)

$a_1$ – coefficients measuring the degree of impact

$\epsilon$ – random component, characterizing the deviation of the empirical meaning from the theoretical one.

The results are presented in table 8.

Table 8

Effect of the average age of population on the number of enterprise births

| Region | $R^2$ | "$a_1$" coefficient of the variable (average age of population) – regressor | | Research hypothesis | | |
|---|---|---|---|---|---|---|
| | | Value | P value | Accepted at 5% error | Accepted at 10% error | Rejected |
| Northwest | 0.51 | -869 | 0.067 | | X | |
| Northcentral | 0.60 | -1106 | 0.039 | X | | |
| Northeast | 0.40 | -1240 | 0.127 | | | X |
| Southeast | 0.23 | -953 | 0.282 | | | X |
| Southcentral | 0.40 | -1489 | 0.129 | | | X |
| Southwest | 0.32 | -5657 | 0.184 | | | X |

Source: Own calculations, EXCEL, Data Analysis.

The following conclusions can be made from the results:

1. In four of the regions the described model has no research value due to which the research hypothesis cannot be accepted;
2. In two of the regions the described model is statistically significant and liner dependency can be defined as moderate;
3. The link between regressor and resulting value is negative;

4. There is very high elasticity – the increase in the average age with very little, makes a significant decrease in the number of enterprise births.

The conclusions made confirm the understanding that the regions in Bulgaria are extremely different in their overall development and therefore the individual socio-economic processes "respond" in different ways to the individual impacts. Perhaps it is not illogical that only in the two most backward regions of the country there is a statistically significant relationship between the average age and the number of enterprise births. These two regions are experiencing the most deteriorated economic and demographic processes. All growth generators are so limited that the average age of population appears to be a major retention factor. The average age exceeds 47 years (in the Northwest region 2014) and 45 years (in the Northcentral for 2014). It is possible to look for a frontier value of the average age, from which the explicable impact of the regressor on the result is triggered, and in the future a similar interaction to be reported in another region as well.

**Second test** - a hypothesis is assumed that there is a linear relationship between the number of the population in the respective region (regressor) and the number of enterprise births. The assumption is that entrepreneurial initiative is more active in more populated regions, as the number of entrepreneurs is higher. The equation is the following:

$$\mathbf{EB = a_0 + a_1\ NP + \epsilon}$$

where:

EB – enterprise births acting as output element;

NP – number of population acting as factor (regressor)

$a_1$ – coefficients measuring the degree of impact

$\epsilon$ - random component, characterizing the deviation of the empirical meaning from the theoretical one.

The results are presented in table 9.

Table 9

Dependence of enterprise births on the number of population

| Region | $R^2$ | "$a_1$" coefficient of the variable (number of population) – regressor | | Research hypothesis | | |
|---|---|---|---|---|---|---|
| | | Value | P value | Accepted at 5% error | Accepted at 10% error | Rejected |
| Northwest | 0,40 | 0,01 | 0,13 | | | X |
| Northcentral | 0,55 | 0,02 | 0,05 | X | | |
| Northeast | 0,41 | 0,09 | 0,12 | | | X |
| Southeast | 0,27 | 0,03 | 0,23 | | | X |
| Southcentral | 0,48 | 0,05 | 0,10 | | X | |
| Southwest | 0,16 | -0,72 | 0,37 | | | X |

Source: Own calculations, EXCEL, Data Analysis.

The following conclusions are drawn from the results obtained:

1. Only two regions have a statistically significant relationship with the defined model (North-Central at 5% error and South-Central at 10% error);
2. The relationship is positive and the impact – moderate, i.e. only part of the result can be explained by the number of the population.

The surprise is about the lack of significant results. It would be logical for regions with high demographic potential to report a distinctly higher entrepreneurial activity. The main reasons for non-conformity with the theoretical expectations are:

1. Unreliable dynamic order to evaluate phenomena and processes. The data covers a relatively short period of time that cannot serve as maximum credibility.
2. The studied period is characterized by extremely high cyclicality and fluctuations. The reason is the economic crisis that has occurred since 2008. Obviously, the crisis and the subsequent recession have an impact on the ability of the model to reliably assess the impact of the variable and to predict the impact of demographic resources on entrepreneurial initiative in the country.

**Third test** – a fundamental rule is that supply of credit resources affects entrepreneurial activity. It is not accidental that we have registered high economic growth since 2000, as the banking sector has seriously reduced interest rates on loans. This is why hypothesis is being tested that low interest rates increase the attractiveness and use of loan capital, resulting in increased entrepreneurial activity. The average annual interest values by the LEONIA index are used to measure interest rates.[4]

Table 10

Dependence of enterprise births on the price of the credit resource

| Region | $R^2$ | "$a_1$" coefficient of variable (price of the credit resource) – regressor | | Research hypothesis | | |
|---|---|---|---|---|---|---|
| | | Стойност | P value | Accepted at 5% error | Accepted at 10% error | Rejected |
| Northwest | 0,39 | 224,38 | 0,13 | | | X |
| Northcentral | 0,52 | 367,34 | 0,06 | | X | |
| Northeast | 0,09 | 304,88 | 0,49 | | | X |
| Southeast | 0,21 | 324,98 | 0,30 | | | X |
| Southcentral | 0,20 | 491,47 | 0,30 | | | X |
| Southwest | 0,05 | 779,47 | 0,60 | | | X |

Source: Own calculations, EXCEL, Data Analysis.

From the results obtained, the following conclusions can be drawn:

[4] LEONIA index is used pursuant to agreement between the Association of banks in Bulgaria (ABB), ACI Bulgaria – BDA and Bulgarian National Bank (BNB). LEONIA is an interest rate on real deals overnight calculated as the average weighted value for all deals on granting non-secured deposits overnight o the inter-bank market in Bulgaria by a representative group of banks.

1. Insufficient dynamic order, combined with the low to moderate impact of the regressor on the resultant unit, determine the low research significance of the defined model. Only in the North-Central region a statistically significant model is reported at trust interval of 90%;
2. The positive relation between the studied parameters is interesting. More determined higher demand for credit resources. But in times of crisis, economic subjects (predominantly SMEs) have no positive expectations for the future, so they prefer to withdraw their money from the real economy and deposit it in the banking system.

## Conclusion

The regions in Bulgaria (NUTS 2) are extremely differentiated by their economic development, which, after the economic crisis, marks, albeit weak, a turnaround. More specific analyses are needed with regard to the new increase in economic growth disproportions in 2015. There is no such strong trend in business demography indicators: three are the main indicators of the business economy, which are widening the gap – number of non-financial enterprises, enterprise birth net rate, and the sectoral structure of enterprises and employees.

The correlation analysis shows that the regional differences in the GDP/cap parameter are mostly related to the differences in the number of non-financial enterprises/1000 persons. The differences in economic growth are also moderately dependent on the regional differences in the number of industrial enterprises and their employees, reflecting the perception of structural theories about the factors of economic growth. Moreover, there is a negative (moderate) dependency between GDP/cap and the number of people employed in the service sector.

The study also acknowledges that the regions respond differently to individual socio-economic impacts. In the richest region of the country (SWR) the biggest changes in most indicators of business demography are observed; In the two least developed regions (NWR and NCR) the change is the weakest; The other three regions report similar average rates of dynamics. In the most backward areas (with very limited growth generators), there is a significant relationship between the average age of the population and the number of enterprise births.

The factor analysis of business demography suggests that high cyclical fluctuations in economic processes affect the impact of demographic resources on entrepreneurial initiative. Business demography is strongly influenced by economic processes on national and global levels. Our country is in a long recession that limits the business initiative. This explains the paradox that low interest rates do not stimulate entrepreneurial activity due to the lack of positive expectations from economic units. Agents' expectations are a subjective presumption that can hardly be influenced by macroeconomic and other incentives.

Expectations are in three directions: 1) government activity for improvement of national business environment; 2) adapting regional policy with specific and effective instruments

according to the regional specificity; 3) activating the factors of the internal business environment, mainly by improving human resources and transfer of innovations.

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ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

ГОДИНА XXVI, 2017, 6

*Violeta Dimitrova*[1]

# GROSS MARGIN AND BUYER POWER IN BULGARIAN FOOD RETAILING

*Increasing concentration in retail trade due to the expansion of physical outlets, the proliferation of online stores and the construction of retail chains results in changes in the bargaining power of retailers. Such changes are further facilitated by the accelerated process of merger, purchase and introduction of own-brands.*
*This work aims to offer a comparative analysis of the structure of food products manufacturing, wholesaling and retailing in Bulgaria and it studies the level of gross margin in retail trade to research the power of retailers as buyers in the sector. This study makes an overview of the theory of the retail buyers' power in the consumer goods supply chain. The paper further explores changes in the concentration of production, wholesale and retail in Bulgaria between 2001 and 2015 by analyzing the market share of the four companies with the largest sales volume and bargaining power of retailers measured by the level of gross margin.*
*JEL: M21*

## 1. Introduction

In recent years the question of the power of big retailers as buyers has been subject to analysis, policy debates, legislative changes and initiated proceedings of the Commission for Protection of Competition (2016). The imbalance in bargaining power between counterparties may vertically result in the application of unfair trading practices and competition restrictions. A new chapter in the Competition Protection Act called "Abuse of stronger position in negotiating" was initiated and adopted in Bulgaria in 2015, following public discussions.

This work offers a comparative analysis of the structure of food products manufacturing, wholesale and retail in Bulgaria, and the level of gross revenue in trade in order to discuss the availability of retail buyers' power in the sector. The purpose of this paper is, in the light of economic theory, to estimate the relevant level of concentration of retailers to wholesalers and manufacturers in the Bulgarian food supply chain, explore how changes in the competitive structure of retail trade affect the power of retailers as buyers and the level of gross margin, and make conclusion about the reasons. Observations on the evolution of the competitive retail structure started in the 1950s globally and studies show that

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percentage gross margins are either constant or rise in the majority of trades as one moves from independent shops to chains with a larger number of outlets (Galbraith, 1954). At present, the retail sector in Bulgaria is characterized by higher concentration than the manufacturing sector and a growth of retail gross margin (Dimitrova, 2016). Changes in the group of non-specialized stores selling food, beverages and tobacco are significant. Food production in Bulgaria is more fragmented. It can be argued that the market power and the margins of an individual manufacturer or retailer are a joint function of their horizontal competitive positions against firms at the same level and their vertical bargaining power with firms at the other stage (Steiner, 1994).

Section 2 summarizes the theoretical foundations referring to the power of retailers as buyers and it explains the gross margin as a measure of retail buying and market power, section 3 presents the methodology, section 4 reports the empirical results and section 5 draws major conclusions.

## 2. Background

*Retail Buyer Power*

This study is in the context of the economic tradition to analyze the evolution of the retail industry and its influences on the conditions of distribution systems (Dobson et.al., 2000). Initial research and public discussions on the power of retailers as shoppers were associated with the analysis of the countervailing power effect. Galbraith (1952) developed the concept of countervailing power of large buyers that arose from the increasing concentration of industries. Market power of sellers could lead to an increased buyer power (e.g. large retail chains), thus acting as a countervailing force against the original market power of suppliers. He argued that strong buyers could translate to the next customers vertically and subsequently obtain a lower price from suppliers. Galbraith (1952) was trying to prove that the mitigation or regulation of economic power could be achieved not only through competition and state regulation but also by neutralizing the power position with another economic power. In a typical modern market with several vendors, active limitation is performed not by competitors, but on the other side of the market – by large buyers (Madau, Furesi and Pulina, 2016). Those who are subject to aggressive use of economic power have incentives to build organized countermeasures. Galbraith analyzed a grocery chain which extracted wholesale price discounts from food producers and large auto manufacturers that extracted price discounts from steel producers (Snyder, 2005). He argued that retail chains, purchase groups of stores, large houses for mail orders, etc. passed discounts negotiated with suppliers over to consumers by lowering the final price. The reason for that is sought in the form of the production function of retailers.

Galbraith's conclusions are subject to research and discussions even today. One of his first critics is Stigler (1954), who believes that Galbraith's arguments have no rational explanation why large retailers are stimulated to grant customers part of their saved costs as a result of lower delivery prices. The change in the bargaining power of suppliers and retailers only leads to a redistribution of the total profit from the sale without impacting

retail prices paid by end customers. Cases of retail price reductions can be explained by the will to prevent inflation. Stigler also states that retail chains are present only where manufacture of the relevant products is not highly concentrated. He points out that there are no big chains in the petroleum or automotive industry for example as production there is highly concentrated. He welcomes innovation in merchandising techniques and the commercial service as a foundation for new formats in retailing.

Hunter (1958) asks the questions 'whether the development of these large scale retail outlets is a direct reaction to the market power of oligopolistic producers", indicating economies of scale as the main reason. He treats the advantages associated with the scale of activity such as the integration of wholesale and retail functions, the lower level of costs due to faster turnover, the allocation of risk between a large number of retail outlets, as related to the organization of business and not to any greater market power. Summaries of different theoretical explanations about the possibility of large buyers obtaining price discounts from sellers are presented by Snyder (2005). One simple explanation is related to the lower cost of servicing large buyers or lower distribution costs per sale unit.

Recently the power of retailers as buyers has constantly increased. Many authors have studied the bargaining power of participants in product distribution. Dobson , as an independent author and co-author, argues that the effects of the power of retailers as buyers should be discussed in terms of 'how differential buyer power affects the competitive position of different buyers" (Dobson and Inderst, 2008). Dobson and Waterson (1997) emphasized that UK authorities, working on competition regulation, remained impassive to rising levels of concentration in the retail sector by adopting the viewpoint 'that greater concentration in retailing may offer benefits through reduced costs which feed through to lower final prices". Reasons can be found in the lower distribution costs resulting from economies of scale of large retailers and their ability to receive suppliers' discounts, mainly manufacturers, due to large quantities of goods purchased. They prove that the scope of positive action of countervailing power is limited, especially in the cases of intense competition in the retail sector. The lower pace of development of US chains in comparison to UK chains at the end of the last century can be explained by adopting the legislation thesis 'that the discounts obtained by large retailers, who under the Robinson-Patman Act of 1936 represent an anti-competitive form of price discrimination, can be used for predatory pricing against smaller rival" (Dobson and Waterson,1997).

Power is interrelated horizontally and vertically. When a company has market power that allows it to extract even more discounts from suppliers relative to its competitors, it may lower retail prices and gain greater market share horizontally, which in turn allows it to get bigger discounts from suppliers for larger quantities purchased. This effect is known as a positive spillover effect. Retail price reduction is an option when the countervailing force can be socially useful for the end customers. Another possible effect that can occur under certain circumstances is the so-called waterbed effect, when as a result of differential buyer power some buyers can gain at both the relative and absolute expense of other buyers (Dobson and Inderst, 2008). Quantity discounts received from major retailers may put others in a worse negotiation position by having to pay higher prices which will result in increased retail prices. As a consequence, losing buyers may have to leave the market as a

result of rising purchase prices and reduced gross margins, and as a result of raising retail prices for end users.

Chen (2003) is able to evaluate the hypothesis of countervailing force by using a model which includes Galbraith's assumptions and basic characteristics of the retail sector as an industry. He proves that an increase of countervailing power by a dominant retailer can lead to a reduction in retail prices. However, total surplus is not always increased with the increase of countervailing power, as it may reduce the effectiveness of retail. He has a significant contribution in proving the need for horizontal competition in the retail industry, so the countervailing power can be useful for end users.

Chen (2003) stresses that acquisition of market power by concentrated retailers allows them to obtain more favorable terms for purchasing goods in comparison with other retailers. Chen looks for new explanations on the effect of countervailing power of retailers that Galbraith revealed, namely reduction of retail prices. He justifies the reduction in retail prices mainly by reducing the share of total income remaining for the suppliers from transactions with large chains. The suppliers seek ways to increase declining profits, mainly by increasing sales to other retailers by reducing prices. Therefore, price reduction in retail is a result not from assigning part of the saving costs from retailers to customers, but of suppliers trying to compensate for the reduction in their profits due to the countervailing force of retail chains, thus proving the importance of competition to limit the countervailing power of large retail chains to protect customers. The existence of small retailers is critical when striving to achieve price reduction in retail while exercising countervailing power. Chen points out that the analysis does not support the claim that countervailing power can replace competition as a regulatory mechanism of the economy.

The possibility that "buying power at the retail level can lead to a rise in wholesale price" is studied by Erutku (2005). The explanation Erutku offers is that retailers without buying power may increase their retail price. Erutku emphasizes that it is hard to determine the effect of an increase in buying power alone on retail prices, as retail prices are a consequence of both the increase in buying power and market power of retailers as sellers as a result of concentration. Therefore, it depends on the effect that will dominate. Regardless of these analyses many questions remain controversial – ranging from how to assess the power of retailers' position as buyers to how the income from sale of products is distributed between the participants and how it affects the welfare of end customers.

*Gross margin measurement of power*

The study of the power of retailers as shoppers is based on two main approaches - economic and behavioral. In applying the first approach, most of the analyzes are aimed at proving the existence of negotiating power by tracking price changes of producer, wholesaler and retailer and their deviation (Madau, Furesi and Pulina, 2016). It examines the relation between retail concentration and final commodity prices. For example, Dobson and Waterson (1997) examine the effects of increases in concentration at the retail level on final prices.

The possibility of the gross margin to be a measure of the vertical force of traders started to be discussed in the middle of the last century. In the beginning, the factors were studied mainly horizontally, as a prerequisite for changes in gross income variations. Or, gross income variations are mainly used as a measure of market power of retailers and a result of the changes in competitive factors such as concentration of retail industry. Hence, it is difficult to identify the effect of an increase in buying power on retail prices alone, since the price changes are a consequence of both the increase in buying power and market power in retailing (Erutku, 2005). It also applies when we use the level of gross margin as a measure.

The first generalized statistical data on the gross margin in trade was collected in the USA by the Bureau of Business Research in 1911 primarily for the purpose of obtaining teaching material for use in the Harvard Graduate School of Business Administration, founded two years earlier (McNair, 1930). Gross margin is defined as the difference between net sales and the cost of merchandise sold. Thus, the net sales revenue is decomposed into cost of goods sold and gross margin. I hereby join the thesis that the gross margin has received insufficient researcher attention, also as a measure of traders' power as buyers (Camillo and Sayed, 2015).

One of the first publications on the importance of gross margin as a measure of retail sector performance is that of Hall and Knapp (1955) in relation to the improvement of the statistical reporting of the British Census of Distribution and of the quality of empirical analyzes. The sales revenue is a major indicator of business outcome in retail. It is the basis for generating profits and cash flow. Sales ensure sustainable business growth while the reduction of costs is limited. But sales do not fully represent the activities of commercial enterprises in the purchase and resale of goods. Sales revenue does not provide information on the efforts and costs incurred for the realization of sales.

Sales revenues on their own cannot present a complete business result. There is no reason to suppose that provided distribution services are the same for all types of traders (Galbraith, 1954). For example, the volume of commercial services in realization of a sales unit is not the same for the different types of traders, because the volume is determined by a number of factors such as quality of service, degree of readiness of the goods for sale, etc. Stigler (1947) states that it is a big task to construct indices showing the result of a retail business.

Statistically, gross margin is divided into two elements – operating expenses and net income. Consequently, gross margin does not reflect costs associated with the operation of the retailer, but is the result of the bargaining power of a retailer when negotiating with suppliers and of the market power against competitors, horizontally. It shows the efficiency of traders' activities in buying and selling products.

Gross income level (percentage gross margins) does not only depend on sales prices. In the event that all retail businesses sell at the same price, but buy at different prices, those whose delivery prices are lower due to more efficient organization of the purchase activities, effective trade negotiations, receive better quantity discounts or have monopsonistic advantages, will show higher percentage of gross margins, even if they have low levels of distribution cost. This is applicable to large retail chains that obtain bulk discounts and achieve economies of scale, allowing them to retain or increase the level of gross income

regardless of whether part of the savings is being transferred to end users in the form of lower prices, or not. It should be pointed that big retail chains take over the functions of the wholesalers by building and maintaining distribution warehouses and receiving part of the total income in the supply chain.

There is a discussion on the variations of gross income commercial companies have as to the volume of sales they make. The conventional view is that the level of gross margin for small retailers is higher due to their exclusive service, manufacturing services or as a compensation for their inefficiency (Hall and Knapp, 1955). For example, in the United States the percentage gross margins of chains were found to be lower than those of independent shops in the inter-war period last century (Bellamy, 1946). However, other studies show contrasting results, including the current study.

Retail trade is characterized by considerable heterogeneity of the product and monopolistic competition. Product differentiation in retail is a result of decisions made by the criteria of consumer choice or of those features customers can evaluate and compare. For example, even in the case of offering the same products and brands at the same price, different physical objects offer different convenience of location. With the introduction of e-commerce, differences between separate online stores are also formed on the basis of easy access and the position of the store in cyberspace. In a local retail grocery market there is a difference in the prices of goods. The level of quality of each product is different. When you offer the same products with the same quality level, service should vary. The information that customers have is imperfect. Even when examining the information electronically customers cannot cover and compare the diversity of opportunities.

Hughes and Pollard (1957) suggest that if the claims of major retailers that they transfer the quantity discounts they receive from manufacturers to final consumers are true, the level of gross margin should not differ too much from that of small retailers. But contrary to that suggestion 'gross margins show very large dispersions, not only as between shops selling similar goods, but also as between shops of similar size selling similar goods'.

According to Steiner (1993), retail gross margin is the scoreboard on which the status of retailer-manufacturer competition is recorded. The brand's retail gross margin (RGM) is the difference between its consumer price (Pc) and the manufacturer's price (Pm) divided by Pc (Steiner, 2001). Thus, the retailer's share of a brand's consumer price is its RGM and the manufacturer's share is 1 – RGM. This same ratio is termed 'gross distribution margin' (GDM) when manufacturers also sell to wholesalers. The negative correlation between margins at the two stages, also called an 'inverse association between the margins of consumer goods manufacturers and retailers' (Steiner, 2001) is widespread, although not a universal phenomenon. Enhanced advertising by producers and distribution of manufacturer brands contributes also to this negative correlation. A brand's retail price depends on the costs and margins of its manufacturer as well as on those of the wholesalers and retailers that distribute it to household consumers.

There are divergent trends in price movements, gross income and advertising costs. For example, advertising can increase the selling price of the manufacturer when the company increases the margin more than the decrease in costs due to increased sales. With a strong manufacturer brand and investments in advertising, competition between distributors and

retailers grows. The power of manufacturers decreases when the retailer decides to use a private label, because it disconnects the manufacturer connection with customers built through direct appeals mostly through advertising as a means of promotion. Not only are private retail chain labels a means of positioning aimed to attract customers and form loyalty, they also serve to allocate income between participants in the supply chain, between manufacturers and retail chains.

Retailers are concentrating on better management of the supply chain as one of the main sources of competitive advantage. The increasing concentration of retail chains brought them as important players on the international commodity markets. This gives grounds to investigate the relationship between retail gross margin and import prices of goods. For example research of EU t-shirt import unit prices and cotton spot prices in China as one of top producers of cotton indicates a correlation (European Apparel Retail, 2011). Apparel import price deflation supported EU apparel retailers gross margin expansion in the period of 15 years (till 2011) but some leading players (retailers) improved gross margins over and above import price deflation. Price studies of certain vertically related markets along the supply chain sometimes require a long period of time, for example for the physical flow of cotton – from raw material to input for yarn production, from fabric to manufactured apparel to store delivery.

Gross margin is the price of commercial service. More and more specialists are treating retailers as sellers of various services to producers and wholesalers who are actually paying for their services. Building on the thesis that the buying power can be defined as the "ability of the dominant retailer to extract a larger share of the maximized joint profit generated by the transaction with the supplier" (Dobson, 2000), gross margin level is an important measure of the bargaining power of retailers.

## 3. Methodology

This research covers the industries of production, wholesaling and retailing of food products in Bulgaria for the period 2001-2015. The beginning of the period was characterized by the first steps of concentration in retailing (after the privatization of the national state and local municipal retail chains), with the creation of national chains, the introduction of foreign chains, the construction of large-structural outlets and early processes of consolidation in the sector through mergers and purchase of existing retail enterprises. This research uses generalized data from the National Statistical Institute of the Republic of Bulgaria, provided at the request of the author, for these three sectors according to Statistical Classification of Economic Activities in the European Community, Revision 2 (NACE.BG-2008) for the period 2008-2015, and for the first half of the period 2001-2008 according to the current classification. When generalizing data the author has complied with the differences resulting from changes in the classification of economic activities and has used NACE.BG-2008 as a reference for the study.

The production of food is statistically presented for sector CA, including classes 10 – Food production and 11 – Production of beverages, Wholesale with G 46.3 – Wholesale of food,

beverages and tobacco, and Retail with G 47.11 – Retail sale in non-specialized stores and G 47.2 – retail sale in specialized stores with food, beverages and tobacco. The research does not cover retail sales of food products in open markets, post office sales, internet sales, home delivery and vending machines sales which is a major limitation of the analysis related to the object. Online sales of the traditional retail network and all sales completed through the click and collect system are elements covered by the activity of the physical retail units.

This analysis is descriptive and involves arranging, summarizing and presenting a set of date. In this paper we calculate and analyze the main economic indicators characterizing the state of the competitive structure of the surveyed sectors and the relations between some of the indicators. Primarily, it determines the changes in the concentration of manufacturing, wholesaling and retailing foods in Bulgaria. The level of concentration is measured by the concentration ratio of the four companies (CR4) with the largest volume of net sales due to the fragmented nature of the industries. We accept the thesis that although the Herfindahl index of concentration appears preferable, both measures give consistent and similar result (Inderst, Jakubovic and Jovanovic, 2015). To study the development of chains we have additionally calculated the sales share of the companies - retail chains selling food products and holding more than 10 retail outlets.

An indirect indicator of the relative fragmentation of wholesale and retail is the wholesale to retail sales ratio of consumer goods or the so-called organizational division of distribution. It indicates the sales share of goods that pass first through wholesalers before reaching the end users. When concentration in the retail sector is low, goods sometimes are subject to resale more than once or pass through several wholesalers before reaching the retail unit. Subject to verification is the hypothesis that in the second half of the studied period a decreasing trend of division level is observed which directly relates to enhancing the level of concentration in the retail sector. The emergence of retail chains buying directly from manufacturers and carrying out part of their functions reduces the total quantity of sales in the wholesale market.

As noted in the foregoing section, the buyer power of the retail and wholesale businesses with food products in the food supply chain is measured by the level of gross margin compared to most studies which are aimed at proving the existence of buyer power by tracking changes in producer prices and those of retailers and their deviation. The level of gross margin is calculated as the difference between net sales and costs of goods sold divided by net sales revenue, or as markup percentage. The study is aimed to identify trends in indicator development for the wholesale and retail sectors, as well as for groups of companies, those with the highest sales volume and retail chains operating with more than 10 retail outlets.

Due to the use of temporary statistical series and the possible presence of autocorrelation in the data, the relations between the concentration and the level of gross margin indicators are represented by the coefficient of overtaking. For example, the comparative analysis of the concentration and the position strength of retailers are realized by the overtaking index (index of concentration ratio divided by the index of retail gross margin). We believe this approach to be more relevant to the current situation in Bulgaria, marked by a significant increase in retail concentration after 2000. Statistical planning data by regions is not

complete due to problems in statistical data reporting local units' contribution by regions. Concentration ratio and retail gross margin level are relative indicators, therefore, when calculated sales revenues are not reduced to comparable prices.

## 4. Results

This paper studies the trends in the food retail industry as a whole comparing it to the food manufacturing and wholesaling in Bulgaria. We are trying to determine whether trends shown by the results can be called a structural change. When considering separate short periods of time it seems that there is no connection whatsoever, but when comparing for a longer period of time, relations appear.

During the study period the number of enterprises for retail sale of food, beverages and tobacco in non-specialized and specialized stores for both sectors G 47.11 and G 47.2 initially increased from 31 810 in 2001 to 35 286[2] units in 2009 when it reached its highest or an increase of 110.93%, then the number began to decline reaching 31 615 units in 2015 or below the number of units at the beginning of the period. Differences in both sub-sectors should be pointed out. Retail companies with non-specialized retail outlets decreased from 23 099 in 2001 to 20 074 in 2015, by 3025, or 13.10%, while those with specialized retail outlets increased during the period by 2 869 or 33.08%. The latter being a consequence of the increased presence of large food retail chains mainly developed the network of supermarkets. As a result of the opening of new large retail outlets small retailers in the sector of non-specialized retail outlets left the market and the new ones were forced to seek niche market mainly offered by the specialized retail outlets.

Following 2009 the process of concentration in food retail started to accelerate noticeably. The total number of employees engaged in the food retail sectors of specialized and non-specialized stores increased from 44 338 to 83 956 people, or the average number of employees in a business enterprise increased from 1.39 to 2.66. This process is especially strong in non-specialized outlets where the average number of employees in an enterprise increased from 1.55 to 3.48 people. The number of outlets in the retail sector of non-specialized stores decreased steadily over the period from 29 506 in 2001 to 24 102 in 2015, while the average sales area almost doubled from 32.69 square meters to 56.72 square meters.

The concentration measured by the share of the four companies with the highest sales volume and the sales share of the chains with more than 10 outlets marked a significant growth. Processes of structural changes are quite obvious in non-specialized retail outlets where the presence of the modern super and hyper markets was becoming more tangible.

[2] Data from the National Statistical Institute of the Republic of Bulgaria, provided at the request of the author and own calculations of the author.

Figure 1
Net sales revenue of food, beverages and tobacco in non-specialized shops

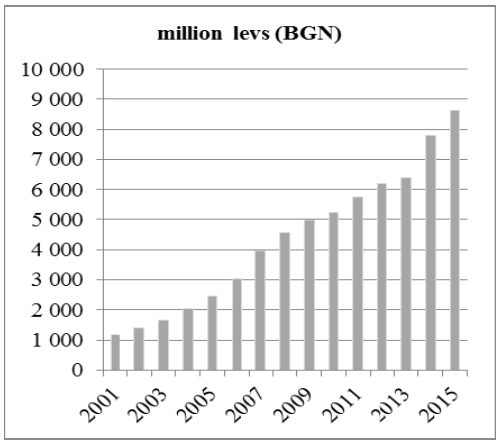
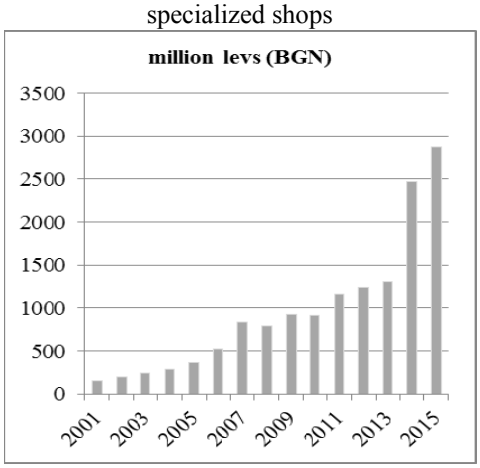



Figure 2
Net sales revenue of the 4 largest companies with food, beverages and tobacco in non-specialized shops




The CR4 index continually increased from 12.59% in 2001 to 33.40% in 2015 or more than 2.5 times which demonstrates the process of concentration especially pronounced in the recent years of the study period. The Euromonitor data show similar results, with 33.40% sales share of the four largest companies in the grocery sector in Bulgaria in 2015 and 33.20% in 2016. According to Euromonitor the group of the largest grocery retailers in Bulgaria for 2015 was formed by Schwarz Beteiliguns GmbH – 20.1%, Rewe Group – 6.2%, Van Holding EOOD – 3.5% and the same market share of 3.4% for CBA Kereskedelmi Kft and Metro AG. As of 2013 Van Holding Ltd running the Fantastico store chain was among the first four. Changes within the group of the top 10 companies were quite significant after the national Piccadilly chain reduced its activity (in 2013 with market share of 2%), Carrefour SA – 2.5% market share in 2013, and after the Penny market chain (Rewe Group), with a market share in 2014 of 2.1%, left the market. The market share of KOOP Targovia I Turizam AD was also reduced from 2.7% in 2012 to 2.2% in 2016. A growth of 1.8% over the past five years marked the market share of Tabak Market AD operating together with Lafka chain.

The share of sales realized by the companies with more than 10 outlets was 26.70% in 2008 and reached the highest value of 44.97% in 2014, decreasing to 38.92% in 2015. Values were similar to those of the CR4 index or apart from the four chains with the largest volume of sales, the other chains with more than 10 outlets realized only 5.52% market share in 2015. The latter indicates that, in general, the sector was fragmented, dominated by companies with less than 10 outlets and with rapidly growing share of large chains in recent years.

The great diversification in retail at the beginning of the study was a prerequisite for the development of the wholesale network. The CR4 index in the wholesale of food, beverages

and tobacco increased over the study period from 4.35% in 2001 and reached its highest value of 17.13% in 2015. Slowly but steadily, consolidation in the wholesale sector was a fact, with still very low levels due to high fragmentation. Gross margin levels were almost two times lower than those in the retail sector, resulting from its primary function, large volumes and rapid turnover of stocks. Competitive intensity was high, as shown by the weak variations in the level of gross margin – 12.15% in 2001 and 11.55% in 2015, the highest being 12.35% in 2007.

Figure 3

Net wholesales revenue of food, beverages and tobacco

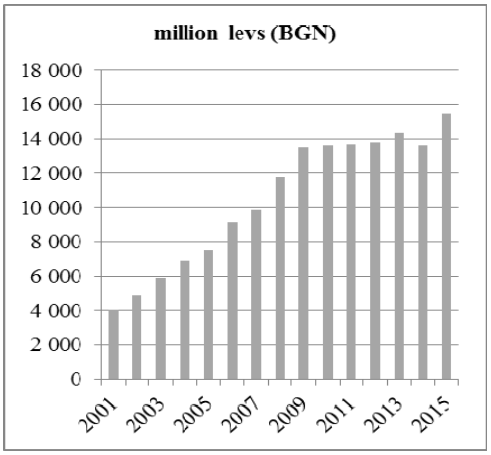
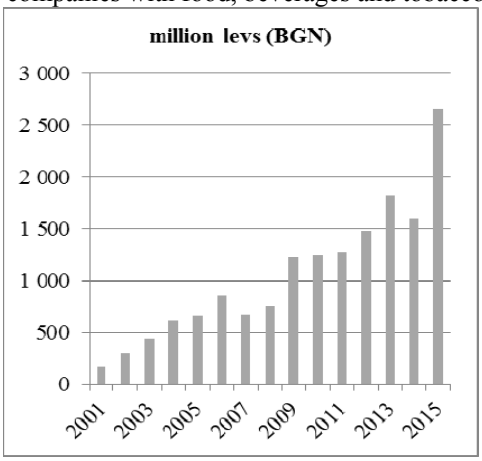



Figure 4

Net wholesales revenue of the 4 largest companies with food, beverages and tobacco

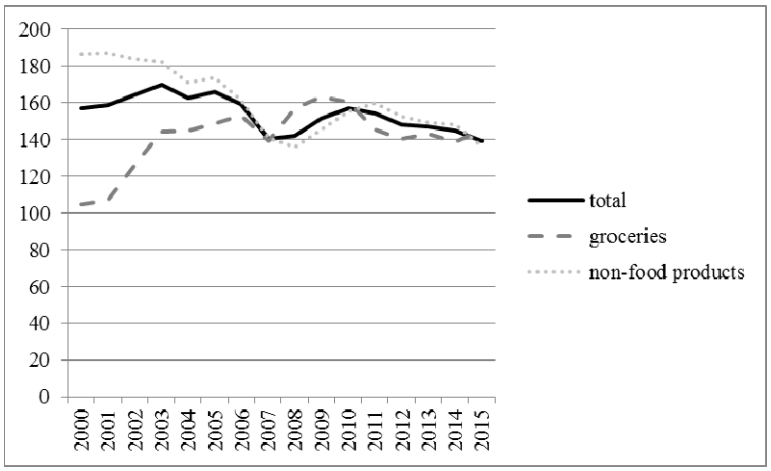



Regardless of the differences related to the nature of goods and the trade situation, the structure of the wholesale and retail trade largely determined the distribution of goods, a trend quite obvious with food products. The increasing concentration in retail and the growing share of chains defined the more extensive use of direct deliveries of goods from manufacturers. The latter being one of the factors to reduce distribution division of food products in Bulgaria after 2009 measured by the ratio of wholesale to retail sales of consumer goods.

Division was different when it came to food and non-food products trading. The non-food products were generally more complex and required conversion of the production assortment into commercial. Durability of food products in general was lower, which also defined the direct deliveries to retail units. Decreased final consumption as a result of the financial crisis also had its impact, as seen from the graph in Figure 5 for 2007. The latter was impacted by export as well. Division is different in different countries, for example, in some countries where national psychology supports small local traders, goods pass through three or more wholesalers before they reach the retailer.

Figure 5

Organizational division in food distribution




Source: Data from the National Statistical Institute of the Republic of Bulgaria and own calculations of the author.

Figure 6

Net Sales Revenue in the food, beverages and tobacco production sector in Bulgaria

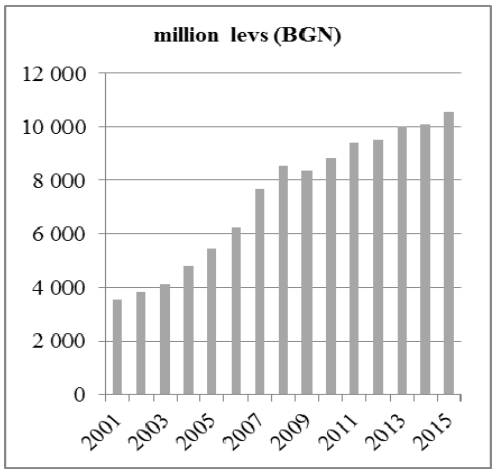
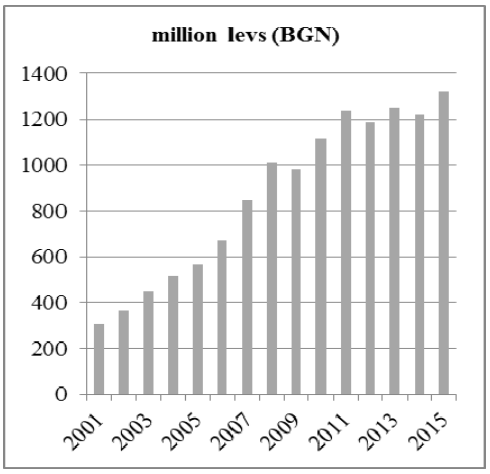



Figure 7

Net Sales Revenue of the 4 largest companies in the food, beverages and tobacco production sector

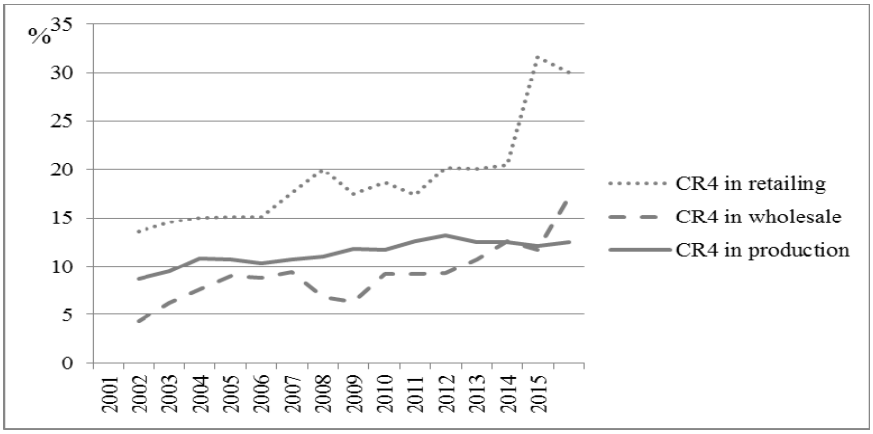



In comparison to the rising level of concentration in retail and wholesale, concentration in the sector of food production shows slight changes during the period of study. The CR4 index varied from 8.73% in 2001 to 12.49 percent in 2015, with the highest value of 13.13% in 2011. The index was 2.5 times lower than that in food products retailing. Food production was highly fragmented with very low levels of concentration. The higher

fragmentation in production resulted in that the retailer purchases comprising a larger portion of an individual seller's sales. Exception to the general low level of concentration of food production was the production of beverages where the CR4 was 47.61% at the end of the period, showing an increasing trend of 27.16% in 2001, retention after 2008 and the highest value of 50.21% in 2009.

Figure 7

CR4 in food retailing, wholesaling and production in Bulgaria




Gross margin trends can be examined against the background of structural changes in the surveyed sectors. Data in Table 1 show significant changes in the volume and level of gross margin in Bulgarian food retailing. A high markup indicates abnormally high profits, whereas a high margin may simply reflect the fact that a sector is highly capital intensive (Competition within Sectors in France, 2008). Usually, the firms tend to reduce their margins in periods of weak economic activity and raise them again in periods of expansion. The level of gross margin to total net sales revenue for the food retailing sector decreased from 19.52% in 2001 to 16.16% in 2008, followed by an increase to 18.62% in 2015.

Despite the reduced demand after 2008, Bulgaria shows a gross margin increase of major retailers. At the beginning of the period gross margin ratio of the four largest companies for food retail was relatively low during the initial introduction of chains – 12.52% in 2001, lower than the average for the sector. After 2005 the gross margin ratio of the four largest companies constantly outpaced the average for the sector as the gap continued to increase at the end of the period reaching 23.58% against 18.62% for the sector as a whole. We can do a more thorough research by company group within a certain type to check if the rate of gross margins has a U-shape, high margins for very large and very small retailers and low margins for medium-sized retailers.

Table 1

**Retail sales** and gross margin in the food retail sector in Bulgaria

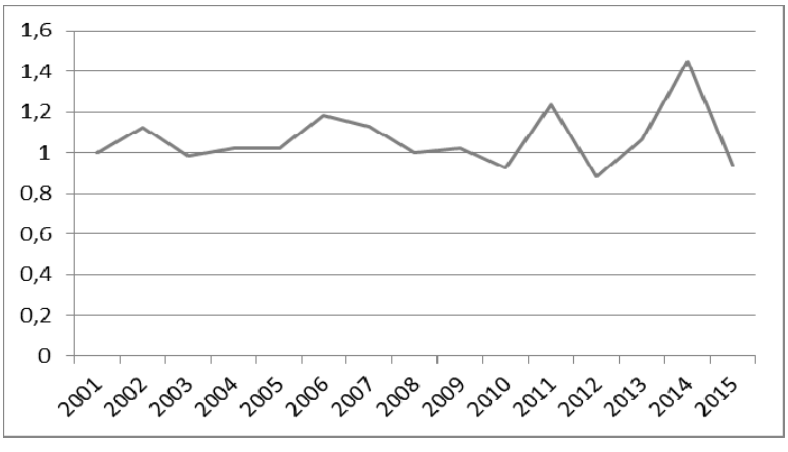
| Years | Net retail sales (thousand levs BGN) | | Gross margin (thousand levs BGN) | | Cross margin ratio or markup (% of the net sales) | |
|---|---|---|---|---|---|---|
| | *Total* | *CR4* | *total* | *CR4* | *total* | *CR4* |
| 2001 | 1 570 814 | 149 587 | 306 670 | 18 725 | 19.52 | 12.52 |
| 2002 | 1 799 286 | 201 187 | 335 082 | 28 986 | 18.62 | 14.41 |
| 2003 | 2 94 851 | 241 756 | 408 430 | 39 011 | 19.50 | 16.14 |
| 2004 | 2 502 217 | 293 377 | 479 511 | 50 759 | 19.16 | 17.30 |
| 2005 | 2 965 173 | 365 996 | 557 200 | 69 653 | 18.79 | 19.03 |
| 2006 | 3 525 015 | 520 105 | 646 839 | 101 794 | 18.35 | 19.57 |
| 2007 | 4 540 687 | 841 546 | 840 760 | 170 334 | 18.52 | 20.24 |
| 2008 | 5 268 700 | 794 808 | 851 394 | 143 561 | 16.16 | 18.06 |
| 2009 | 5 824 161 | 931 670 | 982 144 | 204 194 | 16.86 | 21.92 |
| 2010 | 6 134 714 | 913 803 | 1 040 847 | 202 214 | 16.97 | 22.13 |
| 2011 | 6 716 182 | 1 160 974 | 1 071 977 | 188 779 | 15.96 | 16.26 |
| 2012 | 7 306 494 | 1 239 899 | 1 312 069 | 247 945 | 17.96 | 20.00 |
| 2013 | 7 512 645 | 1 305 643 | 1 294 379 | 280 272 | 17.23 | 21.47 |
| 2014 | 9 092 826 | 2 466 389 | 1 671 272 | 558 100 | 18.38 | 22.63 |
| 2015 | 9 795 120 | 2 880 192 | 1 823 771 | 679 125 | 18.62 | 23.58 |

Source: Data from the National Statistical Institute of the Republic of Bulgaria, provided at the request of the author and own calculations of the author.

The four major retailers significantly reduced the share of cost of goods sold in net sales revenue, from 87.48 % in 2001 to 76.42% in 2015. The total financial result of the four largest chains of food retailers for the period 2009-2013 was negative. During the studied period big chains were mainly investing in expanding trade networks and market shares.

Figure 8

Outpace ratio of the concentration growth rate to the gross margin growth rate in food retailing in Bulgaria



The outpace ratio (Fig. 8) is used to show the relation between indices of concentration in food retail sector and those of gross margin level. Values greater than 1 during most of the period give us reason to assume there is a relation between those indicators as the index number of concentration in food retail outpace the index number of gross margin level. The increasing concentration of retail is not only a function of the developed countries. Unlike some developed European countries where both the buying and selling side of the market tends to be concentrated, in Bulgaria in the last year of the studied period, CR4 in food manufacturing was significantly lower –12.49% compared to CR4 in food retailing – 33.40%. According to the default values of the market concentration coefficient in the Methodology of the CPC (Commission for Protection of Competition) used to study and determine the market position of the companies on the market, the food market remained normally competitive with low concentration values of CR4 of less than 50% in the three sectors of the study. Consolidation in retail and wholesale increased sharply after 2013, unlike manufacturing, where it was reduced after 2011. The increase in concentration in retailing improved the chances of major retailers to exercise their bargaining power as buyers as well as sellers. This process can make some manufacturers and suppliers lose their powers as sellers.

## Conclusion

The evolution in the structure of food retail, wholesale and production sectors in Bulgaria provides unique research opportunities. Though the food market remains relatively unconcentrated on both the buying and selling side, the retail sector in Bulgaria is characterised by concentration growth and significantly higher concentration than manufacturing and wholesale sectors. The research results give reasons to predict that the process of concentration in the food retail trade in Bulgaria will continue, which in turn will lead to an increased power of retailers as buyers.

In recent years, the gross margin of major retailers has grown by reducing the share of purchase costs in net sales revenue. That reflects on the gross margin in the food retail sector as a whole. But the increase in the level of gross income is also the result from the fact that big retail chains take over the functions of the wholesalers by building and maintaining distribution warehouses and receiving part of the total income in the supply chain. Studies in the field of innovations have also been made, "when a large retailer grows in size, this can lead to a shift of innovation activity away from manufacturers to the large retailer" (Inderst, Jakubovic and Jovanovic, 2015). Powerful buyers may discipline the pricing policy of powerful sellers, but when the producers and wholesalers in the upstream are fragmented and have no substantial market power, it can lead to a transfer of wealth from producers and wholesalers to the large buyers.

Increased concentration in retail lowers manufacturers' alternatives for sales, therefore, 'the bargaining position of each retailer is improved" (Erutku, 2005). The question about the growth of bargaining power of major food retailers when negotiating as buyers will gain greater significance for Bulgaria's development and should be the subject of further research.

Results confirm one of the conclusions experts have come to – that an increase in concentration at retail level can lead to an increase in buying power for all retail firms. This is not only associated with obtaining quantitative discounts but better contract terms as well. The power retailers have over suppliers when negotiating discounts as buyers is determined by the nature of their relationships. Reasons for getting discounts by the big buyers can be found in: - the lower costs for servicing a larger buyer; - the possibility of backward integration, vertically, and penetration into the business of the supplier; - the high level of concentration of buyer market versus seller market.

Supply chain management of trade enterprises is concentrating on reducing delivery and purchase costs. When a commercial enterprise combines its operations with those of suppliers and customers to create value, this leads to cooperation. But although the participants in a distribution channel have common goals – creating value for consumers and realization of products, they differ in how they achieve these goals and in the distribution of the received income. During this exchange, the actions of cooperation and competition occur simultaneously as a result of the collective character of exchange as an economic activity. Creating value is not a separate action, but a collective activity that defines the interdependence of the participants on the market. Collective action implies interdependence, which in turn is a source of both cooperation and competition.

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## *SUMMARIES*

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### DRIVERS OF ECONOMIC GROWTH: A COMPARATIVE ANALYSIS OF MACEDONIA AND BULGARIA

The aim of the paper is to investigate the sources of economic growth in Bulgaria and Macedonia. We use a growth accounting framework based on production, demand and sector-side approach, for the period 2000-2015. The tree-sided approach enables the analysis of similarities and differences of growth models in the two countries, through altered perspectives. The estimated results of the conventional decomposition of economic growth sources indicate that the main driver of annual rate of economic growth in both countries is investment in physical capital. However, the differences are found in the contribution of labour force and TFP contribution. The higher contribution of labour force is found in Macedonia, while the contribution of TFP is more significant in Bulgaria. Additionally, the results based on demand-side approach of the sources-of-growth analysis indicate that the households consumption and government spending are the main growth drivers in both countries, with negative effects of trade deficit and, as well, negative contribution of net export to economic growth. Furthermore, the estimated results of growth accounting based on sector-side approach show that the economic growth in both countries predominantly is driven by trade and service sector, with lower contribution of manufacturing. Finally, the paper depicts several policy suggestions and recommendations based on underlying insights, estimated results and conventional guiding principles.
JEL: O40; O43; O47

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### THE IMPACT OF MODERN GLOBALIZATION PROCESSES ON INNOVATIVE DEVELOPMENT OF LABOR POTENTIAL

The influence of modern globalization processes on the innovative development of the labor potential in the paper was defined. The solution of the problems of social and labor sphere development for the regions of Ukraine should be done through new approaches, namely on innovative principles was founded. This means that the focus should concentrate on the efficiency enhancing development of educational-qualification component, because the implementation of the majority of management decisions requires time and generational changes with the formation of the new set of values, obviously can only be achieved through the educational sphere. It is proved that the active cross-border transfers of information, knowledge, technologies and human resources (migration) determine the importance to take into account the globalization factor when searching for opportunities to improve employment conditions.
JEL: F01; J40; O15

*Lotfali Agheli*

## POLITICAL STABILITY, MISERY INDEX AND INSTITUTIONAL QUALITY: CASE STUDY OF MIDDLE EAST AND NORTH AFRICA

The Middle East and North Africa (MENA) are of various political regimes with different governance levels. This region is a multi-lingual, populous and resource-abundant area in the world, too. This paper aims to explore the determinants of political stability (instability) in the MENA over the period 2000-2014. The estimation of panel data model indicates political stability stems from natural resources rents, socioeconomic status and institutional quality. The proper allocation of these rents to productive investments, and welfare-enhancing efforts, the decrease in misery index and any increase in government effectiveness and/or rule of law result in political stability in the region. The policy makers in the region need to make sound fiscal and monetary policies in order to reduce gender and income inequalities and invest in enhancing human prosperity. Regarding civil rights and freedoms, and establishment the voluntary and nongovernmental organizations are socio-political requirements in shifting this developing bloc to high levels of development.
JEL: I32, O17, P16

*Vladia Borisova*

## ECONOMIC MODELS FOR STRUCTURING CULTURAL INDUSTRIES AND MEASURING THEIR CONTRIBUTION TO THE NATIONAL ECONOMY

With the development of digital technologies, the importance of intellectual property becomes a leading for the development of the creative economy, the structuring of the creative industries, their classification and the measurement of their economic contribution. The lack of a unified international conceptual basis on these issues creates a number of challenges for the identification of the creative economy and the determination of its economic share in the economy as a whole. Existing economic models based on the understanding that creativity and knowledge are the required classification criteria do not meet the requirements of the business environment for clear structuring in the creative sector and determining its economic activity. The need to respond to the emerging need allows the development of a new economic model – the one of the intellectual property system.
JEL: A20; K0; L1; L7; M3; O3; Z1

*Donka Zhelyazkova*

## THE PLACE OF TRANSPORT IN THE CIRCULAR ECONOMY OF BULGARIA

The circular economy is based on three basic principles: reduction, reuse and recycle, which can be successfully implemented with the help of transport, which is viewed as a key role in logistics. In the present paper, this idea is developed by performing a theoretical overview of the essence of the circular economy and the impact of transport on the environmental situation of Bulgaria is analysed, in order to open up opportunities for the application of advanced solutions to protect the environment. These opportunities are associated with the implementation of a circular economic model in the country and specialization in the Bulgarian economy in the sector of production of biofuels, recycling of end of life vehicles and tyres.
JEL: L62; N70; R40

*Kolodiychuk A.V.*

## ENTREPRENEURIAL RISK THEORIES AS COMPONENT OF THE THEORETICAL FOUNDATIONS OF INFORMATIZATION PROCESSES IN THE NATIONAL ECONOMY

In the article the place of business risk theories in the structure of theoretical background for processes of informational-communicative technologies introduction in the national economy. In addition, the relationships in the structure of risks theories for ICT introduction in conditions of the development of the national economy are outlined. The theories and concepts of business risks are considered and their significance for the revitalization of the national economic system development and improving state regulation of the economy are described.
JEL: D81; L83

*Petya Koralova*

## SPECIFICS OF THE DANUBE FLEET MANAGEMENT (TRENDS AND PERSPECTIVES FOR DEVELOPMENT)

In the last years the main objective of most of the European strategic documents concerns establishment of sustainable and competitive transport system while promoting the development of secure, safe, reliable, energy effective and environmentally friendly transport modes such as inland waterway transport. The free capacity of European inland waterways provides opportunities for transportation with no traffic jams in the living areas; oversized and bulk cargoes, less green house gas emissions, compared to the road transport. Thanks to the development of the information and communication technologies (ICT) much more innovative vessels, which are economically efficient and environmentally friendly are used. Improving the technical specifications of Danube river fleet is of great importance for the development of the transport sector in the separate countries in the region. This fact is also proved by the growth rate of the inland waterway modal split during the last 5 years in the West-European countries such as Germany (12.6%), France (4.3%), United Kingdom (13.4%), Austria (5.1%), the Netherlands (39.1%) (EUROSTAT, 2016) compared to the road and rail transport. In this regard the main objective of the current study is to analyze, as an example of Bulgaria, the development trends of Danube river fleet and as a result the specifics of its management will be revealed. The following economic indicators are analyzed: Danube fleet performance, number and capacity of vessels, coefficient of capacity usage and average stay of ships at ports for handling activities. These indicators allow the strengths and weaknesses, as well as the threats and opportunities of river fleet to be assessed and also measures for its development to be proposed.
The proposed model for analysis could be successfully used for studying the specifics of river fleet of other countries with transitional economies.
JEL: R49; O31; Q56

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## REGIONAL DISPROPORTIONS – BUSINESS DEMOGRAPHY AND ECONOMIC GROWTH (EXAMPLE OF BULGARIA)

The study investigates imbalances of business demography of regions NUTS 2, Bulgaria, which of them are key determinants of regional economic growth disparities; compares business demography at the time of Bulgaria's accession with the beginning of 2014-2020 programming period in EU; determines the impact of key factors on the dynamics of business demography. **Methods:** The study

applies comparative, variance and regression analysis in business demography and economic growth. A statistical test was done of the relation between some indicators and test of correlation between the coefficient of variation of regional growth and the variation in business demography. **Results:** Differences in GDP per capita are strongly related to differences in the number of NFC/1,000. Average dependence of differences in GDP per capita on the differences in the number of industrial enterprises and employees has been found out. Moderate negative relationship was observed between GDP per capita and the number of dead companies, as well the number of employed in services. **Conclusions:** Business demography is strongly influenced by economic processes at national and international level. Regions react differently to the socio-economic impacts. Attention needs to be drawn towards business environment, which is determined by the state, improving regional policy and measures to business environment in the companies.
JEL: R11

*Violeta Dimitrova*

## GROSS MARGIN AND BUYER POWER IN BULGARIAN FOOD RETAILING

Increasing concentration in retail trade due to the expansion of physical outlets, the proliferation of online stores and the construction of retail chains results in changes in the bargaining power of retailers. Such changes are further facilitated by the accelerated process of merger, purchase and introduction of own-brands.
This work aims to offer a comparative analysis of the structure of food products manufacturing, wholesaling and retailing in Bulgaria and it studies the level of gross margin in retail trade to research the power of retailers as buyers in the sector. This study makes an overview of the theory of the retail buyers' power in the consumer goods supply chain. The paper further explores changes in the concentration of production, wholesale and retail in Bulgaria between 2001 and 2015 by analyzing the market share of the four companies with the largest sales volume and bargaining power of retailers measured by the level of gross margin.
JEL: M21